Preface

Note The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN", refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This section explains the objectives, intended audience, and organization of this publication and describes the conventions that convey instructions and other information.

This section provides the following information:

- Revision History
- Document Objectives
- Audience
- Document Organization
- Related Documentation
- Document Conventions
- Obtaining Optical Networking Information
- Obtaining Documentation, Obtaining Support, and Security Guidelines

Revision History

Date	Notes
December 2011	• Updated the procedure “DLP-G76 Provision DCC/GCC Terminations” in the chapter “Create Optical Channel Circuits and Provisionable Patchcords”. • Updated the section “Termination Modes” in the chapter “Card Features”. • Added a caution to the section, “Related Procedures for RAMAN-CTP and RAMAN-COP Cards” in the chapter, “Provision Optical Amplifier Cards”.
January 2012	• Added a note to step 3 in NTP-G144 in the chapter, “Turn Up a Node”. • Updated the card description for the RAMAN-CTP and RAMAN-COP cards in the chapter, “Provision Optical Amplifier Cards”. • Updated the section “GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards” with pluggable limitations in the chapter Transponder and Muxponder Cards”. • Updated the section “Create a Segment Using CTC” in the chapter “Provision Transponder and Muxponder Cards”.
February 2012	• Updated the procedure “DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode” in the chapter “Provision Transponder and Muxponder Cards”. • Removed the autonegotiation support statement for ADM-10G card from the “Key Features” section and updated the Mode parameter in the table “ADM-10G Card Ethernet Settings” in the chapter “Provision Transponder and Muxponder Cards”. • Updated the procedure “DLP-G278 Provision the Optical Line Rate” in the chapter “Provision Transponder and Muxponder Cards”.
March 2012	• Updated the bandwidth parameter in the procedure, “DLP-G383 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Quality of Service Settings”. • Updated the section, “Multishelf Node” in the chapter, “ Node Reference”. • Added a note in the procedure “NTP-G242 Create an Internal Patchcord Manually” in the chapter “Turn Up a Node”.
April 2012	• Updated the table “DWDM NFV Toolbar Options” in the chapter, “Node Reference”. • Updated the "Faceplate and Block Diagram" section of "GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards" in the chapter,“Provision Transponder and Muxponder Cards”. • Added a note in the procedure “DLP-G368 Change the 10G Multirate Transponder Trunk Wavelength Settings” in the chapter “Provision Transponder and Muxponder Cards”. • Added a new procedure "DLP-G713 Provision Administrative VLAN for Ports in a REP Segment Using CTC" and updated "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" in the chapter, "Provision Transponder and Muxponder Cards".

Date	Notes
May 2012	• Updated the section “RAMAN-CTP and RAMAN-COP Cards” in the chapter “Provision Optical Amplifier Cards”. • Added a note in the procedure “DLP-G507 Enable a Different GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card as the Master Card” in the chapter “Provision Transponder and Muxponder Cards”. • Updated the section “Optical Channel Circuits” in the chapter “Create Optical Channel Circuits and Provisionable Patchcords”. • Updated the “Set Up SNMP” procedure in the chapter “Turn Up a Node”.
June 2012	Updated the section “OTU2_XP Card Configuration Rules” in the chapter “Provision Transponder and Muxponder Cards”.
July 2012	• Document Part Number revisioned to 78-19694-02 and a full length book-PDF was generated. • Updated the table “Gigabit Ethernet RMON Variables” in the chapter “Provision Transponder and Muxponder Cards”.
August 2012	• Updated the table “Platform and Software Release Compatibility for Control Cards” in the chapter “Install the Control Cards”. • Added a section “Important Notes Regarding Patchcord Installation” in the chapter “Provision Optical Amplifier Cards”. • Updated the section “TCC2P Card” in the chapter “Install the Control cards” and “Supported Node Configurations for OPT-RAMP-C and OPT-RAMP-CE Cards” in the chapter “Node Reference”.
September 2012	• Added the “NTP-G333 Add an ADM-10G Card to an Existing Topology” in the chapter “Provision Transponder and Muxponder Cards”. • Updated the procedures “NTP-G60 Create and Delete Overhead Circuits” and “DLP-G76 Provision DCC/GCC Terminations” in the chapter “Create Optical Channel Circuits and Provisionable Patchcords”. • Updated the procedure “NTP-G38 Provision OSC Terminations” in the chapter “Turn Up a Node”.
October 2012	• Updated the “Circuit Provisioning” section of ADM-10G card in the chapter “Provision Transponder and Muxponder Cards”. • Updated the section, “Network Data Pane” in the chapter, “Node Reference”. • Added a note to “DLP -G264 Enable Node Security Mode” in the chapter, “Turn Up a Node”. • Added a caution to the section, “IP Addressing with Secure Mode Enabled” in the chapter, “Management Network Connectivity”.
December 2012	• Updated the "TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE Card Reset" section in the chapter, "CTC Operation, Information, and Shortcuts". • Updated "NTP-G244 Perform the Four Degree ROADM Node with 40-SMR-2-C Cards Acceptance Test" in the chapter, "Perform Node Acceptance Tests". • Renamed chapter "Management Network Connectivity" to "Manage Network Connectivity".

Date	Notes
January 2013	• Updated the procedure “DLP-G351 Delete a Card in CTC” in the chapter, “Turn Up a Node”.
February 2013	• In the chapter “Provision Transponder and Muxponder Cards,” added a note after “Table 11-22 Supported SDH Circuit Sizes of ADM-10G card on ONS 15454 SDH”. • In the chapter “Create Optical Channel Circuits and Provisionable Patchcords,” updated the procedures “NTP-G245 Create an Automatically Routed VCAT Circuit” and “NTP-G246 Create a Manually Routed VCAT Circuit”.
March 2013	• Updated step 3 in the task, "DLP-G95 Set Up External or Line Timing" in the chapter, “Turn Up a Network”. • Updated step 6 in the task, "DLP-G381 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Layer 2 Protection Settings" in the chapter, “Provision Transponder and Muxponder Cards”. • Added a note to the procedure, “NTP-G38 Provision OSC Terminations” in the chapter, “Turn Up a Node”.
April 2013	• Updated the section “External Firewalls” in the chapter “Manage Network Connectivity”. • Updated step 4 in the procedure, "DLP-G713 Provision Administrative VLAN for Ports in a REP Segment Using CTC" in the chapter, “Provision Transponder and Muxponder Cards”.
May 2013	• Updated the "NTP-G38 Provision OSC Terminations" procedure in the chapter, "Turn Up a Node" and the "DLP-G605 Provision PPM and Port for the TNC and TNCE Cards" procedure in the chapter, "Install the Control Cards". • Modified a note in the procedure, "NTP-G104 Restore the Database" in the chapter, "Maintain the Node". • Updated the section, “ REP Limitations and Restrictions” in the chapter, “ Provision Transponder and Muxponder Cards”. • Added the procedure, “NTP-G341 Set Up Secure Access to the ONS 15454 TL1” in the chapter, “Turn Up a Node”.
June 2013	Added a footnote to the table, "MXP_MR_10DME_C or MXP_MR_10DME_L Ethernet Variables" in the chapter, "Provision Transponder and Muxponder Cards".
July 2013	Added a step to the procedure “DLP-G347 Delete Optical Channel Client Connections” in the chapter “Create Optical Channel Circuits and Provisionable Patchcords”.
September 2013	Updated "DLP-G604 Install the TNC, TNCE, TSC, or TSCE Card" in the chapter, "Install the Control Cards".
October 2013	Created a new table "Revision Number Compatibility for Transponder and Muxponder Cards " in the chapter, “Provision Transponder and Muxponder Cards”.

Date	Notes
November 2013	• Updated the section "Trunk Interface" of OTU2_XP card in the chapter "Provision Transponder and Muxponder Cards". • Updated the description of the rx8b10bWords and tx8b10bWords counters in the chapter "Provision Transponder and Muxponder Cards". • Updated the "Multiple Operating Modes" section in the chapter, "Provision Transponder and Muxponder Cards".
October 2014	Added "DLP-G771 Changing the WXC Line Thresholds for the 80-WXC-C Card." in the chapter, "Change DWDM Card Settings".

Document Objectives

The Cisco ONS 15454 DWDM Configuration Guide includes content previously found in two separate guides—Cisco ONS 15454 DWDM Reference Manual and Cisco ONS 15454 DWDM Procedure Guide.

The new Cisco ONS 15454 DWDM Configuration Guide, Release 9.3 and later releases will now include background and reference material, installation, turn up, provisioning, and maintenance procedures for the Cisco ONS 15454, Cisco ONS M2, and Cisco ONS M6 dense wavelength division (DWDM) systems. Use this document in conjunction with the appropriate publications listed in the Related Documentation section.

Audience

To use this publication, you should be familiar with Cisco or equivalent optical transmission hardware and cabling, telecommunications hardware and cabling, electronic circuitry and wiring practices, and preferably have experience as a telecommunications technician

Document Organization

Table 1 Cisco ONS 15454 Configuration Guide Chapters

Title	Summary
"Cisco ONS Documentation Roadmap for Release 9.4"	Provides a link to quickly access publications of Cisco ONS Release 9.4.
Chapter 1, "Install the Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 Shelf"	Explains how to install the Cisco ONS 15454 ETSI, Cisco ONS 15454 ANSI, Cisco ONS 15454 M2, and Cisco ONS 15454 M6 shelf assemblies.
Chapter 2, "Connecting the PC and Logging into the GUI"	Explains how to connect Windows PCs and Solaris workstations to the Cisco ONS 15454 and how to log into Cisco Transport Controller (CTC) software.
Chapter 3, "Install the Control Cards"	Explains how to install the control cards needed for the Cisco ONS 15454, Cisco ONS 15454 M2, and Cisco ONS 15454 M6 shelf assemblies.
Chapter 4, "Setup Optical Service Channel Cards"	Includes descriptions of OSCM and OSC-CSM cards. Also provides references to related procedures.

Table 1 ***Cisco ONS 15454 Configuration Guide Chapters (continued)***

Title	Summary
Chapter 5, "Provision Optical Amplifier Cards"	Includes descriptions of the optical amplifier cards. Also provides references to related procedures.
Chapter 6, "Provision Multiplexer and Demultiplexer Cards"	Includes descriptions of the 32-MUX-O, 32DMX-O, and 4MD-xx.x cards. Also provides references to related procedures.
Chapter 7, "Setup Tunable Dispersion Compensating Units"	Explains the Tunable Dispersion Compensating Units (T-DCU) used in Cisco ONS 15454 dense wavelength division multiplexing (DWDM) networks. Also provides references to related procedures.
Chapter 8, "Provision Protection Switching Module"	Includes descriptions of the Protection Switching Module (PSM) card used in Cisco ONS 15454 DWDM networks. Also provides references to related procedures.
Chapter 9, "Provision Optical Add/Drop Cards"	Includes descriptions of the AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-1B-xx.x, and AD-4B-xx.x cards. Also provides references to related procedures.
Chapter 10, "Provision Reconfigurable Optical Add/Drop Cards"	Includes descriptions of the ROADM cards. Also provides references to related procedures.
Chapter 11, "Provision Transponder and Muxponder Cards"	Includes descriptions of transponder (TXP), muxponder (MXP), Xponder (GE_XP, 10GE_XP, GE_XPE and 10GE_XPE), and ADM-10G cards. Also provides references to related procedures.
Chapter 12, "Node Reference"	Explains the DWDM node types available for the ONS 15454. The DWDM node type is determined by the type of amplifier and filter cards that are installed in an ONS 15454. Also explains the DWDM automatic power control (APC), reconfigurable optical add/drop multiplexing (ROADM) power equalization, span loss verification, and automatic node setup (ANS) functions.
Chapter 13, "Network Reference"	Explains the DWDM network applications and topologies. Also provides network-level optical performance references.
Chapter 14, "Turn Up a Node"	Explains how to provision a single Cisco ONS 15454 DWDM node and turn it up for service.
Chapter 21, "Perform Node Acceptance Tests"	Provides test procedures to verify that installed cards are operating correctly in a Cisco ONS 15454 DWDM node.
Chapter 15, "Turn Up a Network"	Explains how to turn up and test a Cisco ONS 15454 DWDM network.
Chapter 16, "Create Optical Channel Circuits and Provisionable Patchcords"	Explains how to create Cisco ONS 15454 DWDM optical channel client connections (OCHCCs), optical channel network connections (OCHNCs), and optical trail circuits.
Chapter 17, "Monitor Performance"	Explains how to enable and view performance monitoring (PM) statistics for the Cisco ONS 15454.
Chapter 18, "Manage the Node"	Explains how to modify node provisioning for the Cisco ONS 15454 and perform common management tasks such as monitoring the DWDM automatic power control (APC) and span loss values.
Chapter 19, "Alarm and TCA Monitoring and Management"	Contains the procedures for viewing and managing the alarms and conditions on a Cisco ONS 15454.
Chapter 20, "Change DWDM Card Settings"	Explains how to change line, performance monitoring (PM), and threshold settings on Cisco ONS 15454 DWDM cards.

Table 1 Cisco ONS 15454 Configuration Guide Chapters (continued)

Title	Summary
Chapter 22, "Manage Network Connectivity"	Provides an overview of ONS 15454 data communications network (DCN) connectivity. Cisco Optical Networking System (ONS) network communication is based on IP, including communication between Cisco Transport Controller (CTC) computers and ONS 15454 nodes, and communication among networked ONS 15454 nodes. The chapter shows common Cisco ONS 15454 IP network configurations and includes detailed data communications network (DCN) case studies.
Chapter 23, "Upgrade, Add, and Remove Cards and Nodes"	Provides procedures for adding and removing DWDM cards and nodes
Chapter 24, "Maintain the Node"	Provides procedures for maintaining the Cisco ONS 15454, including database backup and restoration, removing and replacing cards, viewing the ONS 15454 audit trail, and hardware maintenance procedures.
Chapter 25, "Security Reference"	Provides information about Cisco ONS 15454 users and security.
Chapter 26, "Timing Reference"	Provides information about Cisco ONS 15454 users and node timing.
Chapter 27, "SNMP"	Explains Simple Network Management Protocol (SNMP) as implemented by the Cisco ONS 15454.
Appendix A, "CTC Operation, Information, and Shortcuts"	Describes the Cisco Transport Controller (CTC) views, menus options, tool options, shortcuts, and table display options.
Appendix B, "Hardware Specifications"	Contains hardware specifications for the ONS 15454 ANSI and ETSI shelf assemblies and cards.
Appendix C, "Administrative and Service States"	Describes the administrative and service states for Cisco ONS 15454 DWDM cards, optical payload ports, out-of-band optical service channel (OSC) ports, optical channel network connections (OCHNCs), and transponder/muxponder cards and ports.
Appendix D, "Configuring GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using PCLI"	Describes how to provision GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards using Pseudo Command Line Interface (PCLI).
Appendix E, "Pseudo Command Line Interface Reference"	Describes Pseudo-IOS command line interface (PCLI) for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Appendix F, "Fiber and Connector Losses in Raman Link Configuration"	Describes guidelines to be followed when configuring a Raman link.
Appendix G, "Card Features"	Describes the card features.
Appendix H, "Network Element Defaults"	Describes the defaults for the network element settings for Cisco ONS 15454, Cisco ONS 15454 M2, and Cisco ONS 15454 M6 platforms.

Related Documentation

Use the *Cisco ONS 15454 DWDM Configuration Guide* in conjunction with the following referenced Release 9.4 publications:

- *Release Notes for Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 DWDM, Release 9.4*
- *Cisco ONS 15454 Hardware Installation Guide*
- *Cisco ONS 15454 DWDM Troubleshooting Guide*

- *Cisco ONS SONET TL1 Command Guide*
- *Cisco ONS SONET TL1 Reference Guide*
- *Cisco ONS SONET TL1 Command Quick Reference Guide*
- *Cisco ONS SONET TL1 for Beginners*
- *Cisco ONS SDH TL1 Command Guide*
- *Cisco ONS SDH TL1 Reference Guide*
- *Cisco ONS SDH TL1Command Quick Reference Guide*
- *Cisco ONS SDH TL1 for Beginners*
- *Cisco Transport Planner – DWDM Operations Guide*
- *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms*
- *Electrostatic Discharge and Grounding Guide for Cisco CPT and Cisco ONS Platforms*

For an update on End-of-Life and End-of-Sale notices, refer to http://www.cisco.com/en/US/products/hw/optical/ps2006/prod_eol_notices_list.html.

Document Conventions

This publication uses the following conventions:

Convention	Application
boldface	Commands and keywords in body text.
italic	Command input that is supplied by the user.
[ ]	Keywords or arguments that appear within square brackets are optional.
{ x | x | x }	A choice of keywords (represented by x) appears in braces separated by vertical bars. The user must select one.
Ctrl	The control key. For example, where Ctrl + D is written, hold down the Control key while pressing the D key.
`screen font`	Examples of information displayed on the screen.
`boldface screen font`	Examples of information that the user must enter.
< >	Command parameters that must be replaced by module-specific codes.

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the document.

Caution Means *reader be careful*. In this situation, the user might do something that could result in equipment damage or loss of data.

Warning **IMPORTANT SAFETY INSTRUCTIONS**

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071

SAVE THESE INSTRUCTIONS

Waarschuwing **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus **TÄRKEITÄ TURVALLISUUSOHJEITA**

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention **IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung **WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza **IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI

Advarsel **VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES

¡Advertencia! **INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES

Varning! **VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

FONTOS BIZTONSÁGI ELOÍRÁSOK

Ez a figyelmezeto jel veszélyre utal. Sérülésveszélyt rejto helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplo figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján keresheto meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение **ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告 重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

警告 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

주의 중요 안전 지침

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

이 지시 사항을 보관하십시오.

Aviso **INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES

Advarsel **VIGTIGE SIKKERHEDSANVISNINGER**

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemesbeskadigelse. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER

تحذير **إرشادات الأمان الهامة**

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في أخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز.

قم بحفظ هذه الإرشادات

Upozorenje **VAŽNE SIGURNOSNE NAPOMENE**

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE

Upozornění **DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY**

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY

Προειδοποίηση ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθεις πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

אזהרה **הוראות בטיחות חשובות**

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כד לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Opomena ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.

ЧУВАЈТЕ ГИ ОВИЕ НАПАТСТВИЈА

Ostrzeżenie **WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie **DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY**

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD

Obtaining Optical Networking Information

This section contains information that is specific to optical networking products. For information that pertains to all of Cisco, refer to the Obtaining Documentation, Obtaining Support, and Security Guidelines section.

Where to Find Safety and Warning Information

For safety and warning information, refer to the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document that accompanied the product. This publication describes the international agency compliance and safety information for the Cisco ONS 15454 system. It also includes translations of the safety warnings that appear in the ONS 15454 system documentation.

Cisco Optical Networking Product Documentation CD-ROM

Optical networking-related documentation, including Cisco ONS 15xxx product documentation, is available in a CD-ROM package that ships with your product. The Optical Networking Product Documentation CD-ROM is updated periodically and may be more current than printed documentation.

Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation.

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS Version 2.0.

Cisco ONS Documentation Roadmap for Release 9.4

To quickly access publications of Cisco ONS Release 9.4, see the [Cisco ONS Documentation Roadmap for Release 9.4]

CHAPTER 1

Install the Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 Shelf

For information on installing the Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 shelf, refer:

Cisco ONS 15454 Hardware Installation Guide.

CHAPTER 2

Connecting the PC and Logging into the GUI

The information in this chapter is in a new location. See *Connect the PC and Log into the GUI* document for information on how to connect Windows PCs and Solaris workstations to the Cisco ONS 15454 and how to log into Cisco Transport Controller (CTC) software, the ONS 15454 Operation, Administration, Maintenance and Provisioning (OAM&P) user interface.

CHAPTER 3

Install the Control Cards

Note The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN", refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This chapter describes the common-control cards needed for the Cisco ONS 15454, Cisco ONS 15454 M2, and Cisco ONS 15454 M6 platforms and provides installation and card turn up procedures.

For card safety and compliance information, refer to the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Note The cards described in this chapter are supported on the Cisco ONS 15454, Cisco ONS 15454 M6, Cisco ONS 15454 M2 platforms, unless noted otherwise.

Chapter topics include:

3.1 Card Overview

The card overview section lists the cards described in this chapter.

Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. The cards are then installed into slots displaying the same symbols. For a list of slots and symbols, see the "Card Slot Requirements" section in the *Cisco ONS 15454 Hardware Installation Guide*.

3.1.1 Common Control Cards

The following common control cards are needed to support the functions of the DWDM, transponder, and muxponder cards on ONS 15454 shelf:

- TCC2 or TCC2P or TCC3
- AIC-I (optional)
- MS-ISC-100T (multishelf configurations only)

The TNC, TNCE, TSC, and TSCE cards are used to support the functions of DWDM, transponder, and muxponder cards on the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 shelves.

3.1.2 Card Compatibility

Table 3-1 lists the platform and software release compatibility for the control cards.

Table 3-1 Platform and Software Release Compatibility for Control Cards

	TCC2	TCC2P	AIC-I	MS-ISC-100T	TCC3[1]	TNC	TSC	TNCE	TSCE
R4.5	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R4.6	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R4.7	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R5.0	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R6.0	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R7.0	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R7.2	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R8.0	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No

Table 3-1 Platform and Software Release Compatibility for Control Cards (continued)

	TCC2	TCC2P	AIC-I	MS-ISC-100T	TCC3[1]	TNC	TSC	TNCE	TSCE
R8.5	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R9.0	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R9.1	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	No	No	No	No	No
R9.2	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2 and 15454-M6	15454-M2 and 15454-M6	No	No
R9.2.1	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2 and 15454-M6	15454-M2 and 15454-M6	No	No
R9.2.2	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2 and 15454-M6	15454-M2 and 15454-M6	No	No
R9.3	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2 and 15454-M6	15454-M2 and 15454-M6	15454-M2 and 15454-M6	15454-M2 and 15454-M6
R9.4	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2 and 15454-M6[2]	15454-M2 and 15454-M6	15454-M2 and 15454-M6[2]	15454-M2 and 15454-M6

1. The TCC3 card is backward compatible with software Release 9.1 and earlier releases. In the Release 9.1 and earlier releases, the TCC3 card boots up as the TCC2P card in the Cisco ONS 15454 DWDM systems.
2. From releases 9.3 and later, the TNC and TNCE cards can be interchanged on an ONS 15454 M6 shelf without any alarms. However, if you combine both the cards in a single chassis and configure the OC3 OSC, it raises an EOC alarm.

3.1.3 Front Mount Electrical Connections (ETSI only)

The following Front Mount Electrical Connections (FMECs) are needed to support the functions of the DWDM, transponder, and muxponder cards:

- MIC-A/P
- MIC-C/T/P

3.2 Safety Labels

For information about safety labels, see the "G.1 Safety Labels" section on page G-1.

3.3 TCC2 Card

(Cisco ONS 15454 only)

Note For TCC2 card specifications, see the "TCC2 Card Specifications" section in the Hardware Specifications document.

The Advanced Timing, Communications, and Control (TCC2) card performs system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection/resolution, SONET section overhead (SOH) data communications channel/generic communications channel (DCC/GCC) termination, optical service channel (OSC) DWDM data communications network (DCN) termination, and system fault detection for the ONS 15454. The TCC2 also ensures that the system maintains Stratum 3 (Telcordia GR-253-CORE) timing requirements. It monitors the supply voltage of the system.

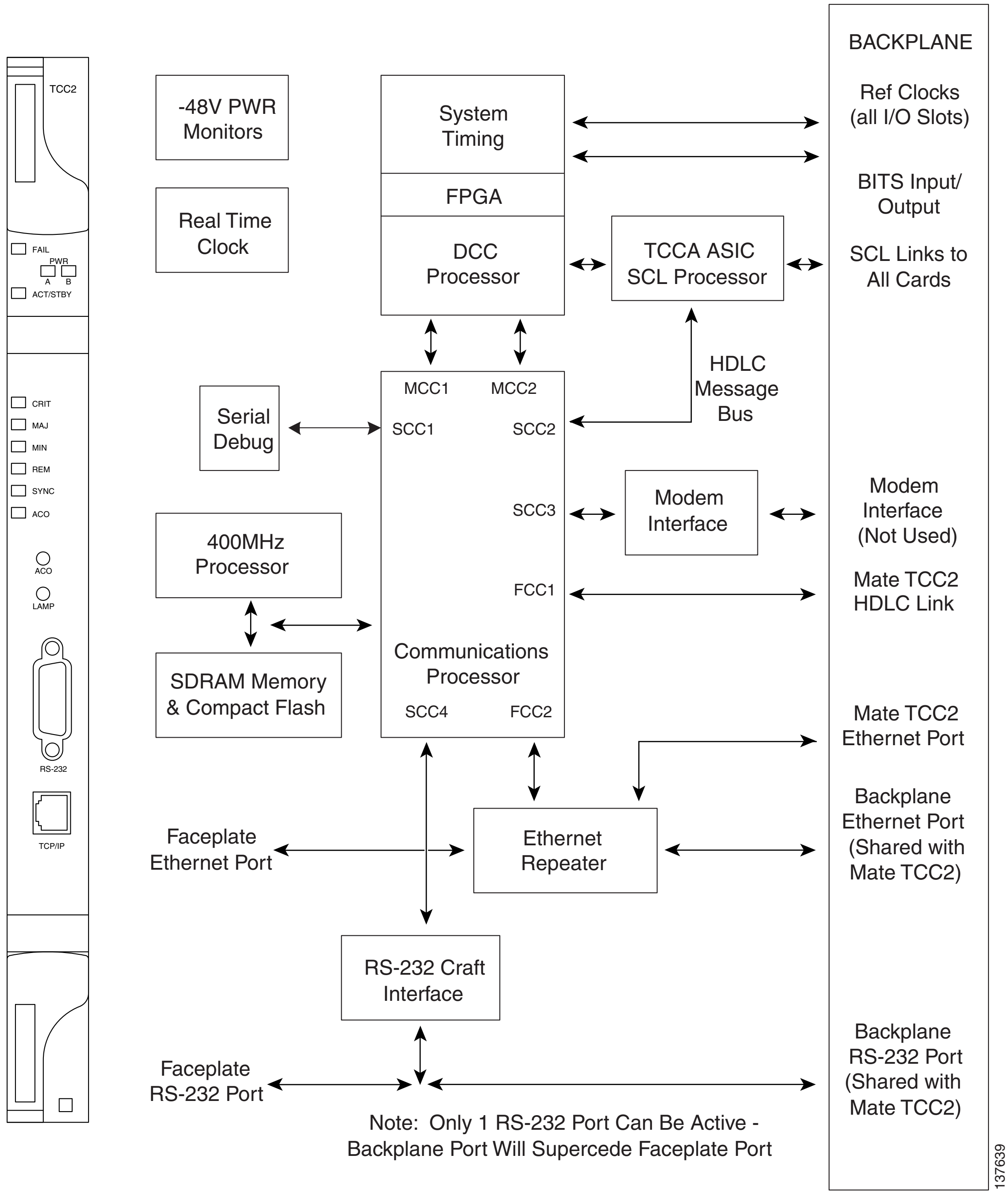
Note The LAN interface of the TCC2 card meets the standard Ethernet specifications by supporting a cable length of 328 ft. (100 m) at temperatures from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius).

Install TCC2 cards in Slots 7 and 11 for redundancy. If the active TCC2 fails, traffic switches to the protect TCC2.

3.3.1 Faceplate and Block Diagram

Figure 3-1 shows the faceplate and block diagram for the TCC2 card.

Figure 3-1 TCC2 Faceplate and Block Diagram



3.3.2 TCC2 Card Functions

The functions of the TCC2 card are:

- G.23 Communication and Control for Controller Cards, page G-20
- G.11 Timing Synchronization, page G-17

- G.24 Interface Ports, page G-22
- G.28 Redundant Controller Card Installation, page G-24
- Card level indicators—Table G-1 on page G-7
- Network level indicators—Table G-13 on page G-13

3.3.3 Related Procedures for TCC2 Card

The following is the list of procedures and tasks related to the configuration of the TCC2 card:

- NTP-G15 Install the Common Control Cards, page 3-34
- NTP-G18 Set Up CTC Computer for Local Craft Connection to the ONS 15454
- NTP-G17 Set Up Computer for CTC
- NTP-G22 Verify Common Card Installation, page 14-4
- NTP-G144 Provision a Multishelf Node, page 14-8
- NTP-G25 Set Battery Power Monitor Thresholds, page 14-15
- NTP-G26 Set Up CTC Network Access, page 14-16
- NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
- NTP-G163 Upgrade Nodes in Single-Shelf Mode to Multishelf Mode, page 14-131
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G81 Change CTC Network Access
- NTP-G146 Add a Rack, Passive Unit, or Shelf to a Multishelf Node
- NTP-G147 Delete a Passive Unit, Shelf, or Rack from a Multishelf Node
- NTP-G103 Back Up the Database, page 24-2
- NTP-G104 Restore the Database, page 24-3
- NTP-G106 Reset Cards Using CTC, page 24-13
- NTP-G105 Restore the Node to Factory Configuration, page 24-4

3.4 TCC2P Card

(Cisco ONS 15454 only)

Note For TCC2P card specifications, see the"TCC2P Card Specifications" section in the Hardware Specifications document.

The Advanced Timing, Communications, and Control Plus (TCC2P) card is an enhanced version of the TCC2 card. The primary enhancements are Ethernet security features and 64K composite clock BITS timing.

The TCC2P card performs system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection/resolution, SONET SOH DCC/GCC termination, and system fault detection for the ONS 15454. The TCC2P also ensures that the system maintains Stratum 3 (Telcordia GR-253-CORE) timing requirements. It monitors the supply voltage of the system.

The TCC2P card supports multi-shelf management. The TCC2P card acts as a shelf controller and node controller for the ONS 15454. The TCC2P card supports up to four subtended shelves through the MS-ISC card or external switch. In a multi-shelf configuration, the TCC2P card allows the ONS 15454 node to be a node controller and does not support subtending of ONS 15454 M6 shelves.

The TCC2P card is compliant to the following standards:

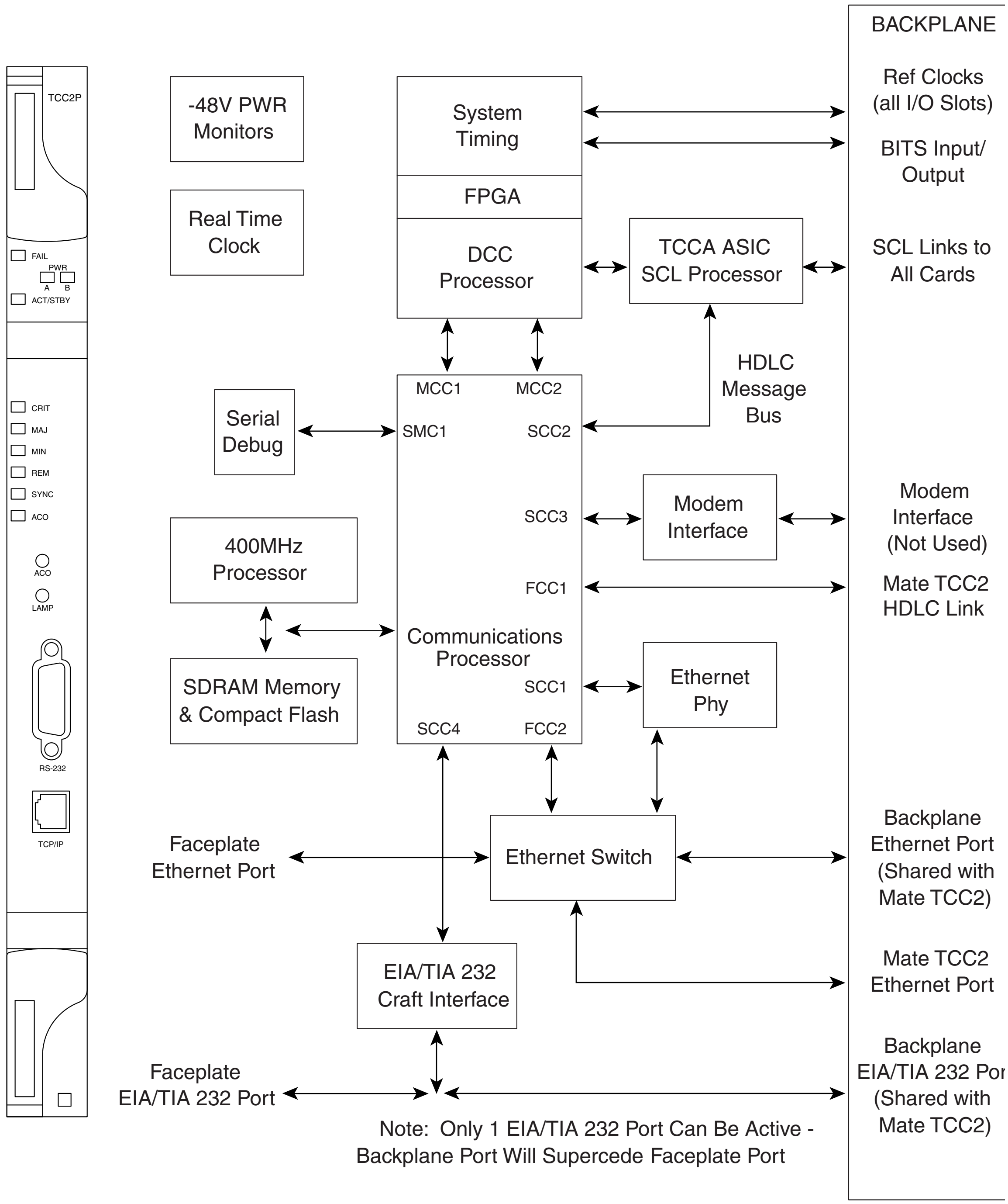
- The LAN interface of the TCC2P card meets the standard Ethernet specifications by supporting a cable length of 328 ft. (100 m) at temperatures from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius). The interfaces can operate with a cable length of 32.8 ft. (10 m) maximum at temperatures from –40 to 32 degrees Fahrenheit (–40 to 0 degrees Celsius).
- The TCC2P card is Restriction of Use of Hazardous Substances (RoHS) complaint. The RoHS regulations limit or ban the specific substances such as lead, cadmium, polybrominated biphenyl (PBB), mercury, hexavalent chromium, and polybrominated diphenyl ether (PBDE) flame retardants in a new electronic and electric equipment.

Install TCC2P cards in Slots 7 and 11 for redundancy. If the active TCC2P card fails, traffic switches to the protect TCC2P card. All TCC2P card protection switches conform to protection switching standards when the bit error rate (BER) counts are not in excess of 1 * 10 exp – 3 and completion time is less than 50 ms.

3.4.1 Faceplate and Block Diagram

Figure 3-2 shows the faceplate and block diagram for the TCC2P card.

Figure 3-2 TCC2P Faceplate and Block Diagram



3.4.2 TCC2P Card Functions

The functions of the TCC2P card are:

- G.23 Communication and Control for Controller Cards, page G-20

- G.11 Timing Synchronization, page G-17
- G.24 Interface Ports, page G-22
- G.27 Database Storage, page G-24
- G.28 Redundant Controller Card Installation, page G-24
- Card level indicators—Table G-1 on page G-7 l
- Network level indicators—Table G-13 on page G-13
- Power level indicators—Table G-11 on page G-12

3.4.3 Related Procedures for TCC2P Card

The following is the list of procedures and tasks related to the configuration of the TCC2P card:

- NTP-G15 Install the Common Control Cards, page 3-34
- NTP-G18 Set Up CTC Computer for Local Craft Connection to the ONS 15454
- NTP-G17 Set Up Computer for CTC
- DLP-G43 Disable or Bypass Proxy Service Using Internet Explorer (Windows)
- DLP-G44 Disable or Bypass Proxy Service Using Mozilla (Solaris)
- DLP-G48 Create Login Node Groups
- DLP-G49 Add a Node to the Current Session or Login Group
- NTP-G22 Verify Common Card Installation, page 14-4
- NTP-G144 Provision a Multishelf Node, page 14-8
- NTP-G25 Set Battery Power Monitor Thresholds, page 14-15
- NTP-G26 Set Up CTC Network Access, page 14-16
- NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
- NTP-G163 Upgrade Nodes in Single-Shelf Mode to Multishelf Mode, page 14-131
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G81 Change CTC Network Access
- NTP-G146 Add a Rack, Passive Unit, or Shelf to a Multishelf Node
- NTP-G147 Delete a Passive Unit, Shelf, or Rack from a Multishelf Node
- NTP-G103 Back Up the Database, page 24-2
- NTP-G104 Restore the Database, page 24-3
- NTP-G106 Reset Cards Using CTC, page 24-13
- NTP-G105 Restore the Node to Factory Configuration, page 24-4

3.5 TCC3 Card

(Cisco ONS 15454 only)

Note For TCC3 card specifications, see the "TCC3 Card Specifications" section in the Hardware Specifications document.

The Timing Communications Control Three (TCC3) card is an enhanced version of the TCC2P card. The primary enhancements include the increase in memory size and compact flash space. The TCC3 card boots up as TCC2P card in older releases and as TCC3 card from Release 9.2 onwards.

The TCC3 card performs system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection/resolution, SONET SOH DCC/GCC termination, and system fault detection for the ONS 15454. The TCC3 also ensures that the system maintains Stratum 3 (Telcordia GR-253-CORE) timing requirements. It monitors the supply voltage of the system.

The TCC3 card supports multi-shelf management. The TCC3 card acts as a shelf controller and node controller for the ONS 15454. The TCC3 card supports up to 30 subtended shelves through the MSM-ISC card or external switch. In a multi-shelf configuration, the TCC3 card allows the ONS 15454 node to be a node controller if an M6 shelf is subtended to it. We recommend the use of TCC3 card as a node controller when the number of subtended shelves exceeds four.

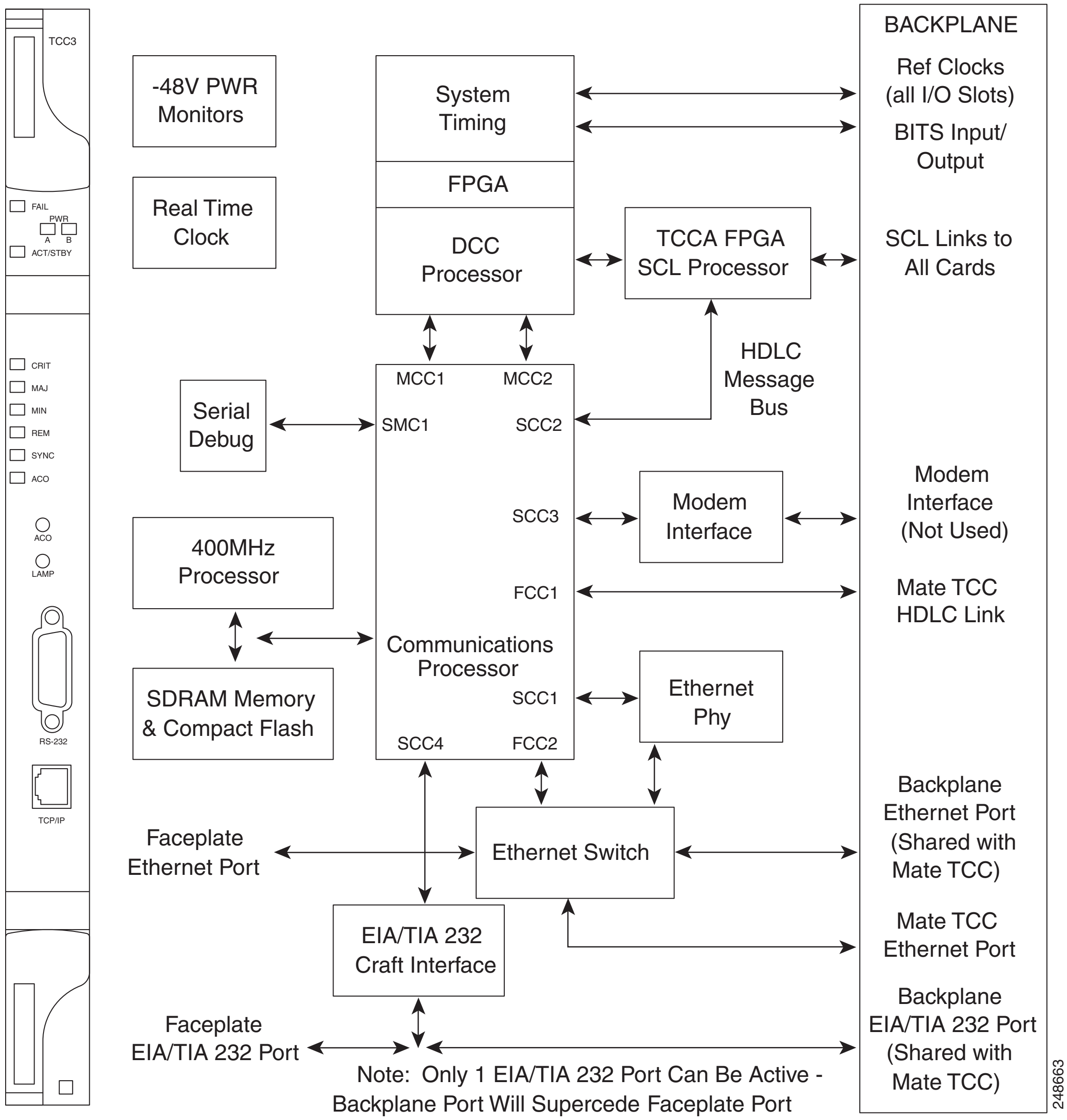
The TCC3 card is compliant with the following standards:

- The LAN interface of the TCC3 card meets the standard Ethernet specifications by supporting a cable length of 328 ft (100 m) at temperatures ranging from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius). The interfaces can operate with a cable length of 32.8 ft (10 m) maximum at temperatures from –40 to 32 degrees Fahrenheit (–40 to 0 degrees Celsius).
- The TCC3 card is Restriction of Use of Hazardous Substances (RoHS) compliant. The RoHS regulations limit or ban the specific substances such as lead, cadmium, polybrominated biphenyl (PBB), mercury, hexavalent chromium, and polybrominated diphenyl ether (PBDE) flame retardants in a new electronic and electric equipment.

3.5.1 Faceplate and Block Diagram

Figure 3-3 shows the faceplate and block diagram for the TCC3 card.

Figure 3-3 TCC3 Faceplate and Block Diagram



3.5.2 TCC3 Card Functions

The functions of the TCC3 card are:

- G.23 Communication and Control for Controller Cards, page G-20
- G.11 Timing Synchronization, page G-17
- G.24 Interface Ports, page G-22
- G.27 Database Storage, page G-24
- G.28 Redundant Controller Card Installation, page G-24
- Card level indicators—Table G-1 on page G-7

- Network level indicators—Table G-13 on page G-13
- Power level indicators—Table G-12 on page G-13

3.5.3 Related Procedures for TCC3 Card

The following is the list of procedures and tasks related to the configuration of the TCC3 card:

- NTP-G15 Install the Common Control Cards, page 3-34
- NTP-G18 Set Up CTC Computer for Local Craft Connection to the ONS 15454
- NTP-G17 Set Up Computer for CTC
- DLP-G43 Disable or Bypass Proxy Service Using Internet Explorer (Windows)
- DLP-G44 Disable or Bypass Proxy Service Using Mozilla (Solaris)
- DLP-G48 Create Login Node Groups
- DLP-G49 Add a Node to the Current Session or Login Group
- NTP-G22 Verify Common Card Installation, page 14-4
- NTP-G144 Provision a Multishelf Node, page 14-8
- NTP-G25 Set Battery Power Monitor Thresholds, page 14-15
- NTP-G26 Set Up CTC Network Access, page 14-16
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- NTP-G103 Back Up the Database, page 24-2
- NTP-G104 Restore the Database, page 24-3
- NTP-G106 Reset Cards Using CTC, page 24-13
- NTP-G105 Restore the Node to Factory Configuration, page 24-4

3.6 TNC and TNCE Card

(Cisco ONS 15454 M2 and ONS 15454 M6 only)

The TNC and TNCE cards combine the functions of multiple cards such as TCC2P, OSCM, ISC, and AIC-I cards. The card has a similar look and feel to TCC2/TCC2P/TCC3 cards.

Note For TNC and TNCE card specifications, see the "TNC and TNCE Card Specifications (Cisco ONS 15454 M2 and Cisco ONS 15454 M6)" section in the Hardware Specifications document.

The TNC and TNCE cards are provisioned as master and slave in the 15454-M6 shelf, and as a stand-alone card in the 15454-M2 shelf. The TNC and TNCE cards serve as the processor card for the node.

On the 15454-M6 shelf, install redundant TNC and TNCE cards in slots 1 and 8. If the active TNC or TNCE card fails, system traffic switches to the redundant TNC or TNCE card. The card supports line cards from slots 2 to 7.

On the 15454-M2 shelf, install the stand-alone TNC and TNCE cards in slot 1. The TNC and TNCE cards support line cards in slots 2 and 3.

The TNC and TNCE cards monitor both the supply voltage inputs on the 15454-M6 shelf. The TNC and TNCE cards raise an alarm if one of the supply voltage inputs has a voltage out of the specified range. The 15454-M2 shelf has dual power supply.

You can insert and remove the TNC and TNCE cards even when the system is online, without impacting the system traffic.

You can upgrade the TSC or TSCE card to a TNC or TNCE card. During the upgrade, the TNC and TNCE cards do not support OSC functions such as UDC, VoIP, DCC, and timing function. However, you can still provision the SFP ports on the TNC and TNCE cards during the upgrade. The TNC/TNCE and TSC/TSCE cards cannot be inserted in the same shelf.

The TNC and TNCE cards support all the alarms supported by the TCC2P and AIC-I cards. The card adjusts the fan speed according to the temperature and reports a fan failure alarm.

Note The LAN interface of the TNC and TNCE cards meet the standard Ethernet specifications by supporting a cable length of 328 ft (100 m) at temperatures from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius). The interfaces can operate with a cable length of 32.8 ft (10 m) maximum at temperatures from -40 to 32 degrees Fahrenheit (-40 to 0 degrees Celsius).

3.6.1 Faceplate and Block Diagram

The faceplate design of the TNC and TNCE cards allow sufficient space to insert or remove cables while accessing the Ethernet and SFP ports.

The TNC and TNCE cards can be installed only in slots 1 or 8 of the ONS 15454 M6 shelf and in slot 1 of the ONS 15454 M2 shelf. The TNC and TNCE cards have an identifier on the faceplate that matches with an identifier in the shelf. A key is also provided on the backplane interface connectors as identifier in the shelf.

The TNC and TNCE cards support field-programmable gate array (FPGA) for the backplane interface. The TNC cards have two FPGA: TCCA, SYNTIDE and FRAMPOS

The TNCE cards have one FPGA: VEGA and FRAMPOS

Figure 3-4 illustrates the faceplate and block diagram for the TNC card.

Figure 3-4 TNC Faceplate and Block Diagram

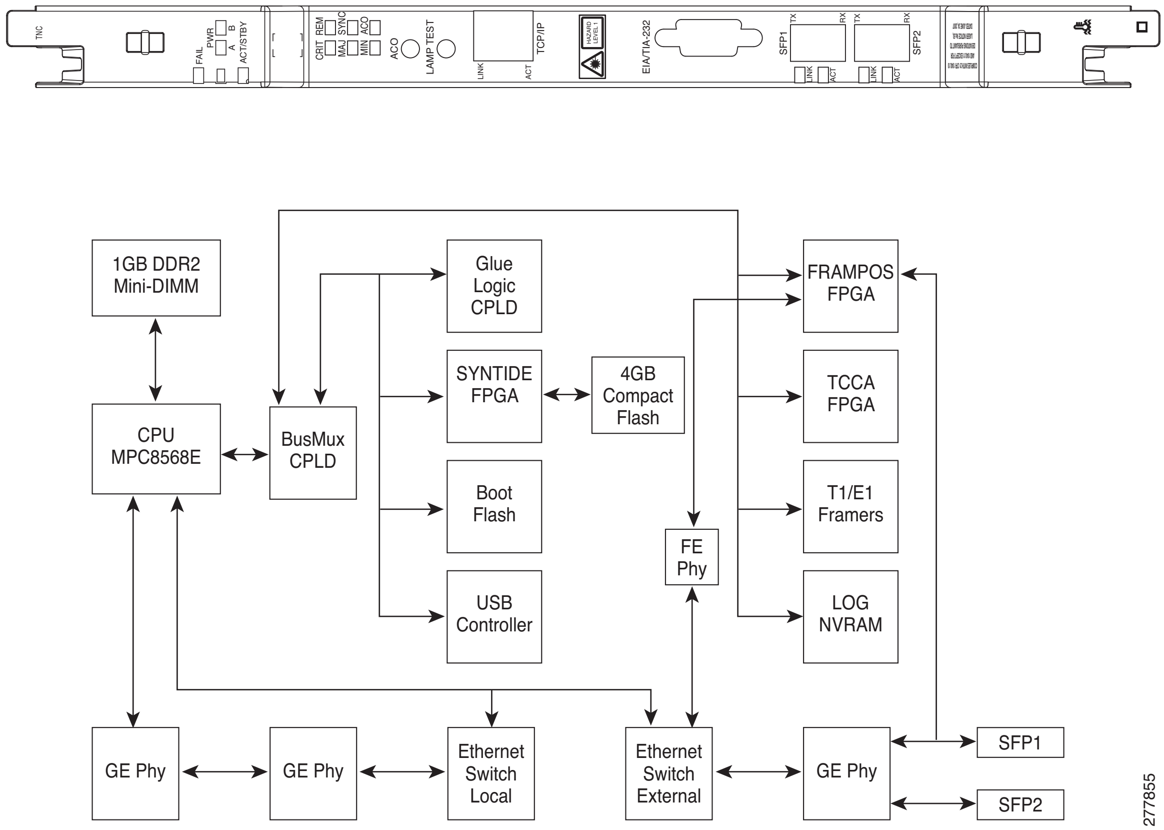
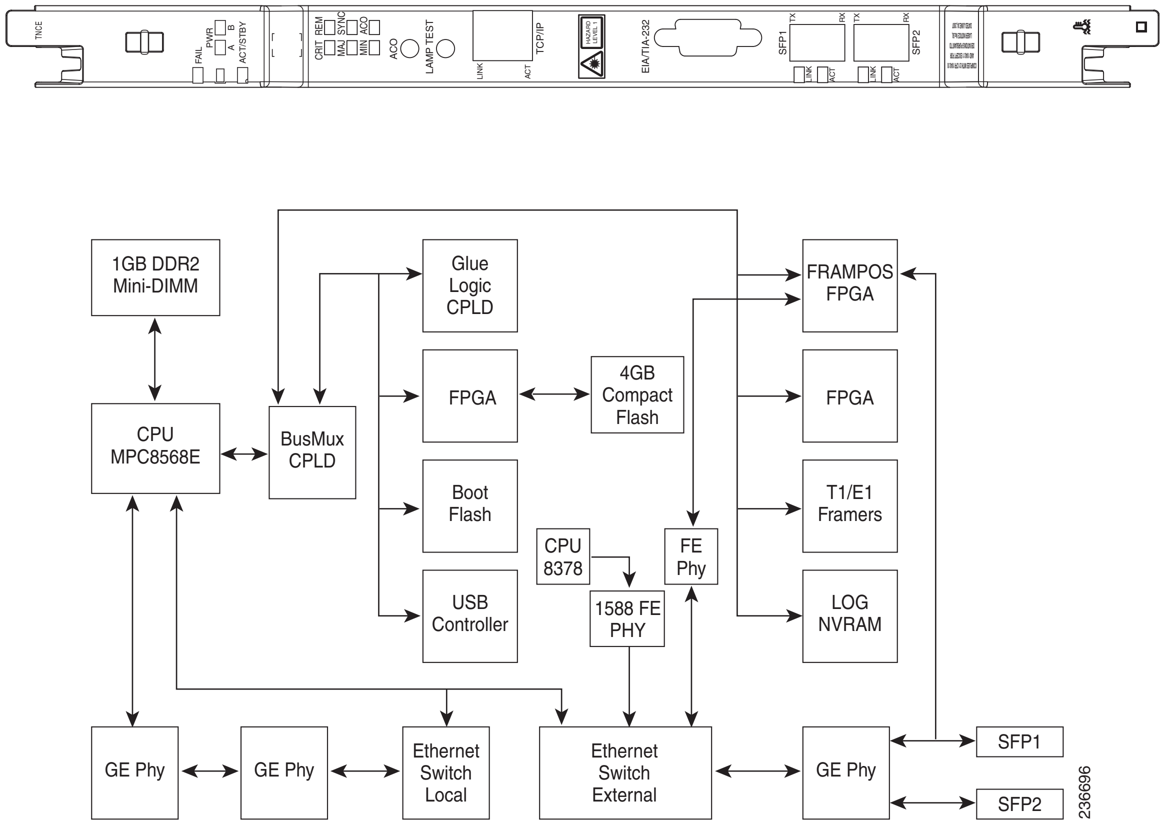


Figure 3-5 illustrates the faceplate and block diagram for the TNCE card.

Figure 3-5 ***TNCE Faceplate and Block Diagram***



3.6.2 TNC and TNCE Card Functions

The functions of the TNC and TNCE cards are:

- G.23 Communication and Control for Controller Cards, page G-20
- G.29 Optical Service Channel, page G-25
- G.11 Timing Synchronization, page G-17
- G.30 MultiShelf Management, page G-25
- G.27 Database Storage, page G-24
- G.24 Interface Ports, page G-22
- G.25 External Alarms and Controls, page G-23
- G.16 Lamp Test, page G-19
- G.28 Redundant Controller Card Installation, page G-24
- Card level indicators—Table G-1 on page G-7
- Network level indicators—Table G-13 on page G-13
- Power level indicators—Table G-12 on page G-13
- Port level indicators—Table G-14 on page G-14
- TNC and TNCE SFP indicators—Table G-15 on page G-14

- G.31 Protection Schemes, page G-25
- G.32 Cards Supported by TNC/TNCE/TSC/TSCE, page G-26

3.6.3 Related Procedures for TNC and TNCE Cards

The following is the list of procedures and tasks related to the configuration of the TNC and TNCE cards:

- NTP-G313 Install and Configure the TNC, TNCE, TSC, or TSCE Card, page 3-41
- NTP-G17 Set Up Computer for CTC
- DLP-G43 Disable or Bypass Proxy Service Using Internet Explorer (Windows)
- DLP-G44 Disable or Bypass Proxy Service Using Mozilla (Solaris)
- DLP-G48 Create Login Node Groups
- DLP-G49 Add a Node to the Current Session or Login Group
- DLP-G41 Set Up a Windows PC for Craft Connection to an ONS 15454 Using Automatic Host Detection
- NTP-G19 Set Up a CTC Computer for a Corporate LAN Connection to the ONS 15454
- NTP-G22 Verify Common Card Installation, page 14-4
- NTP-G250 Verify Digital Image Signing (DIS) Information, page 14-6
- NTP-G279 Monitor TNC and TNCE Card Performance
- NTP-G144 Provision a Multishelf Node, page 14-8
- NTP-G25 Set Battery Power Monitor Thresholds, page 14-15
- NTP-G26 Set Up CTC Network Access, page 14-16
- NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
- NTP-G163 Upgrade Nodes in Single-Shelf Mode to Multishelf Mode, page 14-131
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G81 Change CTC Network Access
- NTP-G146 Add a Rack, Passive Unit, or Shelf to a Multishelf Node
- NTP-G147 Delete a Passive Unit, Shelf, or Rack from a Multishelf Node
- NTP-G103 Back Up the Database, page 24-2
- NTP-G104 Restore the Database, page 24-3
- NTP-G106 Reset Cards Using CTC, page 24-13
- NTP-G277 Provision Alarms and Controls on the TNC, TNCE, TSC, or TSCE Card
- NTP-G105 Restore the Node to Factory Configuration, page 24-4

3.7 TSC and TSCE Cards

(Cisco ONS 15454 M2 and ONS 15454 M6 only)

The TSC and TSCE cards combine the functions of multiple cards such as TCC2P, ISC, and AIC-I cards. The card has a similar look and feel to TCC2/TCC2P/TCC3 cards.

Note For TSC and TSCE cards specification, see the "TSC and TSCE Card Specifications (ONS 15454 M2 and ONS 15454 M6)" section in the Hardware Specifications document.

The TSC and TSCE cards are provisioned as master and slave in the ONS 15454 M6 shelf, and as a stand-alone card in the ONS 15454 M2 shelf. The TSC and TSCE cards serve as the processor card for the node.

On the ONS 15454 M6 shelf, install redundant TSC and TSCE cards in slots 1 and 8. If the active TSC or TSCE card fails, system traffic switches to the redundant TSC or TSCE card. The TSC and TSCE cards support line cards from slots 2 to 7.

On the ONS 15454 M2 shelf, install the stand-alone TSC and TSCE cards in slot 1. The TSC and TSCE cards support line cards in slots 2 and 3.

The TSC and TSCE cards monitor both the supply voltage inputs on the 15454-M6 shelf. The TSC and TSCE cards raise an alarm if one of the supply voltage inputs has a voltage out of the specified range. The 15454-M2 shelf has dual power supply.

You can insert and remove the TSC and TSCE cards even when the system is online, without impacting the system traffic.

The TSC and TSCE cards do not support optical service channel (OSC) and SFP ports.

You can upgrade the TSC or TSCE card to a TNC or TNCE card. During the upgrade, the TNC and TNCE cards do not support OSC functions such as UDC, VoIP, DCC, and timing function. However, you can still provision SFP ports on the TNC and TNCE cards during the upgrade. The TNC, TNCE, TSC, and TSCE cards cannot be inserted in the same shelf.

The TSC and TSCE cards support all the alarms supported by the TCC2P and AIC-I cards. The card adjusts the fan speed according to the temperature and reports a fan failure alarm.

Note The LAN interface of the TSC and TSCE cards meet the standard Ethernet specifications by supporting a cable length of 328 ft (100 m) at temperatures from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius). The interfaces can operate with a cable length of 32.8 ft (10 m) maximum at temperatures from -40 to 32 degrees Fahrenheit (-40 to 0 degrees Celsius).

3.7.1 Faceplate and Block Diagram

The faceplate design of the TSC and TSCE cards allow sufficient space to insert or remove cables while accessing the Ethernet ports.

The TSC and TSCE cards can be installed only in slots 1 or 8 of the 15454-M6 shelf and in slot 1 of the 15454-M2 shelf. The TSC and TSCE cards have an identifier on the faceplate that matches with an identifier in the shelf. A key is also provided on the backplane interface connectors as identifier in the shelf.

The TSC and TSCE cards support field-programmable gate array (FPGA) for the backplane interface. The TSC cards have two FPGA: TCCA and SYNTIDE

The TSCE cards have one FPGA: VEGA

Figure 3-6 illustrates the faceplate and block diagram for the TSC card.

Figure 3-6 TSC Faceplate and Block Diagram

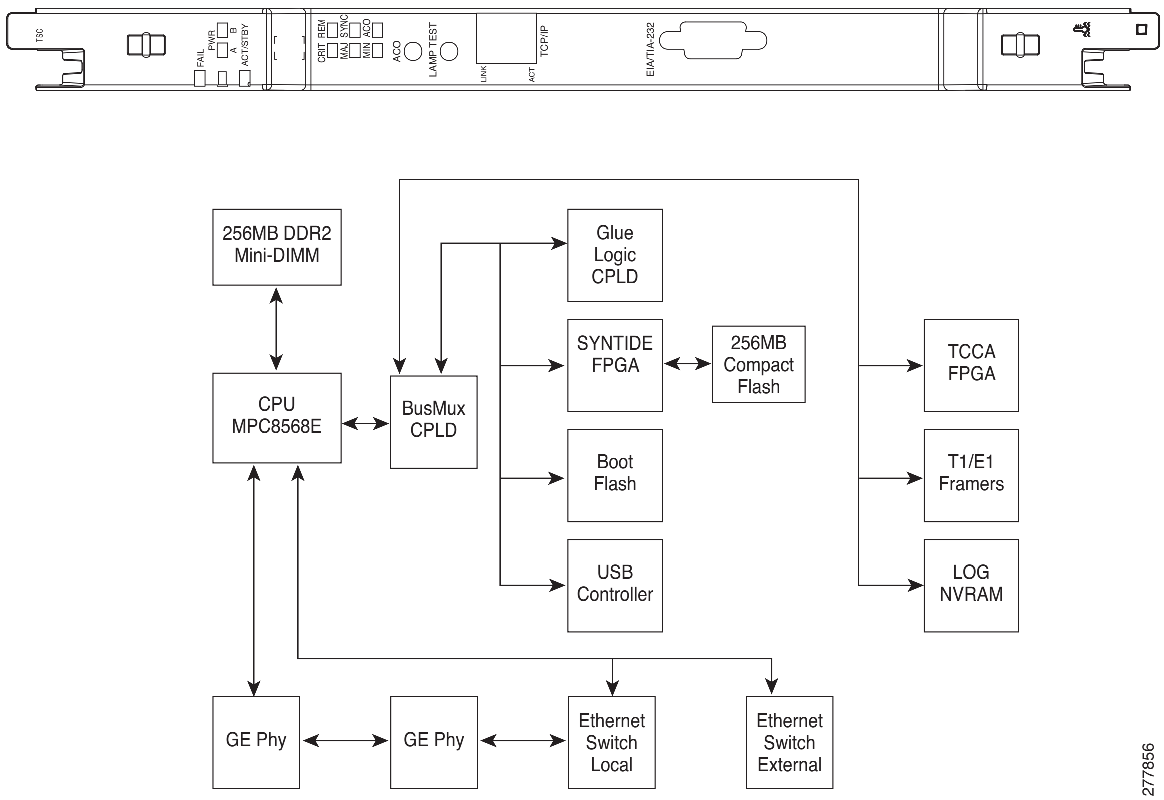
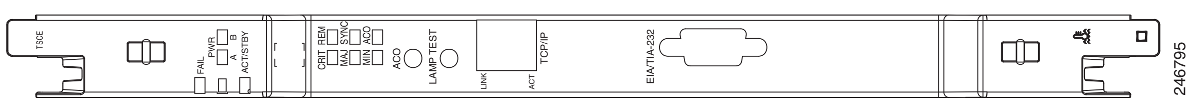


Figure 3-7 illustrates the faceplate for the TSCE card.

Figure 3-7 TSCE Faceplate



3.7.2 TSC and TSCE Card Functions

The functions of the TSC and TSCE cards are:

- G.23 Communication and Control for Controller Cards, page G-20
- G.11 Timing Synchronization, page G-17
- G.30 MultiShelf Management, page G-25
- G.27 Database Storage, page G-24
- G.24 Interface Ports, page G-22
- G.25 External Alarms and Controls, page G-23
- G.16 Lamp Test, page G-19
- G.28 Redundant Controller Card Installation, page G-24
- Card level indicators—Table G-1 on page G-7

- Network level indicators—Table G-13 on page G-13
- Power level indicators—Table G-12 on page G-13
- Port level indicators—Table G-14 on page G-14
- G.31 Protection Schemes, page G-25
- G.32 Cards Supported by TNC/TNCE/TSC/TSCE, page G-26

3.7.3 Related Procedures for TSC and TSCE Cards

The following is the list of procedures and tasks related to the configuration of the TSC and TSCE cards:

- NTP-G313 Install and Configure the TNC, TNCE, TSC, or TSCE Card, page 3-41
- NTP-G17 Set Up Computer for CTC
- DLP-G43 Disable or Bypass Proxy Service Using Internet Explorer (Windows)
- DLP-G44 Disable or Bypass Proxy Service Using Mozilla (Solaris)
- DLP-G48 Create Login Node Groups
- DLP-G49 Add a Node to the Current Session or Login Group
- DLP-G41 Set Up a Windows PC for Craft Connection to an ONS 15454 Using Automatic Host Detection
- NTP-G19 Set Up a CTC Computer for a Corporate LAN Connection to the ONS 15454
- NTP-G22 Verify Common Card Installation, page 14-4
- NTP-G250 Verify Digital Image Signing (DIS) Information, page 14-6
- NTP-G144 Provision a Multishelf Node, page 14-8
- NTP-G25 Set Battery Power Monitor Thresholds, page 14-15
- NTP-G26 Set Up CTC Network Access, page 14-16
- NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
- NTP-G163 Upgrade Nodes in Single-Shelf Mode to Multishelf Mode, page 14-131
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G81 Change CTC Network Access
- NTP-G146 Add a Rack, Passive Unit, or Shelf to a Multishelf Node
- NTP-G147 Delete a Passive Unit, Shelf, or Rack from a Multishelf Node
- NTP-G103 Back Up the Database, page 24-2
- NTP-G104 Restore the Database, page 24-3
- NTP-G106 Reset Cards Using CTC, page 24-13
- NTP-G103 Back Up the Database, page 24-2
- NTP-G104 Restore the Database, page 24-3
- NTP-G106 Reset Cards Using CTC, page 24-13
- NTP-G277 Provision Alarms and Controls on the TNC, TNCE, TSC, or TSCE Card
- NTP-G280 Modify Threshold Settings for the TNC and TNCE Cards, page 20-121
- NTP-U510 Upgrade the TSC Card to the TNC Card

- NTP-G105 Restore the Node to Factory Configuration, page 24-4

3.8 Digital Image Signing

(Cisco ONS 15454 M2 and ONS 15454 M6 only)

The DIS feature complies with the new U.S. Government Federal Information Processing Standard (FIPS) 140-3 to provide security for all software provided on the Cisco ONS 15454 M6 and ONS 15454 M2 platforms. This standard requires software to be digitally signed and verified for authenticity and integrity prior to load and execution.

DIS feature automatically provides increased protection. DIS focuses on software security and provides increased protection from attacks and threats to Cisco ONS 15454 M2 and ONS 15454 M6 products. DIS verifies software integrity and provides assurance that the software has not been tampered with or modified. Digitally signed Cisco software provides counterfeit protection.

New controller cards, such as TNC/TNCE/TSC/TSCE, provide services that authenticate the origin of the software running on the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms. The signage and verification process is transparent until verification fails.

3.8.1 DIS Identification

Digitally signed software can be identified by the last three characters appended to the working version and protected version field in CTC. The DIS conventions can be viewed under the working version displayed in the **Maintenance > Software** tab in CTC. For example, 9.2.0 (09.20-X10C-29.09-SDA) and 9.2.0 (09.20-010C-18.18-SPA).

The significance of the three characters appended to the software version is explained in Table:

Table 3-2 DIS Conventions in the Software Version

Character	Meaning
S (first character)	Indicates that the package is signed.
P or D (second character)	Production (P) or Development (D) image. Production image—Software approved for general release. Development image—development software provided under special conditions for limited use.
A (third character)	This third character indicates the version of the key used for signature generation. The version changes when a key is revoked and a new key is used. The values of the version key varies from A to Z.

3.8.2 Related Procedures for DIS

To verify DIS, see NTP-G250 Verify Digital Image Signing (DIS) Information, page 14-6.

3.9 AIC-I Card

(Cisco ONS 15454 only)

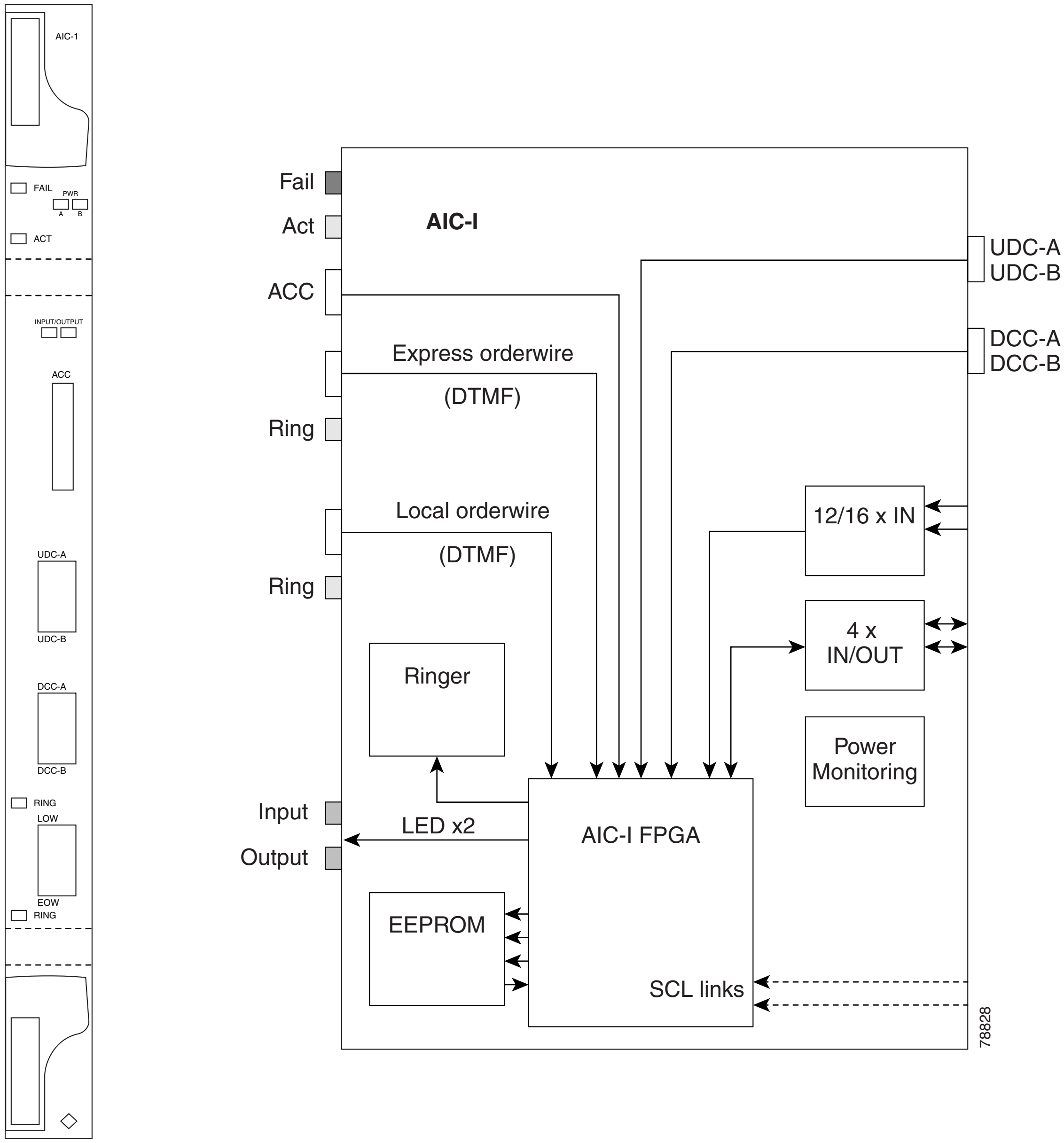
Note For hardware specifications, see the "AIC-I Card Specifications" section in the Hardware Specifications document.

The optional Alarm Interface Controller–International (AIC-I) card provides customer-defined (environmental) alarms and controls and supports local and express orderwire. It provides 12 customer-defined input and 4 customer-defined input/output contacts. The physical connections are via the backplane wire-wrap pin terminals. If you use the additional alarm expansion panel (AEP), the AIC-I card can support up to 32 inputs and 16 outputs, which are connected on the AEP connectors. The AEP is compatible with ANSI shelves only. A power monitoring function monitors the supply voltage (–48 VDC).

3.9.1 Faceplate and Block Diagram

Figure 3-8 shows the AIC-I faceplate and a block diagram of the card.

Figure 3-8 AIC-I Faceplate and Block Diagram



3.9.2 AIC-I Card-Level Indicators

Table G-2 lists the card-level LEDs on the card.

3.9.3 External Alarms and Controls

The AIC-I card provides input/output alarm contact closures. You can define up to 12 external alarm inputs and 4 external alarm inputs/outputs (user configurable). The physical connections are made using the backplane wire-wrap pins or FMEC connections. For information about increasing the number of input/output contacts, see the “ONS 15454 ANSI Alarm Expansion Panel” section in the *Cisco ONS 15454 Hardware Installation Guide*.

LEDs on the front panel of the AIC-I indicate the status of the alarm lines, one LED representing all of the inputs and one LED representing all of the outputs. External alarms (input contacts) are typically used for external sensors such as open doors, temperature sensors, flood sensors, and other environmental conditions. External controls (output contacts) are typically used to drive visual or audible devices such as bells and lights, but they can control other devices such as generators, heaters, and fans.

You can program each of the twelve input alarm contacts separately. You can program each of the sixteen input alarm contacts separately. Choices include:

- Alarm on Closure or Alarm on Open
- Alarm severity of any level (Critical, Major, Minor, Not Alarmed, Not Reported)
- Service Affecting or Non-Service Affecting alarm-service level
- 63-character alarm description for CTC display in the alarm log

You cannot assign the fan-tray abbreviation for the alarm; the abbreviation reflects the generic name of the input contacts. The alarm condition remains raised until the external input stops driving the contact or you provision the alarm input.

The output contacts can be provisioned to close on a trigger or to close manually. The trigger can be a local alarm severity threshold, a remote alarm severity, or a virtual wire:

- Local NE alarm severity: A hierarchy of Not Reported, Not Alarmed, Minor, Major, or Critical alarm severities that you set to cause output closure. For example, if the trigger is set to Minor, a Minor alarm or above is the trigger.
- Remote NE alarm severity: Same as the local NE alarm severity but applies to remote alarms only.
- Virtual wire entities: You can provision any environmental alarm input to raise a signal on any virtual wire on external outputs 1 through 4 when the alarm input is an event. You can provision a signal on any virtual wire as a trigger for an external control output.

You can also program the output alarm contacts (external controls) separately. In addition to provisionable triggers, you can manually force each external output contact to open or close. Manual operation takes precedence over any provisioned triggers that might be present.

Note For ANSI shelves, the number of inputs and outputs can be increased using the AEP. The AEP is connected to the shelf backplane and requires an external wire-wrap panel.

3.9.4 Orderwire

Orderwire allows a crafts person to plug a phone set into an ONS 15454 and communicate with crafts people working at other ONS 15454s or other facility equipment. The orderwire is a pulse code modulation (PCM) encoded voice channel that uses E1 or E2 bytes in section/line overhead.

The AIC-I allows simultaneous use of both local (section overhead signal) and express (line overhead channel) orderwire channels on a SONET/SDH ring or particular optics facility. Express orderwire also allows communication via regeneration sites when the regenerator is not a Cisco device.

You can provision orderwire functions with CTC similar to the current provisioning model for DCC/GCC channels. In CTC, you provision the orderwire communications network during ring turn-up so that all NEs on the ring can reach one another. Orderwire terminations (that is, the optics facilities that receive and process the orderwire channels) are provisionable. Both express and local orderwire can be configured as on or off on a particular SONET/SDH facility. The ONS 15454 supports up to four orderwire channel terminations per shelf. This allows linear, single ring, dual ring, and small hub-and-spoke configurations. Orderwire is not protected in ring topologies such as bidirectional line switched ring (BLSR), multiplex section-shared protection ring (MS-SPRing), path protection, or subnetwork connection protection (SNCP) ring.

Caution Do not configure orderwire loops. Orderwire loops cause feedback that disables the orderwire channel.

The ONS 15454 implementation of both local and express orderwire is broadcast in nature. The line acts as a party line. Anyone who picks up the orderwire channel can communicate with all other participants on the connected orderwire subnetwork. The local orderwire party line is separate from the express orderwire party line. Up to four OC-N/STM-N facilities for each local and express orderwire are provisionable as orderwire paths.

The AIC-I supports selective dual tone multi-frequency (DTMF) dialing for telephony connectivity, which causes one AIC-I card or all ONS 15454 AIC-I cards on the orderwire subnetwork to “ring.” The ringer/buzzer resides on the AIC-I. There is also a “ring” LED that mimics the AIC-I ringer. It flashes when a call is received on the orderwire subnetwork. A party line call is initiated by pressing ***0000** on the DTMF pad. Individual dialing is initiated by pressing ***** and the individual four-digit number on the DTMF pad.

Table 3-3 shows the pins on the orderwire connector that correspond to the tip and ring orderwire assignments.

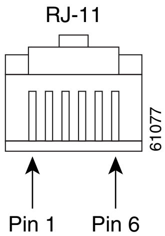
Table 3-3 Orderwire Pin Assignments

RJ-11 Pin Number	Description
1	Four-wire receive ring
2	Four-wire transmit tip
3	Two-wire ring
4	Two-wire tip
5	Four-wire transmit ring
6	Four-wire receive tip

When provisioning the orderwire subnetwork, make sure that an orderwire loop does not exist. Loops cause oscillation and an unusable orderwire channel.

Figure 3-9 shows the standard RJ-11 connectors used for orderwire ports.

Figure 3-9 RJ-11 Connector



3.9.5 Power Monitoring

The AIC-I card provides a power monitoring circuit that monitors the supply voltage of –48 VDC for presence, under voltage, and over voltage.

3.9.6 User Data Channel

The user data channel (UDC) features a dedicated data channel of 64 kbps (F1 byte) between two nodes in an ONS 15454 network. Each AIC-I card provides two user data channels, UDC-A and UDC-B, through separate RJ-11 connectors on the front of the AIC-I card. Each UDC can be routed to an individual optical interface in the ONS 15454.

The UDC ports are standard RJ-11 receptacles. Table 3-4 lists the UDC pin assignments.

Table 3-4 UDC Pin Assignments

RJ-11 Pin Number	Description
1	For future use
2	TXN
3	RXN
4	RXP
5	TXP
6	For future use

3.9.7 Data Communications Channel

The DCC features a dedicated data channel of 576 kbps (D4 to D12 bytes) between two nodes in an ONS 15454 network. Each AIC-I card provides two data communications channels, DCC-A and DCC-B, through separate RJ-45 connectors on the front of the AIC-I card. Each DCC can be routed to an individual optical interface in the ONS 15454.

The DCC ports are synchronous serial interfaces. The DCC ports are standard RJ-45 receptacles. Table 3-5 lists the DCC pin assignments.

Table 3-5 DCC Pin Assignments

RJ-45 Pin Number	Description
1	TCLKP
2	TCLKN
3	TXP
4	TXN
5	RCLKP
6	RCLKN
7	RXP
8	RXN

3.9.8 Related Procedures for AIC-I Card

The following is the list of procedures and tasks related to the configuration of the AIC-I card:

- NTP-G15 Install the Common Control Cards, page 3-34
- NTP-G22 Verify Common Card Installation, page 14-4
- NTP-G60 Create and Delete Overhead Circuits, page 16-81
- NTP-G72 Provision External Alarms and Controls on the Alarm Interface Controller-International Card
- NTP-G101 Modify Alarm Interface Controller–International Settings, page 20-117

3.10 MS-ISC-100T Card

(Cisco ONS 15454 only)

Note For hardware specifications, see the "MS-ISC-100T Card Specifications" section in the Hardware Specifications document.

The Multishelf Internal Switch Card (MS-ISC-100T) is an Ethernet switch used to implement the multishelf LAN. It connects the node controller shelf to the network and to subtending shelves. The MS-ISC-100T must always be equipped on the node controller shelf; it cannot be provisioned on a subtending controller shelf.

The recommended configuration is to implement LAN redundancy using two MS-ISC-100T cards: one switch is connected to the Ethernet front panel port of the TCC2/TCC2P card in Slot 7, and the other switch is connected to the Ethernet front panel port of the TCC2/TCC2P card in Slot 11. The Ethernet configuration of the MS-ISC-100T card is part of the software package and is automatically loaded. The MS-ISC-100T card operates in Slots 1 to 6 and 12 to 17 on the node controller shelf; the recommended slots are Slot 6 and Slot 12.

Table 3-6 lists the MS-ISC-100T port assignments.

Table 3-6 MS-ISC-100T Card Port Assignments

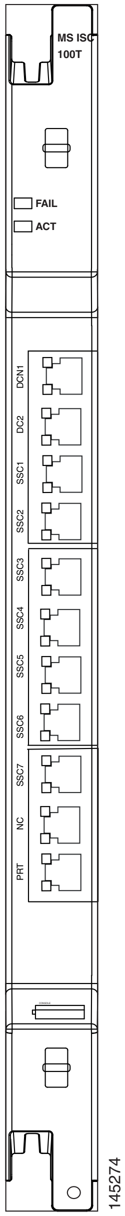
Port	Description
DCN 1and DCN 2	Connection to the network
SSC1 to SSC7	Connection to subtending shelves
NC	Connection to TCC2/TCC2P using a cross-over cable
PRT	Connection to the PRT port of the redundant MS-ISC-100T

Caution Shielded twisted-pair cabling should be used for inter-building applications.

3.10.1 Faceplate Diagram

Figure 3-10 shows the card faceplate.

Figure 3-10 MS-ISC-100T Faceplate



3.10.2 MS-ISC-100T Card-Level Indicators

Table G-3 lists the card-level LEDs on the card.

3.10.3 Related Procedures for MS-ISC-100T Card

The following is the list of procedures and tasks related to the configuration of the MS-ISC-100T card:

- NTP-G15 Install the Common Control Cards, page 3-34

- NTP-G22 Verify Common Card Installation, page 14-4
- NTP-G144 Provision a Multishelf Node, page 14-8
- NTP-G163 Upgrade Nodes in Single-Shelf Mode to Multishelf Mode, page 14-131
- NTP-G146 Add a Rack, Passive Unit, or Shelf to a Multishelf Node
- NTP-G147 Delete a Passive Unit, Shelf, or Rack from a Multishelf Node

3.11 Front Mount Electrical Connections

This section describes the MIC-A/P and MIC-C/T/P FMECs, which provide power, external alarm, and timing connections for the ONS 15454 ETSI shelf.

3.11.1 MIC-A/P FMEC

Note For hardware specifications, see the "MIC-A/P FMEC Specifications (ETSI only)" section in the Hardware Specifications document.

The MIC-A/P FMEC provides connection for the BATTERY B input, one of the two possible redundant power supply inputs. It also provides connection for eight alarm outputs (coming from the TCC2/TCC2P card), sixteen alarm inputs, and four configurable alarm inputs/outputs. Its position is in Slot 23 in the center of the subrack Electrical Facility Connection Assembly (EFCA) area.

The MIC-A/P FMEC has the following features:

- Connection for one of the two possible redundant power supply inputs
- Connection for eight alarm outputs (coming from the TCC2/TCC2P card)
- Connection for four configurable alarm inputs/outputs
- Connection for sixteen alarm inputs
- Storage of manufacturing and inventory data

For proper system operation, both the MIC-A/P and MIC-C/T/P FMECs must be installed in the ONS 15454 ETSI shelf.

3.11.2 Faceplate and Block Diagram

Figure 3-11 shows the MIC-A/P faceplate.

Figure 3-11 MIC-A/P Faceplate

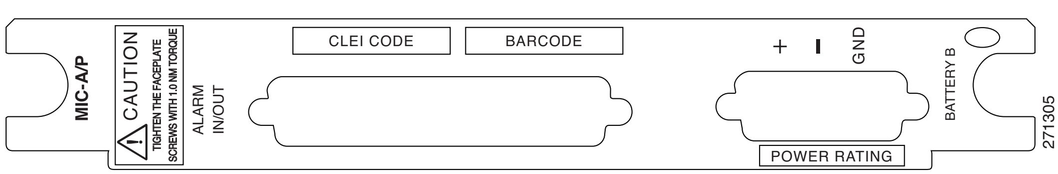


Figure 3-12 shows a block diagram of the MIC-A/P.

Figure 3-12 MIC-A/P Block Diagram

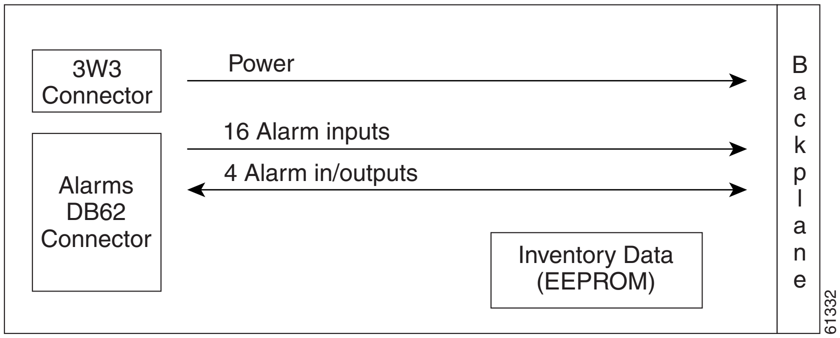


Table 3-7 shows the alarm interface pinouts on the MIC-A/P DB-62 connector.

Table 3-7 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector

Pin No.	Signal Name	Signal Description
1	ALMCUTOFF N	Alarm cutoff, normally open ACO pair
2	ALMCUTOFF P	Alarm cutoff, normally open ACO pair
3	ALMINP0 N	Alarm input pair 1, reports closure on connected wires
4	ALMINP0 P	Alarm input pair 1, reports closure on connected wires
5	ALMINP1 N	Alarm input pair 2, reports closure on connected wires
6	ALMINP1 P	Alarm input pair 2, reports closure on connected wires
7	ALMINP2 N	Alarm input pair 3, reports closure on connected wires
8	ALMINP2 P	Alarm input pair 3, reports closure on connected wires
9	ALMINP3 N	Alarm input pair 4, reports closure on connected wires
10	ALMINP3 P	Alarm input pair 4, reports closure on connected wires
11	EXALM0 N	External customer alarm 1
12	EXALM0 P	External customer alarm 1
13	GND	Ground
14	EXALM1 N	External customer alarm 2
15	EXALM1 P	External customer alarm 2
16	EXALM2 N	External customer alarm 3
17	EXALM2 P	External customer alarm 3
18	EXALM3 N	External customer alarm 4
19	EXALM3 P	External customer alarm 4
20	EXALM4 N	External customer alarm 5
21	EXALM4 P	External customer alarm 5
22	EXALM5 N	External customer alarm 6
23	EXALM5 P	External customer alarm 6
24	EXALM6 N	External customer alarm 7
25	EXALM6 P	External customer alarm 7

Table 3-7 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector (continued)

Pin No.	Signal Name	Signal Description
26	GND	Ground
27	EXALM7 N	External customer alarm 8
28	EXALM7 P	External customer alarm 8
29	EXALM8 N	External customer alarm 9
30	EXALM8 P	External customer alarm 9
31	EXALM9 N	External customer alarm 10
32	EXALM9 P	External customer alarm 10
33	EXALM10 N	External customer alarm 11
34	EXALM10 P	External customer alarm 11
35	EXALM11 N	External customer alarm 12
36	EXALM11 P	External customer alarm 12
37	ALMOUP0 N	Normally open output pair 1
38	ALMOUP0 P	Normally open output pair 1
39	GND	Ground
40	ALMOUP1 N	Normally open output pair 2
41	ALMOUP1 P	Normally open output pair 2
42	ALMOUP2 N	Normally open output pair 3
43	ALMOUP2 P	Normally open output pair 3
44	ALMOUP3 N	Normally open output pair 4
45	ALMOUP3 P	Normally open output pair 4
46	AUDALM0 N	Normally open Minor audible alarm
47	AUDALM0 P	Normally open Minor audible alarm
48	AUDALM1 N	Normally open Major audible alarm
49	AUDALM1 P	Normally open Major audible alarm
50	AUDALM2 N	Normally open Critical audible alarm
51	AUDALM2 P	Normally open Critical audible alarm
52	GND	Ground
53	AUDALM3 N	Normally open Remote audible alarm
54	AUDALM3 P	Normally open Remote audible alarm
55	VISALM0 N	Normally open Minor visual alarm
56	VISALM0 P	Normally open Minor visual alarm
57	VISALM1 N	Normally open Major visual alarm
58	VISALM1 P	Normally open Major visual alarm
59	VISALM2 N	Normally open Critical visual alarm
60	VISALM2 P	Normally open Critical visual alarm

Table 3-7 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector (continued)

Pin No.	Signal Name	Signal Description
61	VISALM3 N	Normally open Remote visual alarm
62	VISALM3 P	Normally open Remote visual alarm

3.11.3 MIC-C/T/P FMEC

Note For hardware specifications, see the "MIC-C/T/P FMEC Specifications (ETSI only)" section in the Hardware Specifications document.

The MIC-C/T/P FMEC provides connection for the BATTERY A input, one of the two possible redundant power supply inputs. It also provides connection for system management serial port, system management LAN port, modem port (for future use), and system timing inputs and outputs. Install the MIC-C/T/P in Slot 24.

The MIC-C/T/P FMEC has the following features:

- Connection for one of the two possible redundant power supply inputs
- Connection for two serial ports for local craft/modem (for future use)
- Connection for one LAN port
- Connection for two system timing inputs
- Connection for two system timing outputs
- Storage of manufacturing and inventory data

For proper system operation, both the MIC-A/P and MIC-C/T/P FMECs must be installed in the shelf.

3.11.4 Faceplate and Block Diagram

Figure 3-13 shows the MIC-C/T/P FMEC faceplate.

Figure 3-13 MIC-C/T/P Faceplate

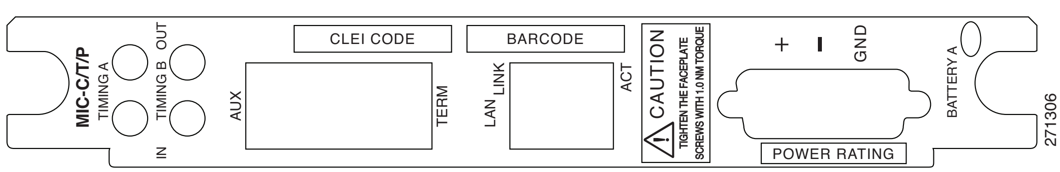
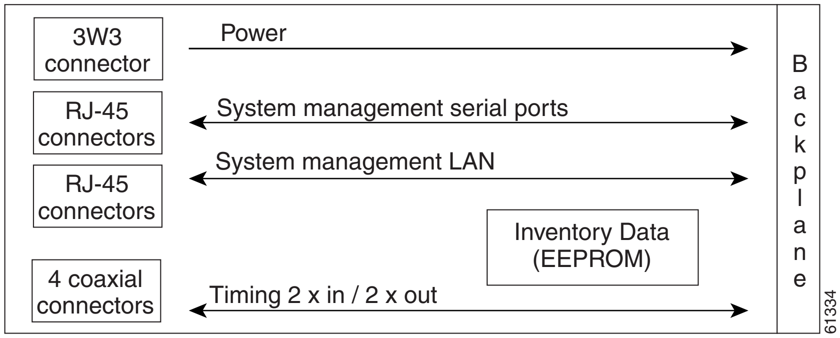


Figure 3-14 shows a block diagram of the MIC-C/T/P.

Figure 3-14 MIC-C/T/P Block Diagram



The MIC-C/T/P FMEC has one pair of LEDs located on the RJ45 LAN connector. The green LED is on when a link is present, and the amber LED is on when data is being transferred.

3.12 Procedures for Control Cards

The procedures described below explain how to install the control cards needed for the Cisco ONS 15454, Cisco ONS 15454 M2, and Cisco ONS 15454 M6 platforms.

3.12.1 Before You Begin

Before performing any of the following procedures, investigate all alarms and clear any trouble conditions. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* as necessary.

This section lists the chapter procedures (NTPs). Turn to a procedure for applicable tasks (DLPs).

- NTP-G15 Install the Common Control Cards, page 3-34—Complete this procedure to install the control cards needed for the ONS 15454 platform.
- NTP-G313 Install and Configure the TNC, TNCE, TSC, or TSCE Card, page 3-41—Complete this procedure to install the control cards needed for the ONS 15454 M2 and ONS 15454 M6 platforms.

NTP-G15 Install the Common Control Cards

Purpose	This procedure describes how to install the control cards needed for the ONS 15454 platform.
Tools/Equipment	Redundant TCC2/TCC2P/TCC3 cards on ONS 15454 shelf (required) AIC-I card (optional) MS-ISC-100T (optional; for multishelf node configurations)
Prerequisite Procedures	Following procedures in the *Cisco ONS 15454 Hardware Installation Guide:* • "NTP-G7 Install the Power and Ground" • "NTP-G14 Install DWDM Equipment"
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

Caution Always use the supplied ESD wristband when working with a powered ONS 15454. For detailed instructions on how to wear the ESD wristband, refer to the *Electrostatic Discharge and Grounding Guide for Cisco CPT and Cisco ONS Platforms*.

Note If protective clips are installed on the backplane connectors of the cards, remove the clips before installing the cards.

Note If you install a card incorrectly, the FAIL LED flashes continuously.

Step 1 (ONS 15454 only) Complete the "DLP-G33 Install the TCC2, TCC2P, or TCC3 Card" task on page 3-35.

Note If you install the wrong card in a slot, see the NTP-G107 Remove Permanently or Remove and Replace DWDM Cards.

Step 2 (ONS 15454 only) Complete the "DLP-G34 Install the AIC-I Card" task on page 3-38, if necessary.

Step 3 (ONS 15454 only) Complete the "DLP-G309 Install the MS-ISC-100T Card" task on page 3-39, if necessary.

Stop. You have completed this procedure.

DLP-G33 Install the TCC2, TCC2P, or TCC3 Card

Purpose	This task installs redundant TCC2/TCC2P/TCC3 cards. The first card you install in the ONS 15454 must be a TCC2/TCC2P/TCC3 card, and it must initialize before you install any cross-connect or traffic cards. Cross-connect cards are only required in hybrid nodes.
Tools/Equipment	Two TCC2/TCC2P/TCC3 cards
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not remove a TCC2/TCC2P/TCC3 card during the software transfer process, which is indicated by alternate flashing FAIL and ACT/STBY LEDs. Removing a TCC2/TCC2P/TCC3 during the software transfer process will corrupt the system memory.

Note Allow each card to boot completely before installing the next card.

Step 1 Open the latches/ejectors of the first TCC2/TCC2P/TCC3 card that you will install.

Step 2 Use the latches/ejectors to firmly slide the card along the guide rails until the card plugs into the receptacle at the back of the slot (Slot 7 or 11).

Note In Step 4, you will be instructed to watch the LED activity (sequence) on the front of the TCC2/TCC2P/TCC3 card. This activity begins immediately after you close the latches in Step 3.

Step 3 Verify that the card is inserted correctly and close the latches/ejectors on the card.

Note It is possible to close the latches/ejectors when the card is not completely plugged into the back panel of the shelf. Ensure that you cannot insert the card any farther.

If you insert a card into a slot provisioned for a different card, all LEDs turn off.

Step 4 As needed, go to Step a to verify the LED activity on the TCC2 card. For the TCC2P go to Step b. For the TCC3 card go to Step c.

a. For the TCC2 card:

- All LEDs turn on briefly. The red FAIL LED and the yellow ACT/STBY LED turn on for about 15 seconds. (For TCC3 card it takes around 20 to 25 seconds)
- The red FAIL LED and the green ACT/STBY LED turn on for about 40 seconds.
- The red FAIL LED blinks for about 15 seconds.
- The red FAIL LED turns on for about 15 seconds. All LEDs turn on for about 3 seconds before turning off for about 3 seconds.
- Both green PWR LEDs turn on for 10 seconds. The PWR LEDs then turn red for 2 to 3 minutes before going to steady green.

- While the PWR LEDs are red for two to three minutes, the ACT/STBY turn on.
- The boot-up process is complete when the PWR LEDs turn green and the ACT/STBY remains on. (The ACT/STBY LED will be green if this is the first TCC2 card installed, and amber if this is the second TCC2 card installed.)

Note It might take up to four minutes for the A and B power alarms to clear.

Note Alarm LEDs might be on; disregard alarm LEDs until you are logged into CTC and can view the Alarms tab.

Note If you are logged into CTC, the SFTWDOWN alarm might appear as many as two times while the TCC2 card initializes. The alarm should clear after the card completely boots.

Note If the FAIL LED is on continuously, see the tip in Step 8 about the TCC2 card automatic upload.

b. For the TCC2P card:

- All LEDs turn on briefly. The red FAIL LED, the yellow ACT/STBY LED, the green SYNC LED, and the green ACO LED turn on for about 15 seconds.
- The red FAIL LED and the green ACT/STBY LED turn on for about 30 seconds.
- The red FAIL LED blinks for about 3 seconds.
- The red FAIL LED turns on for about 15 seconds.
- The red FAIL LED blinks for about 10 seconds and then becomes solid.
- All LEDs (including the CRIT, MAJ, MIN, REM, SYNC, and ACO LEDs) blink once and turn off for about 5 seconds.
- Both green PWR LEDs turn on for 10 seconds. The PWR LEDs then turn red for 2 to 3 minutes before going to steady green. During this time, the ACT/STBY, MJ, and MN LEDs might turn on, followed by the SNYC LED briefly.
- The boot-up process is complete when the PWR LEDs turn green and the yellow ACT/STBY remains on. (The ACT/STBY LED will be green if this is the first TCC2P card installed, and yellow if this is the second TCC2P card installed.)

Note It might take up to three minutes for the A and B power alarms to clear.

Note Alarm LEDs might be on; disregard alarm LEDs until you are logged into CTC and can view the Alarms tab.

Note If you are logged into CTC, the SFTWDOWN alarm might appear as many as two times while the TCC2P card initializes. The alarm should clear after the card completely boots.

Note If the FAIL LED is on continuously, see the tip in Step 8 about the TCC2P card automatic upload.

c. For the TCC3 card:

- All LEDs turn on briefly. The red FAIL LED, the yellow ACT/STBY LED, the green SYNC LED, and the green ACO LED turn on for about 25 seconds.
- The red FAIL LED and the green ACT/STBY LED turn on for about 15 seconds.
- The red FAIL LED blinks for about 3 seconds.
- The red FAIL LED turns on for about 60 seconds.
- The red FAIL LED blinks for about 15 seconds and then becomes solid (the LED is turned on for about 20 seconds).
- All LEDs (including the CRIT, MAJ, MIN, REM, SYNC, and ACO LEDs) blink once and turn off for about 5 seconds.
- Both green PWR LEDs turn on for 10 seconds. The PWR LEDs then turn red for 2 to 3 minutes before going to steady green. During this time, the ACT/STBY, MJ, and MN LEDs might turn on, followed by the SNYC LED briefly.
- The boot-up process is complete when the PWR LEDs turn green and the yellow ACT/STBY remains on. (The ACT/STBY LED will be green if this is the first TCC3 card installed, and yellow if this is the second TCC3 card installed.)

Note It might take up to three minutes for the A and B power alarms to clear.

Note Alarm LEDs might be on; disregard alarm LEDs until you are logged into CTC and can view the Alarms tab.

Note If you are logged into CTC, the SFTWDOWN alarm might appear as many as two times while the TCC3 card initializes. The alarm should clear after the card completely boots.

Note If the FAIL LED is on continuously, see the tip in Step 8 about the TCC3 card automatic upload.

Step 5 Verify that the ACT/STBY LED is green if this is the first powered-up TCC2/TCC2P/TCC3 card installed, or yellow for standby if this is the second powered-up TCC2/TCC2P/TCC3. The IP address, temperature of the node, and time of day appear on the LCD. The default time and date is 12:00 AM, January 1, 1970.

Step 6 The LCD cycles through the IP address (the default is 192.1.0.2), node name, and software version. Verify that the correct software version is shown on the LCD. The software text string indicates the node type (SDH or SONET) and software release. (For example: SDH 09.20-05L-20.10 indicates it is an SDH software load, Release 9.2. The numbers following the release number do not have any significance.)

Step 7 If the LCD shows the correct software version, continue with Step 8. If the LCD does not show the correct software version, refer to your next level of technical support, upgrade the software, or remove the TCC2/TCC2P/TCC3 card and install a replacement card.

Refer to the release-specific software upgrade document to replace the software. To replace the TCC2/TCC2P/TCC3 card, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide.*

Step 8 Repeat Steps 1 through 7 for the redundant TCC2/TCC2P/TCC3 card. If both TCC2/TCC2P/TCC3 cards are already installed, proceed to Step 9.

Tip If you install a standby TCC2/TCC2P/TCC3 card that has a different software version than the active TCC2/TCC2P/TCC3 card, the newly installed standby TCC2/TCC2P/TCC3 card automatically copies the software version from the active TCC2/TCC2P/TCC3 card. You do not need to do anything in this situation. However, the loading TCC2/TCC2P/TCC3 card does not boot up in the normal manner. When the standby card is first inserted, the LEDs follow most of the normal boot-up sequence. However, after the red FAIL LED turns on for about 5 seconds, the FAIL LED and the ACT/STBY LED begin to flash alternately for up to 30 minutes while the new software loads onto the active TCC2/TCC2P/TCC3 card. After loading the new software, the upgraded TCC2/TCC2P/TCC3 card's LEDs repeat the appropriate bootup sequence, and the amber ACT/STBY LED turns on.

Note If you insert a card into a slot provisioned for a different card, all LEDs turn off.

Note Alarm LEDs might be on; disregard alarm LEDs until you are logged into CTC and can view the Alarms tab.

Step 9 Return to your originating procedure (NTP).

DLP-G34 Install the AIC-I Card

Purpose	This task installs the AIC-I card. The AIC-I card provides connections for external alarms and controls (environmental alarms).
Tools/Equipment	AIC-I card
Prerequisite Procedures	DLP-G33 Install the TCC2, TCC2P, or TCC3 Card, page 3-35
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note When installing cards, allow each card to boot completely before installing the next card.

Step 1 Open the latches/ejectors on the card.

Step 2 Use the latches/ejectors to firmly slide the card along the guide rails in Slot 9 until the card plugs into the receptacle at the back of the slot.

Step 3 Verify that the card is inserted correctly and close the latches/ejectors on the card.

Note It is possible to close the latches/ejectors when the card is not completely plugged into the backplane. Ensure that you cannot insert the card any further.

Step 4 Verify the following:

- The red FAIL LED blinks for up to 10 seconds.

  Note If the red FAIL LED does not turn on, check the power.

- The PWR A and PWR B LEDs become red, the two INPUT/OUTPUT LEDs become amber, and the ACT LED turns green for approximately 5 seconds.
- The PWR A and PWR B LEDs turn green, the INPUT/OUTPUT LEDs turn off, and the green ACT LED remains on.

  Note It might take up to 3 minutes for the PWR A and PWR B LEDs to update.

  Note If you insert a card into a slot provisioned for a different card, no LEDs turn on.

  Note If the red FAIL LED is on continuously or the LEDs act erratically, the card is not installed properly. Remove the card and repeat Steps 1 to 4.

Step 5 Return to your originating procedure (NTP).

DLP-G309 Install the MS-ISC-100T Card

Purpose	This task installs redundant MS-ISC-100T cards. The MS-ISC-100T card is required for a multishelf node configuration. It provides LAN redundancy on the node controller shelf. An alternative to using the MS-ISC-100T card is the Cisco Catalyst 2950, although Cisco recommends using the MS-ISC-100T. For more information on the Catalyst 2950 installation, refer to the Catalyst 2950 product documentation.
Tools/Equipment	MS-ISC-100T card (2)
Prerequisite Procedures	DLP-G33 Install the TCC2, TCC2P, or TCC3 Card, page 3-35
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note When installing cards, allow each card to boot completely before installing the next card.

Note The MS-ISC-100T is not supported in a subtended shelf.

Step 1 Open the latches/ejectors on the card.

Step 2 Use the latches/ejectors to firmly slide the card along the guide rails into the appropriate slot in the node controller shelf until the card plugs into the receptacle at the back of the slot. The card can be installed in any slot from Slot 1 to 6 or 12 to 17. Cisco recommends that you install the MS-ISC-100T cards in Slot 6 and Slot 12.

Step 3 Verify that the card is inserted correctly and close the latches/ejectors on the card.

Note It is possible to close the latches/ejectors when the card is not completely plugged into the backplane. Ensure that you cannot insert the card any further.

Step 4 Verify the LED activity:

- The red FAIL LED blinks for 35 to 45 seconds.
- The red FAIL LED turns on for 15 to 20 seconds.
- The red FAIL LED blinks for approximately 3 minutes.
- The red FAIL LED turns on for approximately 6 minutes.
- The green ACT or ACT/STBY LED turns on. The SF LED can persist until all card ports connect to their far end counterparts and a signal is present.

Note If the red FAIL LED does not turn on, check the power.

Note If you insert a card into a slot provisioned for a different card, all LEDs turn off.

Step 5 Repeat Steps 1 through 4 for the redundant MS-ISC-100T card.

Step 6 Return to your originating procedure (NTP).

NTP-G313 Install and Configure the TNC, TNCE, TSC, or TSCE Card

Purpose	This procedure describes how to install and configure the TNC, TNCE, TSC, or TSCE card. TNC, TNCE, TSC, and TSCE cards are the control cards needed for the ONS 15454 M2 and ONS 15454 M6 platforms.
Tools/Equipment	Redundant TNC/TNCE/TSC/TSCE cards on ONS 15454 M6 shelf (required) Stand-alone TNC/TNCE/TSC/TSCE card on ONS 15454 M2 shelf (required)
Prerequisite Procedures	Following procedures in the *Cisco ONS 15454 Hardware Installation Guide:* • "NTP-G271 Install the Power and Ground to the ONS 15454 M2 Shelf" • "NTP-G14 Install DWDM Equipment"
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

Caution Always use the supplied ESD wristband when working with a powered ONS 15454 M2 and ONS 15454 M6 shelf assemblies. For detailed instructions on how to wear the ESD wristband, refer to the *Electrostatic Discharge and Grounding Guide for Cisco CPT and Cisco ONS Platforms*.

Note If you install a card incorrectly, the FAIL LED flashes continuously.

Step 1 Complete the "DLP-G604 Install the TNC, TNCE, TSC, or TSCE Card" task on page 3-42.

Note If you install the wrong card in a slot, see the NTP-G107 Remove Permanently or Remove and Replace DWDM Cards.

Step 2 Complete the "DLP-G605 Provision PPM and Port for the TNC and TNCE Cards" task on page 3-45.

Step 3 Complete the "DLP-G606 Configure UDC and VoIP for the TNC and TNCE Cards" task on page 3-45.

Step 4 Complete the "DLP-G774 Change the Frame Type on the OSC" task on page 3-46.

Stop. You have completed this procedure.

DLP-G604 Install the TNC, TNCE, TSC, or TSCE Card

Purpose	(ONS 15454 M2 and ONS 15454 M6 only) This task installs redundant TNC/TNCE/TSC/TSCE cards on the ONS 15454 M6 shelf and a stand-alone TNC/TNCE/TSC/TSCE card on the ONS 15454 M2 shelf. Install and initialize the TNC/TNCE/TSC/TSCE card before installing any other line cards into the shelf assemblies. On the ONS 15454 M6 shelf, install the TNC/TNCE/TSC/TSCE cards in slots 1 and 8 for redundancy. On the ONS 15454 M2 shelf, install the stand-alone TNC/TNCE/TSC/TSCE card in slot 1.
Tools/Equipment	Two TNC/TNCE/TSC/TSCE cards for the ONS 15454 M6 shelf and one TNC/TNCE/TSC/TSCE card for the ONS 15454 M2 shelf
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note The ONS 15454 M2 shelf supports stand-alone control cards such as TNC, TSC, TNCE, or TSCE. During replacement or removal of the control card, ensure that the optical fibers are not disturbed. The fibers must be correctly routed in the retention feature mounted on the front side of the shelf.

Caution Do not remove the TNC/TNCE/TSC/TSCE cards during the software installation process, which is indicated by alternate flashing FAIL and ACT/STBY LEDs. Removing the TNC/TNCE/TSC/TSCE cards during the software installation process will corrupt the system memory.

Note Allow each TNC/TNCE/TSC/TSCE card to boot completely before installing the redundant TNC/TNCE/TSC/TSCE card.

Note On the ONS 15454 M6 shelf, install the TNC/TNCE/TSC/TSCE cards in slots 1 and 8 for redundancy. On the ONS 15454 M2 shelf, install the stand-alone TNC/TNCE/TSC/TSCE card in slot 1. For more information, see the "Card Slot Requirements" section in the *Cisco ONS 15454 Hardware Installation Guide*.

Note You cannot insert the TNC/TNCE/TSC/TSCE cards in other slots due to mechanical constraints. To identify the card slot, match the symbol placed on the lower side of the card front panel with the symbol in the shelf.

Caution To achieve redundancy, two TNC and TNCE cards or two TSC and TSCE cards must be installed in the ONS 15454 M6 shelf. Do not install one TNC or TNCE card and a redundant TSC or TSCE card in the same shelf.

Step 1 Open the latches/ejectors of the first TNC/TNCE/TSC/TSCE card that you will install.

Step 2 Use the latches/ejectors to firmly slide the card horizontally along the guide rails until the card plugs into the receptacle at the back of the slot (slot 1 or 8 in the ONS 15454 M6 shelf and slot 1 in the ONS 15454 M2 shelf).

Step 3 Verify that the card is inserted correctly, and close the latches/ejectors on the card.

If you insert a card into a slot assigned for a different card, all LEDs turn off.

Step 4 As needed, verify the LED activity on the TNC/TNCE/TSC/TSCE card.

- The red FAIL LED, PWR LED turn on briefly.
- The red FAIL LED turns on for about 10 seconds.
- The red FAIL LED and the amber ACT/STBY LED turn on for about 30 seconds.
- The red FAIL LED blinks for about 10 seconds.
- The red FAIL LED turns on for about 15 seconds.
- All the LEDs including the CRIT, MAJ, MIN, REM, SYNC, and ACO LEDs blink once and turn off for about 10 seconds.
- ACT/STBY LED blinks for about 1 second.
- All the LEDs including the CRIT, MAJ, MIN, REM, SYNC, and ACO LEDs turn off for about 10 seconds.
- The ACT/STBY, ACO, and PWR LEDs turn on.
- The boot-up process is complete when the PWR LEDs turn green and the amber ACT/STBY remains on. The ACT/STBY LED turns green if this is the first TNC/TNCE/TSC/TSCE card installed, and amber if this is the second TNC/TNCE/TSC/TSCE card installed.

Note It might take up to four minutes for the power alarms to clear.

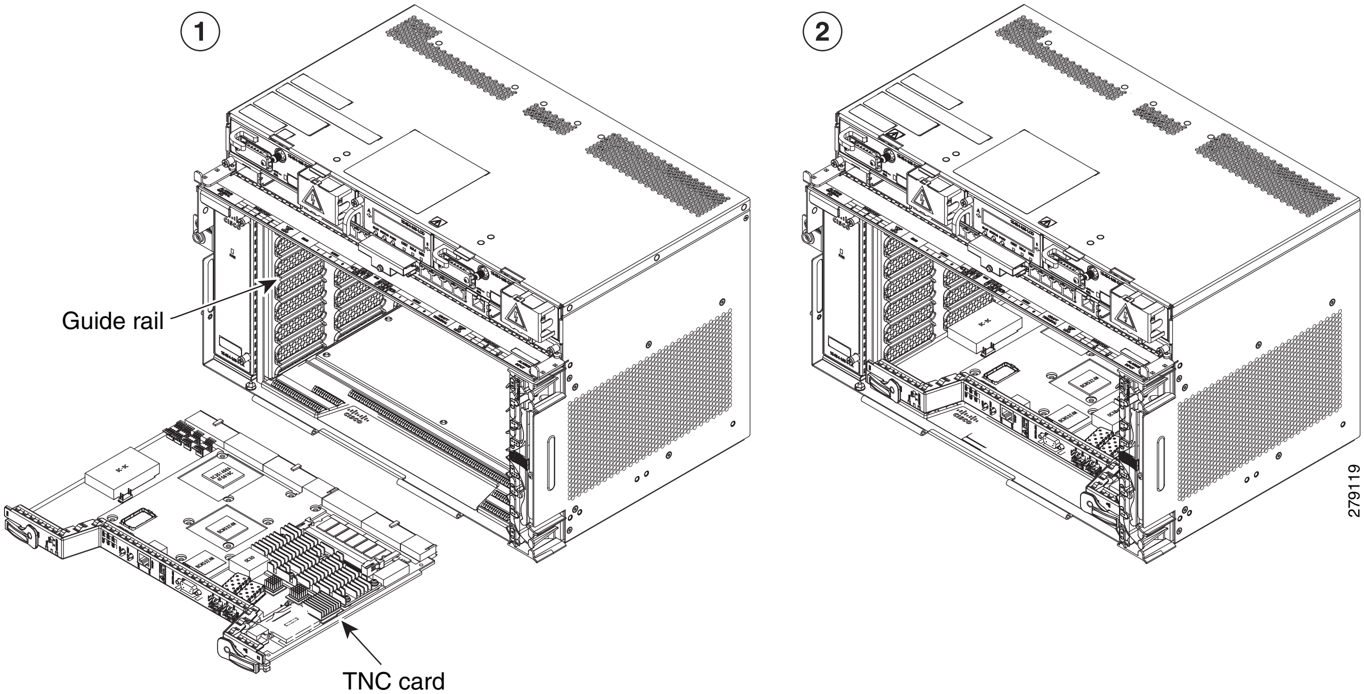
Note Alarm LEDs might be on. After completing the TNC/TNCE/TSC/TSCE card installation, log in to CTC and click the Alarms tab to display the alarms raised on the card. For procedure to clear the alarm, see the *Cisco ONS DWDM Troubleshooting Guide*.

Note During the TNC/TNCE/TSC/TSCE card initialization, the SFTWDOWN alarm appears twice. The alarm clears after the TNC/TNCE/TSC/TSCE card boots completely.

Note If the FAIL LED is on continuously, see the tip in Step 8 about the TNC/TNCE/TSC/TSCE card automatic upload.

Figure 3-15 illustrates the installation of TNC and TNCE cards on ONS 15454 M6 shelf.

Figure 3-15 Installing TNC and TNCE Cards on ONS 15454 M6 Shelf



Step 5 Verify that the ACT/STBY LED is green if this is the first powered-up TNC/TNCE/TSC/TSCE card installed or amber if this is the second powered-up TNC/TNCE/TSC/TSCE. The IP address, temperature of the node, and time of day appear on the LCD. The default time and date is 12:00 AM, January 1, 1970.

Step 6 The LCD cycles through the IP address (the default is 192.1.0.2), node name, and software version. Verify that the correct software version is shown on the LCD. The software text string indicates the node type (SDH or SONET) and software release. (For example: SDH 09.20-05L-20.10 indicates it is an SDH software load, Release 9.2. The numbers following the release number do not have any significance.)

Step 7 If the LCD shows the correct software version, continue with Step 8. If the LCD does not show the correct software version, refer to your next level of technical support, upgrade the software, or remove the TNC/TNCE/TSC/TSCE card and install a replacement card. Refer to the release-specific software upgrade document to replace the software.

Step 8 (ONS 15454 M6 shelf only) Repeat Steps 1 through 7 for the redundant TNC/TNCE/TSC/TSCE card.

Tip If you install a standby TNC/TNCE/TSC/TSCE card that has a different software version than the active TNC/TNCE/TSC/TSCE card, the standby TNC/TNCE/TSC/TSCE card copies the software version from the active TNC/TNCE/TSC/TSCE card. When the standby card is first inserted, the LEDs follow the normal boot-up sequence. However, after the red FAIL LED turns on for about 5 seconds, the FAIL LED and the ACT/STBY LED begin to flash alternately for up to 30 minutes. After loading the new software, the upgraded TNC/TNCE/TSC/TSCE cards LEDs repeat the appropriate bootup sequence, and the amber ACT/STBY LED turns on.

Step 9 Return to your originating procedure (NTP).

DLP-G605 Provision PPM and Port for the TNC and TNCE Cards

Purpose	(ONS 15454 M2 and ONS 15454 M6 only) This task provisions a PPM and port on TNC and TNCE cards. PPMs are created to support the OSC function.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	None

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TNC and TNCE cards where you want to provision PPM and port settings.

Step 2 Click the **Provisioning > Pluggable Port Modules** tabs.

Step 3 In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.

Step 4 In the Create PPM dialog box, complete the following:

- PPM—Choose 1 or 2 from the PPM drop-down list.
- PPM Type—Displays the PPM associated with the chosen PPM in the above step.

Step 5 Click **OK**. The newly created PPM appears in the Pluggable Port Modules area. The row in the Pluggable Port Modules area becomes white when the PPM is inserted and the Actual Equipment Type column lists the name of PPM.

Step 6 In the Pluggable Ports area, click **Create**. The Create Port dialog box appears.

Step 7 In the Create Ports dialog box, complete the following:

- Port—Choose the port you want to configure from the Port drop-down list.
- Port Type—Choose the port type, such as OC-3, FE, or ONE-GE from the Port Type drop-down list.

Note OC-3 can be configured only on PPM port 1. FE and ONE-GE can be configured on both the ports. If the port type is FE, then disable ALS before provisioning OSC on that port.

Step 8 Click **OK**. The newly created port appears in the Pluggable Ports area. The port type you provisioned is listed in the Rate column.

Step 9 Repeat Steps 3 through 8 to provision another PPM and port on the TNC and TNCE cards.

Step 10 Return to your originating procedure (NTP).

DLP-G606 Configure UDC and VoIP for the TNC and TNCE Cards

Purpose	(ONS 15454 M2 and ONS 15454 M6 only) This task configures UDC and VoIP traffic for the TNC and TNCE cards.
Tools/Equipment	None

Prerequisite Procedures	DLP-G46 Log into CTC NTP-G38 Provision OSC Terminations, page 14-126 DLP-G605 Provision PPM and Port for the TNC and TNCE Cards, page 3-45
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	None

Note Each TNC and TNCE cards support UDC/VoIP configuration. You can configure UDC or VoIP on the two SFP ports present on the TNC and TNCE cards. The TNC and TNCE cards support the UDC/VoIP configuration only when OSC is provisioned on the SFP ports.

Note If two nodes are connected through the fiber and if the TNC and TNCE cards in one node has UDC configuration, the TNC and TNCE cards in the other node must also have UDC configuration. The same rule applies to VoIP configuration.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TNC and TNCE cards where you want to configure UDC and VoIP.

Step 2 Click the **Provisioning > UDC / VOIP** tabs.

Step 3 From the Service Type drop-drop list, choose UDC or VOIP.

Note You can configure UDC or VoIP on only one SFP port at a time per TNC or TNCE card. If you want to configure UDC or VoIP on the second SFP port, choose NONE from the Service Type drop-down list for the first port and then choose UDC or VoIP for the second port.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G774 Change the Frame Type on the OSC

Purpose	This task changes the frame type on the OSC.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	None

Step 1 Delete the OC-3, STM1, FE, or ONE_GE OSC communication channel. See DLP-G186 Delete an OSC Termination.

Step 2 Click the **Provisioning > WDM-ANS > Internal Patchcords** tabs.

Step 3 Choose the internal patchcord that is associated with OSC and click **Delete**.

Step 4 Delete the OSC payload on the TNC/TNCE card.

   a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TNC/TNCE card where you want to delete the OSC payload.

   b. Click the **Provisioning** > **Pluggable Port Modules** tabs.

   c. In the Pluggable Ports area, choose the OSC payload that you want to delete and click **Delete**.

Step 5 Provision the OSC payload on the TNC/TNCE card. See "DLP-G605 Provision PPM and Port for the TNC and TNCE Cards" procedure on page 3-45.

> **Note** OC-3/STM1 can be configured only on port 1. FE and ONE-GE can be configured on both the ports.

Step 6 Provision the internal patchcord from the OSC on the TNC card to the corresponding line card. See Virtual Patchcords.

Step 7 Provision the OSC communication channel. See NTP-G38 Provision OSC Terminations.

Step 8 Repeat the above steps for the other node.

Step 9 Return to your originating procedure (NTP).

CHAPTER 4

Setup Optical Service Channel Cards

This chapter describes the optical service channel (OSC) cards for Cisco ONS 15454 dense wavelength division multiplexing (DWDM) networks. For card safety and compliance information, refer to the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document.

Note Unless noted otherwise, the cards described in this chapter are supported on the Cisco ONS 15454, Cisco ONS 15454 M6, Cisco ONS 15454 M2 platforms.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

4.1 Card Overview

This section provides card summary and compatibility information.

Note Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. The cards are then installed into slots displaying the same symbols. For a list of slots and symbols, see the "Card Slot Requirements" section in the *Cisco ONS 15454 Hardware Installation Guide*.

An optical service channel (OSC) is a bidirectional channel connecting two adjacent nodes in a DWDM ring. For every DWDM node (except terminal nodes), two different OSC terminations are present, one for the west side and another for the east side. The channel transports OSC overhead that is used to manage ONS 15454 DWDM networks. An OSC signal uses the 1510-nm wavelength and does not affect client traffic. The primary purpose of this channel is to carry clock synchronization and orderwire channel communications for the DWDM network. It also provides transparent links between each node in the network. The OSC is an OC-3/STM-1 formatted signal.

There are two versions of the OSC modules: the OSCM, and the OSC-CSM, which contains the OSC wavelength combiner and separator component in addition to the OSC module.

The Mesh/Multiring Upgrade (MMU) card is used to optically bypass a given wavelength from one section of the network or ring to another one without requiring 3R regeneration.

Note On 15454-M2 and 15454-M6 shelves, the TNC and TNCE cards include the functions of the OSCM card. OSC can be created on the OC3 port (SFP-0) of the TNC and TNCE cards.

The TNC and TNCE cards support two optical service channels (OSC): primary OSC and secondary OSC.

The primary optical service channel (SFP-0) supports the following interfaces:

- OC-3/STM-1
- Fast Ethernet (FE)
- Gigabit Ethernet (GE).

The secondary optical service channel (SFP-1) supports the following interfaces:

- Fast Ethernet (FE)
- Gigabit Ethernet (GE).

4.1.1 Card Summary

Table 4-1 lists and summarizes the functions of each card.

Table 4-1 OSCM, and OSC-CSM Card Summary

Card	Port Description	For Additional Information
OSCM	The OSCM has one set of optical ports and one Ethernet port located on the faceplate. It operates in Slots 8 and 10.	See the "4.3 OSCM Card" section on page 4-3.
OSC-CSM	The OSC-CSM has three sets of optical ports and one Ethernet port located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "4.4 OSC-CSM Card" section on page 4-6.

4.1.2 Card Compatibility

Table 4-2 lists the CTC software compatibility for the OSC and OSCM cards.

Table 4-2 Software Release Compatibility for Optical Service Channel Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
OSCM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OSC-CSM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4.2 Class 1 Laser Safety Labels

For information about safety labels, see the "G.1 Safety Labels" section on page G-1.

4.3 OSCM Card

(Cisco ONS 15454 only)

Note For OSCM card specifications, see the OSCM Card Specifications document.

Note On 15454-M2 and 15454-M6 shelves, the TNC and TNCE cards include the functions of the OSCM card.

The OSCM card is used in amplified nodes that include the OPT-BST, OPT-BST-E, or OPT-BST-L booster amplifier. The OPT-BST, OPT-BST-E, and OPT-BST-L cards include the required OSC wavelength combiner and separator component. The OSCM cannot be used in nodes where you use OC-N/STM-N cards, electrical cards, or cross-connect cards. The OSCM uses Slots 8 and 10, which are also cross-connect card slots.

The OSCM supports the following features:

- OC-3/STM-1 formatted OSC
- Supervisory data channel (SDC) forwarded to the TCC2/TCC2P/TCC3 cards for processing
- Distribution of the synchronous clock to all nodes in the ring
- 100BaseT far-end (FE) User Channel (UC)
- Monitoring functions such as orderwire support and optical safety

The OC-3/STM-1 section data communications channel (SDCC or RS-DCC) overhead bytes are used for network communications. An optical transceiver terminates the OC-3/STM-1, then it is regenerated and converted into an electrical signal. The SDCC or RS-DCC bytes are forwarded to the active and standby TCC2/TCC2P/TCC3 cards for processing through the system communication link (SCL) bus on the backplane. Orderwire bytes (E1, E2, F1) are also forwarded via the SCL bus to the TCC2/TCC2P/TCC3 for forwarding to the AIC-I card.

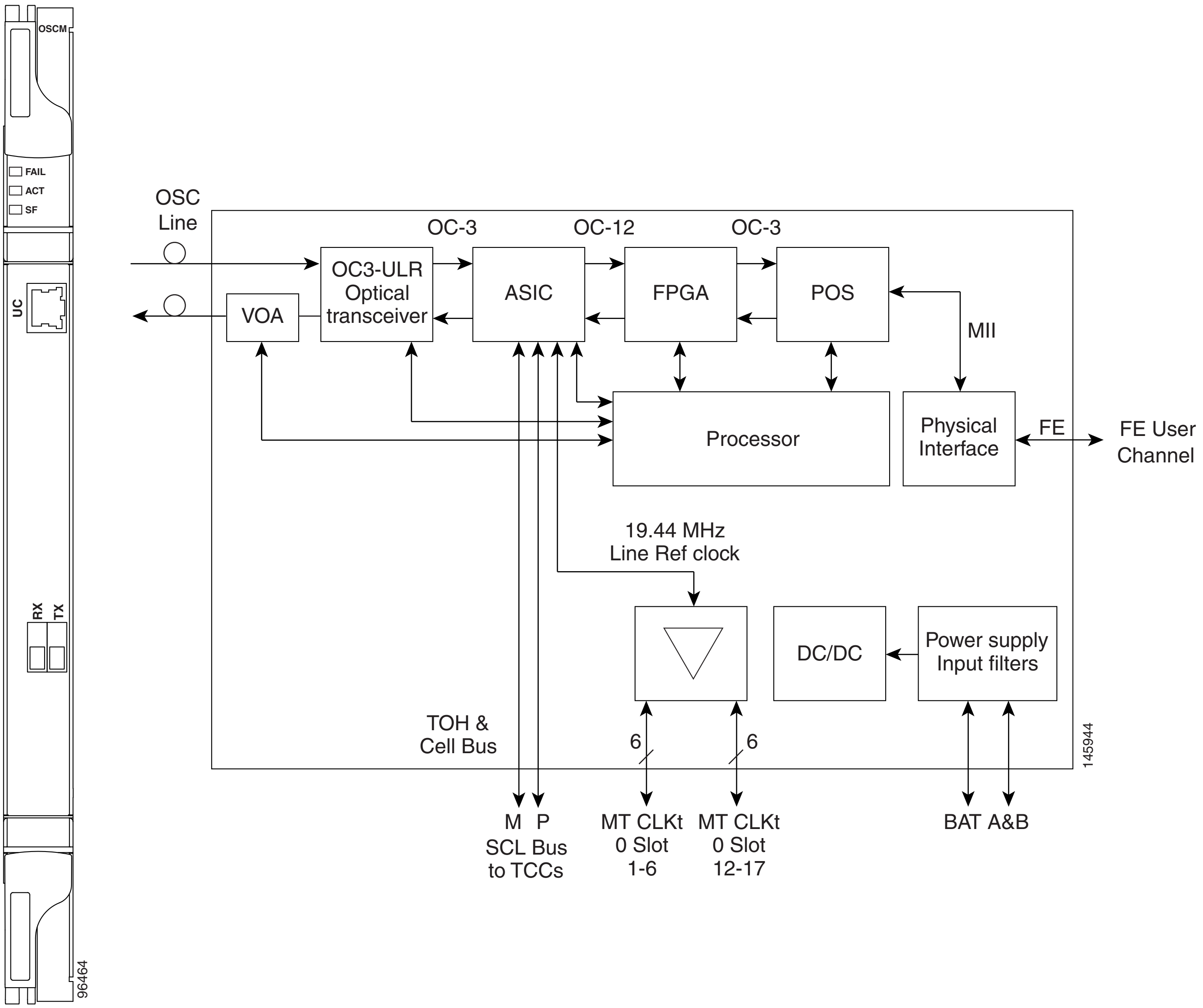
The payload portion of the OC-3/STM-1 is used to carry the fast Ethernet UC. The frame is sent to a packet-over-SONET/SDH (POS) processing block that extracts the Ethernet packets and makes them available at the RJ-45 connector.

The OSCM distributes the reference clock information by removing it from the incoming OC-3/STM-1 signal and then sending it to the DWDM cards. The DWDM cards then forward the clock information to the active and standby TCC2/TCC2P/TCC3 cards.

4.3.1 Faceplate and Block Diagram

Figure 4-1 shows the OSCM card faceplate and block diagram.

Figure 4-1 OSCM Card Faceplate

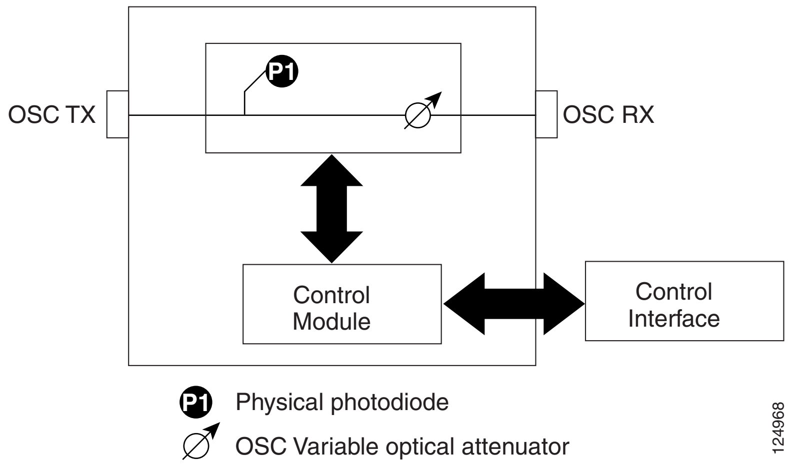


For information on safety labels for the card, see the "4.2 Class 1 Laser Safety Labels" section on page 4-3.

Figure 4-2 shows the block diagram of the variable optical attenuator (VOA) within the OSCM.

The OSCM has one OC-3/STM-1 optical port located on the faceplate. One long-reach OSC transmits and receives the OSC to and from another DWDM node. Both DCN data and FE payload are carried on this link.

Figure 4-2 OSCM VOA Optical Module Functional Block Diagram



4.3.2 OSCM Card Functions

The functions of the OSCM card are:

- 4.3.2.1 OSCM Card Power Monitoring
- Card level indicators—Table G-5 on page G-9
- G.4 Port-Level Indicators, page G-9

4.3.2.1 OSCM Card Power Monitoring

Physical photodiode P1 monitors the power for the OSCM card. The returned power level value is calibrated to the OSC TX port (Table 4-3).

Table 4-3 OSCM VOA Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Output OSC	OSC TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide*.

4.3.3 Related Procedures for the OSCM Card

The following is the list of procedures and tasks related to the configuration of the OSCM card:

- NTP-G39 Verify OSCM Transmit Power, page 14-129
- NTP-G45 Perform the C-Band and L-Band Line Amplifier Node with OSCM Cards Acceptance Test, page 21-75
- NTP-G47 Perform the C-Band Line Amplifier Node with OSCM and OSC-CSM Cards Acceptance Test, page 21-87

- NTP-G157 Perform the L-Band Line Amplifier Node with OSCM and OSC-CSM Cards Acceptance Test, page 21-91
- NTP-G48 Perform the OADM Node Acceptance Test on a Symmetric Node with OSCM Cards, page 21-95
- DLP-G93 Verify Add and Drop Connections on an OADM Node with OSCM Cards, page 21-105
- DLP-G139 View PM Parameters for OSCM and OSC-CSM cards
- NTP-G90 Modify OSCM and OSC-CSM Card Line Settings and PM Thresholds, page 20-2

4.4 OSC-CSM Card

Note For OSC-CSM card specifications, see the OSC-CSM Card Specifications document.

The OSC-CSM card is used in unamplified nodes. This means that the booster amplifier with the OSC wavelength combiner and separator is not required for OSC-CSM operation. The OSC-CSM can be installed in Slots 1 to 6 and 12 to 17. To operate in hybrid mode, the OSC-CSM cards must be accompanied by cross-connect cards. The cross-connect cards enable functionality on the OC-N/STM-N cards and electrical cards.

The OSC-CSM supports the following features:

- Optical combiner and separator module for multiplexing and demultiplexing the optical service channel to or from the wavelength division multiplexing (WDM) signal
- OC-3/STM-1 formatted OSC
- SDC forwarded to the TCC2/TCC2P/TCC3 cards for processing
- Distribution of the synchronous clock to all nodes in the ring
- 100BaseT FE UC
- Monitoring functions such as orderwire support
- Optical safety: Signal loss detection and alarming, fast transmitted power shut down by means of an optical 1x1 switch
- Optical safety remote interlock (OSRI), a feature capable of shutting down the optical output power
- Automatic laser shutdown (ALS), a safety mechanism used in the event of a fiber cut. For details on ALS provisioning for the card, see the DLP-G203 Change the OSCM and OSC-CSM ALS Maintenance Settings, page 20-12. For information on using the card to implement ALS in a network, see the "13.11 Network Optical Safety" section on page 13-30.

The WDM signal coming from the line is passed through the OSC combiner and separator, where the OSC signal is extracted from the WDM signal. The WDM signal is sent along with the remaining channels to the COM port (label on the front panel) for routing to the OADM or amplifier units, while the OSC signal is sent to an optical transceiver.

The OSC is an OC-3/STM-1 formatted signal. The OC-3/STM-1 SDCC or RS-DCC overhead bytes are used for network communications. An optical transceiver terminates the OC-3/STM-1, and then it is regenerated and converted into an electrical signal. The SDCC or RS-DCC bytes are forwarded to the active and standby TCC2/TCC2P/TCC3 cards for processing via the SCL bus on the backplane. Orderwire bytes (E1, E2, F1) are also forwarded via the SCL bus to the TCC2/TCC2P/TCC3 for forwarding to the AIC-I card.

The payload portion of the OC-3/STM-1 is used to carry the fast Ethernet UC. The frame is sent to a POS processing block that extracts the Ethernet packets and makes them available at the RJ-45 front panel connector.

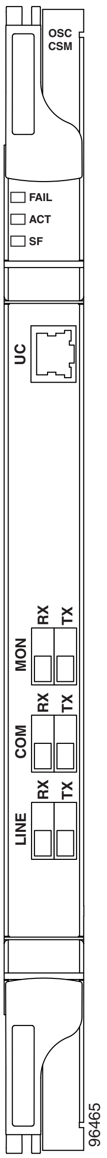
The OSC-CSM distributes the reference clock information by removing it from the incoming OC-3/STM-1 signal and then sending it to the active and standby TCC2/TCC2P/TCC3 cards. The clock distribution is different from the OSCM card because the OSC-CSM does not use Slot 8 or 10 (cross-connect card slots).

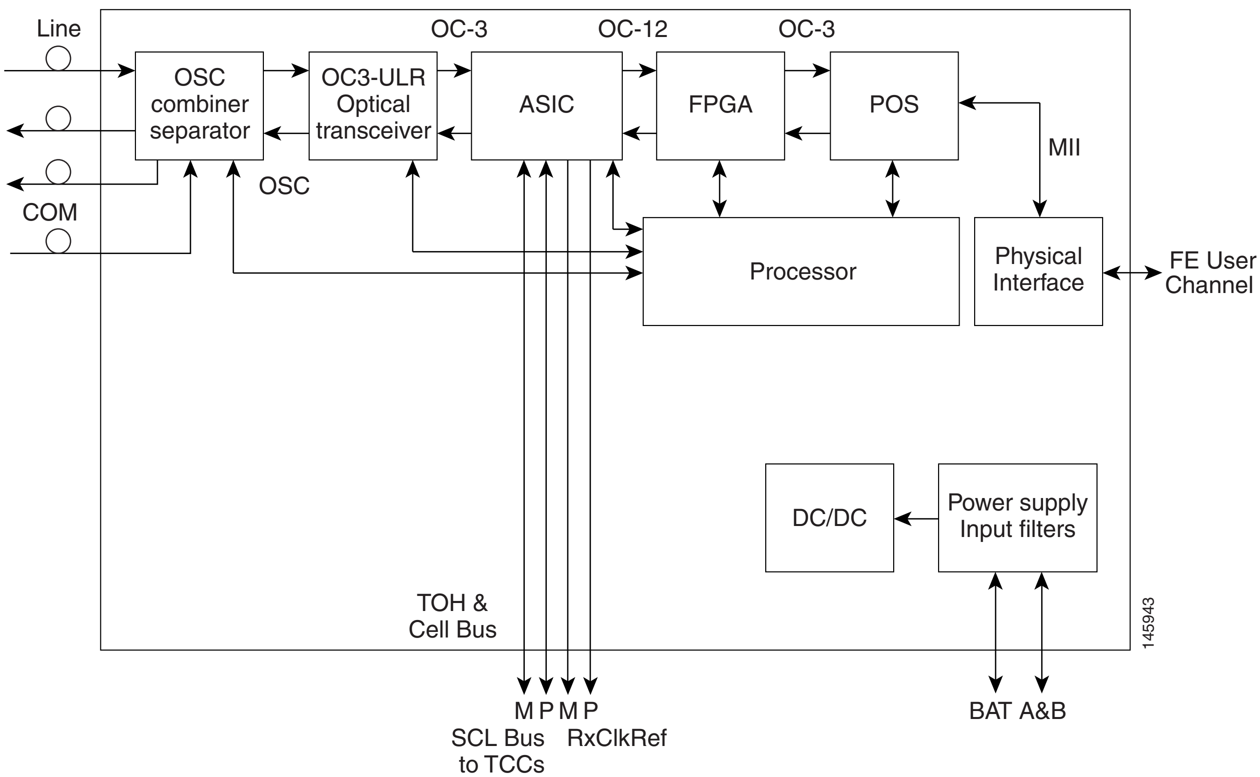
Note S1 and S2 (Figure 4-5 on page 4-10) are optical splitters with a splitter ratio of 2:98. The result is that the power at the MON TX port is about 17 dB lower than the relevant power at the COM RX port, and the power at the MON RX port is about 20 dB lower than the power at the COM TX port. The difference is due to the presence of a tap coupler for the P1 photodiode.

4.4.1 Faceplate and Block Diagram

Figure 4-3 shows the OSC-CSM faceplate.

Figure 4-3   OSC-CSM Faceplate





For information on safety labels for the card, see the "4.2 Class 1 Laser Safety Labels" section on page 4-3.

The OSC-CSM has a OC3 port and three other sets of ports located on the faceplate.

Figure 4-4 shows a block diagram of the OSC-CSM card.

Figure 4-4 *OSC-CSM Block Diagram*

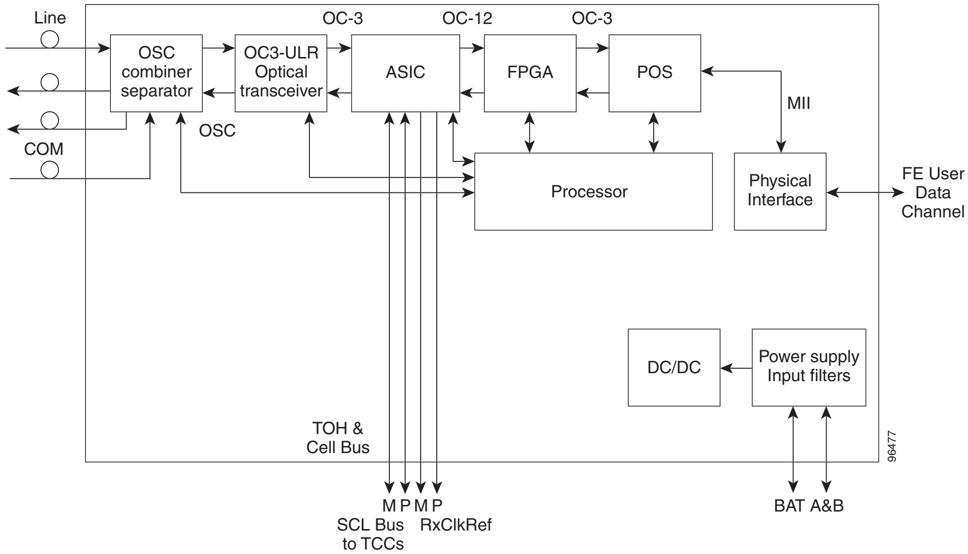
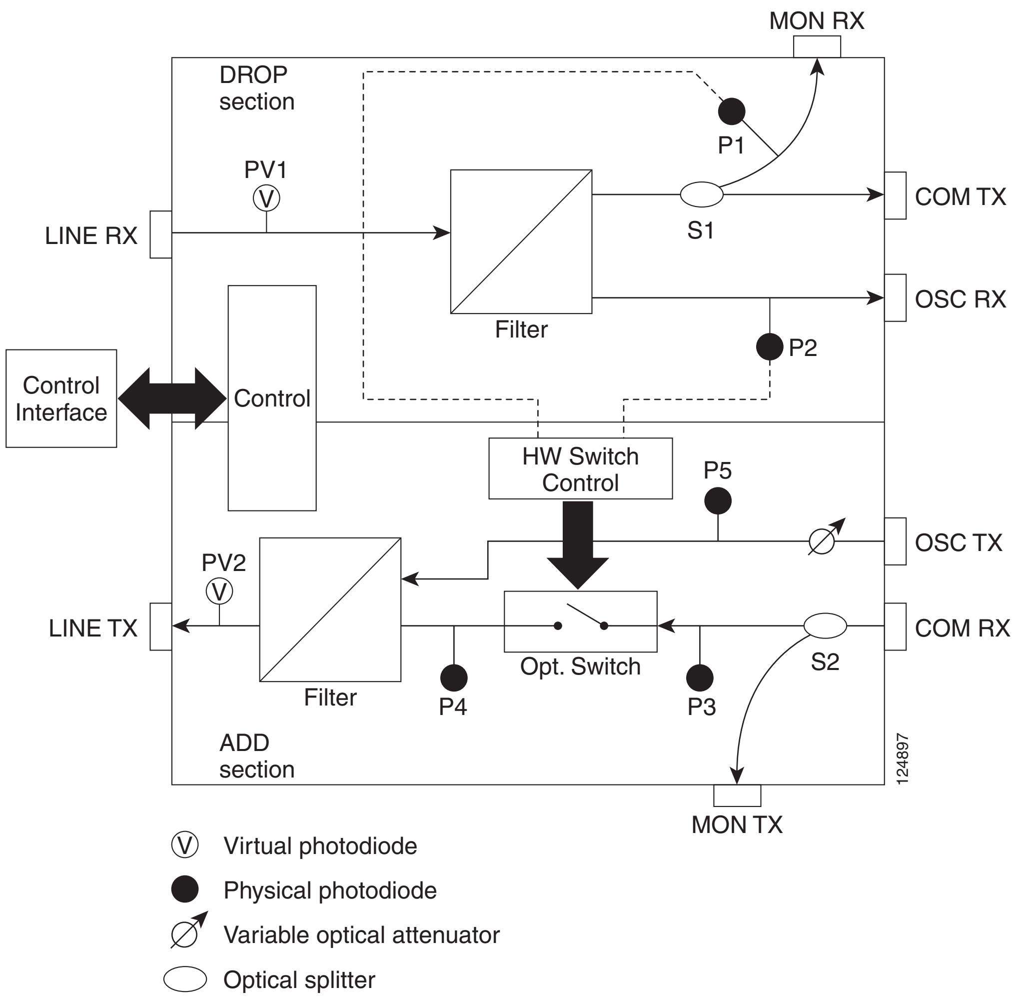


Figure 4-5 shows the OSC-CSM optical module functional block diagram.

Figure 4-5 OSC-CSM Optical Module Functional Block Diagram



4.4.2 OSC-CSM Card Functions

The functions of the OSC-CSM card are:

- 4.4.2.1 OSC-CSM Card Power Monitoring
- G.34 Alarms and Thresholds, page G-26
- Card level indicators—Table G-5 on page G-9
- G.4 Port-Level Indicators, page G-9

4.4.2.1 OSC-CSM Card Power Monitoring

Physical photodiodes P1, P2, P3, and P5 monitor the power for the OSC-CSM card. Their function is as follows:

- P1: The returned power value is calibrated to the LINE RX port, including the insertion loss of the previous filter (the reading of this power dynamic range has been brought backward towards the LINE RX output).
- P2: The returned value is calibrated to the LINE RX port.
- P3: The returned value is calibrated to the COM RX port.
- P5: The returned value is calibrated to the OSC TX port, including the insertion loss of the subsequent filter.

The returned power level values are calibrated to the ports as shown in Table 4-4.

Table 4-4 OSC-CSM Port Calibration

Photodiode	CTC Type Name	Calibrated to Port	Power	PM Parameters
P1	Input Line	LINE RX	Channel Power	Supported
			OSC Power	
P2	Input Line	LINE RX	OSC Power	Supported
P3	Input Com	COM RX	Channel Power	Supported
P5	Output OSC	OSC TX	OSC Power	Supported

The OSC power on the LINE TX is the same as the power reported from P5.

The PM parameters for the power values are listed in the Optics and 8b10b PM Parameter Definitions document.

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide*.

4.4.3 Related Procedures for the OSC-CSM Card

The following is the list of procedures and tasks related to the configuration of the OSC-CSM card:

- NTP-G46 Perform the C-Band Line Amplifier Node with OSC-CSM Cards Acceptance Test, page 21-79
- NTP-G156 Perform the L-Band Line Amplifier Node with OSC-CSM Cards Acceptance Test, page 21-83
- NTP-G47 Perform the C-Band Line Amplifier Node with OSCM and OSC-CSM Cards Acceptance Test, page 21-87
- NTP-G157 Perform the L-Band Line Amplifier Node with OSCM and OSC-CSM Cards Acceptance Test, page 21-91
- NTP-G49 Perform the Active OADM Node Acceptance Test on a Symmetric Node with OSC-CSM Cards, page 21-107
- NTP-G50 Perform the Passive OADM Node Acceptance Test on a Symmetric Node with OSC-CSM Cards, page 21-113
- DLP-G139 View PM Parameters for OSCM and OSC-CSM cards
- NTP-G90 Modify OSCM and OSC-CSM Card Line Settings and PM Thresholds, page 20-2

CHAPTER 5

Provision Optical Amplifier Cards

This chapter describes the optical amplifier cards used in Cisco ONS 15454 dense wavelength division multiplexing (DWDM) networks and related procedures.

For card safety and compliance information, refer to the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document.

Note The cards described in this chapter are supported on the Cisco ONS 15454, Cisco ONS 15454 M6, Cisco ONS 15454 M2 platforms, unless noted otherwise.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Note In this chapter, "RAMAN-CTP" refers to the 15454-M-RAMAN-CTP card. "RAMAN-COP" refers to the 15454-M-RAMAN-COP card.

Chapter topics include the nine types of ONS 15454 DWDM amplifiers:

5.1 Card Overview

This section provides summary and compatibility information for the optical amplifier cards.

Note Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. Cards should be installed in slots that have the same symbols. See the *Cisco ONS 15454 Hardware Installation Guide* for a list of slots and symbols.

Optical amplifier card architecture includes an optical plug-in module with a controller that manages optical power, laser current, and temperature control loops. An amplifier also manages communication with the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card and operation, administration, maintenance, and provisioning (OAM&P) functions such as provisioning, controls, and alarms.

5.1.1 Applications

The following amplifiers can be configured as booster or preamplifiers:

- OPT-AMP-C
- OPT-AMP-17C
- OPT-AMP-L
- OPT-BST-E
- OPT-BST
- OPT-EDFA-17
- OPT-EDFA-24

The amplifier functions as a booster amplifier by default. The amplifier role is automatically configured when the CTP NE update configuration file is loaded in CTC. The amplifier role can also be manually modified.

Note The OPT-BST and OPT-BST-E amplifiers are supported as preamplifiers in sites that are equipped with the OPT-RAMP-C card. In any other configuration, the OPT-BST and OPT-BST-E cards must be configured as a booster amplifier.

For more information about the supported configurations and network topologies, see Chapter 12, "Node Reference" and Chapter 13, "Network Reference."

5.1.2 Card Summary

Table 5-1 lists and summarizes the functions of each optical amplifier card.

Table 5-1 Optical Amplifier Cards for the ONS 15454

Card	Port Description	For Additional Information
OPT-PRE	The OPT-PRE amplifier has five optical ports (three sets) located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "5.3 OPT-PRE Amplifier Card" section on page 5-7.
OPT-BST	The OPT-BST amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "5.4 OPT-BST and OPT-BST-E Amplifier Card" section on page 5-11.
OPT-BST-E	The OPT-BST-E amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "5.4 OPT-BST and OPT-BST-E Amplifier Card" section on page 5-11.
OPT-BST-L	The OPT-BST-L L-band amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "5.5 OPT-BST-L Amplifier Card" section on page 5-15.
OPT-AMP-L	The OPT-AMP-L L-band preamplifier has five sets of optical ports located on the faceplate. It is a two-slot card that operates in Slots 1 to 6 and 12 to 17.	See the "5.6 OPT-AMP-L Card" section on page 5-20.
OPT-AMP-17-C	The OPT-AMP-17-C C-band low-gain preamplifier/booster amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "5.7 OPT-AMP-17-C Card" section on page 5-25.
OPT-AMP-C	The OPT-AMP-C C-band high-gain, high-power preamplifier/booster amplifier has five sets of optical ports located on the faceplate. It operates as a preamplifier when equipped and provisioned in Slots 2 to 6 and 11 to 16 or as a booster amplifier when equipped and provisioned in Slot 1 and 17.	See the "5.8 OPT-AMP-C Card" section on page 5-30.
OPT-RAMP-C	The OPT-RAMP-C C-band amplifier has five sets of optical ports located on the faceplate and operates in Slots 1 to 5 and 12 to 16.	See the "5.9 OPT-RAMP-C and OPT-RAMP-CE Cards" section on page 5-34.
OPT-RAMP-CE	The OPT-RAMP-CE C-band amplifier has five sets of optical ports located on the faceplate and operates in Slots 1 to 5 and 12 to 16.	See the "5.9 OPT-RAMP-C and OPT-RAMP-CE Cards" section on page 5-34.
RAMAN-CTP	The RAMAN-CTP amplifier is a single-slot card and has six optical ports located on the faceplate. The RAMAN-CTP and RAMAN-COP units must be installed in adjacent slots (Slots 2 and 3, 4 and 5, or 6 and 7) in the ONS 15454 M6 chassis and Slots 2 and 3 in the ONS 15454 M2 chassis.	See the "5.10 RAMAN-CTP and RAMAN-COP Cards" section on page 5-39.
RAMAN-COP	The RAMAN-COP amplifier has one optical port located on the faceplate. It is a single-slot card and works in conjunction with the RAMAN-CTP amplifier.	See the "5.10 RAMAN-CTP and RAMAN-COP Cards" section on page 5-39.

Table 5-1 Optical Amplifier Cards for the ONS 15454 (continued)

Card	Port Description	For Additional Information
OPT-EDFA-17	The OPT-EDFA-17 amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "5.11 OPT-EDFA-17 and OPT-EDFA-24 Cards" section on page 5-45
OPT-EDFA-24	The OPT-EDFA-24 amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "5.11 OPT-EDFA-17 and OPT-EDFA-24 Cards" section on page 5-45

5.1.3 Card Compatibility

Table 5-2 lists the Cisco Transport Controller (CTC) software compatibility for each optical amplifier card.

Table 5-2 Software Release Compatibility for Optical Amplifier Cards up to Release 5.0

Card Type	R4.5	R4.6	R4.7	R5.0
OPT-PRE	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
OPT-BST	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
OPT-BST-E	No	No	15454-DWDM	15454-DWDM
OPT-BST-L	No	No	No	No
OPT-AMP-L	No	No	No	No
OPT-AMP-17-C	No	No	No	No
OPT-AMP-C	No	No	No	No
OPT-RAMP-C	No	No	No	No
OPT-RAMP-CE	No	No	No	No
RAMAN-CTP	No	No	No	No
RAMAN-COP	No	No	No	No
OPT-EDFA-17	No	No	No	No
OPT-EDFA-24	No	No	No	No

Table 5-3 Software Release Compatibility for Optical Amplifier Cards Release 6.0 and Later

Card Type	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R 9.2	R 9.2.1	R 9.3	R 9.4
OPT-PRE	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6
OPT-BST	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6
OPT-BST-E	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6
OPT-BST-L	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
OPT-AMP-L	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
OPT-AMP-17-C	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6
OPT-AMP-C	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6
OPT-RAMP-C	No	No	No	No	No	15454-DWDM	15454-DWDM	ONS 15454, 15454-M6	ONS 15454, 15454-M6	ONS 15454, 15454-M6	ONS 15454, 15454-M6
OPT-RAMP-CE	No	No	No	No	No	No	15454-DWDM	ONS 15454, 15454-M6	ONS 15454, 15454-M6	ONS 15454, 15454-M6	ONS 15454, 15454-M6
RAMAN-CTP	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6	15454-M2, 15454-M6
RAMAN-COP	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6	15454-M2, 15454-M6
OPT-EDFA-17	No	No	No	No	No	No	No	No	No	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6
OPT-EDFA-24	No	No	No	No	No	No	No	No	No	ONS 15454, 15454-M2, 15454-M6	ONS 15454, 15454-M2, 15454-M6

5.1.4 Optical Power Alarms and Thresholds

Table 5-4 lists the alarms and related thresholds for the OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-17-C, and OPT-AMP-C cards.

Table 5-4 Alarms and Thresholds

Port	Alarms	Thresholds
LINE RX	LOS	None
	LOS-P	LOS-P Fail Low
	LOS-O	LOS-O Fail Low
LINE TX	OPWR-FAIL	OPWR Fail Low
OSC TX	None	None
OSC RX	None	None
COM TX	None	None
COM RX	LOS-P	LOS-P Fail Low

5.2 Class 1M Laser Safety Labels

For information about safety labels, see the "G.1 Safety Labels" section on page G-1.

5.3 OPT-PRE Amplifier Card

Note For OPT-PRE card specifications, see the OPT-PRE Amplifier Card Specifications section in the *Hardware Specifications* document.

Note For OPT-PRE card safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

The OPT-PRE is a C-band, DWDM, two-stage erbium-doped fiber amplifier (EDFA) with midamplifier loss (MAL) that can be connected to a dispersion compensating unit (DCU). The OPT-PRE is equipped with a built-in variable optical attenuator (VOA) that controls the gain tilt and can also be used to pad the DCU to a reference value. You can install the OPT-PRE in Slots 1 to 6 and 12 to 17. The card is designed to support up to 80 channels at 50-GHz channel spacing. The OPT-PRE features include:

- Fixed gain mode with programmable tilt
- True variable gain
- Fast transient suppression
- Nondistorting low-frequency transfer function
- Settable maximum output power
- Fixed output power mode (mode used during provisioning)

- MAL for fiber-based DCU
- Amplified spontaneous emissions (ASE) compensation in fixed gain mode
- Full monitoring and alarm handling with settable thresholds
- Four signal photodiodes to monitor the input and output optical power of the two amplifier stages through CTC
- An optical output port for external monitoring

Note The optical splitter has a ratio of 1:99, resulting in about 20 dB-lower power at the MON port than at the COM TX port.

5.3.1 OPT-PRE Faceplate Ports and Block Diagram

The OPT-PRE amplifier has five optical ports located on the faceplate:

- MON is the output monitor port
- COM RX (receive) is the input signal port
- COM TX (transmit) is the output signal port
- DC RX is the MAL input signal port
- DC TX is the MAL output signal port

Figure 5-1 shows the OPT-PRE amplifier card faceplate.

Figure 5-1 OPT-PRE Faceplate

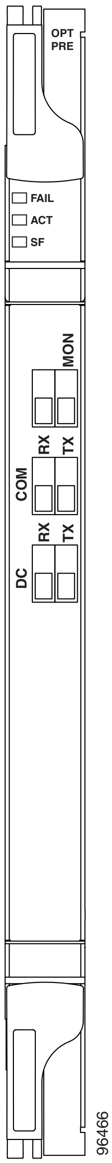


Figure 5-2 shows a simplified block diagram of the OPT-PRE card's features.

Figure 5-2 ***OPT-PRE Block Diagram***

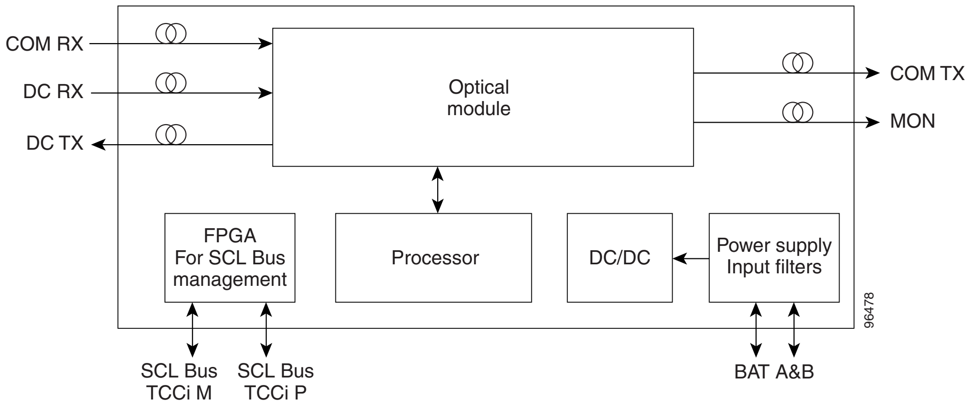
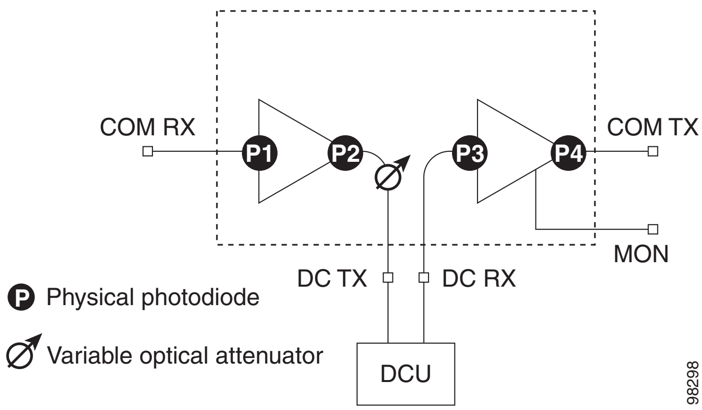


Figure 5-3 shows the a block diagram of how the OPT-PRE optical module functions.

Figure 5-3 ***OPT-PRE Optical Module Functional Block Diagram***



5.3.2 OPT-PRE Card Functions

The functions of the OPT-PRE card are:

- 5.3.2.1 OPT-PRE card Power Monitoring
- Card level indicators—Table G-4 on page G-9
- G.4 Port-Level Indicators, page G-9

5.3.2.1 OPT-PRE card Power Monitoring

Physical photodiodes P1, P2, P3, and P4 monitor the power for the OPT-PRE card. Table 5-5 shows the returned power level values calibrated to each port.

Table 5-5 OPT-PRE Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Input Com	COM RX
P2	Output DC	DC TX
P3	Input DC	DC RX
P4	Output COM (Total Output)	COM TX
	Output COM (Signal Output)	

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in Cisco ONS SONET TL1 Command Guide.

5.3.3 Related Procedures for OPT-PRE Card

The following is the list of procedures and tasks related to the configuration of the OPT-PRE card:

- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G38 Provision OSC Terminations, page 14-126
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- NTP-G77 Manage Automatic Power Control
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

5.4 OPT-BST and OPT-BST-E Amplifier Card

Note For OPT-BST and OPT-BST-E hardware specifications, see the OPT-BST Amplifier Card Specifications and OPT-BST-E Amplifier Card Specifications sections in the *Hardware Specifications* document.

Note For OPT-BST and OPT-BST-E cards safety labels, see the “G.1.2 Class 1M Laser Product Cards” section on page G-4.

The OPT-BST is designed to ultimately support up to 80 channels at 50-GHz channel spacing. The OPT-BST-E amplifier card is a gain-enhanced version of the OPT-BST card. It is designed to support up to 80 channels at 50-GHz channel spacing. Both the cards are C-band, DWDM EDFA with optical service channel (OSC) add-and-drop capability. When an OPT-BST or an OPT-BST-E is installed in the an ONS 15454, an OSCM card is also needed to process the OSC. You can install the OPT-BST and OPT-BST-E cards in Slots 1 to 6 and 12 to 17. The card's features include:

- Fixed gain mode (with programmable tilt)
- Gain range of 5 to 20 dB in constant gain mode and output power mode for an OPT-BST card
- Gain range of 8 to 23 dBm with the tilt managed at 0 dBm in constant gain mode and output power mode for an OPT-BST-E card
- Enhanced gain range of 23 to 26 dBm with unmanaged tilt with OPT-BST-E card
- True variable gain
- Built-in VOA to control gain tilt
- Fast transient suppression
- Nondistorting low-frequency transfer function
- Settable maximum output power
- Fixed output power mode (mode used during provisioning)
- ASE compensation in fixed gain mode
- Full monitoring and alarm handling with settable thresholds
- Optical Safety Remote Interlock (OSRI), a CTC software feature capable of shutting down optical output power or reducing the power to a safe level (automatic power reduction)
- Automatic laser shutdown (ALS), a safety mechanism used in the event of a fiber cut. For information about using the card to implement ALS in a network, see the "13.11 Network Optical Safety" section on page 13-30.

Note The optical splitters each have a ratio of 1:99. The result is that MON TX and MON RX port power is about 20 dB lower than COM TX and COM RX port power.

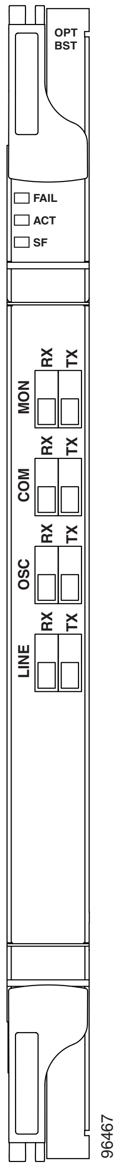
5.4.1 OPT-BST and OPT-BST-E Faceplate Ports and Block diagram

The OPT-BST and OPT-BST-E amplifier has eight optical ports located on the faceplate:

- MON RX is the output monitor port (receive section).
- MON TX is the output monitor port.
- COM RX is the input signal port.
- LINE TX is the output signal port.
- LINE RX is the input signal port (receive section).
- COM TX is the output signal port (receive section).
- OSC RX is the OSC add input port.
- OSC TX is the OSC drop output port.

Figure 5-4 shows the OPT-BST amplifier card faceplate.

Figure 5-4 OPT-BST Faceplate



The OPT-BST-E card faceplate is the same as that of the OPT-BST card.

Figure 5-5 shows a simplified block diagram of the OPT-BST and OPT-BST-E card’s features.

Figure 5-5 OPT-BST and OPT-BST-E Block Diagram

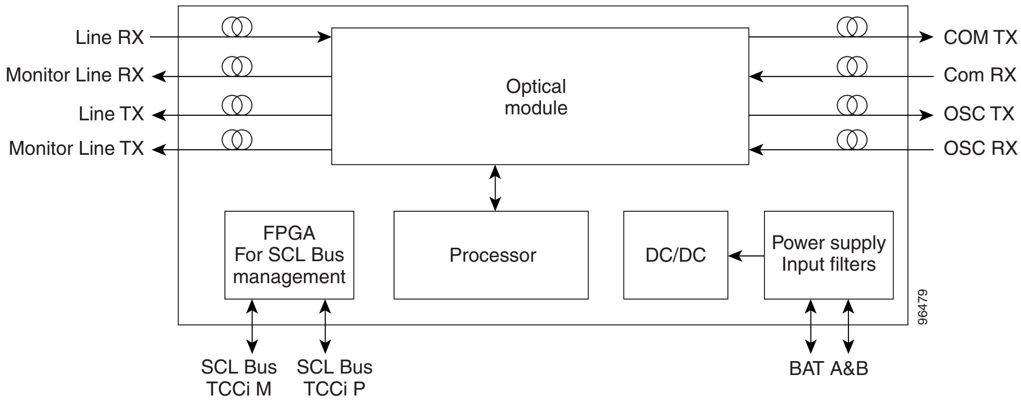
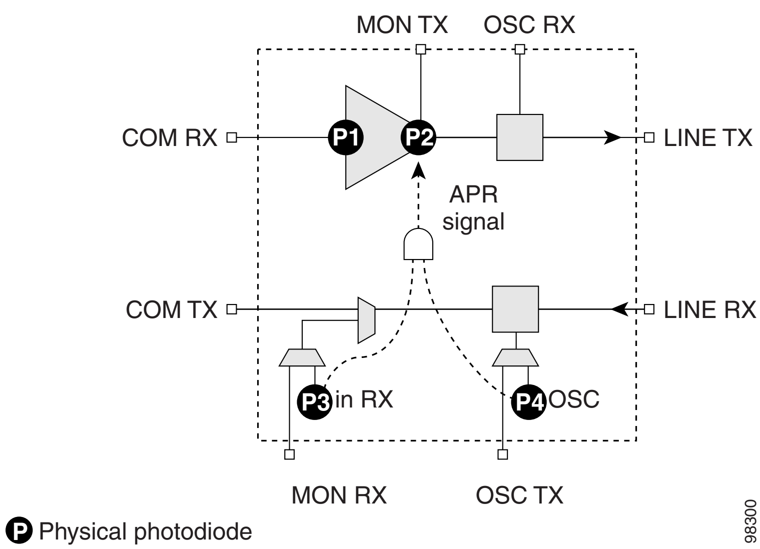


Figure 5-6 shows a block diagram of how the OPT-BST and OPT-BST-E optical module functions.

Figure 5-6 OPT-BST and OPT-BST-E Optical Module Functional Block Diagram



5.4.2 OPT-BST and OPT-BST-E Card Functions

The functions of the OPT-BST and OPT-BST-E cards are:

- 5.4.2.1 OPT-BST and OPT-BST-E cards Power Monitoring
- Card level indicators—Table G-4 on page G-9
- G.4 Port-Level Indicators, page G-9

5.4.2.1 OPT-BST and OPT-BST-E cards Power Monitoring

Physical photodiodes P1, P2, P3, and P4 monitor the power for the OPT-BST and OPT-BST-E cards. Table 5-6 shows the returned power level values calibrated to each port.

Table 5-6 Port Calibration

Photodiode	CTC Type Name	Calibrated to Port	Power	PM Parameter
P1	Input Com	COM RX	Channel Power	Supported
P2	Output Line (Total Output)	LINE TX	Channel Power	Supported
	Output Line (Signal Output)			
P3	Input Line	LINE RX	Channel Power	Supported
P4	Input Line	LINE RX	OSC Power	Supported

The power on the OSC-TX and COM-TX ports are calculated by adding the insertion loss (IL) to the power reported from P3 and P4.

The PM parameters for the power values are listed in the Optics and 8b10b PM Parameter Definitions document.

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide*.

5.4.3 Related Procedures for OPT-BST and OPT-BST-E Cards

The following is the list of procedures and tasks related to the configuration of the OPT-BST and OPT-BST-E cards:

- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G38 Provision OSC Terminations, page 14-126
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- DLP-G140 View Power Statistics for Optical Amplifier, 40-SMR1-C, and 40-SMR2-C Cards
- NTP-G77 Manage Automatic Power Control
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

5.5 OPT-BST-L Amplifier Card

(Cisco ONS 15454 only)

Note For OPT-BST-L card specifications, see the OPT-BST-L Amplifier Card Specifications section in the *Hardware Specifications* document.

Note For OPT-BST-L safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

The OPT-BST-L is an L-band, DWDM EDFA with OSC add-and-drop capability. The card is well suited for use in networks that employ dispersion shifted (DS) fiber or SMF-28 single-mode fiber. The OPT-BST-L is designed to ultimately support 64 channels at 50-GHz channel spacing, but in Software R9.0 and earlier it is limited to 32 channels at 100-GHz spacing.When an ONS 15454 has an OPT-BST-L installed, an OSCM card is needed to process the OSC. You can install the OPT-BST-L in Slots 1 to 6 and 12 to 17. The card's features include:

- Fixed gain mode (with programmable tilt)
- Standard gain range of 8 to 20 dB in the programmable gain tilt mode
- True variable gain
- 20 to 27 dB gain range in the uncontrolled gain tilt mode
- Built-in VOA to control gain tilt
- Fast transient suppression
- Nondistorting low-frequency transfer function
- Settable maximum output power
- Fixed output power mode (mode used during provisioning)
- ASE compensation in fixed gain mode
- Full monitoring and alarm handling with settable thresholds
- OSRI
- ALS

Note The optical splitters each have a ratio of 1:99. The result is that MON TX and MON RX port power is about 20 dB lower than COM TX and COM RX port power.

5.5.1 OPT-BST-L Faceplate Ports and Block Diagram

The OPT-BST-L amplifier has eight optical ports located on the faceplate:

- MON RX is the output monitor port (receive section).
- MON TX is the output monitor port.
- COM RX is the input signal port.
- LINE TX is the output signal port.
- LINE RX is the input signal port (receive section).
- COM TX is the output signal port (receive section).
- OSC RX is the OSC add input port.

- OSC TX is the OSC drop output port.

Figure 5-7 shows the OPT-BST-L card faceplate.

Figure 5-7 OPT-BST-L Faceplate

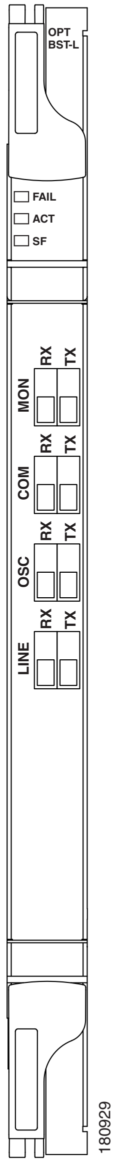


Figure 5-8 shows a simplified block diagram of the OPT-BST-L card's features.

Figure 5-8 OPT-BST-L Block Diagram

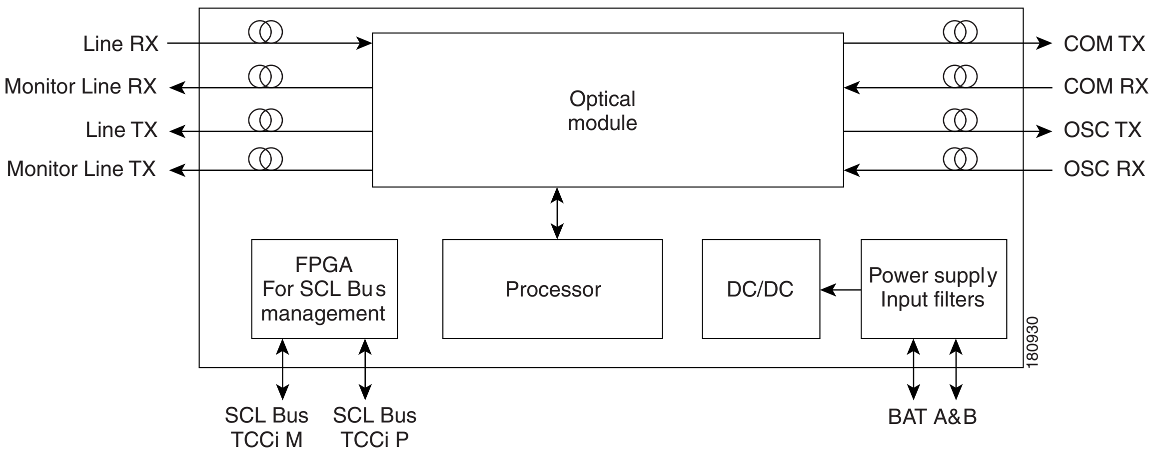
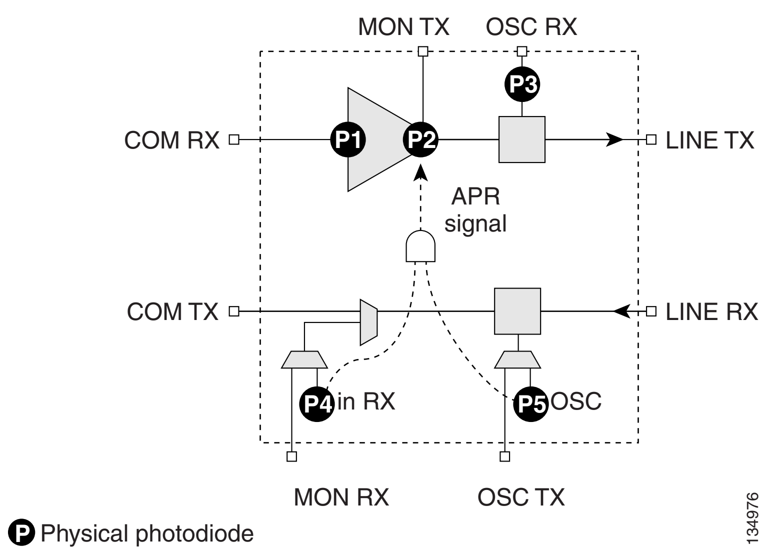


Figure 5-9 shows a block diagram of how the OPT-BST-L optical module functions.

Figure 5-9 OPT-BST-L Optical Module Functional Block Diagram



5.5.2 OPT-BST-L Card Functions

The functions of the OPT-BST-L card are:

- 5.5.2.1 OPT-BST-L Card Power Monitoring
- Card level indicators—Table G-4 on page G-9
- G.4 Port-Level Indicators, page G-9

5.5.2.1 OPT-BST-L Card Power Monitoring

Physical photodiodes P1, P2, P3, P4, and P5 monitor the power for the OPT-BST-L card. Table 5-7 shows the returned power level values calibrated to each port.

Table 5-7 OPT-BST-L Port Calibration

Photodiode	CTC Type Name	Calibrated to Port	Power	PM Parameter
P1	Input COM	COM RX	Channel Power	Supported
P2	Output Line (Total Output)	LINE TX	Channel Power	Supported
	Output Line (Signal Output)			
P3	Input OSC	OSC RX	OSC Power	Supported
P4	Input Line	LINE RX	Channel Power	Supported
P5	Input Line	LINE RX	OSC Power	Supported

The power values on the OSC-TX and COM-TX ports are calculated by adding the insertion loss (IL) to the power values reported from P4 and P5.

The OSC power on the LINE TX is calculated by adding the IL to the power reported from P3.

The PM parameters for the power values are listed in the Optics and 8b10b PM Parameter Definitions document.

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide*.

5.5.3 Related Procedures for OPT-BST-L Card

The following is the list of procedures and tasks related to the configuration of the OPT-BST-L card:

- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G38 Provision OSC Terminations, page 14-126
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- DLP-G140 View Power Statistics for Optical Amplifier, 40-SMR1-C, and 40-SMR2-C Cards
- NTP-G77 Manage Automatic Power Control
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

5.6 OPT-AMP-L Card

(Cisco ONS 15454 only)

Note For OPT-AMP-L card specifications, see the OPT-AMP-L Preamplifier Card Specifications section in the *Hardware Specifications* document.

Note For OPT-AMP-L card safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

The OPT-AMP-L is an L-band, DWDM optical amplifier card consisting of a two-stage EDFA with midstage access loss (MSL) for an external DCU and OSC add-and-drop capability. Using CTC, the card is provisionable as a preamplifier (OPT-PRE) or booster amplifier (OPT-BST), and is well suited for use in networks that employ DS or SMF-28 fiber. The amplifier can operate up to 64 optical transmission channels at 50-GHz channel spacing in the 1570 nm to 1605 nm wavelength range.

When an OPT-AMP-L installed, an OSCM card is needed to process the OSC. You can install the two-slot OPT-AMP-L in Slots 1 to 6 and 12 to 17.

The card has the following features:

- Maximum power output of 20 dBm
- True variable gain amplifier with settable range from 12 to 24 dBm in the standard gain range and 24 dBm to 35 dbM with uncontrolled gain tilt
- Built-in VOA to control gain tilt
- Up to 12 dBm MSL for an external DCU
- Fast transient suppression; able to adjust power levels in hundreds of microseconds to avoid bit errors in failure or capacity growth situations
- Nondistorting low frequency transfer function
- Midstage access loss for dispersion compensation unit
- Constant pump current mode (test mode)
- Constant output power mode (used during optical node setup)
- Constant gain mode
- Internal ASE compensation in constant gain mode and in constant output power mode
- Full monitoring and alarm handling capability
- Optical safety support through signal loss detection and alarm at any input port, fast power down control (less than one second), and reduced maximum output power in safe power mode. For information on using the card to implement ALS in a network, see the "13.11 Network Optical Safety" section on page 13-30.

Note Before disconnecting any OPT AMP-L fiber for troubleshooting, first make sure the OPT AMP-L card is unplugged.

5.6.1 OPT-AMP-L Faceplate Ports and Block Diagrams

The OPT-AMP-L amplifier card has ten optical ports located on the faceplate:

- MON RX is the output monitor port (receive section).
- MON TX is the output monitor port.
- COM RX is the input signal port.
- LINE TX is the output signal port.
- LINE RX is the input signal port (receive section).
- COM TX is the output signal port (receive section).
- OSC RX is the OSC add input port.
- OSC TX is the OSC drop output port.
- DC TX is the output signal to the DCU.
- DC RX is the input signal from the DCU.

Figure 5-10 shows the OPT-AMP-L card faceplate.

Figure 5-10 OPT-AMP-L Faceplate

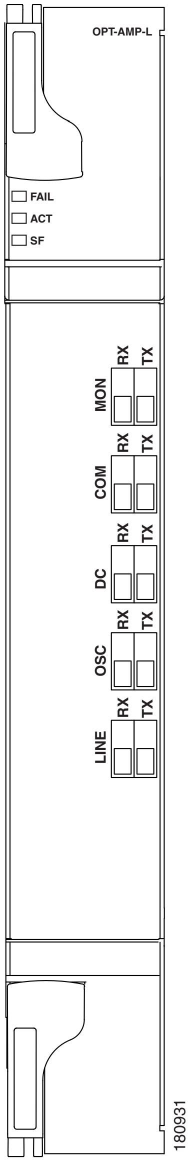


Figure 5-11 shows a simplified block diagram of the OPT-AMP-L card's features.

Figure 5-11 OPT-AMP-L Block Diagram

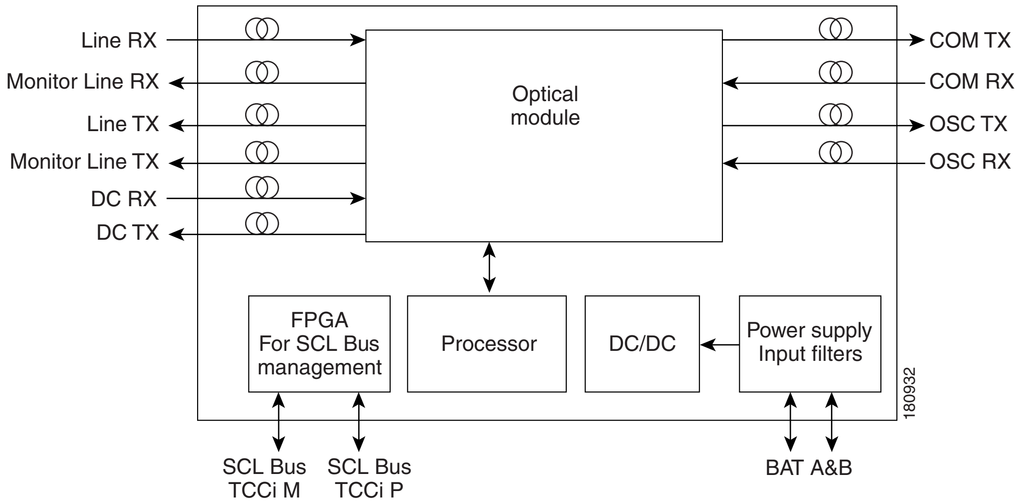
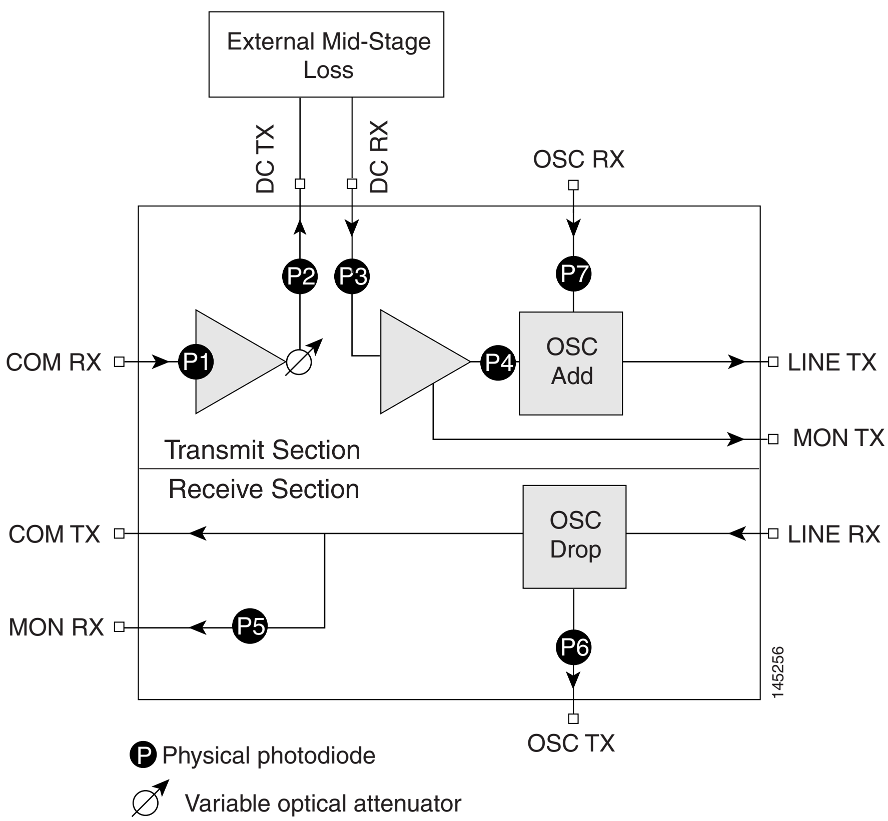


Figure 5-12 shows a block diagram of how the OPT-AMP-L optical module functions.

Figure 5-12 OPT-AMP-L Optical Module Functional Block Diagram



5.6.2 OPT-AMP-L Card Functions

The functions of the OPT-AMP-L card are:

- 5.6.2.1 OPT-AMP-L and OPT-AMP-C cards Power Monitoring
- Card level indicators—Table G-4 on page G-9
- G.4 Port-Level Indicators, page G-9

5.6.2.1 OPT-AMP-L and OPT-AMP-C cards Power Monitoring

Physical photodiodes P1 through P7 monitor the power for the OPT-AMP-L and OPT-AMP-C cards. Table 5-8 shows the returned power level values calibrated to each port.

Table 5-8 Port Calibration

Photodiode	CTC Type Name	Calibrated to Port	Power	PM Parameter
P1	Input COM	COM RX	Channel Power	Supported
P2	Output DC (total power)	DC TX	Channel Power	Supported
	Output DC (signal power)			
P3	Input DC (input power)	DC RX	Channel Power	Supported
P4	Output Line (total power)	LINE TX	Channel Power	Supported
	Output Line (signal power)			
P5	Input Line	LINE RX	Channel Power	Supported
P6	Input Line	LINE RX	OSC Power	Supported
P7	Input OSC	OSC RX	OSC Power	Supported

The power values on the OSC-TX and COM-TX ports are calculated by adding the insertion loss (IL) to the power values reported from P5 and P6.

The power values on the LINE TX port is calculated by adding the IL to the power value reported from P7.

The PM parameters for the power values are listed in the Optics and 8b10b PM Parameter Definitions document.

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide*.

5.6.3 Related Procedures for OPT-AMP-L Card

The following is the list of procedures and tasks related to the configuration of the OPT-AMP-L card:

- NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G38 Provision OSC Terminations, page 14-126

- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- DLP-G140 View Power Statistics for Optical Amplifier, 40-SMR1-C, and 40-SMR2-C Cards
- NTP-G77 Manage Automatic Power Control
- NTP-G160 Modify OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Line Settings and PM Thresholds, page 20-27
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

5.7 OPT-AMP-17-C Card

Note For OPT-AMP-17-C card specifications, see the OPT-AMP-17-C Amplifier Card Specifications section in the *Hardware Specifications* document.

Note For OPT-AMP-17-C safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

The OPT-AMP-17-C is a 17-dB gain, C-band, DWDM EDFA amplifier/preamplifier with OSC add-and-drop capability. It supports 80 channels at 50-GHz channel spacing in the C-band (that is, the 1529 nm to 1562.5 nm wavelength range). When an ONS 15454 has an OPT-AMP-17-C installed, an OSCM card is needed to process the OSC. You can install the OPT-AMP-17-C in Slots 1 to 6 and 12 to 17.

The card's features include:

- Fixed gain mode (no programmable tilt)
- Standard gain range of 14 to 20 dB at startup when configured as a preamplifier
- Standard gain range of 20 to 23 dB in the transient mode when configured as a preamplifier
- Gain range of 14 to 23 dB (with no transient gain range) when configured as a booster amplifier
- True variable gain
- Fast transient suppression
- Nondistorting low-frequency transfer function
- Settable maximum output power
- Fixed output power mode (mode used during provisioning)
- ASE compensation in fixed gain mode
- Full monitoring and alarm handling with settable thresholds
- OSRI
- ALS

5.7.1 OPT-AMP-17-C Faceplate Ports and Block Diagrams

The OPT-AMP-17-C amplifier card has eight optical ports located on the faceplate:

- MON RX is the output monitor port (receive section).
- MON TX is the output monitor port.
- COM RX is the input signal port.
- LINE TX is the output signal port.
- LINE RX is the input signal port (receive section).
- COM TX is the output signal port (receive section).
- OSC RX is the OSC add input port.
- OSC TX is the OSC drop output port.

Figure 5-13 shows the OPT-AMP-17-C amplifier card faceplate.

Figure 5-13 OPT-AMP-17-C Faceplate

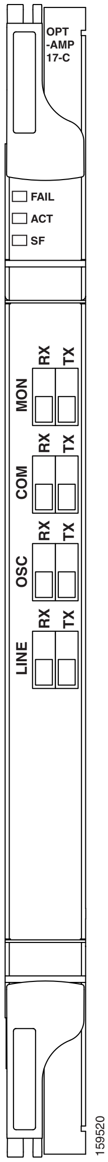


Figure 5-14 shows a simplified block diagram of the OPT-AMP-17C card's features.

Figure 5-14 OPT-AMP17-C Block Diagram

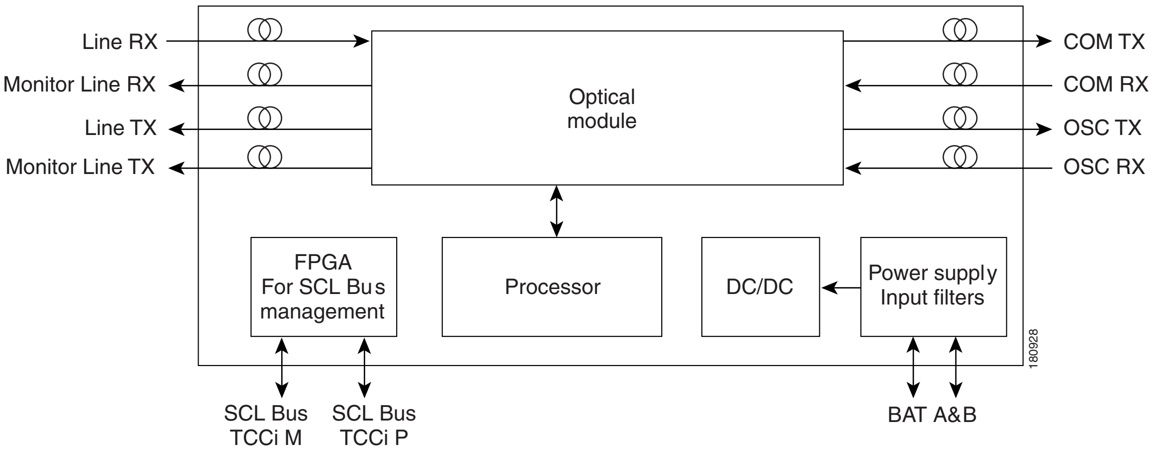
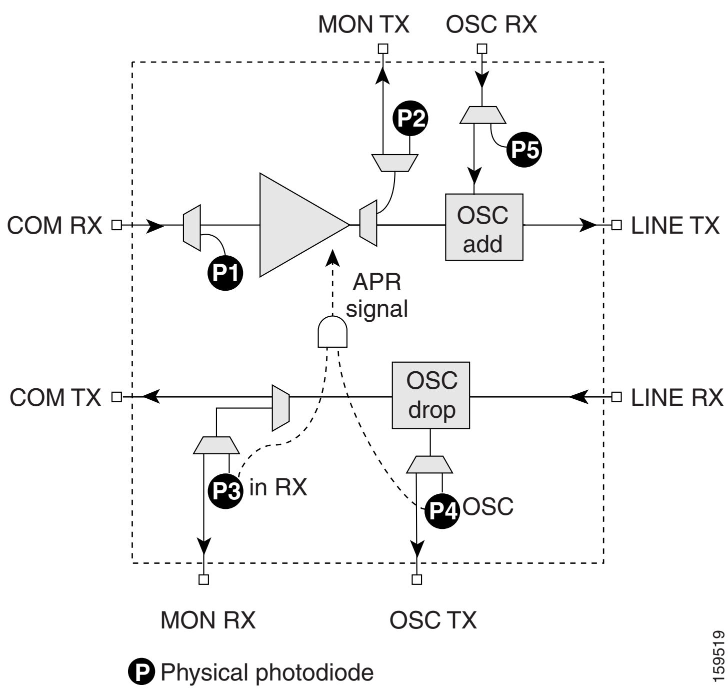


Figure 5-15 shows how the OPT-AMP-17-C optical module functions.

Figure 5-15 OPT-AMP-17-C Optical Module Functional Block Diagram



5.7.2 OPT-AMP-17-C Card Functions

The functions of the OPT-AMP-17-C card are:

- G.33 Automatic Power Control, page G-26
- 5.7.2.1 OPT-AMP-17-C card Power Monitoring
- Card level indicators—Table G-4 on page G-9

- G.4 Port-Level Indicators, page G-9

5.7.2.1 OPT-AMP-17-C card Power Monitoring

Physical photodiodes P1, P2, P3, P4, and P5 monitor power for the OPT-AMP-17-C card. Table 5-9 shows the returned power level values calibrated to each port.

Table 5-9 OPT-AMP-17-C Port Calibration

Photodiode	CTC Type Name	Calibrated to Port	Power	PM Parameter
P1	Input COM	COM RX	Channel Power	Supported
P2	Output Line (Total Output)	LINE TX	Channel Power	Supported
	Output Line (Signal Output)			
P3	Input Line	LINE RX	Channel Power	Supported
P4	Input Line	LINE RX	OSC Power	Supported
P5	Input OSC	OSC RX	OSC Power	Supported

The power on the OSC-TX and COM-TX ports are calculated by adding the insertion loss (IL) to the power reported from P3 and P4.

The OSC power on the LINE TX is calculated by adding the IL to the power reported from P5.

The PM parameters for the power values are listed in the Optics and 8b10b PM Parameter Definitions document.

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide*.

5.7.3 Related Procedures for OPT-AMP-17-C Card

The following is the list of procedures and tasks related to the configuration of the OPT-AMP-17-C card:

- NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G38 Provision OSC Terminations, page 14-126
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- DLP-G140 View Power Statistics for Optical Amplifier, 40-SMR1-C, and 40-SMR2-C Cards
- NTP-G77 Manage Automatic Power Control

- NTP-G160 Modify OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Line Settings and PM Thresholds, page 20-27
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

5.8 OPT-AMP-C Card

Note For OPT-AMP-C card specifications, see the OPT-AMP-C Amplifier Card Specifications section in the *Hardware Specifications* document.

Note For OPT-AMP-C card safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

The OPT-AMP-C card is a 20-dB output power, C-band, DWDM EDFA amplifier/preamplifier. It contains mid-stage access loss for a Dispersion Compensation Unit (DCU). To control gain tilt, a VOA is used. The VOA can also be used to attenuate the signal to the DCU to a reference value. The amplifier module also includes the OSC add (TX direction) and drop (RX direction) optical filters.

The OPT-AMP-C card supports 80 channels at 50-GHz channel spacing in the C-band (that is, the 1529 nm to 1562.5 nm wavelength range). When an ONS 15454 has an OPT-AMP-C card installed, an OSCM card is needed to process the OSC. You can install the OPT-AMP-C card in Slots 1 to 6 and 12 to 17. Slots 2 to 6 and Slots 12 to 16 are the default slots for provisioning the OPT-AMP-C card as a preamplifier, and slots 1 and 17 are the default slots for provisioning the OPT-AMP-C card as a booster amplifier.

The card's features include:

- Fast transient suppression
- Nondistorting low-frequency transfer function
- Mid-stage access for DCU
- Constant pump current mode (test mode)
- Fixed output power mode (mode used during provisioning)
- Constant gain mode
- ASE compensation in Constant Gain and Constant Output Power modes
- Programmable tilt
- Full monitoring and alarm handling capability
- Gain range with gain tilt control of 12 to 24 dB
- Extended gain range (with uncontrolled tilt) of 24 to 35 dB
- Full monitoring and alarm handling with settable thresholds
- OSRI
- ALS

5.8.1 OPT-AMP-C Card Faceplate Ports and Block Diagrams

The OPT-AMP-C amplifier card has 10 optical ports located on the faceplate:

- MON RX is the output monitor port (receive section).
- MON TX is the output monitor port.
- COM RX is the input signal port.
- COM TX is the output signal port (receive section).
- DC RX is the input DCU port.
- DC TX is the output DCU port.
- OSC RX is the OSC add input port.
- OSC TX is the OSC drop output port.
- LINE RX is the input signal port (receive section).
- LINE TX is the output signal port.

Figure 5-16 shows the OPT-AMP-C amplifier card faceplate.

Figure 5-16 OPT-AMP-C Card Faceplate

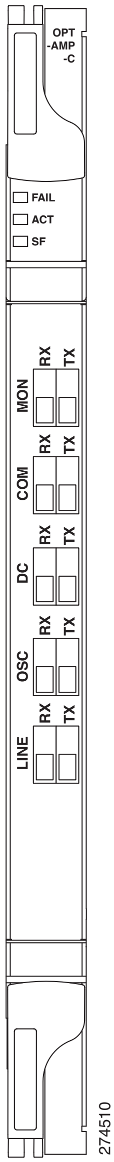


Figure 5-17 shows a simplified block diagram of the OPT-AMP-C card features.

Figure 5-17 OPT-AMP-C Block Diagram

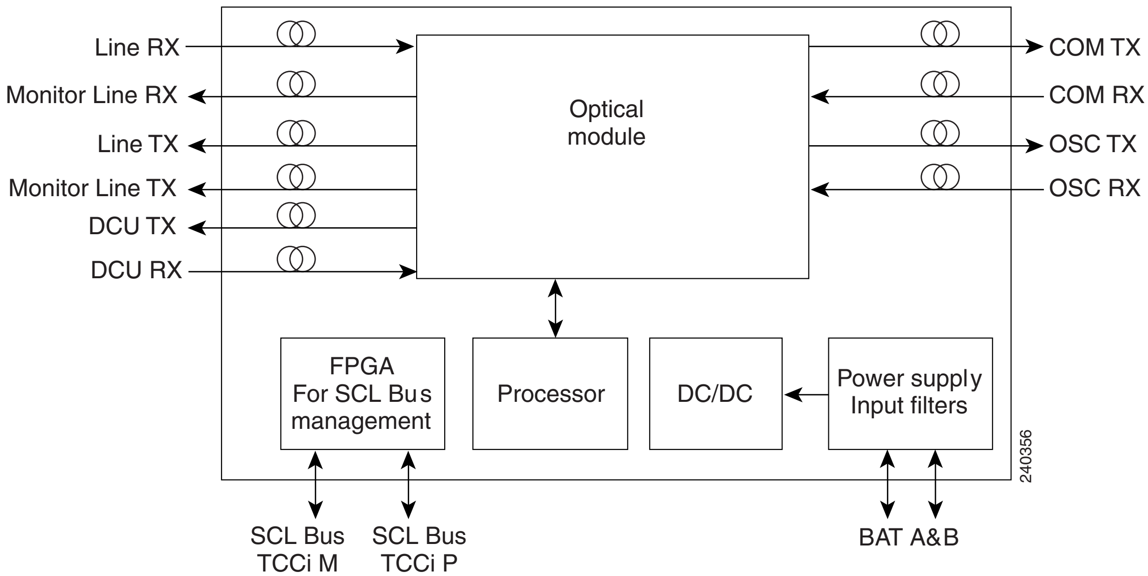
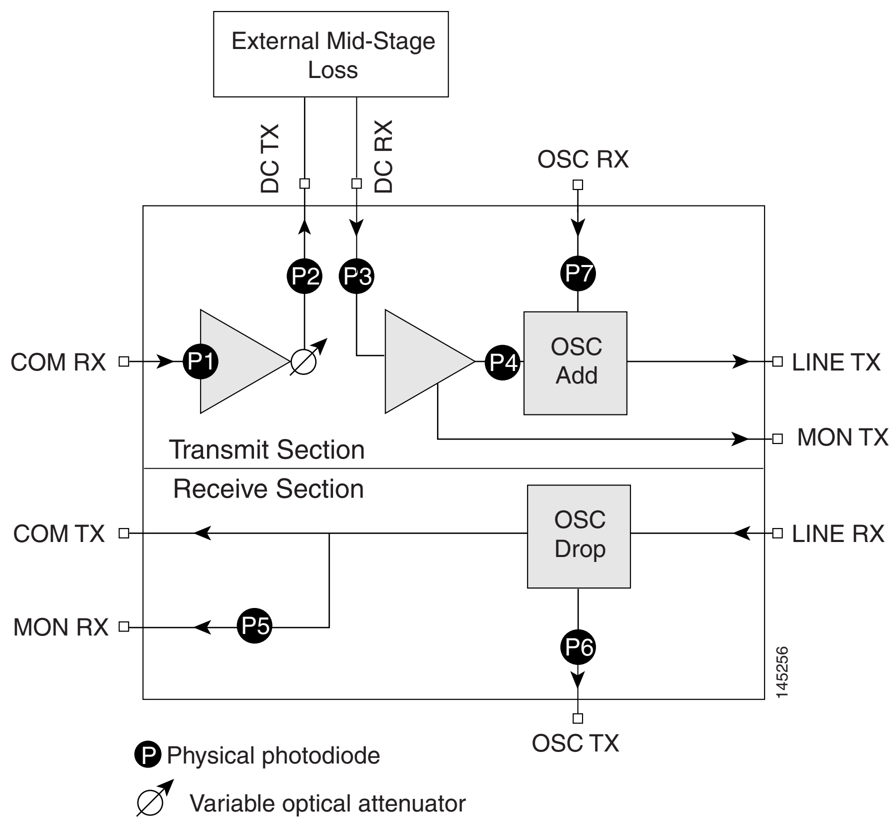


Figure 5-18 shows how the OPT-AMP-C optical module functions.

Figure 5-18 OPT-AMP-C Optical Module Functional Block Diagram



5.8.2 OPT-AMP-C Card Functions

The functions of the OPT-AMP-C card are:

- 5.6.2.1 OPT-AMP-L and OPT-AMP-C cards Power Monitoring
- Card level indicators—Table G-4 on page G-9
- G.4 Port-Level Indicators, page G-9

5.8.3 Related Procedures for OPT-AMP-C Card

The following is the list of procedures and tasks related to the configuration of the OPT-AMP-C card:

- NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G38 Provision OSC Terminations, page 14-126
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- DLP-G140 View Power Statistics for Optical Amplifier, 40-SMR1-C, and 40-SMR2-C Cards
- NTP-G77 Manage Automatic Power Control
- NTP-G160 Modify OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Line Settings and PM Thresholds, page 20-27
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

5.9 OPT-RAMP-C and OPT-RAMP-CE Cards

(Cisco ONS 15454 and ONS 15454 M6 only)

Note For OPT-RAMP-C and OPT-RAMP-CE specifications, see the OPT-RAMP-C Amplifier Card Specifications and OPT-RAMP-CE Amplifier Card Specifications sections in the *Hardware Specifications* document.

Note For OPT-RAMP-C or OPT-RAMP-CE card safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

The OPT-RAMP-C card is a double-slot card that improves unregenerated sections in long spans using the span fiber to amplify the optical signal. Different wavelengths in C-band receive different gain values. To achieve Raman amplification, two Raman signals (that do not carry any payload or overhead) are required to be transmitted on the optical fiber because the gain generated by one signal is not flat. The energy of these Raman signals transfer to the higher region of the spectrum thereby amplifying the signals transmitted at higher wavelengths. The Raman effect reduces span loss but does not compensate it completely.

When the Raman optical powers are set correctly, a gain profile with limited ripple is achieved. The wavelengths of the Raman signals are not in the C-band of the spectrum (used by MSTP for payload signals). The two Raman wavelengths are fixed and always the same. Due to a limited Raman gain, an EDFA amplifier is embedded into the card to generate a higher total gain. An embedded EDFA gain block provides a first amplification stage, while the mid stage access (MSA) is used for DCU loss compensation.

The OPT-RAMP-CE card is a 20 dBm output power, gain-enhanced version of the OPT-RAMP-C card and is optimized for short spans. The OPT-RAMP-C and OPT-RAMP-CE cards can support up to 80 optical transmission channels at 50-GHz channel spacing over the C-band of the optical spectrum (wavelengths from 1529 nm to 1562.5 nm). To provide a counter-propagating Raman pump into the transmission fiber, the Raman amplifier provides up to 500 mW at the LINE-RX connector. The OPT-RAMP-C or OPT-RAMP-CE card can be installed in Slots 1 to 5 and 12 to 16, and supports all network configurations. However, the OPT-RAMP-C or OPT-RAMP-CE card must be equipped on both endpoints of a span.

The Raman total power and Raman ratio can be configured using CTC. The Raman configuration can be viewed on the Maintenance > Installation tab.

The features of the OPT-RAMP-C and OPT-RAMP-CE card include:

- Raman pump with embedded EDFA gain block
- Raman section: 500 mW total pump power for two pump wavelengths
- EDFA section:
  - OPT-RAMP-C: 16 dB gain and 17 dB output power
  - OPT-RAMP-CE: 11 dB gain and 20 dB output power
- Gain Flattening Filter (GFF) for Raman plus EDFA ripple compensation
- MSA for DC units
- VOA for DC input power control
- Full monitoring of pump, OSC, and signal power
- Fast gain control for transient suppression
- Low-FIT (hardware-managed) optical laser safety
- Hardware output signals for LOS monitoring at input photodiodes
- Optical service channel add and drop filters
- Raman pump back-reflection detector

5.9.1 Card Faceplate Ports and Block Diagrams

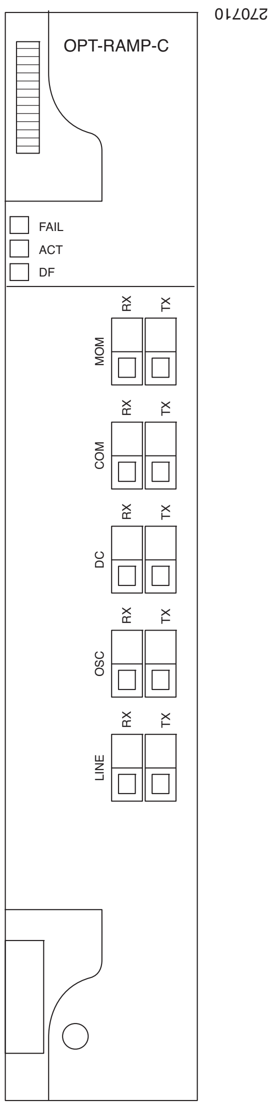
The OPT-RAMP-C and OPT-RAMP-CE cards have ten optical ports located on the faceplate:

- MON RX is the output monitor port (receive section).
- MON TX is the output monitor port.
- COM RX is the input signal port (receive section).
- COM TX is the output signal port.

- DC RX is the input DCU port.
- DC TX is the output DCU port.
- OSC RX is the OSC add input port.
- OSC TX is the OSC drop output port.
- LINE RX is the input signal port (receive section).
- LINE TX is the output signal port.

Figure 5-19 shows the OPT-RAMP-C card faceplate.

Figure 5-19 OPT-RAMP-C Faceplate



The OPT-RAMP-CE card faceplate is the same as that of the OPT-RAMP-C card.

Figure 5-20 shows a simplified block diagram of the OPT-RAMP-C and OPT-RAMP-CE card features.

Figure 5-20 OPT-RAMP-C and OPT-RAMP-CE Block Diagram

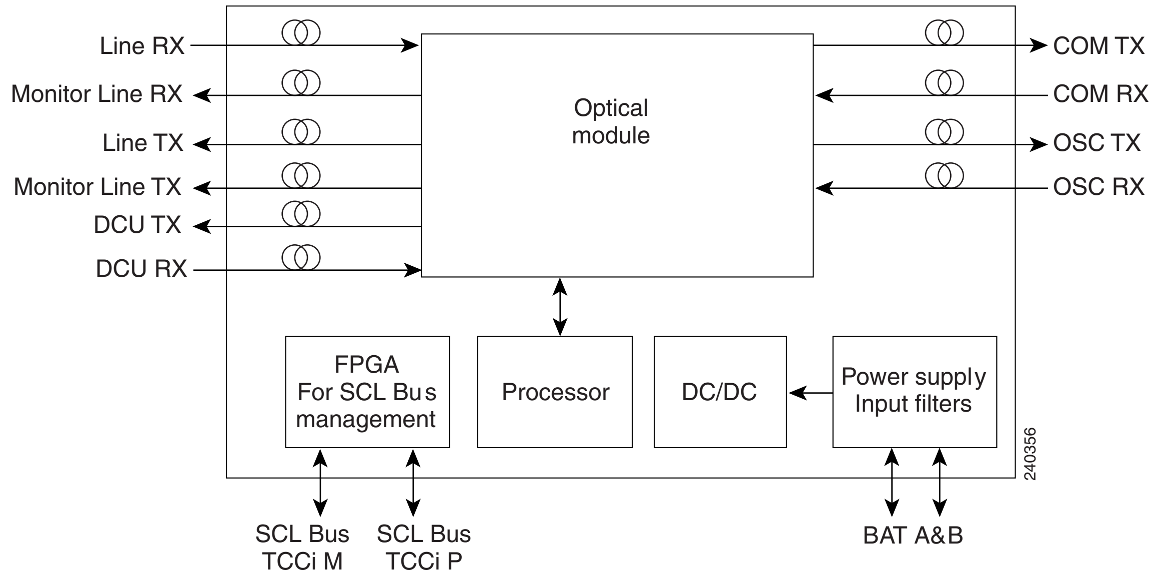
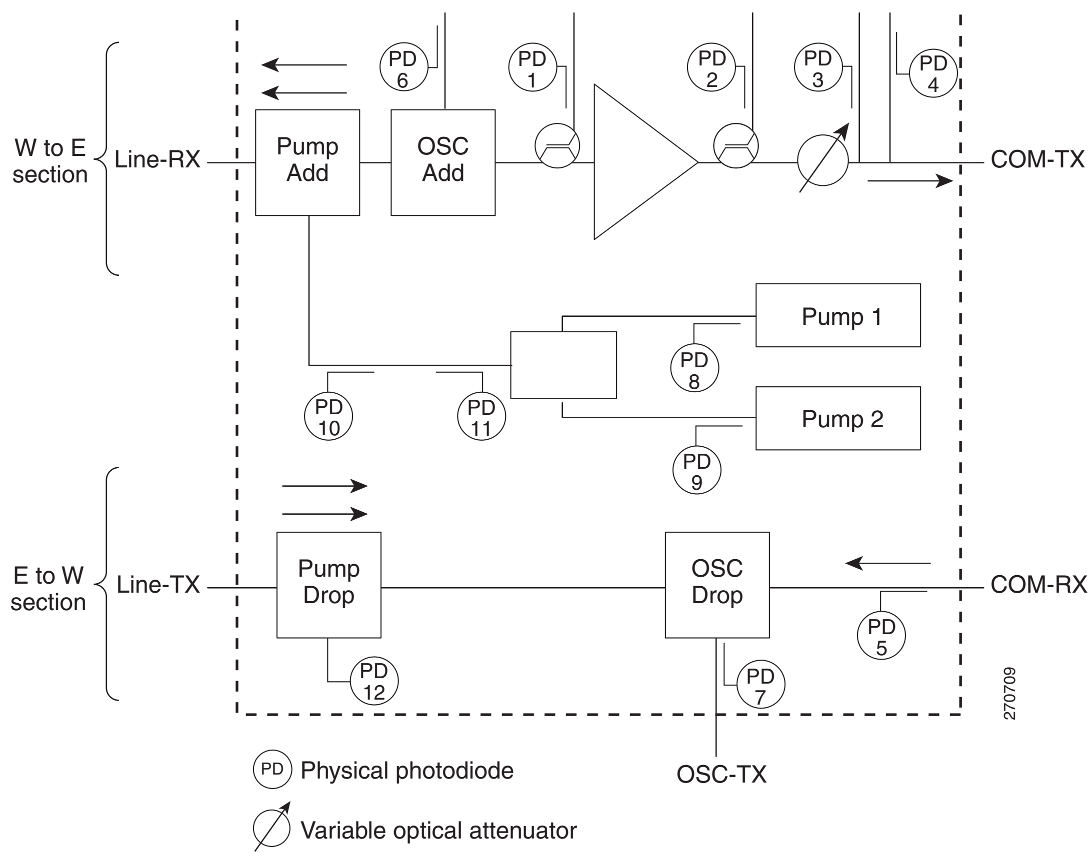


Figure 5-21 shows a block diagram of how the OPT-RAMP-C and OPT-RAMP-CE card functions.

Figure 5-21 OPT-RAMP-C and OPT-RAMP-CE Card Functional Block Diagram



Two Raman pump lasers are combined internally and launched in-fiber at the LINE-RX port, thereby counter-propagating with the DWDM signal. An EDFA gain block provides further amplification of the DWDM signal, which allows regulated output power entry in the mid stage access and acts upon the VOA attenuation. While the optical filters are present for the OSC add and drop functions, the OSC signal counter-propagates with the DWDM signal. Two monitor ports, MON-RX and MON-TX, are provided at the EDFA input and output stages and are used to evaluate the total gain ripple. A total of 12 photodiodes (PDs) are provided, allowing full monitoring of RP power, DWDM power, and OSC power in each section of the device. In particular, PD12 allows the detection of the remnant Raman pump power at the end of the counter-pumped span, while PD11 detects the amount of Raman pump power back scattered by the LINE-RX connector and transmission fiber.

The EDFA section calculates the signal power, considering the expected ASE power contribution to the total output power. The signal output power or the signal gain can be used as feedback signals for the EDFA pump power control loop. The ASE power is derived according to the working EDFA gain. PD2, PD3, and PD4 provide the total power measured by the photodiode and the signal power is derived by calculating the total power value. The insertion loss of the main optical path and the relative optical attenuation of the two monitor ports are stored into the card's not-volatile memory.

5.9.2 OPT-RAMP-C and OPT-RAMP-CE Card Functions

The functions of the OPT-RAMP-C and OPT-RAMP-CE card are:

- 5.9.2.1 OPT-RAMP-C and OPT-RAMP-CE Cards Power Monitoring, page 5-38
- Card level indicators—Table G-4 on page G-9
- G.4 Port-Level Indicators, page G-9

5.9.2.1 OPT-RAMP-C and OPT-RAMP-CE Cards Power Monitoring

Physical photodiodes PD1 through PD12 monitor the power for the OPT-RAMP-C and OPT-RAMP-CE cards (see Table 5-10).

Table 5-10 OPT-RAMP-C and OPT-RAMP-CE Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
PD1	EDFA DWDM Input Power	LINE-RX
PD2	EDFA Output Power (pre-VOA attenuation)	DC-TX (port with 0 dB VOA attenuation)
PD3	DCU Input Power	DC-TX
PD4	DCU Output Power	DC-RX
PD5	DWDM Input Power	COM-RX
PD6	OSC ADD Input Power	OSC-RX
PD7	OSC DROP Output Power	OSC-TX
PD8	Pump 1 in-fiber Output Power	LINE-RX
PD9	Pump 2 in-fiber Output Power	LINE-RX
PD10	Total Pump in-fiber Output Power	LINE-RX

Table 5-10 OPT-RAMP-C and OPT-RAMP-CE Port Calibration (continued)

Photodiode	CTC Type Name	Calibrated to Port
PD11	Back-Reflected Pump Power	LINE-RX
PD12	Remnant Pump Power	LINE-TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide.*

5.9.3 Related Procedures for OPT-RAMP-C and OPT-RAMP-CE Cards

The following is the list of procedures and tasks related to the configuration of the OPT-RAMP-C and OPT-RAMP-CE cards:

- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G38 Provision OSC Terminations, page 14-126
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G201 Configure the Raman Pump on an MSTP Link, page 15-4
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- DLP-G140 View Power Statistics for Optical Amplifier, 40-SMR1-C, and 40-SMR2-C Cards
- NTP-G77 Manage Automatic Power Control
- NTP-G160 Modify OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Line Settings and PM Thresholds, page 20-27
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

5.10 RAMAN-CTP and RAMAN-COP Cards

(Cisco ONS 15454 M2 and ONS 15454 M6 only)

Note For hardware specifications, see the RAMAN-CTP and RAMAN-COP Card Specifications section in the *Hardware Specifications* document.

Note For RAMAN-CTP and RAMAN-COP cards safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

The 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP cards are supported on Cisco ONS 15454 M2 and Cisco ONS 15454 M6, Release 9.4.01 and later releases only. These cards do not operate on systems running earlier versions.

After installing Release 9.4.01 software, reinstall the 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP cards.

The single-slot RAMAN-CTP and RAMAN-COP cards support counter and co-propagating Raman amplification on very long unregenerated spans.

The cards manage up to 96 ITU-T 50-GHz spaced channels over the C-band of the optical spectrum (wavelengths from 1528.77 nm to 1566.72 nm). The counter-propagating RAMAN-CTP card is the master unit. The co-propagating RAMAN-COP card is the slave unit and can be used only when the counter-propagating unit is present. The RAMAN-CTP card and the RAMAN-COP card must be installed in adjacent slots (Slots 2 and 3, 4 and 5, or 6 and 7) in the Cisco ONS 15454 M6 chassis and Slots 2 and 3 in the Cisco ONS 15454 M2 chassis. However, these adjacent slots must not be used to install two RAMAN-CTP or two RAMAN-COP cards.

The features of the RAMAN-CTP and RAMAN-COP cards include:

- Raman section: 1000 mW total pump power for four pumps and two wavelengths
- Embedded distributed feedback (DFB) laser at 1568.77 nm to be used for optical safety and link continuity (in RAMAN-CTP card only)
- Photodiodes to enable monitoring of Raman pump power
- Photodiodes to enable monitoring of the DFB laser and signal power (in RAMAN-CTP card only)
- Hardware managed automatic laser shutdown (ALS) for optical laser safety
- Hardware output signals for loss of signal (LOS) monitoring at input photodiodes
- Raman pump back reflection detector to check for excessive back reflection

5.10.0.0.1 Important Notes Regarding Patchcord Installation

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Warning **Avoid eye or skin exposure to direct or scattered radiation.** Statement 1013

- Two E-2000 PS PC to F-3000s SM PC patchcords are shipped with the RAMAN-CTP card.
- One E-2000 PS PC to E-2000 PS PC patchcord is shipped with the RAMAN-COP card.
- Connect the F-3000s SM PC connector to the RAMAN-CTP card before connecting the E2000 PS PC high optical power connector to the card.
- The F-3000s SM PC connector is mechanically and optically compatible with the LC PC connectors and the LC PC mating adapters. If the connectors are clean, the standard connectors and the F-3000s SM PC connectors can be used for optical power of 250 mW and higher.
- The patchcords used to connect the RAMAN-CTP cards to the span must use only PC connectors and not angled connectors.

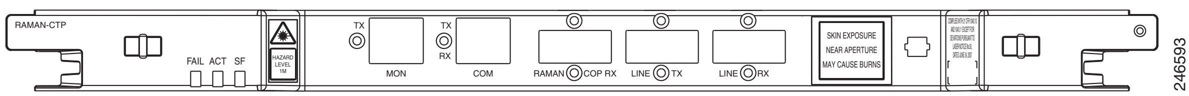
5.10.1 Card Faceplate Ports and Block Diagrams

The RAMAN-CTP card has six optical ports located on the faceplate:

- MON TX is the output monitor port
- COM RX is the input signal port (receive section)
- COM TX is the output signal port
- RAMAN-COP RX is the Raman co-propagating input port
- LINE RX is the input signal port (receive section)
- LINE TX is the output signal port

Figure 5-22 shows the RAMAN-CTP card faceplate.

Figure 5-22 RAMAN-CTP Faceplate



The RAMAN-COP card has only one optical port located on the faceplate. RAMAN-TX is the Raman co-propagating output port.

Figure 5-23 shows the RAMAN-COP card faceplate.

Figure 5-23 RAMAN-COP Faceplate

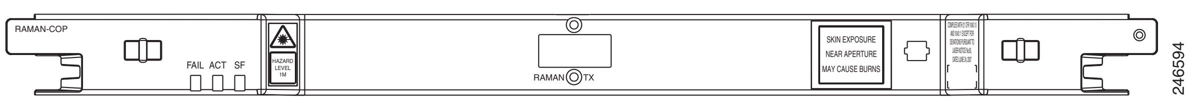
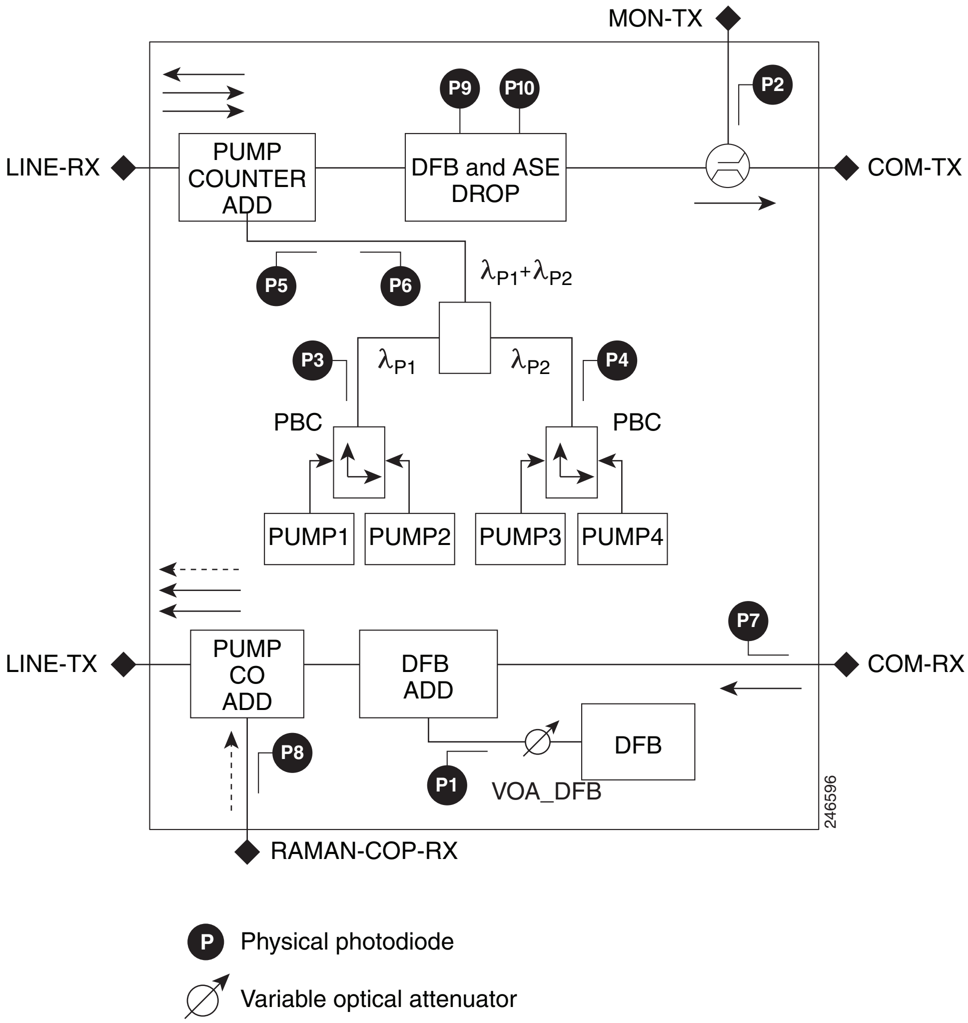


Figure 5-24 shows a block diagram of how the RAMAN-CTP card functions.

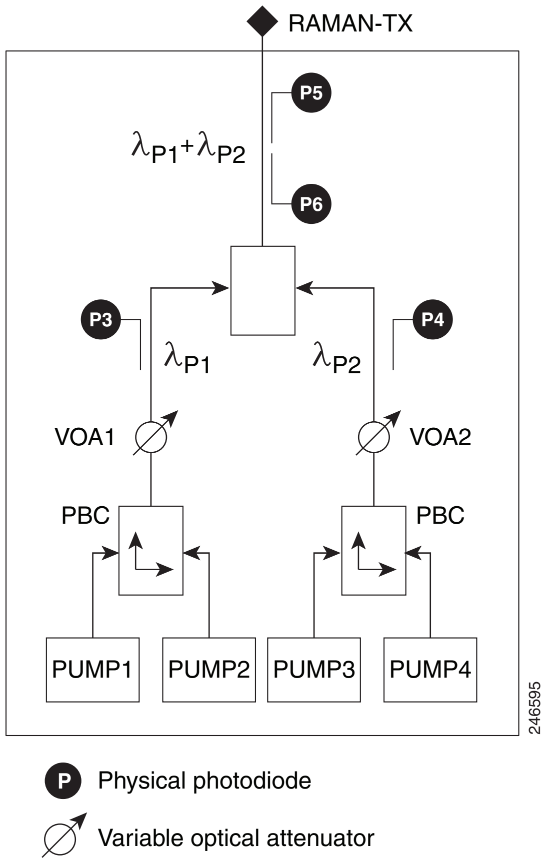
Figure 5-24 RAMAN-CTP Functional Block Diagram



Four Raman pump lasers (two for each wavelength) are combined internally and launched in-fiber at the LINE-RX port, thereby counter-propagating with the DWDM signal. The two pump lasers at the same nominal central wavelength, power, and polarization are made orthogonally polarized by the polarization beam combiner (that rotates one of the laser beams) and then coupled, resulting in a depolarized beam. A DFB laser at 1568.77 nm is used for optical safety. Optical filters for DFB add and drop are present. The DFB signal generated by the DFB laser is transmitted in-fiber, co-propagating with the DWDM signal. A MON-TX port monitors the DWDM signal at the COM-TX port. A total of ten photodiodes are provided, allowing monitoring of Raman pump (RP) power, DWDM signal power, and DFB signal power in each section of the card. In particular, P8 measures the co-propagating Raman pump power in-fiber (when the RAMAN-COP unit is present), while P6 detects the amount of Raman pump power back scattered by the LINE-RX connector and transmission fiber. P1 measures the DFB signal power transmitted in-fiber while P9 and P10 measure the DFB signal and ASE power respectively, which is received from the other line site. The insertion loss of the main optical path and the relative optical attenuation of the monitor port is stored in non-volatile memory of the card.

Figure 5-25 shows a block diagram of how the RAMAN-COP card functions.

Figure 5-25 15454-M-RAMAN-COP Functional Block Diagram



Four Raman pump lasers (two for each wavelength) are combined internally and launched in-fiber at the LINE-TX port of the counter-propagating unit, thereby co-propagating with the DWDM signal. The two pump lasers at the same nominal central wavelength, power, and polarization are made orthogonally polarized by the polarization beam combiner (that rotates one of the laser beams) and then coupled, resulting in a depolarized beam. A total of four photodiodes are provided, allowing the monitoring of RP power. In particular, P6 detects the amount of Raman pump power back scattered by the LINE-RX connector and transmission fiber.

5.10.2 RAMAN-CTP and RAMAN-COP Cards Power Monitoring

Physical photodiodes P1 through P10 monitor the power for the RAMAN-CTP card (see Table 5-11).

Table 5-11 RAMAN-CTP Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	DFB in-fiber Output Power	LINE-TX
P2	DWDM RX Input Power	LINE-RX
P3	Pump 1 in-fiber Output Power	LINE-RX
P4	Pump 2 in-fiber Output Power	LINE-RX
P5	Total Pump in-fiber Output Power	LINE-RX

Table 5-11 RAMAN-CTP Port Calibration (continued)

Photodiode	CTC Type Name	Calibrated to Port
P6	Back-Reflected Pump Power	LINE-RX
P7	DWDM TX Input Power	COM-RX
P8	Total Co-Pump in-fiber Output Power	LINE-TX
P9	DFB Input Power	LINE-RX
P10	ASE Input Power	LINE-RX

Physical photodiodes P3 through P6 monitor the power for the RAMAN-COP card (see Table 5-12).

Table 5-12 RAMAN-CTP Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P3	Pump 1 in-fiber Output Power	RAMAN-TX
P4	Pump 2 in-fiber Output Power	RAMAN-TX
P5	Total Pump in-fiber Output Power	RAMAN-TX
P6	Back-Reflected Pump Power	RAMAN-TX

The PM parameters for the power values are listed in the Optics and 8b10b PM Parameter Definitions document.

For information on the associated TL1 AIDs for the optical power monitoring points, see the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 9.4*.

5.10.3 RAMAN-CTP and RAMAN-COP Card Functions

The functions of the RAMAN-CTP and RAMAN-COP cards are:

- Card level indicators—Table G-4 on page G-9
- G.4 Port-Level Indicators, page G-9
- G.16 Lamp Test, page G-19

5.10.4 Related Procedures for RAMAN-CTP and RAMAN-COP Cards

Caution During a software upgrade, do not unplug the RAMAN-CTP or RAMAN-COP card fibers or connectors. The ends of unterminated fibers or connectors emit invisible laser radiation.

The following is the list of procedures and tasks related to the configuration of the RAMAN-CTP and RAMAN-COP cards:

- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78

- NTP-G38 Provision OSC Terminations, page 14-126
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G201 Configure the Raman Pump on an MSTP Link, page 15-4
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- DLP-G140 View Power Statistics for Optical Amplifier, 40-SMR1-C, and 40-SMR2-C Cards
- NTP-G77 Manage Automatic Power Control
- NTP-G160 Modify OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Line Settings and PM Thresholds, page 20-27
- NTP-G184 Create a Provisionable Patchcord, page 16-72
- DLP-G690 Configure the Raman Pump Using Manual Day-0 Installation
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

5.11 OPT-EDFA-17 and OPT-EDFA-24 Cards

Note For OPT-EDFA-17 and OPT-EDFA-24 card specifications, see the OPT-EDFA-17 Amplifier Card Specifications and OPT-EDFA-24 Amplifier Card Specifications sections in the *Hardware Specifications* document.

Note For OPT-EDFA-17 and OPT-EDFA-24 card safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

The OPT-EDFA-17 and OPT-EDFA-24 cards are C-band, DWDM EDFA amplifiers/preamplifiers with 20-dBm output powers. These cards do not contain mid-stage access loss for a Dispersion Compensation Unit (DCU). The OPT-EDFA-17 and OPT-EDFA-24 cards provide a noise-figure optimized version of the EDFA amplifiers to cope with new modulation formats like PM-DQPSK, which do not need dispersion compensation. To control gain tilt, a VOA is used. The amplifier module also includes the OSC add (TX direction) and drop (RX direction) optical filters.

The OPT-EDFA-17 and OPT-EDFA-24 cards share the same hardware platform and firmware architecture but differ in their operative optical gain range, which is 17 dB and 24 dB respectively.

The OPT-EDFA-17 and OPT-EDFA-24 cards are true variable gain amplifiers, offering an optimal equalization of the transmitted optical channels over a wide gain range. They support 96 channels at 50-GHz channel spacing in the C-band (that is, 1528.77 nm to 1566.72 nm wavelength range). When an ONS 15454 has an OPT-EDFA-17 or OPT-EDFA-24 card installed, an OSCM card is needed to process the OSC. You can install the OPT-EDFA-17 or OPT-EDFA-24 card in Slots 1 to 6 and 12 to 17. Slots 2 to 6 and Slots 12 to 16 are the default slots for provisioning the OPT-EDFA-17 and OPT-EDFA-24 cards as a preamplifier. Slots 1 and 17 are the default slots for provisioning the OPT-EDFA-17 and OPT-EDFA-24 cards as a booster amplifier. You can install the OPT-EDFA-17 or OPT-EDFA-24 card in Slots 2 and 3 in an ONS 15454 M2 chassis, and Slots 2 to 7 in an ONS 15454 M6 chassis.

The main functionalities of the OPT-EDFA-17 and OPT-EDFA-24 cards are:

- Amplification of the input signal at COM-RX port towards LINE-TX port through a true-variable gain EDFA block
- Multiplexing the OSC to the LINE-TX port
- Demultiplexing the OSC from LINE-RX port
- Monitoring of the LINE input or output signal with 1% TAP splitters

The features of the OPT-EDFA-17 and OPT-EDFA-24 cards are:

- Embedded Gain Flattening Filter
- Constant pump current mode (test mode)
- Constant output power mode
- Constant gain mode
- Nondistorting low-frequency transfer function
- ASE compensation in Constant Gain and Constant Output Power modes
- Fast transient suppression
- Programmable tilt
- Full monitoring and alarm handling capability
- Gain range with gain tilt control of 5 to 17 dB (for OPT-EDFA-17 card) and 12 to 24 dB (for OPT-EDFA-24 card)
- Extended gain range (with uncontrolled tilt) of 17 to 20 dB (for OPT-EDFA-17 card) and 24 to 27 dB (for OPT-EDFA-24 card)
- Optical Safety Remote Interlock (OSRI)
- Automatic Alarm Shutdown (ALS)

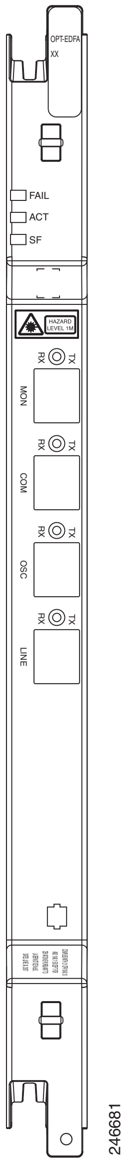
5.11.1 Card Faceplate Ports and Block Diagrams

The OPT-EDFA-17 and OPT-EDFA-24 cards have eight optical ports located on the faceplate:

- MON RX is the input monitor port (receive section).
- MON TX is the output monitor port.
- COM RX is the input signal port.
- COM TX is the output signal port (receive section).
- LINE RX is the input signal port (receive section).
- LINE TX is the output signal port.
- OSC RX is the OSC add input port.
- OSC TX is the OSC drop output port.

Figure 5-26 shows the OPT-EDFA-17 card faceplate.

Figure 5-26 OPT-EDFA-17 Card Faceplate



The OPT-EDFA-24 card faceplate is similar to that of the OPT-EDFA-17 card.

Figure 5-27 shows a simplified block diagram of the OPT-EDFA-17 and OPT-EDFA-24 card features.

Figure 5-27 OPT-EDFA-17 and OPT-EDFA-24 Block Diagram

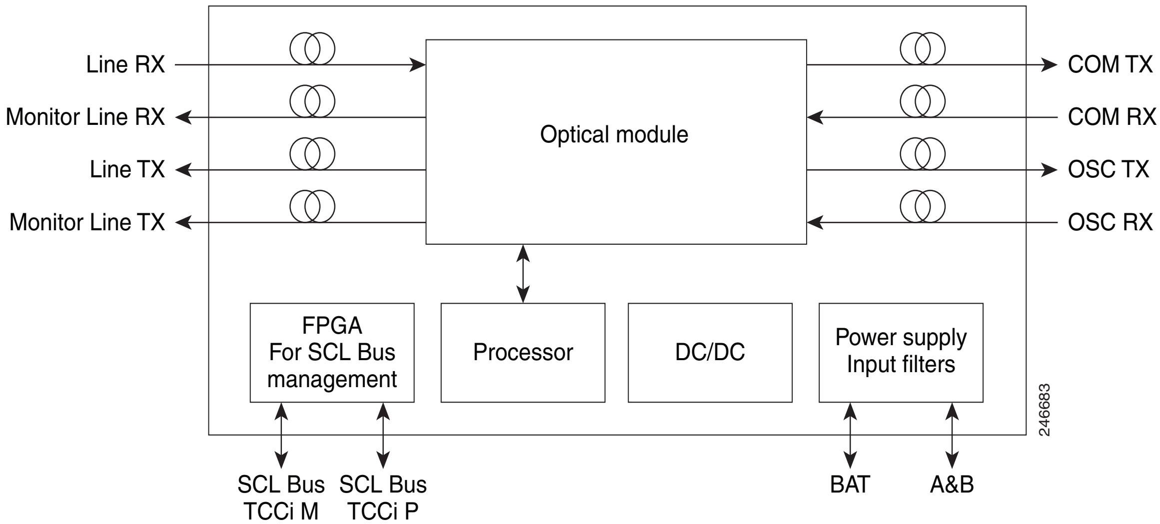
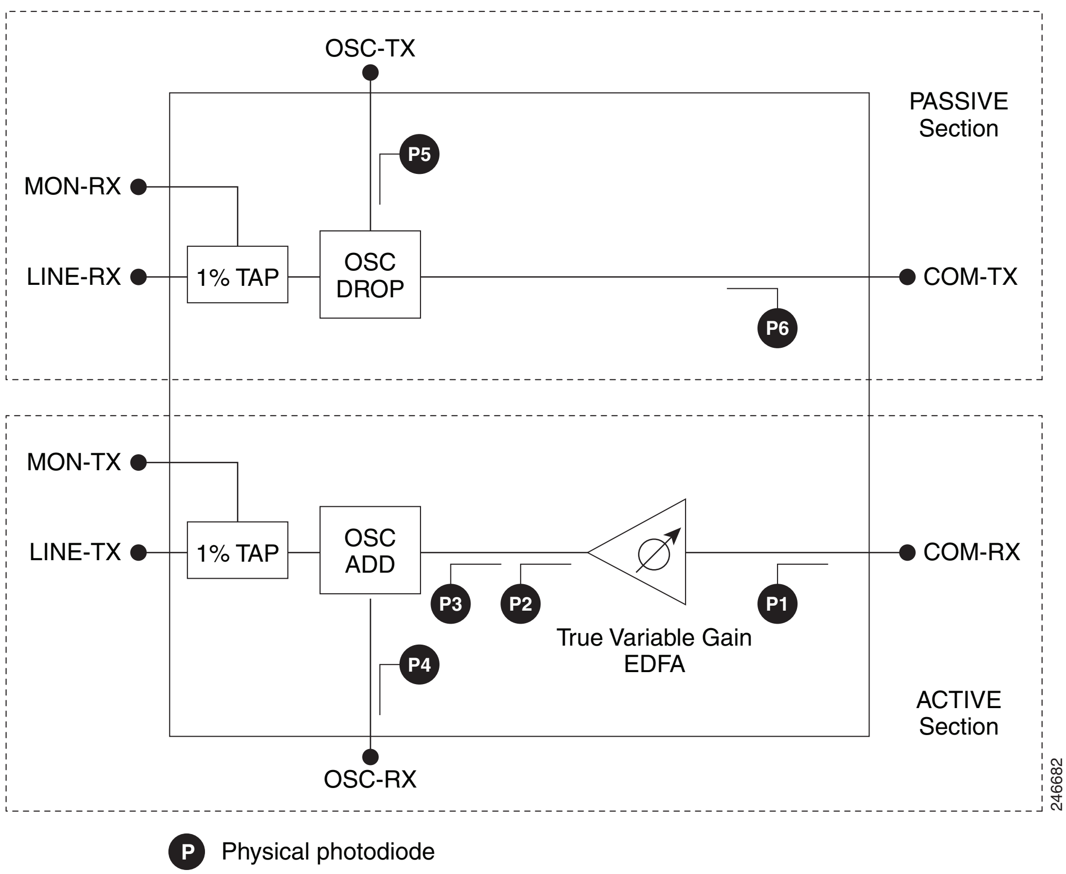


Figure 5-28 shows a block diagram of how the OPT-EDFA-17 and OPT-EDFA-24 optical modules function.

Figure 5-28 OPT-EDFA-17 and OPT-EDFA-24 Optical Modules Function



5.11.2 OPT-EDFA-17 and OPT-EDFA-24 Cards Power Monitoring

Physical photodiodes PD1 through PD6 monitor the power for the OPT-EDFA-17 and OPT-EDFA-24 cards (see Table 5-13).

Table 5-13 OPT-EDFA-17 and OPT-EDFA-24 Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	EDFA Input Power	COM-RX
P2	EDFA Output Power	LINE-TX
P3	EDFA Output Power	LINE-TX
P4	OSC ADD Input Power	OSC-RX
P5	OSC DROP Output Power	LINE-RX
P6	COM-TX Output Power	LINE-RX

5.11.3 OPT-EDFA-17 and OPT-EDFA-24 Card Functions

The functions of the OPT-EDFA-17 and OPT-EDFA-24 cards are:

- Card level indicators—Table G-4 on page G-9
- G.4 Port-Level Indicators, page G-9

5.11.4 Related Procedures for OPT-EDFA-17 and OPT-EDFA-24 Cards

The list of procedures and tasks related to the configuration of the OPT-EDFA-17 and OPT-EDFA-24 cards are:

- NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G38 Provision OSC Terminations, page 14-126
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G76 Verify Optical Span Loss Using CTC
- NTP-G74 Monitor DWDM Card Performance
- DLP-G140 View Power Statistics for Optical Amplifier, 40-SMR1-C, and 40-SMR2-C Cards
- NTP-G77 Manage Automatic Power Control
- NTP-G160 Modify OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Line Settings and PM Thresholds, page 20-27
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards

CHAPTER 6

Provision Multiplexer and Demultiplexer Cards

This chapter describes legacy multiplexer and demultiplexer cards used in Cisco ONS 15454 dense wavelength division multiplexing (DWDM) networks and related procedures.

For card safety and compliance information, see the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

Note For a description of the 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 40-MUX-C, 40-WSS-C, 40-WSS-CE, and 40-WXC-C cards, see the "Provision Reconfigurable Optical Add/Drop Cards" chapter.

6.1 Card Overview

The card overview section contains card summary, compatibility, interface class, and channel allocation plan information for legacy multiplexer and demultiplexer cards.

Note Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. The cards are then installed into slots displaying the same symbols. For a list of slots and symbols, see the "Card Slot Requirements" section in the *Cisco ONS 15454 Hardware Installation Guide*.

6.1.1 Card Summary

Table 6-1 lists and summarizes the functions of the 32MUX-O, 32DMX-O, and 4MD-xx.x cards.

Table 6-1 Multiplexer and Demultiplexer Cards

Card	Port Description	For Additional Information
32MUX-O	The 32MUX-O has five sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "6.3 32MUX-O Card" section on page 6-9.
32DMX-O	The 32DMX-O has five sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	"6.4 32DMX-O Card" section on page 6-14
4MD-xx.x	The 4MD-xx.x card has five sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "6.5 4MD-xx.x Card" section on page 6-19.

6.1.2 Card Compatibility

Table 6-2 lists the CTC software compatibility for the legacy cards.

Table 6-2 Software Compatibility for Legacy Multiplexer and Demultiplexer Cards

	Cards		
Release	**32MUX-O**	**32DMX-O**	**4MD-xx.x**
R4.5	Yes	Yes	Yes
R4.6	Yes	Yes	Yes
R4.7	Yes	Yes	Yes
R5.0	Yes	Yes	Yes
R6.0	Yes	Yes	Yes
R7.0	Yes	Yes	Yes
R7.2	Yes	Yes	Yes
R8.0	Yes	Yes	Yes
R8.5	Yes	Yes	Yes
R9.0	Yes	Yes	Yes
R9.1	Yes	Yes	Yes
R9.2	Yes	Yes	Yes
R9.2.1	Yes	Yes	Yes
R9.3	Yes	Yes	Yes
R9.4	Yes	Yes	Yes

6.1.3 Interface Classes

The 32MUX-O, 32DMX-O, and 4MD-xx.x cards have different input and output optical channel signals depending on the interface card where the input signal originates. The input interface cards have been grouped in classes listed in Table 6-3. The subsequent tables list the optical performance and output power of each interface class.

Table 6-3 ONS 15454 Card Interfaces Assigned to Input Power Classes

Input Power Class	Card
A	10-Gbps multirate transponder cards (TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L) with forward error correction (FEC) enabled, 10-Gbps muxponder cards (MXP_2.5G_10G, MXP_2.5G_10E, MXP_MR_10DME_C, MXP_MR_10DME_L, MXP_2.5G_10E_C, and MXP_2.5G_10E_L) with FEC enabled, 40-Gbps transponder cards (40E-TXP-C, and 40ME-TXP-C), and 40-Gbps muxponder cards (40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C)
B	10-Gbps multirate transponder card (TXP_MR_10G) without FEC, 10-Gbps muxponder cards (MXP_2.5G_10G, MXP_MR_10DME_C, MXP_MR_10DME_L), 40-Gbps transponder cards (40E-TXP-C, and 40ME-TXP-C), 40-Gbps muxponder cards (40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C), and ADM-10G cards with FEC disabled
C	OC-192 LR ITU cards (TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L) without FEC
D	2.5-Gbps multirate transponder card (TXP_MR_2.5G), both protected and unprotected, with FEC enabled
E	OC-48 100-GHz DWDM muxponder card (MXP_MR_2.5G) and 2.5-Gbps multirate transponder card (TXP_MR_2.5G), protected or unprotected, with FEC disabled and retime, reshape, and regenerate (3R) mode enabled
F	2.5-Gbps multirate transponder card (TXP_MR_2.5G), protected or unprotected, in regenerate and reshape (2R) mode
G	OC-48 ELR 100 GHz card
H	2/4 port GbE transponder (GBIC WDM 100GHz)
I	TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L, 40E-TXP-C, and 40ME-TXP-C cards with enhanced FEC (E-FEC) and the MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_MR_10DME_C, MXP_MR_10DME_L, 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards with E-FEC enabled

Table 6-5 lists the optical performance parameters for 40-Gbps cards that provide signal input to multiplexer and demultiplexer cards.

Table 6-4 40-Gbps Interface Optical Performance

Parameter	Class A		Class B		Class I	
Type	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited
Maximum bit rate	40 Gbps		40 Gbps		40 Gbps	
Regeneration	3R		3R		3R	
FEC	Yes		No		Yes (E-FEC)	
Threshold	Optimum		Average		Optimum	
Maximum BER[2]	10^{-15}		10^{-12}		10^{-15}	
OSNR[1] sensitivity	23 dB	9 dB	23 dB	19 dB	20 dB	8 dB
Power sensitivity	–24 dBm	–18 dBm	–21 dBm	–20 dBm	–26 dBm	–18 dBm
Power overload	–8 dBm		–8 dBm		–8 dBm	
Transmitted Power Range[3]						
40-Gbps multirate transponder/40-Gbps EC transponder (40E-TXP-C and 40ME-TXP-C)	+2.5 to 3.5 dBm		+2.5 to 3.5 dBm		—	
OC-192 LR ITU	—		—		—	
Dispersion compensation tolerance	+/–800 ps/nm		+/–1,000 ps/nm		+/–800 ps/nm	

1. OSNR = optical signal-to-noise ratio
2. BER = bit error rate
3. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

Table 6-5 lists the optical performance parameters that provide signal input for the 40-Gbps multiplexer and demultiplexer cards.

Table 6-5 10-Gbps Interface Optical Performance Parameters

Parameter	Class A		Class B		Class C	Class I	
Type	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited	OSNR Limited	Power Limited	OSNR Limited
Maximum bit rate	10 Gbps		10 Gbps		10 Gbps	10 Gbps	
Regeneration	3R		3R		3R	3R	
FEC	Yes		No		No	Yes (E-FEC)	
Threshold	Optimum		Average		Average	Optimum	
Maximum BER[2]	10^{-15}		10^{-12}		10^{-12}	10^{-15}	
OSNR[1] sensitivity	23 dB	9 dB	23 dB	19 dB	19 dB	20 dB	8 dB
Power sensitivity	–24 dBm	–18 dBm	–21 dBm	–20 dBm	–22 dBm	–26 dBm	–18 dBm

Table 6-5 10-Gbps Interface Optical Performance Parameters (continued)

Parameter	Class A		Class B		Class C	Class I	
Type	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited	OSNR Limited	Power Limited	OSNR Limited
Power overload	–8 dBm		–8 dBm		–9 dBm	–8 dBm	
Transmitted Power Range[3]							
10-Gbps multirate transponder/10-Gbps FEC transponder (TXP_MR_10G)	+2.5 to 3.5 dBm		+2.5 to 3.5 dBm		—	—	
OC-192 LR ITU	—		—		+3.0 to 6.0 dBm	—	
10-Gbps multirate transponder/10-Gbps FEC transponder (TXP_MR_10E)	+3.0 to 6.0 dBm		+3.0 to 6.0 dBm		—	+3.0 to 6.0 dBm	
Dispersion compensation tolerance	+/–800 ps/nm		+/–1,000 ps/nm		+/–1,000 ps/nm	+/–800 ps/nm	

1. OSNR = optical signal-to-noise ratio
2. BER = bit error rate
3. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

Table 6-6 lists the optical interface performance parameters for 2.5-Gbps cards that provide signal input to multiplexer and demultiplexer cards.

Table 6-6 2.5-Gbps Interface Optical Performance

Parameter	Class D		Class E		Class F	Class G		Class H		Class J
Type	Power Limited	OSNR Limited	Power Limited	OSNR Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited
Maximum bit rate	2.5 Gbps		2.5 Gbps		2.5 Gbps	2.5 Gbps		1.25 Gbps		2.5 Gbps
Regeneration	3R		3R		2R	3R		3R		3R
FEC	Yes		No		No	No		No		No
Threshold	Average		Average		Average	Average		Average		Average
Maximum BER	10^{-15}		10^{-12}		10^{-12}	10^{-12}		10^{-12}		10^{-12}
OSNR sensitivity	14 dB	6 dB	14 dB	10 dB	15 dB	14 dB	11 dB	13 dB	8 dB	12 dB
Power sensitivity	–31 dBm	–25 dBm	–30 dBm	–23 dBm	–24 dBm	–27 dBm	–33 dBm	–28 dBm	–18 dBm	–26 dBm
Power overload	–9 dBm		–9 dBm		–9 dBm	–9 dBm		–7 dBm		–17dBm

Table 6-6 2.5-Gbps Interface Optical Performance (continued)

Parameter	Class D		Class E		Class F	Class G		Class H		Class J
Type	Power Limited	OSNR Limited	Power Limited	OSNR Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited
Transmitted Power Range[1]										
TXP_MR_2.5G	–1.0 to 1.0 dBm		–1.0 to 1.0 dBm		–1.0 to 1.0 dBm	–2.0 to 0 dBm				
TXPP_MR_2.5G	–4.5 to –2.5 dBm		–4.5 to –2.5 dBm		–4.5 to –2.5 dBm					
MXP_MR_2.5G	—		+2.0 to +4.0 dBm		—					
MXPP_MR_2.5G	—		–1.5 to +0.5 dBm		—					
2/4 port GbE Transponder (GBIC WDM 100GHz)								+2.5 to 3.5 dBm		—
Dispersion compensation tolerance	–1200 to +5400 ps/nm		–1200 to +5400 ps/nm		–1200 to +3300 ps/nm	–1200 to +3300 ps/nm		–1000 to +3600 ps/nm		–1000 to +3200 ps/nm

1. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

6.1.4 Channel Allocation Plan

ONS 15454 DWDM multiplexer and demultiplexer cards are designed for use with specific channels in the C band and L band. In most cases, the channels for these cards are either numbered (for example, 1 to 32 or 1 to 40) or delimited (odd or even). Client interfaces must comply with these channel assignments to be compatible with the ONS 15454 system.

Table 6-7 lists the channel IDs and wavelengths assigned to the C-band DWDM channels.

Note In some cases, a card uses only one of the bands (C band or L band) and some or all of the channels listed in a band. Also, some cards use channels on the 100-GHz ITU grid while others use channels on the 50-GHz ITU grid. See the specific card description or the "Hardware Specifications" document for more details.

Table 6-7 DWDM Channel Allocation Plan (C Band)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115

Table 6-7 DWDM Channel Allocation Plan (C Band) (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

Table 6-8 lists the channel IDs and wavelengths assigned to the L-band channels.

Table 6-8 DWDM Channel Allocation Plan (L Band)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88

Table 6-8 DWDM Channel Allocation Plan (L Band) (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

6.2 Safety Labels

For information about safety labels, see the "G.1 Safety Labels" section on page G-1".

6.3 32MUX-O Card

Note For 32MUX-O card specifications, see the "32MUX-O Card Specifications" section in the Hardware Specifications document.

The 32-Channel Multiplexer (32MUX-O) card multiplexes 32 100-GHz-spaced channels identified in the channel plan. The 32MUX-O card takes up two slots in an ONS 15454 and can be installed in Slots 1 to 5 and 12 to 16.

6.3.1 32MUX-O Card Functions

The 32MUX-O functions include:

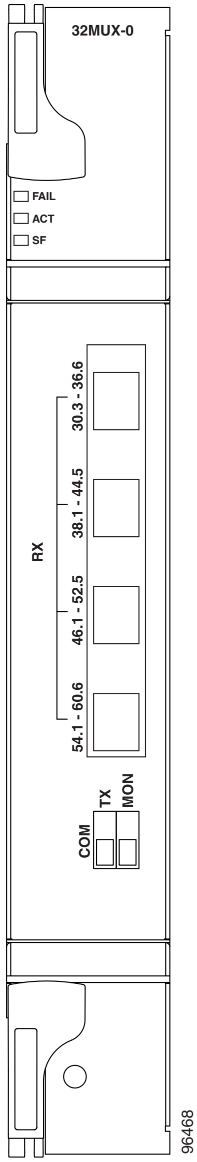
- Arrayed waveguide grating (AWG) device that enables full multiplexing functions for the channels.
- Each single-channel port is equipped with VOAs for automatic optical power regulation prior to multiplexing. In the case of electrical power failure, the VOA is set to its maximum attenuation for safety purposes. A manual VOA setting is also available.
- Each single-channel port is monitored using a photodiode to enable automatic power regulation.
- Card level indicators—Table G-4 on page G-9

An additional optical monitoring port with 1:99 splitting ratio is available.

6.3.2 32MUX-O Card Faceplate and Block Diagram

Figure 6-1 shows the 32MUX-O faceplate.

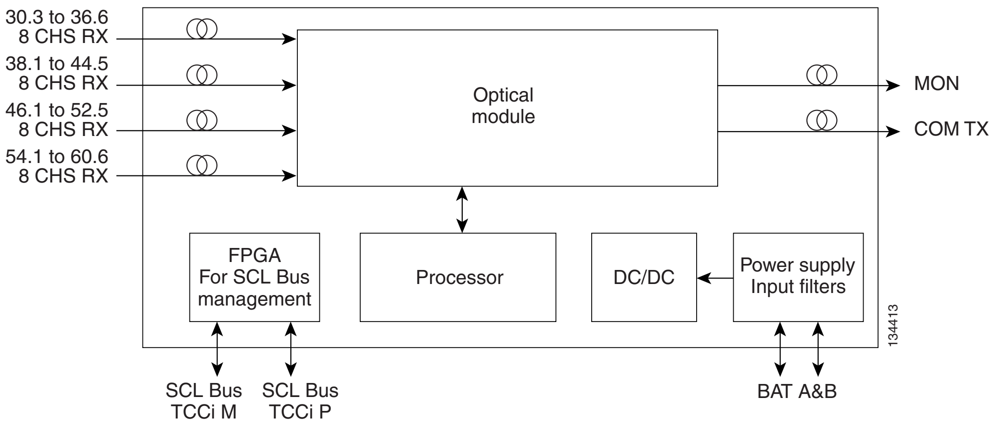
Figure 6-1 32MUX-O Faceplate



For information on safety labels for the card, see the "G.1 Safety Labels" section on page G-1".

Figure 6-2 shows a block diagram of the 32MUX-O card.

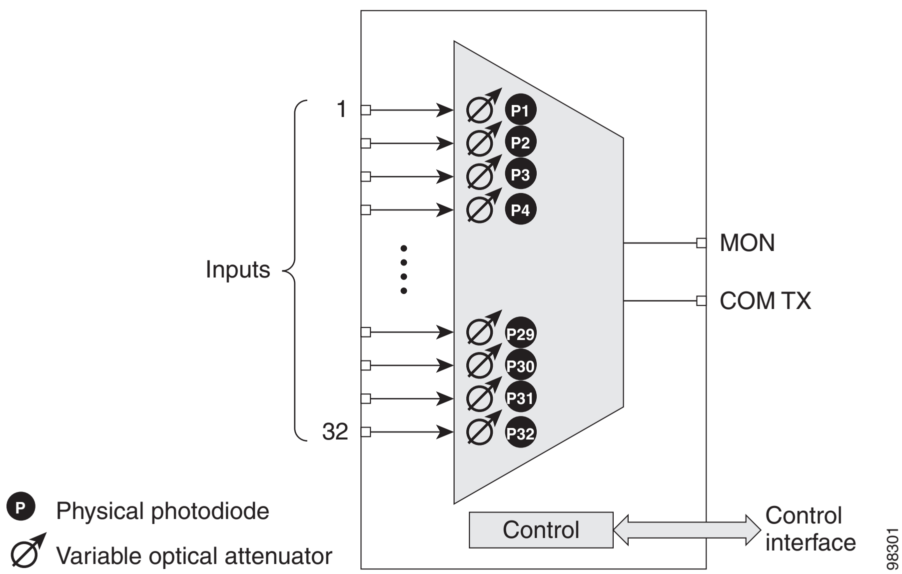
Figure 6-2 32MUX-O Block Diagram



The 32MUX-O card has four receive connectors that accept multifiber push-on (MPO) cables on its front panel for the client input interfaces. MPO cables break out into eight separate cables. The 32MUX-O card also has two LC-PC-II optical connectors, one for the main output and the other for the monitor port.

Figure 6-3 shows the 32MUX-O optical module functional block diagram.

Figure 6-3 32MUX-O Optical Module Functional Block Diagram



6.3.2.1 Port-Level Indicators for the 32MUX-O Cards

The 32MUX-O card has five sets of ports located on the faceplate. COM TX is the line output. COM MON is the optical monitoring port. The xx.x to yy.y RX ports represent the four groups of eight channels ranging from wavelength xx.x to wavelength yy.y, according to the channel plan.

6.3.3 Channel Plan

The 32MUX-O is typically used in hub nodes and provides the multiplexing of 32 channels, spaced at 100 GHz, into one fiber before their amplification and transmission along the line. The channel plan is shown in Table 6-9.

Table 6-9 32MUX-O Channel Plan

Channel Number[1]	Channel ID	Frequency (GHz)	Wavelength (nm)
1	30.3	195.9	1530.33
2	31.2	195.8	1531.12
3	31.9	195.7	1531.90
4	32.6	195.6	1532.68
5	34.2	195.4	1534.25
6	35.0	195.3	1535.04
7	35.8	195.2	1535.82
8	36.6	195.1	1536.61
9	38.1	194.9	1538.19
10	38.9	194.8	1538.98
11	39.7	194.7	1539.77
12	40.5	194.6	1540.56
13	42.1	194.4	1542.14
14	42.9	194.3	1542.94
15	43.7	194.2	1543.73
16	44.5	194.1	1544.53
17	46.1	193.9	1546.12
18	46.9	193.8	1546.92
19	47.7	193.7	1547.72
20	48.5	193.6	1548.51
21	50.1	193.4	1550.12
22	50.9	193.3	1550.92
23	51.7	193.2	1551.72
24	52.5	193.1	1552.52
25	54.1	192.9	1554.13
26	54.9	192.8	1554.94
27	55.7	192.7	1555.75
28	56.5	192.6	1556.55
29	58.1	192.4	1558.17
30	58.9	192.3	1558.98

Table 6-9 32MUX-O Channel Plan

Channel Number[1]	Channel ID	Frequency (GHz)	Wavelength (nm)
31	59.7	192.2	1559.79
32	60.6	192.1	1560.61

1. The Channel Number column is only for reference purposes. The channel ID is consistent with the ONS 15454 and is used in card identification.

6.3.4 Power Monitoring

Physical photodiodes P1 through P32 monitor the power for the 32MUX-O card. The returned power level values are calibrated to the ports as shown in Table 6-10.

Table 6-10 32MUX-O Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	ADD	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide*.

6.3.5 Related Procedures for the 32MUX-O Card

The following is the list of procedures and tasks related to the configuration of the 32MUX-O card:

- "DLP-G353 Preprovision a Slot" task on page 14-53
- "NTP-G30 Install the DWDM Cards" task on page 14-64
- "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" task on page 14-47
- "NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs" task on page 14-78
- "NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes" task on page 14-82
- "DLP-G315 Install Fiber-Optic Cables From the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Standard Patch Panel Tray" task on page 14-85
- "DLP-G356 Install Fiber-Optic Cables from the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Deep Patch Panel Tray" task on page 14-90
- "NTP-G184 Create a Provisionable Patchcord" task on page 16-72
- "NTP-G152 Create and Verify Internal Patchcords" task on page 14-113
- "NTP-G242 Create an Internal Patchcord Manually" task on page 14-114
- "NTP-G86 Convert a Pass-Through Connection to Add/Drop Connections"
- "NTP-G41 Perform the Terminal or Hub Node with 32MUX-O and 32DMX-O Cards Acceptance Test" task on page 21-3
- "NTP-G44 Perform the Anti-ASE Hub Node Acceptance Test" task on page 21-71
- "NTP-G74 Monitor DWDM Card Performance"

- "DLP-G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards"
- "NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds" task on page 20-54
- "DLP-G414 Change Optical Line Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-55
- "DLP-G415 Change Optical Line Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-57
- "DLP-G416 Change Optical Channel Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-59
- "DLP-G417 Change Optical Channel Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-62
- "DLP-G78 Verify the 32MUX-O or 40-MUX-C Card Power" task on page 21-7
- "DLP-G269 Verify the 32DMX-O or 40-DMX-C Card Power" task on page 21-7
- "DLP-G355 Delete an Internal Patchcord" task on page 14-123
- "NTP-G106 Reset Cards Using CTC" task on page 24-13
- "DLP-G251 Reset DWDM Cards Using CTC" task on page 24-14
- "NTP-G107 Remove Permanently or Remove and Replace DWDM Card"
- "DLP-G351 Delete a Card in CTC" task on page 14-51
- "NTP-G119 Power Down the Node" task on page 24-27

6.4 32DMX-O Card

Note For 32DMX-O card specifications, see the "32DMX-O Card Specifications" section in the Hardware Specifications document.

The 32-Channel Demultiplexer (32DMX-O) card demultiplexes 32 100-GHz-spaced channels identified in the channel plan. The 32DMX-O takes up two slots in an ONS 15454 and can be installed in Slots 1 to 5 and 12 to 16.

6.4.1 32DMX-O Card Functions

The 32DMX-O functions include:

- AWG that enables channel demultiplexing functions.
- Each single-channel port is equipped with VOAs for automatic optical power regulation after demultiplexing. In the case of electrical power failure, the VOA is set to its maximum attenuation for safety purposes. A manual VOA setting is also available.
- The 32DXM-O has four physical receive connectors that accept MPO cables on its front panel for the client input interfaces. MPO cables break out into eight separate cables.

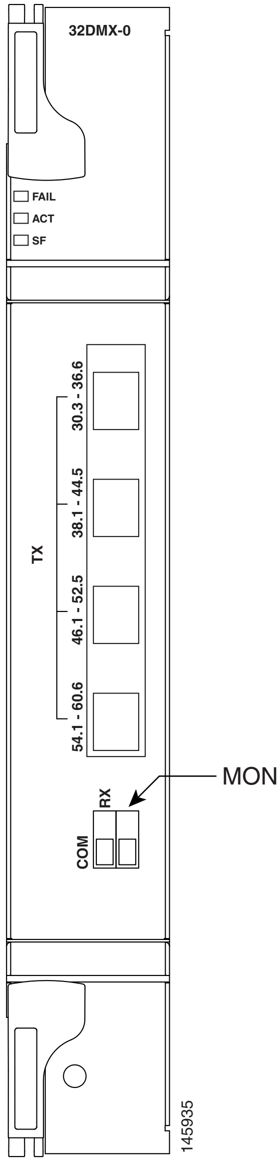
> **Note** In contrast, the single-slot 32DMX card does not have VOAs on each drop port for optical power regulation. The 32DMX optical demultiplexer module is used in conjunction with the 32WSS card in ONS 15454 Multiservice Transport Platform (MSTP) nodes.

- Each single-channel port is monitored using a photodiode to enable automatic power regulation.
- Card level indicators—Table G-4 on page G-9

6.4.2 32DMX-O Card Faceplate and Block Diagram

Figure 6-4 shows the 32DMX-O card faceplate.

Figure 6-4 32DMX-O Faceplate



For information on safety labels for the card, see the "G.1 Safety Labels" section on page G-1".

Figure 6-5 shows a block diagram of the 32DMX-O card.

Figure 6-5 32DMX-O Block Diagram

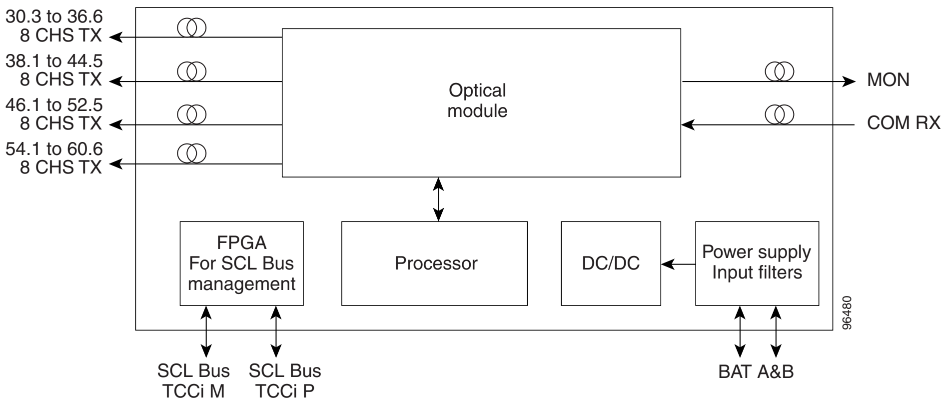
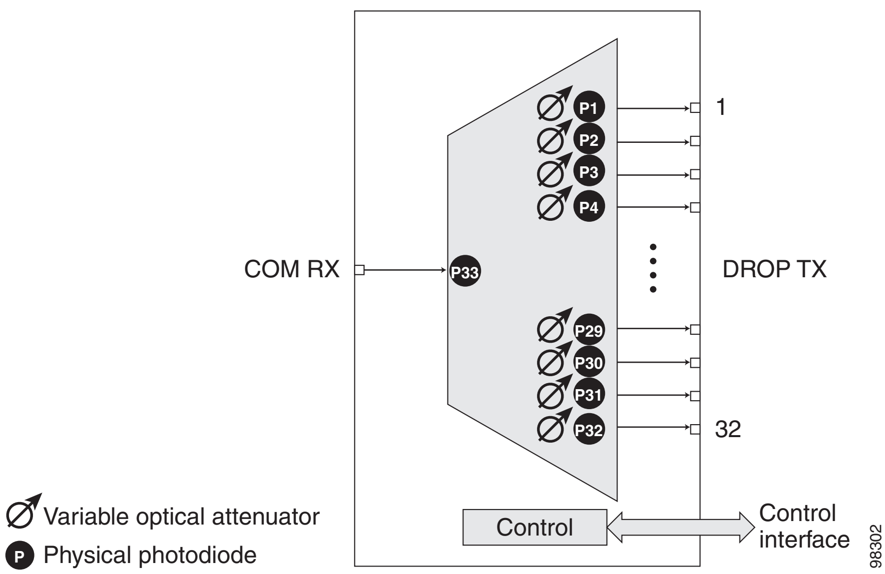


Figure 6-6 shows the 32DMX-O optical module functional block diagram.

Figure 6-6 32DMX-O Optical Module Functional Block Diagram



6.4.2.1 Port-Level Indicators for the 32DMX-O Cards

The 32DMX-O card has five sets of ports located on the faceplate. MON is the output monitor port. COM RX is the line input. The xx.x to yy.y TX ports represent the four groups of eight channels ranging from wavelength xx.x to wavelength yy.y according to the channel plan.

6.4.3 Power Monitoring

Physical photodiodes P1 through P33 monitor the power for the 32DMX-O card. The returned power level values are calibrated to the ports as shown in Table 6-11.

Table 6-11 32DMX-O Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	DROP	DROP TX
P33	INPUT COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1.*

6.4.4 Related Procedures for the 32DMX-O Card

The following is the list of procedures and tasks related to the configuration of the 32DMX-O card:

- “DLP-G353 Preprovision a Slot” task on page 14-53
- “NTP-G30 Install the DWDM Cards” task on page 14-64
- “NTP-G143 Import the Cisco Transport Planner NE Update Configuration File” task on page 14-47
- “NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs” task on page 14-78
- “NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes” task on page 14-82
- “DLP-G315 Install Fiber-Optic Cables From the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Standard Patch Panel Tray” task on page 14-85
- “DLP-G356 Install Fiber-Optic Cables from the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Deep Patch Panel Tray” task on page 14-90
- “NTP-G184 Create a Provisionable Patchcord” task on page 16-72
- “NTP-G152 Create and Verify Internal Patchcords” task on page 14-113
- “NTP-G242 Create an Internal Patchcord Manually” task on page 14-114
- “NTP-G86 Convert a Pass-Through Connection to Add/Drop Connections”
- “NTP-G44 Perform the Anti-ASE Hub Node Acceptance Test” task on page 21-71
- “NTP-G41 Perform the Terminal or Hub Node with 32MUX-O and 32DMX-O Cards Acceptance Test” task on page 21-3
- “NTP-G74 Monitor DWDM Card Performance”
- “DLP-G78 Verify the 32MUX-O or 40-MUX-C Card Power” task on page 21-7
- “DLP-G269 Verify the 32DMX-O or 40-DMX-C Card Power” task on page 21-7
- “DLP-G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards”
- “NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds” task on page 20-54
- “DLP-G414 Change Optical Line Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards” task on page 20-55
- “DLP-G415 Change Optical Line Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards” task on page 20-57

- "DLP-G416 Change Optical Channel Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-59
- "DLP-G417 Change Optical Channel Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-62
- "DLP-G355 Delete an Internal Patchcord" task on page 14-123
- "NTP-G106 Reset Cards Using CTC" task on page 24-13
- "DLP-G251 Reset DWDM Cards Using CTC" task on page 24-14
- "NTP-G107 Remove Permanently or Remove and Replace DWDM Card"
- "DLP-G351 Delete a Card in CTC" task on page 14-51
- "NTP-G119 Power Down the Node" task on page 24-27

6.5 4MD-xx.x Card

Note For 4MD-xx.x card specifications, see the section "4MD-xx.x Card Specifications" section in the Hardware Specifications document.

The 4-Channel Multiplexer/Demultiplexer (4MD-xx.x) card multiplexes and demultiplexes four 100-GHz-spaced channels identified in the channel plan. The 4MD-xx.x card is designed to be used with band OADMs (both AD-1B-xx.x and AD-4B-xx.x).

The card is bidirectional. The demultiplexer and multiplexer functions are implemented in two different sections of the same card. In this way, the same card can manage signals flowing in opposite directions.

There are eight versions of this card that correspond with the eight sub-bands specified in Table 6-12 on page 6-22. The 4MD-xx.x can be installed in Slots 1 to 6 and 12 to 17.

6.5.1 4MD-xx.x Card Functions

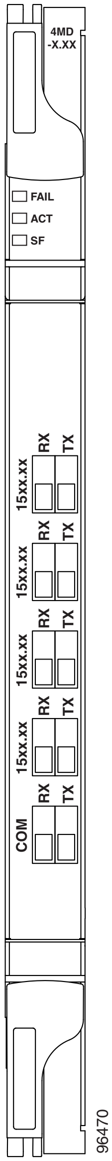
The 4MD-xx.x has the following functions implemented inside a plug-in optical module:

- Passive cascade of interferential filters perform the channel multiplex/demultiplex function.
- Software-controlled VOAs at every port of the multiplex section regulate the optical power of each multiplexed channel.
- Software-monitored photodiodes at the input and output multiplexer and demultiplexer ports for power control and safety purposes.
- Software-monitored virtual photodiodes at the common DWDM output and input ports. A virtual photodiode is a firmware calculation of the optical power at that port. This calculation is based on the single channel photodiode reading and insertion losses of the appropriated paths.
- Card level indicators—Table G-4 on page G-9

6.5.2 4MD-xx.x Card Faceplate and Block Diagram

Figure 6-7 shows the 4MD-xx.x faceplate.

Figure 6-7 4MD-xx.x Faceplate



For information on safety labels for the card, see the "G.1 Safety Labels" section on page G-1".

Figure 6-8 shows a block diagram of the 4MD-xx.x card.

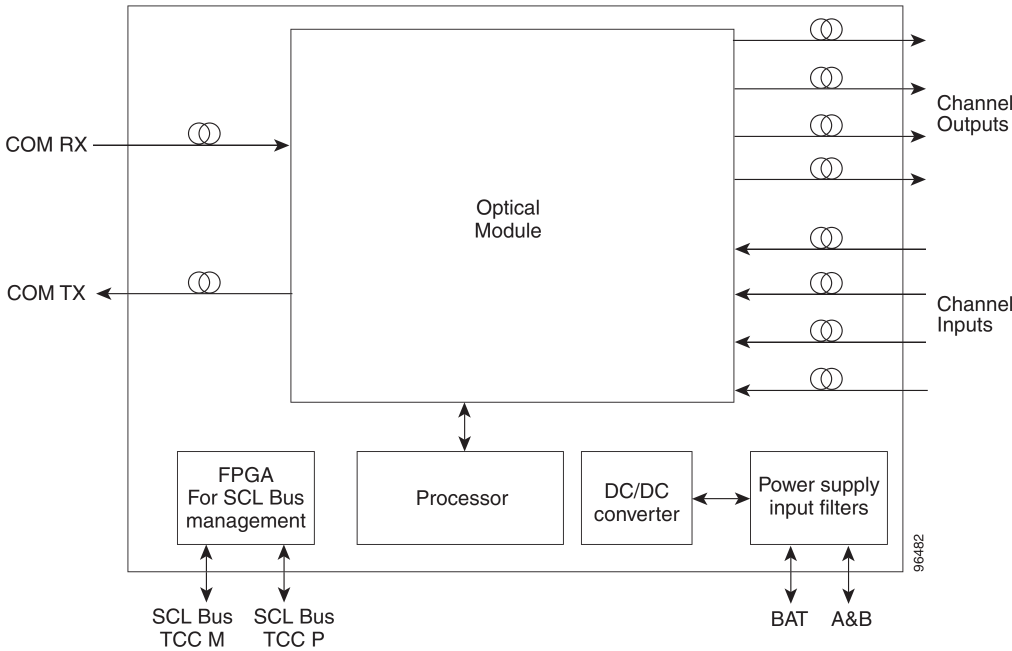


Figure 6-8 4MD-xx.x Block Diagram

Figure 6-9 shows the 4MD-xx.x optical module functional block diagram.

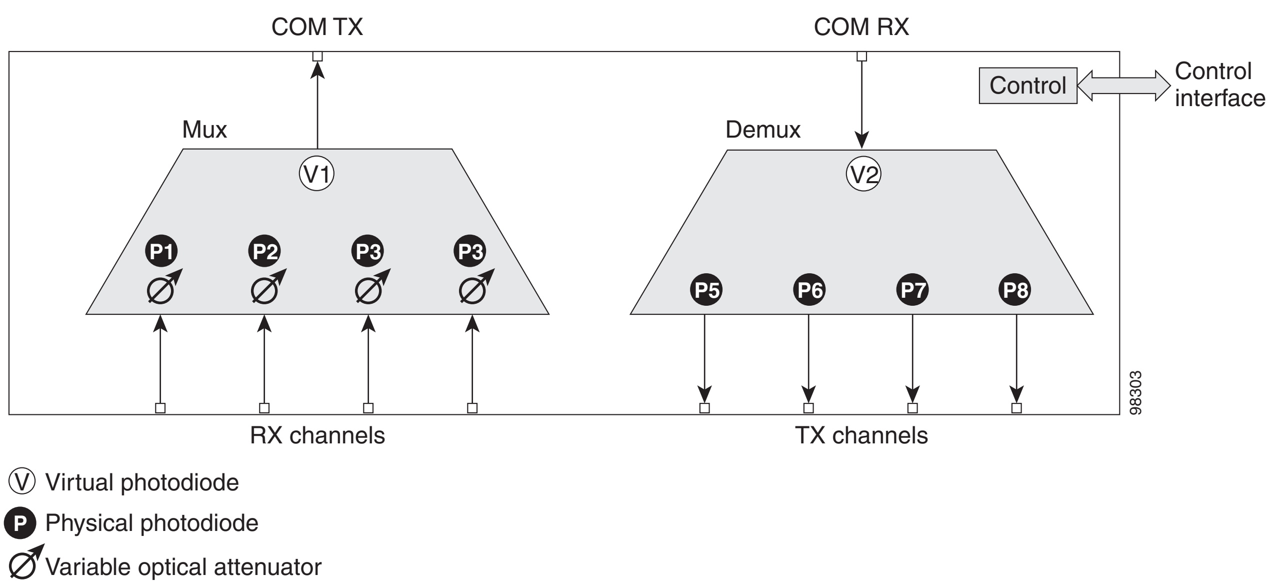


Figure 6-9 4MD-xx.x Optical Module Functional Block Diagram

The optical module shown in Figure 6-9 is optically passive and consists of a cascade of interferential filters that perform the channel multiplexing and demultiplexing functions.

VOAs are present in every input path of the multiplex section in order to regulate the optical power of each multiplexed channel. Some optical input and output ports are monitored by means of photodiodes implemented both for power control and for safety purposes. An internal control manages VOA settings and functionality as well as photodiode detection and alarm thresholds. The power at the main output and input ports is monitored through the use of virtual photodiodes. A virtual photodiode is implemented in the firmware of the plug-in module. This firmware calculates the power on a port, summing the measured values from all single channel ports (and applying the proper path insertion loss) and then providing the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card with the obtained value.

6.5.2.1 Port-Level Indicators for the 4MD-xx.x Cards

The 4MD-xx.x card has five sets of ports located on the faceplate. COM RX is the line input. COM TX is the line output. The 15xx.x TX ports represent demultiplexed channel outputs 1 to 4. The 15xx.x RX ports represent multiplexed channel inputs 1 to 4.

6.5.3 Wavelength Pairs

Table 6-12 shows the band IDs and the add/drop channel IDs for the 4MD-xx.x card.

Table 6-12 4MD-xx.x Channel Sets

Band ID	Add/Drop Channel IDs
Band 30.3 (A)	30.3, 31.2, 31.9, 32.6
Band 34.2 (B)	34.2, 35.0, 35.8, 36.6
Band 38.1 (C)	38.1, 38.9, 39.7, 40.5
Band 42.1 (D)	42.1, 42.9, 43.7, 44.5
Band 46.1 (E)	46.1, 46.9, 47.7, 48.5
Band 50.1 (F)	50.1, 50.9, 51.7, 52.5
Band 54.1 (G)	54.1, 54.9, 55.7, 56.5
Band 58.1 (H)	58.1, 58.9, 59.7, 60.6

6.5.4 Power Monitoring

Physical photodiodes P1 through P8 and virtual photodiodes V1 and V2 monitor the power for the 4MD-xx.x card. The returned power level values are calibrated to the ports as shown in Table 6-13.

Table 6-13 4MD-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P4	ADD	COM TX
P5–P8	DROP	DROP TX
V1	OUT COM	COM TX
V2	IN COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1.*

6.5.5 Related Procedures for the 4MD-xx.x Card

The following is the list of procedures and tasks related to the configuration of the 4MD-xx.x card:

- "DLP-G353 Preprovision a Slot" task on page 14-53
- "NTP-G30 Install the DWDM Cards" task on page 14-64
- "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" task on page 14-47
- "NTP-G48 Perform the OADM Node Acceptance Test on a Symmetric Node with OSCM Cards" task on page 21-94
- "DLP-G89 Verify OADM Node Pass-Through Channel Connections" task on page 21-99
- "DLP-G92 Verify 4MD-xx.x Pass-Through Connection Power" task on page 21-100
- "DLP-G93 Verify Add and Drop Connections on an OADM Node with OSCM Cards" task on page 21-104
- "NTP-G49 Perform the Active OADM Node Acceptance Test on a Symmetric Node with OSC-CSM Cards" task on page 21-106
- "DLP-G94 Verify Add and Drop Connections on an OADM Node with OSC-CSM Cards" task on page 21-110
- "NTP-G59 Create, Delete, and Manage Optical Channel Network Connections" task on page 16-40
- "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41
- "NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs" task on page 14-78
- "NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes" task on page 14-82
- "DLP-G315 Install Fiber-Optic Cables From the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Standard Patch Panel Tray" task on page 14-85
- "DLP-G356 Install Fiber-Optic Cables from the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Deep Patch Panel Tray" task on page 14-90
- "NTP-G184 Create a Provisionable Patchcord" task on page 16-72
- "NTP-G152 Create and Verify Internal Patchcords" task on page 14-113
- "NTP-G242 Create an Internal Patchcord Manually" task on page 14-114
- "NTP-G41 Perform the Terminal or Hub Node with 32MUX-O and 32DMX-O Cards Acceptance Test" task on page 21-3
- "NTP-G44 Perform the Anti-ASE Hub Node Acceptance Test" task on page 21-71
- "NTP-G86 Convert a Pass-Through Connection to Add/Drop Connections"
- "NTP-G74 Monitor DWDM Card Performance"
- "DLP-G78 Verify the 32MUX-O or 40-MUX-C Card Power" task on page 21-7
- "DLP-G269 Verify the 32DMX-O or 40-DMX-C Card Power" task on page 21-7
- "DLP-G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards"
- "NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds" task on page 20-54

- "DLP-G414 Change Optical Line Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-55
- "DLP-G415 Change Optical Line Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-57
- "DLP-G416 Change Optical Channel Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-59
- "DLP-G417 Change Optical Channel Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards" task on page 20-62
- "DLP-G355 Delete an Internal Patchcord" task on page 14-123
- "NTP-G106 Reset Cards Using CTC" task on page 24-13
- "DLP-G251 Reset DWDM Cards Using CTC" task on page 24-14
- "NTP-G107 Remove Permanently or Remove and Replace DWDM Card"
- "DLP-G351 Delete a Card in CTC" task on page 14-51
- "NTP-G119 Power Down the Node" task on page 24-27

CHAPTER 7

Setup Tunable Dispersion Compensating Units

This chapter explains the Tunable Dispersion Compensating Units (T-DCU) used in Cisco ONS 15454 dense wavelength division multiplexing (DWDM) networks. For card safety and compliance information, refer to the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

The T-DCU unit compensates for chromatic dispersion (CD) of the transmission fiber. The T-DCU provides two line cards with varied set of tunable wavelengths to compensate for CD.

This chapter includes:

7.1 Card Overview

The T-DCU card provides a selectable set of discrete negative chromatic dispersion values to compensate for chromatic dispersion of the transmission line. The card operates over the entire C-band (in the range of 1529.0 nm to 1562.5 nm) and monitors the optical power at the input and the output ports. The two types of T-DCU line cards are:

- TDC-CC (Coarse T-DCU)
- TDC-FC (Fine T-DCU)

Note Each T-DCU card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. Cards should be installed in slots that have the same symbols. See the "Card Slot Requirements" section in the *Cisco ONS 15454 Hardware Installation Guide*.

7.1.1 Card Summary

Table 7-1 lists and summarizes the information about the TDC-CC and TDC-FC cards.

Table 7-1 T-DCU Cards

Card	Port Description	For Additional Information
TDC-CC	The TDC-CC has one set of optical ports located on the faceplate. It operates in slots 1 to 6 and slots 12 to 17.	See the 7.3 TDC-CC and TDC-FC Cards section.
TDC-FC	The TDC-FC has one set of optical ports located on the faceplate. It operates in slots 1 to 6 and slots 12 to 17.	

7.2 Safety Labels

For information about safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

7.3 TDC-CC and TDC-FC Cards

The TDC-CC card provides 16 values of CD ranging from 0 to -1650 ps/nm with a granularity of 110 ps/nm in the C-band spectrum.

The TDC-FC card provides 16 values of CD ranging from 0 to -675 ps/nm with a granularity of 45 ps/nm in the C-band spectrum.

You can configure the TDC-CC and TDC-FC cards for the CD value listed in Table 7-2.

Table 7-2 TDC-CC and TDC-FC Tunable CD Value

Unit Configuration	TDC-CC [ps/nm]	TDC-FC [ps/nm]
0	0 [1]	0[2]
1	-110	-45
2	-220	-90
3	-330	-135
4	-440	-180
5	-550	-225
6	-660	-270
7	-770	-315
8	-880	-360
9	-990	-405
10	-1100	-450
11	-1210	-495
12	-1320	-540

Table 7-2 TDC-CC and TDC-FC Tunable CD Value

Unit Configuration	TDC-CC [ps/nm]	TDC-FC [ps/nm]
13	-1430	-585
14	-1540	-630
15	-1650	-675

1. The default value of the TDC-CC CD value for Coarse Unit is 0.
2. The default value of the TDC-FC value for Fine Unit is 0.

7.3.1 Key Features

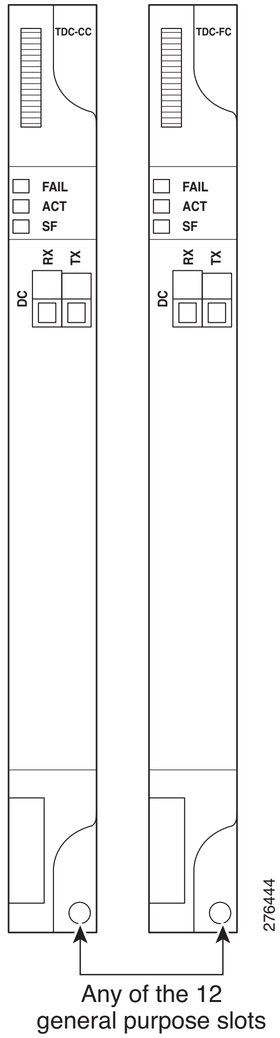
The TDC-CC and TDC-FC cards provide the following features:

- Single slot card with three LEDs on the front panel.
- Two LC-PC-II optical connectors on the front panel.
- Operates in slots from slot 1 to 6 and 12 to 17.
- Operates over the C-band (wavelengths from 1529 nm to 1562.5 nm) of the optical spectrum.
- Allows upto 16 provisionable CD values for chromatic dispersion compensation.
- Connects to OPT-PRE, OPT-AMP-C, OPT-RAMP-C, and OPT-RAMP-CE amplifiers and 40-SMR-1 and 40-SMR-2 cards.
- Supports performance monitoring and alarm handling for selectable thresholds.
- Allows monitoring and provisioning using CTC, SNMP, or TL1.

7.3.2 TDC-CC and TDC-FC Faceplate Diagram

Figure 7-1 shows the TDC-CC and TDC-FC faceplate diagram. The TDC-CC and TDC-FC cards can be installed or pulled out of operation from any user interface slot, without impacting other service cards operating within that shelf.

Figure 7-1 TDC-CC and TDC-FC Faceplates



Note The coarse T-DCU is identified with the card label as TDC-CC and the fine T-DCU with TDC-FC in the faceplate of the T-DCU card.

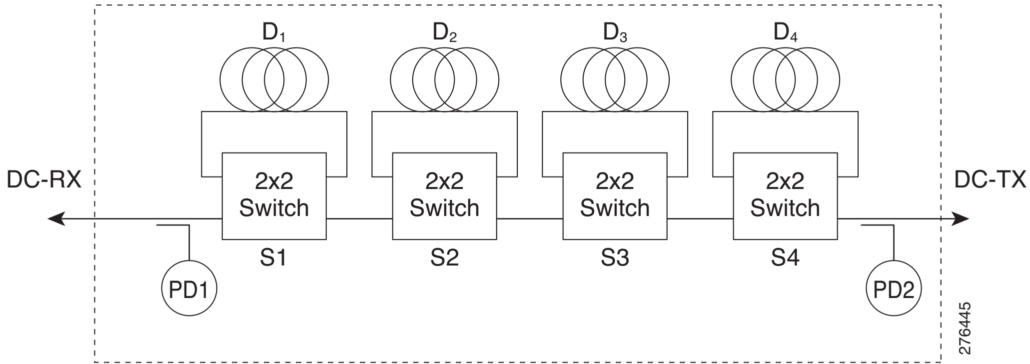
7.3.3 Functioning of Optical Ports

The T-DCU unit contains the DC-RX (input) and DC-TX (output) ports. The optical signal enters the DC-RX port, compensates the chromatic dispersion and then exits from the DC-TX port.

7.3.4 TDC-CC and TDC-FC Block Diagram

The TDC-CC and TDC-FC cards embed an optical module with four spools (D1, D2, D3, and D4) of dispersion compensating fiber that connects through the 2x2 bypass switches (Figure 7-2). Each bypass switch allows the corresponding dispersion compensation fiber spools to connect to the optical path from the DC-RX (input port) to the DC-TX (output port). The switch configuration selects the requested CD value and combines the four spools based on the 16 chromatic dispersion compensation values fetched. The photo diodes PD1 and PD2 are used to monitor the input and output ports respectively.

Figure 7-2 Block Diagram of TDC-CC and TDC-FC



7.3.5 TDC-CC and TDC-FC Cards Functions

The functions of the TDC-CC and TDC-FC cards are:

- G.16 Lamp Test, page G-19
- Card level indicators—Table G-1 on page G-7

7.4 Monitoring Optical Performance

The TDC-CC and TDC-FC cards monitor the optical input power and optical output power of the fiber. It monitors the insertion loss from the input (DC-RX) to the output (DC-TX) port, with the help of the two photodiodes PD1 and PD2. The TDC-CC and TDC-FC cards report the minimum, average, and maximum power statistics of each of the monitored ports or channels in the specific card. To view the optical power statistics of the TDC-CC and TDC-FC cards, refer to the Monitor Performance document. The performance data is recorded at 15 minutes and 24 hours intervals.

Note You can view the performance monitoring (PM) data of the card using CTC, SNMP, and TL1 interfaces.

Note The PM data is stored on a wrap-around basis at 32 x 15 min. and 2 x 24 hour intervals.

7.4.1 Related Procedures for TDC-CC and TDC-FC Cards

The following section lists procedures and tasks related to the configuration of the TDC-CC and TDC-FC cards:

- NTP-G30 Install the DWDM Cards, page 14-64
- DLP-G525 View Optical Power Statistics for TDC-CC and TDC-FC cards
- NTP-G240 Modify TDC-CC and TDC-FC Line Settings and PM Thresholds, page 20-76
- NTP-G242 Modify the CD setting of TDC-CC and TDC-FC Cards
- NTP-G119 Power Down the Node, page 24-27

CHAPTER 8

Provision Protection Switching Module

This chapter describes the Protection Switching Module (PSM) card used in Cisco ONS 15454 dense wavelength division multiplexing (DWDM) networks. For card safety and compliance information, refer to the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

8.1 PSM Card Overview

The PSM card performs splitter protection functions. In the transmit (TX) section of the PSM card (see Figure 8-1), the signal received on the common receive port is duplicated by a hardware splitter to both the working and protect transmit ports. In the receive (RX) section of the PSM card (Figure 8-1), a switch is provided to select one of the two input signals (on working and protect receive ports) to be transmitted through the common transmit port.

The PSM card supports multiple protection configurations:

- Channel protection—The PSM COM ports are connected to the TXP/MXP trunk ports.
- Line (or path) protection—The PSM working (W) and protect (P) ports are connected directly to the external line.
- Multiplex section protection—The PSM is equipped between the MUX/DMX stage and the amplification stage.
- Standalone—The PSM can be equipped in any slot and supports all node configurations.

The PSM card is a single-slot card that can be installed in any node from Slot 1 to 6 and 12 to 17. The PSM card includes six LC-PC-II optical connectors on the front panel. In channel protection configuration, the PSM card can be installed in a different shelf from its peer TXP/MXP card.

Note It is strongly recommended that you use the default layouts designed by Cisco Transport Planner, which place the PSM card and its peer TXP/MXP card as close as possible to simplify cable management.

For more information on the node configurations supported for the PSM card, see the 12.3 Supported Node Configurations for PSM Card, page 12-46.

For more information on the network topologies supported for the PSM card, see the 13.6 Network Topologies for the PSM Card, page 13-19.

8.1.1 Key Features

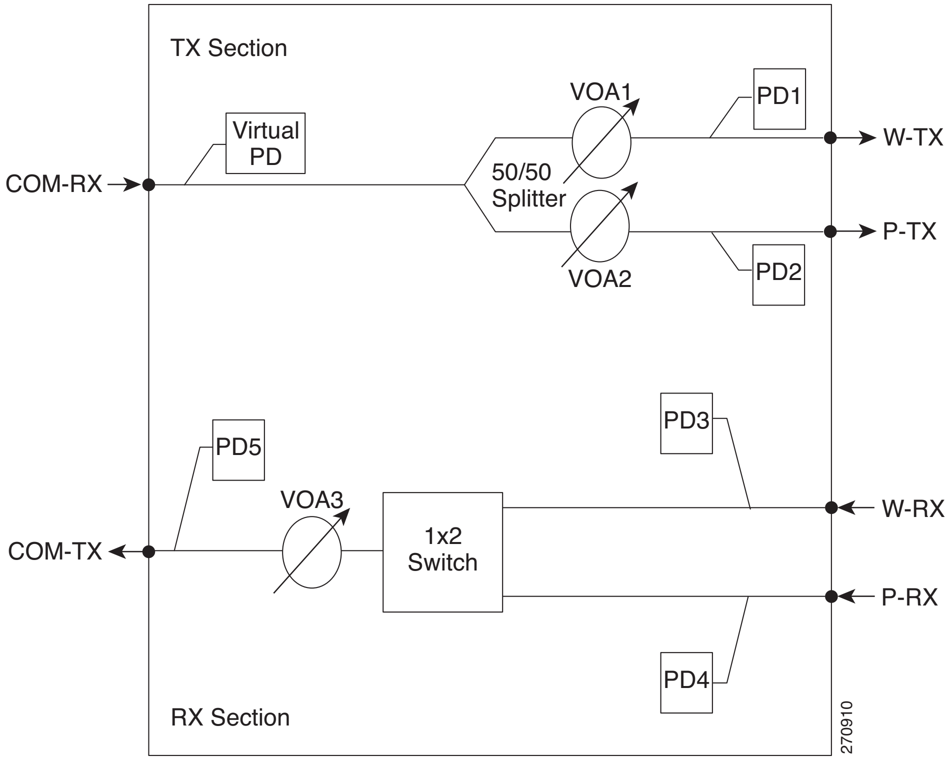
The PSM card provides the following features:

- Operates over the C-band (wavelengths from 1529 nm to 1562.5 nm) and L-band (wavelengths from 1570.5 nm to 1604 nm) of the optical spectrum.
- Implements bidirectional non-revertive protection scheme. For more details on bidirectional switching, see the "8.1.5 PSM Bidirectional Switching" section on page 8-4.
- Supports automatic creation of splitter protection group when the PSM card is provisioned.
- Supports switching priorities based on ITU-T G.873.1.
- Supports performance monitoring and alarm handling with settable thresholds.
- Supports automatic laser shutdown (ALS), a safety mechanism used in the event of a fiber cut. ALS is applicable only in line protection configuration. For information about using the card to implement ALS in a network, see the 13.11 Network Optical Safety, page 13-30.

8.1.2 PSM Block Diagram

Figure 8-1 shows a simplified block diagram of the PSM card.

Figure 8-1 PSM Block Diagram



8.1.3 PSM Faceplate Ports

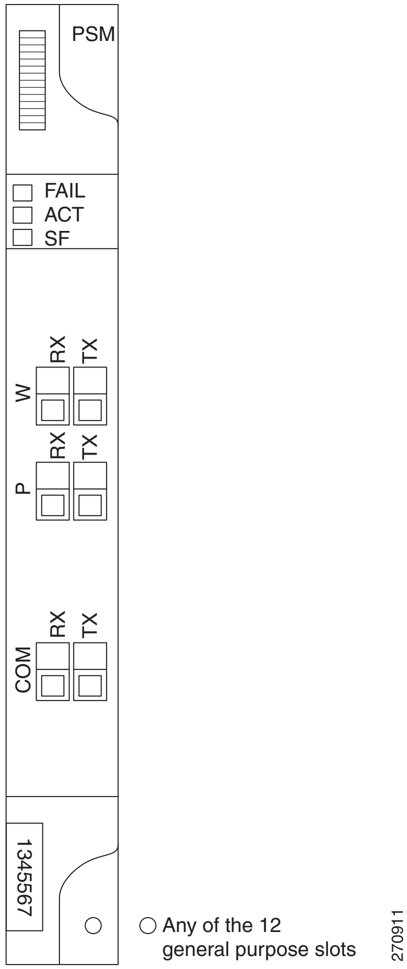
The PSM card has six optical ports located on the faceplate:

- COM-RX (receive) is the input signal port.
- COM-TX (transmit) is the output signal port.
- W-RX is the working input signal port (receive section).
- W-TX is the working output signal port (transmit section).
- P-RX is the protect input signal port (receive section).
- P-TX is the protect output signal port (transmit section).

All ports are equipped with photodiodes to monitor optical power and other related thresholds. The COM-RX port is equipped with a virtual photodiode (firmware calculations of port optical power) to monitor optical power. The W-RX, P-RX, W-TX, and P-TX ports have optical power regulation, which are provided by variable optical attenuators (VOA). All VOAs equipped within the PSM card work in control attenuation mode.

Figure 8-2 shows the PSM card faceplate.

Figure 8-2 PSM Card Faceplate



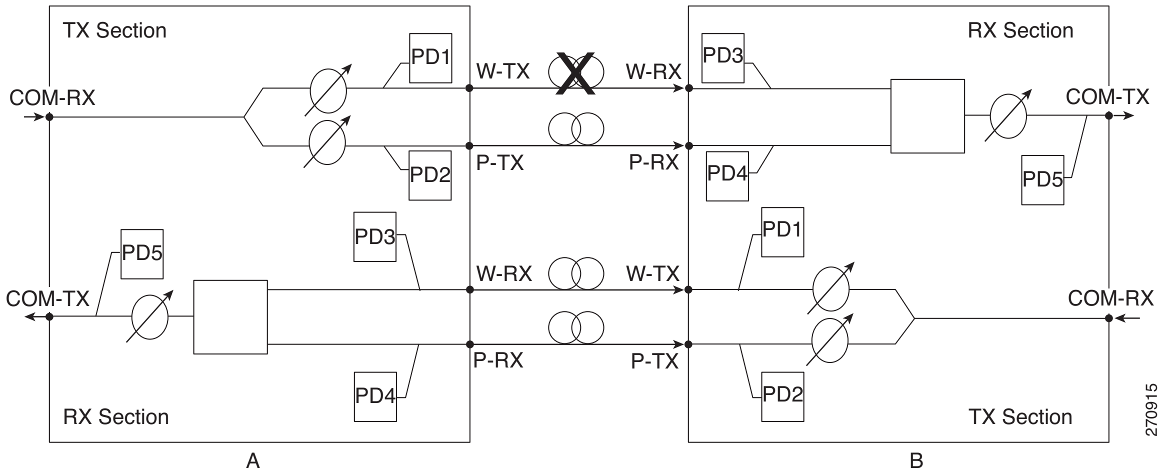
8.1.4 PSM Card-Level Indicators

Table G-1 describes the card-level indicators on the card.

8.1.5 PSM Bidirectional Switching

A VOA is equipped after the hardware splitter within the PSM card. The VOA implements bidirectional switching when there is a single fiber cut in a protection configuration involving two peer PSM cards. Figure 8-3 shows a sample configuration that explains the bidirectional switching capability of the PSM card.

Figure 8-3 PSM Bidirectional Switching



In this example, there is a fiber cut in the working path from Station A to Station B as shown in Figure 8-3. As a result of the fiber cut, an LOS alarm is raised on the W-RX port of Station B and it immediately switches traffic on to its P-RX port. Station B simultaneously also stops transmission (for approximately 25 milliseconds) on its W-TX port, which raises an LOS alarm on the W-RX port of Station A. This causes Station A to also switch traffic to its P-RX port. In this way, PSM implements bidirectional switching without any data exchange between the two stations.

Since the two stations do not communicate using signaling protocols (overhead bytes), a Manual or Force protection switch on the PSM card is implemented by creating a traffic hit. For example, consider that you perform a Manual or Force protection switch on Station A. The TX VOA on the active path is set to automatic VOA shutdown (AVS) state for 25 milliseconds. This causes Station B to switch traffic to the other path because it cannot differentiate between a maintenance operation and a real fail. After 25 milliseconds, the VOA in Station A is automatically reset. However, Station B will not revert back by itself because of nonrevertive switching protection scheme used in the PSM card.

To effectively implement switching, the Lockout and Force commands must be performed on both the stations. If these commands are not performed on both the stations, the far-end and near-end PSMs can be misaligned. In case of misalignment, when a path recovers, traffic might not recover automatically. You might have to perform a Force protection switch to recover traffic.

Note The order in which you repair the paths is important in the event of a double failure (both the working and protect paths are down due to a fiber cut) on the PSM card in line protection configuration when the active path is the working path. If you repair the working path first, traffic is automatically restored. However, if you repair the protect path first, traffic is not automatically restored. You must perform a Force protection switch to restore traffic on the protect path.

8.1.6 Related Procedures for PSM Card

The following is the list of procedures and tasks related to the configuration of the PSM card:

- NTP-G30 Install the DWDM Cards, page 14-64
- NTP-G202 Modify PSM Card Line Settings and PM Thresholds, page 20-47
- NTP-G242 Create an Internal Patchcord Manually, page 14-114

- DLP-G493 Provision Protected Optical Channel Network Connections, page 16-44
- DLP-G479 View Optical Power Statistics for the PSM Card
- DLP-G176 Modify a Splitter Protection Group
- DLP-G459 Delete a Splitter Protection Group

CHAPTER 9

Provision Optical Add/Drop Cards

This chapter describes optical add/drop cards used in Cisco ONS 15454 dense wavelength division multiplexing (DWDM) networks. For card safety and compliance information, refer to the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document.

Note The cards described in this chapter are supported on the Cisco ONS 15454, Cisco ONS 15454 M6, Cisco ONS 15454 M2 platforms, unless noted otherwise.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

9.1 Card Overview

The card overview section contains card overview, software compatibility, interface class, and channel allocation information for optical add/drop cards.

Note Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. The cards are then installed into slots displaying the same symbols. For a list of slots and symbols, see the "Card Slot Requirements" section in the *Cisco ONS 15454 Hardware Installation Guide*.

Optical add/drop cards are divided into two groups: band optical add/drop multiplexer (OADM) cards and channel OADM cards. Band OADM cards add and drop one or four bands of adjacent channels. The cards in this chapter, including the 4-Band OADM (AD-4B-xx.x) and the 1-Band OADM (AD-1B-xx.x) are utilized only in the C band. Channel OADM cards add and drop one, two, or four adjacent channels; they include the 4-Channel OADM (AD-4C-xx.x), the 2-Channel OADM (AD-2C-xx.x), and the 1-Channel OADM (AD-1C-xx.x).

Note For information about L band add and drop capability, see Chapter 10, "Provision Reconfigurable Optical Add/Drop Cards."

9.1.1 Card Summary

Table 9-1 lists and summarizes the functions of the optical add/drop cards.

Table 9-1 Optical Add/Drop Cards

Card	Port Description	For Additional Information
AD-1C-xx.x	The AD-1C-xx.x card has three sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "9.3 AD-1C-xx.x Card" section on page 9-9.
AD-2C-xx.x	The AD-2C-xx.x card has four sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "9.4 AD-2C-xx.x Card" section on page 9-12.
AD-4C-xx.x	The AD-4C-xx.x card has six sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "9.5 AD-4C-xx.x Card" section on page 9-16.
AD-1B-xx.x	The AD-1B-xx.x card has three sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "9.6 AD-1B-xx.x Card" section on page 9-20.
AD-4B-xx.x	The AD-4B-xx.x card has six sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "9.7 AD-4B-xx.x Card" section on page 9-23.

9.1.2 Card Compatibility

Table 9-2 lists the CTC software compatibility for each optical add/drop card.

Table 9-2 Software Release Compatibility for Optical Add/Drop Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
AD-1C -xx.x	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
AD-2C -xx.x	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
AD-4C -xx.x	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
AD-1B -xx.x	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
AD-4B -xx.x	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM

9.1.3 Interface Classes

The AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-1B-xx.x, and AD-4B-xx.x cards have different input and output optical channel signals depending on the interface card where the input signal originates from. The input interface cards have been grouped in classes listed in Table 9-3. The subsequent tables list the optical performances and output power of each interface class.

Table 9-3 ONS 15454 Card Interfaces Assigned to Input Power Classes

Input Power Class	Card
A	10-Gbps multirate transponder cards (TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L) with forward error correction (FEC) enabled, 10-Gbps muxponder cards (MXP_2.5G_10G, MXP_2.5G_10E, MXP_MR_10DME_C, MXP_MR_10DME_L, MXP_2.5G_10E_C, and MXP_2.5G_10E_L) with FEC enabled, 40-Gbps transponder cards (40E-TXP-C, and 40ME-TXP-C), and 40-Gbps muxponder cards (40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C)
B	10-Gbps multirate transponder card (TXP_MR_10G) without FEC and the 10-Gbps muxponder card (MXP_2.5G_10G, MXP_MR_10DME_C, MXP_MR_10DME_L), 40-Gbps transponder cards (40E-TXP-C, and 40ME-TXP-C), and 40-Gbps muxponder cards (40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C), and ADM-10G cards with FEC disabled
C	OC-192 LR ITU cards (TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L) without FEC
D	2.5-Gbps multirate transponder card (TXP_MR_2.5G), both protected and unprotected, with FEC enabled
E	OC-48 100-GHz DWDM muxponder card (MXP_MR_2.5G) and 2.5-Gbps multirate transponder card (TXP_MR_2.5G), both protected and unprotected, with FEC disabled and retime, reshape, and regenerate (3R) mode enabled
F	2.5-Gbps multirate transponder card (TXP_MR_2.5G), both protected and unprotected, in regenerate and reshape (2R) mode
G	OC-48 ELR 100 GHz card
H	2/4 port GbE transponder (GBIC WDM 100GHz)
I	TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L, 40E-TXP-C, and 40ME-TXP-C cards with enhanced FEC (E-FEC) and the MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_MR_10DME_C, MXP_MR_10DME_L, 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards with E-FEC enabled

Table 9-4 lists the optical performance parameters for 40-Gbps cards that provide signal input to the optical add/drop cards.

Table 9-4 40-Gbps Interface Optical Performance

Parameter	Class A		Class B		Class I	
Type	**Power Limited**	**OSNR[1] Limited (if appl.)**	**Power Limited**	**OSNR Limited (if appl.)**	**Power Limited**	**OSNR Limited (if appl.)**
Maximum bit rate	40 Gbps		40 Gbps		40 Gbps	
Regeneration	3R		3R		3R	
FEC	Yes		No		Yes (E-FEC)	
Threshold	Optimum		Average		Optimum	
Maximum BER[2]	10^{-15}		10^{-12}		10^{-15}	
OSNR[1] sensitivity	23 dB	9 dB	23 dB	19 dB	20 dB	8 dB
Power sensitivity	–24 dBm	–18 dBm	–21 dBm	–20 dBm	–26 dBm	–18 dBm
Power overload	–8 dBm		–8 dBm		–8 dBm	
Transmitted Power Range[3]						
40-Gbps multirate transponder/40-Gbps FEC transponder (40E-TXP-C, and 40ME-TXP-C)	+2.5 to 3.5 dBm		+2.5 to 3.5 dBm		—	
OC-192 LR ITU	—		—		—	
Dispersion compensation tolerance	+/–800 ps/nm		+/–1,000 ps/nm		+/–800 ps/nm	

1. OSNR = optical signal-to-noise ratio
2. BER = bit error rate
3. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

Table 9-5 lists the optical performance parameters for 40-Gbps cards that provide signal input to the optical add/drop cards.

Table 9-5 10-Gbps Interface Optical Performance

Parameter	Class A		Class B		Class C	Class I	
Type	**Power Limited**	**OSNR[1] Limited (if appl.)**	**Power Limited**	**OSNR Limited (if appl.)**	**OSNR Limited**	**Power Limited**	**OSNR Limited (if appl.)**
Maximum bit rate	10 Gbps		10 Gbps		10 Gbps	10 Gbps	
Regeneration	3R		3R		3R	3R	
FEC	Yes		No		No	Yes (E-FEC)	
Threshold	Optimum		Average		Average	Optimum	
Maximum BER[2]	10^{-15}		10^{-12}		10^{-12}	10^{-15}	
OSNR[1] sensitivity	23 dB	9 dB	23 dB	19 dB	19 dB	20 dB	8 dB

Table 9-5 10-Gbps Interface Optical Performance (continued)

Parameter	Class A		Class B		Class C	Class I	
Type	**Power Limited**	**OSNR[1] Limited (if appl.)**	**Power Limited**	**OSNR Limited (if appl.)**	**OSNR Limited**	**Power Limited**	**OSNR Limited (if appl.)**
Power sensitivity	–24 dBm	–18 dBm	–21 dBm	–20 dBm	–22 dBm	–26 dBm	–18 dBm
Power overload	–8 dBm		–8 dBm		–9 dBm	–8 dBm	
Transmitted Power Range[3]							
10-Gbps multirate transponder/10-Gbps FEC transponder (TXP_MR_10G)	+2.5 to 3.5 dBm		+2.5 to 3.5 dBm		—	—	
OC-192 LR ITU	—		—		+3.0 to 6.0 dBm	—	
10-Gbps multirate transponder/10-Gbps FEC transponder (TXP_MR_10E)	+3.0 to 6.0 dBm		+3.0 to 6.0 dBm		—	+3.0 to 6.0 dBm	
Dispersion compensation tolerance	+/–800 ps/nm		+/–1,000 ps/nm		+/–1,000 ps/nm	+/–800 ps/nm	

1. OSNR = optical signal-to-noise ratio
2. BER = bit error rate
3. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

2.5-Gbps cards that provide signal input to the optical add/drop cards have the interface performance parameters listed in Table 9-6.

Table 9-6 2.5-Gbps Interface Optical Performance

Parameter	Class D		Class E		Class F	Class G		Class H		Class J
Type	**Power Limited**	**OSNR Limited (if appl.)**	**Power Limited**	**OSNR Limited (if appl.)**	**OSNR Limited**	**Power Limited**	**OSNR Limited (if appl.)**	**Power Limited**	**OSNR Limited (if appl.)**	**Power Limited**
Maximum bit rate	2.5 Gbps		2.5 Gbps		2.5 Gbps	2.5 Gbps		1.25 Gbps		2.5 Gbps
Regeneration	3R		3R		2R	3R		3R		3R
FEC	Yes		No		No	No		No		No
Threshold	Average		Average		Average	Average		Average		Average
Maximum BER	10^{-15}		10^{-12}		10^{-12}	10^{-12}		10^{-12}		10^{-12}
OSNR sensitivity	14 dB	6 dB	14 dB	10 dB	15 dB	14 dB	11 dB	13 dB	8 dB	12 dB
Power sensitivity	–31 dBm	–25 dBm	–30 dBm	–23 dBm	–24 dBm	–27 dBm	–33 dBm	–28 dBm	–18 dBm	–26 dBm
Power overload	–9 dBm		–9 dBm		–9 dBm	–9 dBm		–7 dBm		–17dBm

Table 9-6 2.5-Gbps Interface Optical Performance (continued)

Parameter	Class D		Class E		Class F	Class G		Class H		Class J
Type	Power Limited	OSNR Limited (if appl.)	Power Limited	OSNR Limited (if appl.)	OSNR Limited	Power Limited	OSNR Limited (if appl.)	Power Limited	OSNR Limited (if appl.)	Power Limited
Transmitted Power Range[1]										
TXP_MR_2.5G	–1.0 to 1.0 dBm		–1.0 to 1.0 dBm		–1.0 to 1.0 dBm	–2.0 to 0 dBm		—		—
TXPP_MR_2.5G	–4.5 to –2.5 dBm		–4.5 to –2.5 dBm		–4.5 to –2.5 dBm					
MXP_MR_2.5G	—		+2.0 to +4.0 dBm		—					
MXPP_MR_2.5G	—		–1.5 to +0.5 dBm		—					
2/4 port GbE Transponder (GBIC WDM 100GHz)	—		—		—	—		+2.5 to 3.5 dBm		—
Dispersion compensation tolerance	–1200 to +5400 ps/nm		–1200 to +5400 ps/nm		–1200 to +3300 ps/nm	–1200 to +3300 ps/nm		–1000 to +3600 ps/nm		–1000 to +3200 ps/nm

1. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

9.1.4 DWDM Card Channel Allocation Plan

ONS 15454 DWDM channel OADM and band OADM cards are designed for use with specific channels in the C band. In most cases, the channels for these cards are either numbered (for example, 1 to 32) or delimited (odd or even). Client interfaces must comply with these channel assignments to be compatible with the ONS 15454 system.

Table 9-7 lists the channel IDs and wavelengths assigned to the C-band DWDM channels.

Note In some cases, a card uses only some or all of the channels listed in a band. Also, some cards use channels on the 100-GHz ITU-T grid while others use channels on the 50-GHz ITU-T grid. See specific card descriptions in Appendix B, "Hardware Specifications," for more details.

Table 9-7 DWDM Channel Allocation Plan (C Band)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715

Table 9-7 DWDM Channel Allocation Plan (C Band) (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

9.2 Safety Labels

For information about safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

9.3 AD-1C-xx.x Card

Note For AD-1C-xx.x card specifications, see the "AD-1C-xx.x Card Specifications" section in the Hardware Specifications document.

The 1-Channel OADM (AD-1C-xx.fx) card passively adds or drops one of the 32 channels utilized within the 100-GHz-spacing of the DWDM card system. Thirty-two versions of this card—each designed only for use with one wavelength—are used in the ONS 15454 DWDM system. Each wavelength version of the card has a different part number. The AD-1C-xx.x can be installed in Slots 1 to 6 and 12 to 17.

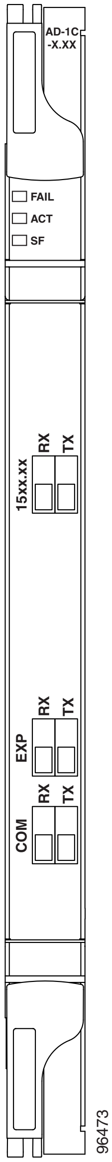
The AD-1C-xx.x has the following internal features:

- Two cascaded passive optical interferential filters perform the channel add and drop functions.
- One software-controlled variable optical attenuator (VOA) regulates the optical power of the inserted channel.
- Software-controlled VOA regulates the insertion loss of the express optical path.
- VOA settings and functions, photodiode detection, and alarm thresholds, are internally controlled.
- Virtual photodiodes (firmware calculations of port optical power) at the common DWDM output and input ports are monitored within the software.

9.3.1 Faceplate and Block Diagrams

Figure 9-1 shows the AD-1C-xx.x faceplate.

Figure 9-1 AD-1C-xx.x Faceplate



For information on safety labels for the card, see the "9.2 Safety Labels" section on page 9-9.

Figure 9-2 shows a block diagram of the AD-1C-xx.x card.

Figure 9-2 AD-1C-xx.x Block Diagram

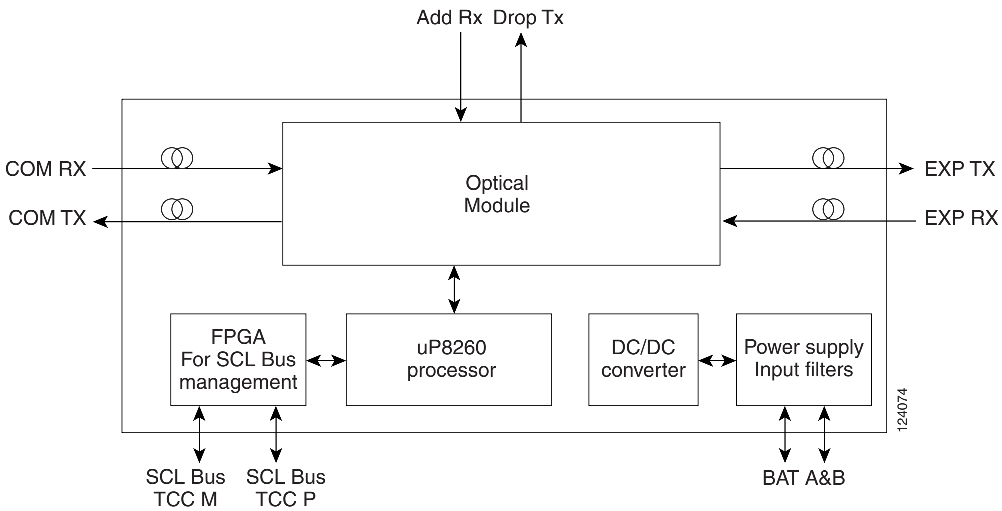
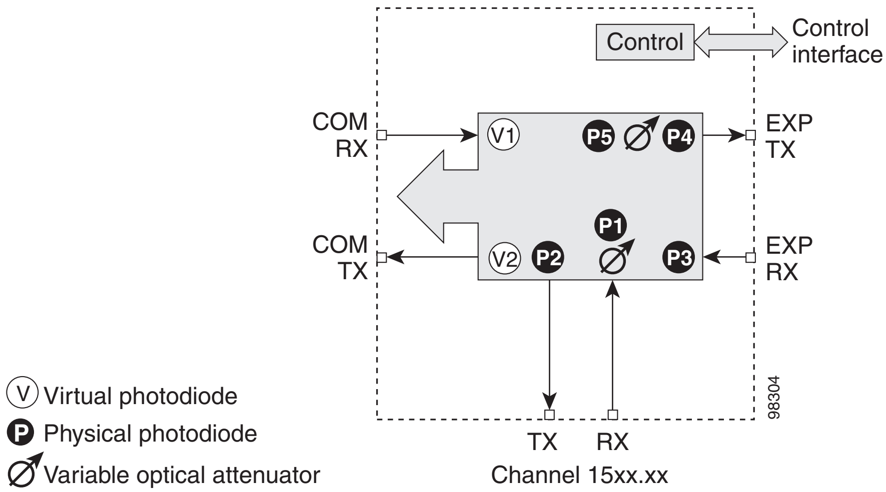


Figure 9-3 shows the AD-1C-xx.x optical module functional block diagram.

Figure 9-3 AD-1C-xx.x Optical Module Functional Block Diagram



9.3.2 Power Monitoring

Physical photodiodes P1 through P4 and virtual photodiodes V1 and V2 monitor the power for the AD-1C-xx.x card. The returned power level values are calibrated to the ports as shown in Table 9-8.

Table 9-8 AD-1C-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	ADD	DROP RX
P2	DROP	DROP TX

Table 9-8 AD-1C-xx.x Port Calibration (continued)

Photodiode	CTC Type Name	Calibrated to Port
P3	IN EXP	EXP RX
P4	OUT EXP	EXP TX
V1	IN COM	COM RX
V2	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1.*

9.3.3 AD-1C-xx.x Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

9.3.4 Related Procedures for AD-1C-xx.x Card

The following section lists procedures and tasks related to the configuration of the AD-1C-xx.x card:

- "NTP-G30 Install the DWDM Cards" procedure on page 14-64
- "NTP-G37 Run Automatic Node Setup" procedure on page 14-127
- "NTP-G59 Create, Delete, and Manage Optical Channel Network Connections" procedure on page 16-40
- "NTP-G51 Verify DWDM Node Turn Up" procedure on page 15-2
- NTP-G74 Monitor DWDM Card Performance
- "NTP-G106 Reset Cards Using CTC" procedure on page 24-13
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards
- "NTP-G119 Power Down the Node" procedure on page 24-27

9.4 AD-2C-xx.x Card

Note For AD-2C-xx.x card specifications, see the "AD-2C-xx.x Card Specifications" section in theHardware Specifications document.

The 2-Channel OADM (AD-2C-xx.x) card passively adds or drops two adjacent 100-GHz channels within the same band. Sixteen versions of this card—each designed for use with one pair of wavelengths—are used in the ONS 15454 DWDM system. The card bidirectionally adds and drops in two different sections on the same card to manage signal flow in both directions. Each version of the card has a different part number.

The AD-2C-xx.x has the following features:

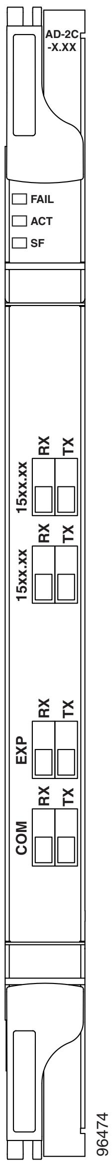
- Passive cascade of interferential filters perform the channel add and drop functions.

- Two software-controlled VOAs in the add section, one for each add port, regulate the optical power of inserted channels.
- Software-controlled VOAs regulate insertion loss on express channels.
- VOA settings and functions, photodiode detection, and alarm thresholds are internally controlled.
- Virtual photodiodes (firmware calculation of port optical power) at the common DWDM output and input ports are monitored within the software.

9.4.1 Faceplate and Block Diagrams

Figure 9-4 shows the AD-2C-xx.x faceplate.

Figure 9-4 AD-2C-xx.x Faceplate



For information on safety labels for the card, see the "9.2 Safety Labels" section on page 9-9.

Figure 9-5 shows a block diagram of the AD-2C-xx.x card.

Figure 9-5 AD-2C-xx.x Block Diagram

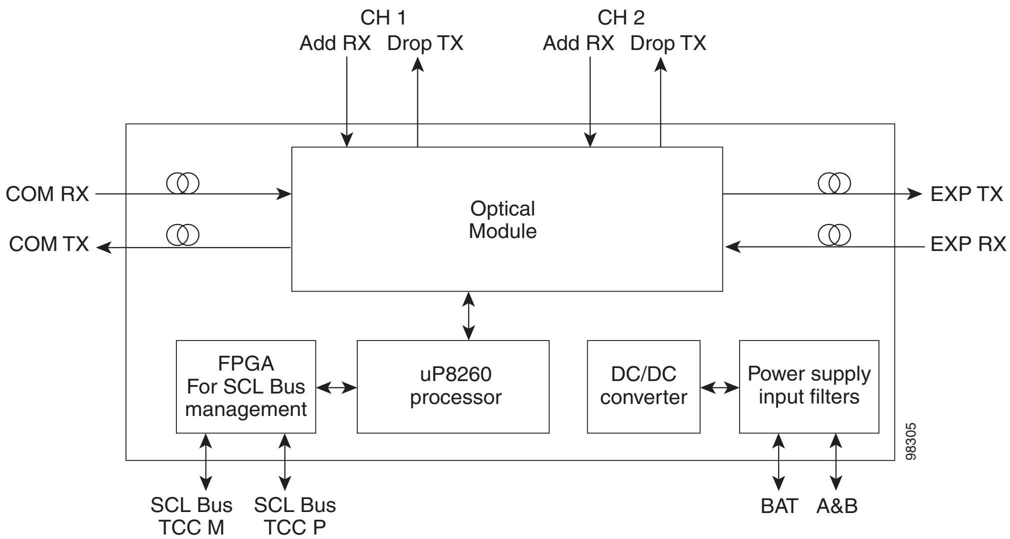
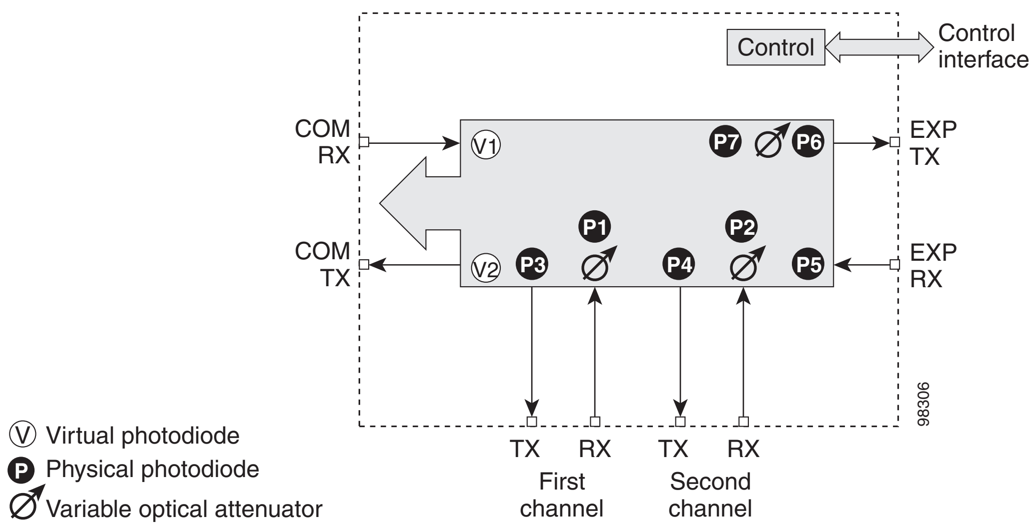


Figure 9-6 shows the AD-2C-xx.x optical module functional block diagram.

Figure 9-6 AD-2C-xx.x Optical Module Functional Block Diagram



9.4.2 Wavelength Pairs

The AD-2C-xx.x cards are provisioned for the wavelength pairs listed in Table 9-9. In this table, channel IDs are given rather than wavelengths. To compare channel IDs with the actual wavelengths they represent, see wavelengths in Table 9-7 on page 9-7.

Table 9-9 AD-2C-xx.x Channel Pairs

Band ID	Add/Drop Channel ID
Band 30.3 (A)	30.3, 31.2
	31.9, 32.6
Band 34.2 (B)	34.2, 35.0
	35.8, 36.6
Band 38.1 (C)	38.1, 38.9
	39.7, 40.5
Band 42.1 (D)	42.1, 42.9
	43.7, 44.5
Band 46.1 (E)	46.1, 46.9
	47.7, 48.5
Band 50.1 (F)	50.1, 50.9
	51.7, 52.5
Band 54.1 (G)	54.1, 54.9
	55.7, 56.5
Band 58.1 (H)	58.1, 58.9
	59.7, 60.6

9.4.3 Power Monitoring

Physical photodiodes P1 through P10 and virtual photodiodes V1 and V2 monitor the power for the AD-2C-xx.x card. The returned power level values are calibrated to the ports as shown in Table 9-10.

Table 9-10 AD-2C-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P2	ADD	COM TX
P3–P4	DROP	DROP TX
P5	IN EXP	EXP RX
P6	OUT EXP	EXP TX
V1	IN COM	COM RX
V2	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

9.4.4 AD-2C-xx.x Card Functions

- Card level indicators—Table G-4 on page G-9

- "G.4 Port-Level Indicators" section on page G-9

9.4.5 Related Procedures for AD-2C-xx.x Card

The following section lists procedures and tasks related to the configuration of the AD-2C-xx.x card:

- "NTP-G30 Install the DWDM Cards" procedure on page 14-64
- "NTP-G37 Run Automatic Node Setup" procedure on page 14-127
- "NTP-G59 Create, Delete, and Manage Optical Channel Network Connections" procedure on page 16-40
- "NTP-G51 Verify DWDM Node Turn Up" procedure on page 15-2
- NTP-G74 Monitor DWDM Card Performance
- "NTP-G106 Reset Cards Using CTC" procedure on page 24-13
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards
- "NTP-G119 Power Down the Node" procedure on page 24-27

9.5 AD-4C-xx.x Card

Note For AD-4C-xx.x card specifications, see the "AD-4C-xx.x Card Specifications" section in the Hardware Specifications document.

The 4-Channel OADM (AD-4C-xx.x) card passively adds or drops all four 100-GHz-spaced channels within the same band. Eight versions of this card—each designed for use with one band of wavelengths—are used in the ONS 15454 DWDM system. The card bidirectionally adds and drops in two different sections on the same card to manage signal flow in both directions. There are eight versions of this card with eight part numbers.

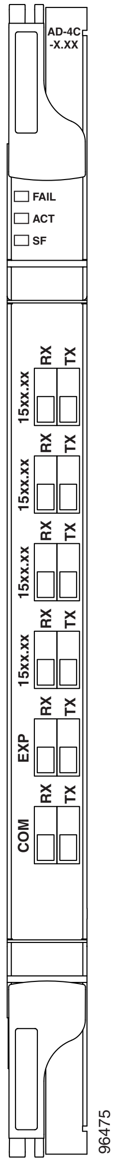
The AD-4C-xx.x has the following features:

- Passive cascade of interferential filters perform the channel add and drop functions.
- Four software-controlled VOAs in the add section, one for each add port, regulate the optical power of inserted channels.
- Two software-controlled VOAs regulate insertion loss on express and drop path, respectively.
- Internal control of the VOA settings and functions, photodiode detection, and alarm thresholds.
- Software-monitored virtual photodiodes (firmware calculation of port optical power) at the common DWDM output and input ports.

9.5.1 Faceplate and Block Diagrams

Figure 9-7 shows the AD-4C-xx.x faceplate.

Figure 9-7 AD-4C-xx.x Faceplate



For information on safety labels for the card, see the "9.2 Safety Labels" section on page 9-9.

Figure 9-8 shows a block diagram of the AD-4C-xx.x card.

Figure 9-8 AD-4C-xx.x Block Diagram

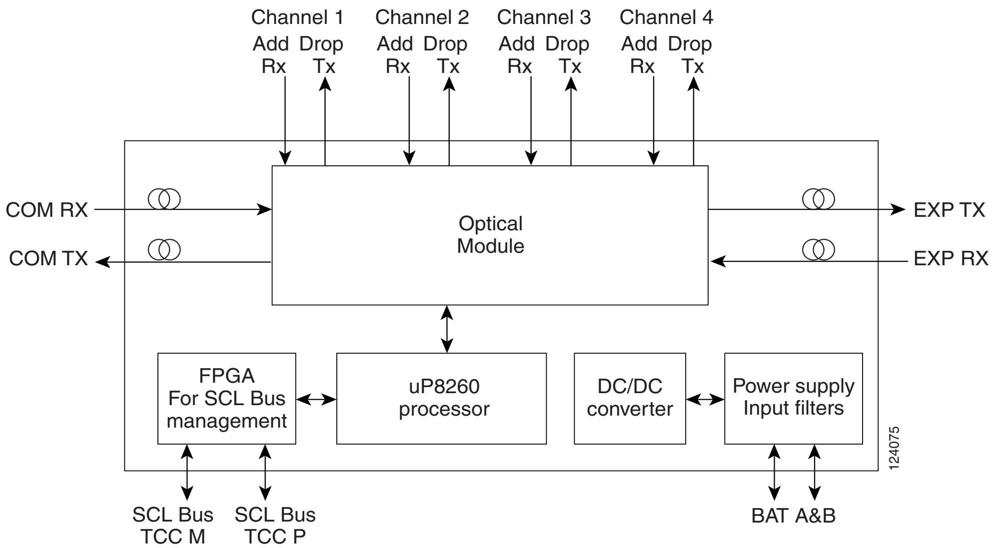
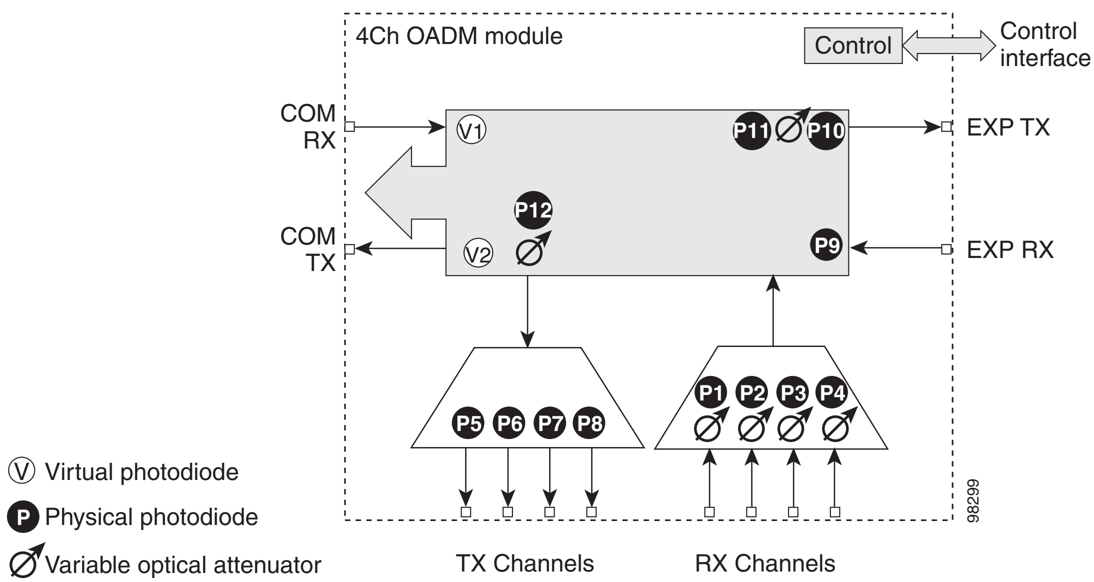


Figure 9-9 shows the AD-4C-xx.x optical module functional block diagram.

Figure 9-9 AD-4C-xx.x Optical Module Functional Block Diagram



9.5.2 Wavelength Sets

The AD-4C-xx.x cards are provisioned for the sets of four 100-GHz-spaced wavelengths shown Table 9-11 on page 9-19.

Table 9-11 AD-4C-xx.x Channel Sets

Band ID	Add/Drop Wavelengths
Band 30.3 (A)	1530.3, 1531.2, 1531.9, 1532.6
Band 34.2 (B)	1534.2, 1535.0, 1535.8, 1536.6
Band 38.1 (C)	1538.1, 1538.9, 1539.7, 1540.5
Band 42.1 (D)	1542.1, 1542.9, 1543.7, 1544.5
Band 46.1 (E)	1546.1, 1546.9, 1547.7, 1548.5
Band 50.1 (F)	1550.1, 1550.9, 1551.7, 1552.5
Band 54.1 (G)	1554.1, 1554.9, 1555.7, 1556.5
Band 58.1 (H)	1558.1, 1558.9, 1559.7, 1560.6

9.5.3 Power Monitoring

Physical photodiodes P1 through P10 and virtual photodiodes V1 and V2 monitor the power for the AD-4C-xx.x card. The returned power level values are calibrated to the ports as shown in Table 9-12.

Table 9-12 AD-4C-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P4	ADD	COM TX
P5–P8	DROP	DROP TX
P9	IN EXP	EXP RX
P10	OUT EXP	EXP TX
V1	IN COM	COM RX
V2	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1.*

9.5.4 AD-4C-xx.x Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

9.5.5 Related Procedures for AD-4C-xx.x Card

The following section lists procedures and tasks related to the configuration of the AD-4C-xx.x card:

- "NTP-G30 Install the DWDM Cards" procedure on page 14-64
- "NTP-G37 Run Automatic Node Setup" procedure on page 14-127

- "NTP-G59 Create, Delete, and Manage Optical Channel Network Connections" procedure on page 16-40
- "NTP-G51 Verify DWDM Node Turn Up" procedure on page 15-2
- NTP-G74 Monitor DWDM Card Performance
- "NTP-G106 Reset Cards Using CTC" procedure on page 24-13
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards
- "NTP-G119 Power Down the Node" procedure on page 24-27

9.6 AD-1B-xx.x Card

(Cisco ONS 15454 only)

Note For AD-1B-xx.x card specifications, see the "AD-1B-xx.x Card Specifications" section in the Hardware Specifications document.

The 1-Band OADM (AD-1B-xx.x) card passively adds or drops a single band of four adjacent 100-GHz-spaced channels. Eight versions of this card with eight different part numbers—each version designed for use with one band of wavelengths—are used in the ONS 15454 DWDM system. The card bidirectionally adds and drops in two different sections on the same card to manage signal flow in both directions. This card can be used when there is asymmetric adding and dropping on each side (east or west) of the node; a band can be added or dropped on one side but not on the other.

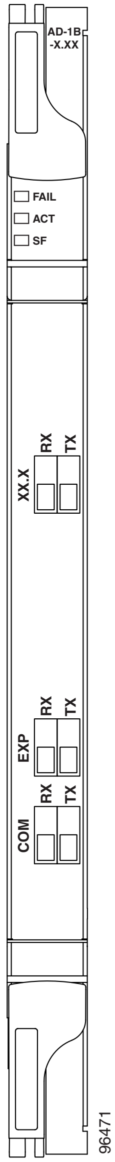
The AD-1B xx.x can be installed in Slots 1 to 6 and 12 to17 and has the following features:

- Passive cascaded interferential filters perform the channel add and drop functions.
- Two software-controlled VOAs regulate the optical power flowing in the express and drop OADM paths (drop section).
- Output power of the dropped band is set by changing the attenuation of the VOA drop.
- The VOA express is used to regulate the insertion loss of the express path.
- VOA settings and functions, photodiode detection, and alarm thresholds are internally controlled.
- Virtual photodiode (firmware calculation of port optical power) at the common DWDM output are monitored within the software.

9.6.1 Faceplate and Block Diagrams

Figure 9-10 shows the AD-1B-xx.x faceplate.

Figure 9-10 AD-1B-xx.x Faceplate



For information on safety labels for the card, see the "9.2 Safety Labels" section on page 9-9.

Figure 9-11 shows a block diagram of the AD-1B-xx.x card.

Figure 9-11 AD-1B-xx.x Block Diagram

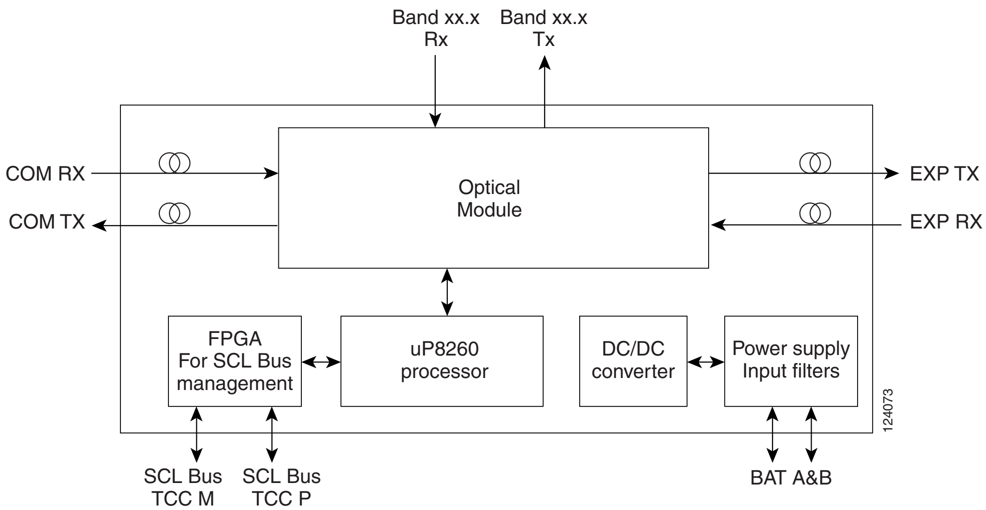
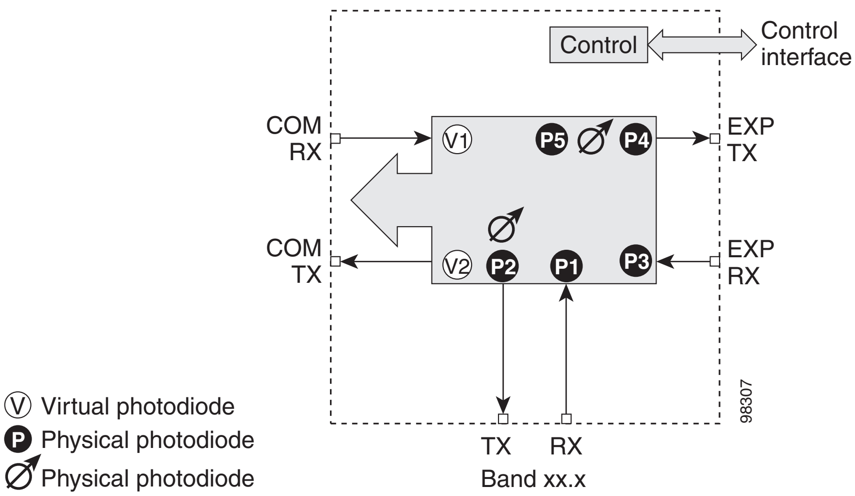


Figure 9-12 shows the AD-1B-xx.x optical module functional block diagram.

Figure 9-12 AD-1B-xx.x Optical Module Functional Block Diagram



9.6.2 Power Monitoring

Physical photodiodes P1 through P4 and virtual photodiodes V1 and V2 monitor the power for the AD-1B-xx.x card. The returned power level values are calibrated to the ports as shown in Table 9-13.

Table 9-13 AD-1B-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	ADD	BAND RX
P2	DROP	BAND TX

Table 9-13 AD-1B-xx.x Port Calibration (continued)

Photodiode	CTC Type Name	Calibrated to Port
P3	IN EXP	EXP RX
P4	OUT EXP	EXP TX
V1	IN COM	COM RX
V2	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

9.6.3 AD-1B-xx.x Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

9.6.4 Related Procedures for AD-1B-xx.x Card

The following section lists procedures and tasks related to the configuration of the AD-1B-xx.x card:

- "NTP-G30 Install the DWDM Cards" procedure on page 14-64
- "NTP-G37 Run Automatic Node Setup" procedure on page 14-127
- "NTP-G59 Create, Delete, and Manage Optical Channel Network Connections" procedure on page 16-40
- "NTP-G51 Verify DWDM Node Turn Up" procedure on page 15-2
- NTP-G74 Monitor DWDM Card Performance
- "NTP-G106 Reset Cards Using CTC" procedure on page 24-13
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards
- "NTP-G119 Power Down the Node" procedure on page 24-27

9.7 AD-4B-xx.x Card

(Cisco ONS 15454 only)

The 4-Band OADM (AD-4B-xx.x) card passively adds or drops four bands of four adjacent 100-GHz-spaced channels. Two versions of this card with different part numbers—each version designed for use with one set of bands—are used in the ONS 15454 DWDM system. The card bidirectionally adds and drops in two different sections on the same card to manage signal flow in both directions. This card can be used when there is asymmetric adding and dropping on each side (east or west) of the node; a band can be added or dropped on one side but not on the other.

The AD1B-xx.x can be installed in Slots 1 to 6 and 12 to 17 and has the following features:

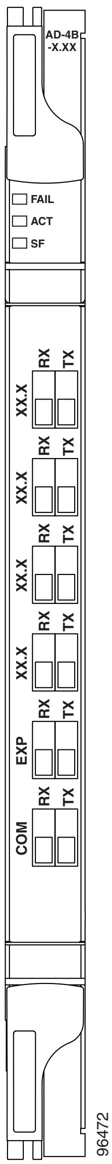
- Five software-controlled VOAs regulate the optical power flowing in the OADM paths.
- Output power of each dropped band is set by changing the attenuation of each VOA drop.

- The VOA express is used to regulate the insertion loss of the express path.
- VOA settings and functions, photodiode detection, and alarm thresholds are internally controlled.
- Virtual photodiode (firmware calculation of port optical power) at the common DWDM output port are monitored within the software.

9.7.1 Faceplate and Block Diagrams

Figure 9-13 shows the AD-4B-xx.x faceplate.

Figure 9-13 AD-4B-xx.x Faceplate



For information on safety labels for the card, see the "9.2 Safety Labels" section on page 9-9.

Figure 9-14 shows a block diagram of the AD-4B-xx.x card.

Figure 9-14 AD-4B-xx.x Block Diagram

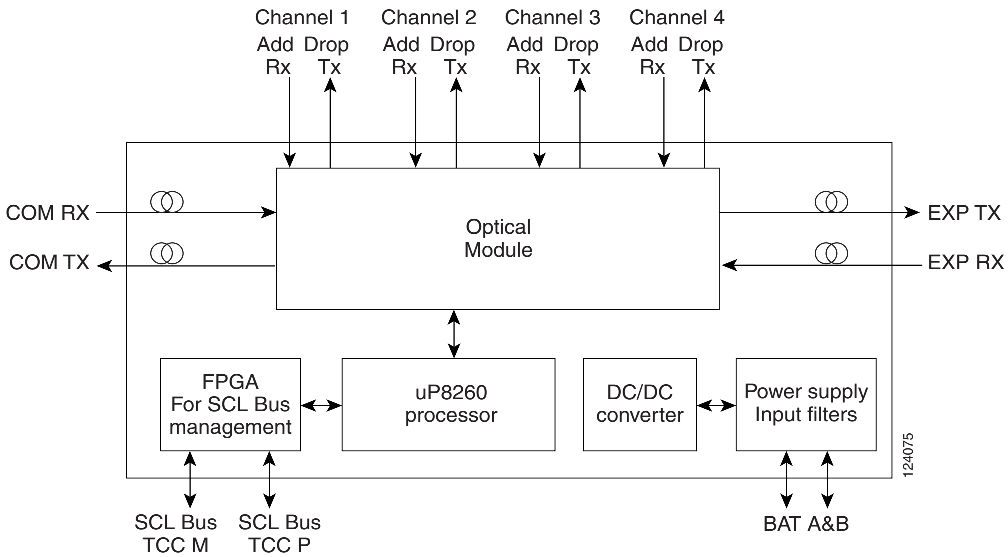
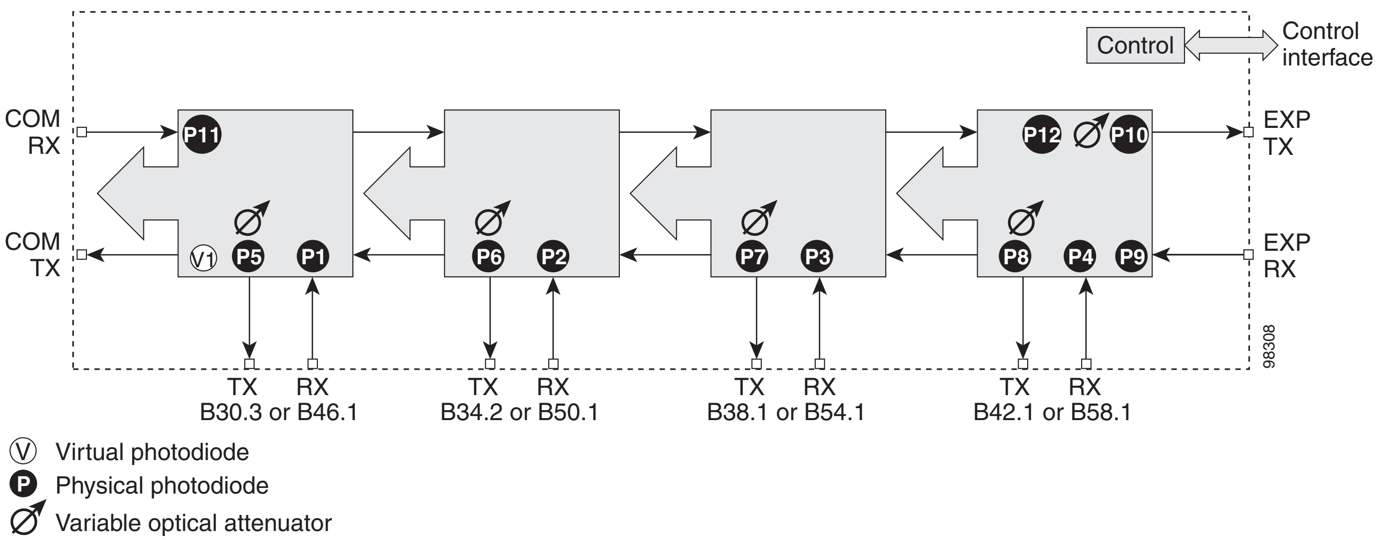


Figure 9-15 shows the AD-4B-xx.x optical module functional block diagram.

Figure 9-15 AD-4B-xx.x Optical Module Functional Block Diagram



9.7.2 Power Monitoring

Physical photodiodes P1 through P11 and virtual photodiode V1 monitor the power for the AD-4B-xx.x card. The returned power level values are calibrated to the ports as shown in Table 9-14.

Table 9-14 AD-4B-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P4	ADD	COM TX
P5–P8	DROP	DROP TX
P9	IN EXP	EXP RX
P10	OUT EXP	EXP TX
P11	IN COM	COM RX
V1	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1.*

9.7.3 AD-4B-xx.x Card Functions

- Card level indicators—Table G-4 on page G-9
- “G.4 Port-Level Indicators” section on page G-9

9.7.4 Related Procedures for AD-4B-xx.x Card

The following section lists procedures and tasks related to the configuration of the AD-4B-xx.x card:

- “NTP-G30 Install the DWDM Cards” procedure on page 14-64
- “NTP-G37 Run Automatic Node Setup” procedure on page 14-127
- “NTP-G59 Create, Delete, and Manage Optical Channel Network Connections” procedure on page 16-40
- “NTP-G51 Verify DWDM Node Turn Up” procedure on page 15-2
- NTP-G74 Monitor DWDM Card Performance
- “NTP-G106 Reset Cards Using CTC” procedure on page 24-13
- NTP-G107 Remove Permanently or Remove and Replace DWDM Cards
- “NTP-G119 Power Down the Node” procedure on page 24-27

CHAPTER 10

Provision Reconfigurable Optical Add/Drop Cards

This chapter describes the Cisco ONS 15454 cards deployed in reconfigurable optical add/drop (ROADM) networks. For card safety and compliance information, refer to the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms* document.

Note The cards described in this chapter are supported on the Cisco ONS 15454, Cisco ONS 15454 M6, Cisco ONS 15454 M2 platforms, unless noted otherwise.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

Note This chapter contains information about cards that perform mesh topology functions. Multiplexer and demultiplexer cards that do not perform these functions are described in Chapter 6, "Provision Multiplexer and Demultiplexer Cards."

10.1 Card Overview

The ROADM cards include six add drop cards utilized in the C-band (32WSS, 32DMX, 32DMX-C, 40-MUX-C, 40-WXC-C, 80-WXC-C, and MMU), two add drop cards utilized for the L-band (32WSS-L, and 32DMX-L), and two single module ROADM (SMR) cards utilized in the C-band (40-SMR1-C and 40-SMR2-C).

This section provides card summary, compatibility, channel allocation, and safety information.

Note Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. The cards are then installed into slots that have the same symbols. For a list of slots and symbols, see the "Card Slot Requirements" section in the *Cisco ONS 15454 Hardware Installation Guide*.

10.1.1 Card Summary

Table 10-1 lists and summarizes information about each ROADM card.

Table 10-1 ROADM Card Summary

Card	Port Description	For Additional Information
32WSS	The 32WSS card has seven sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "10.3 32WSS Card" section on page 10-16
32WSS-L	The 32WSS-L card has seven sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "10.4 32WSS-L Card" section on page 10-22

Table 10-1 ROADM Card Summary (continued)

Card	Port Description	For Additional Information
32DMX	The 32DMX has five sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "10.5 32DMX Card" section on page 10-29
32DMX-L	The 32DMX-L has five sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "10.6 32DMX-L Card" section on page 10-34
40-DMX-C	The 40-DMX-C has six sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "10.7 40-DMX-C Card" section on page 10-39
40-DMX-CE	The 40-DMX-CE has six sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "10.8 40-DMX-CE Card" section on page 10-44
40-MUX-C	The 40-MUX-C has six sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "10.9 40-MUX-C Card" section on page 10-49.
40-WSS-C	The 40-WSS-C card has eight sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "10.10 40-WSS-C Card" section on page 10-54
40-WSS-CE	The 40-WSS-CE card has eight sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "10.11 40-WSS-CE Card" section on page 10-60
40-WXC-C	The 40-WXC-C card has five sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "10.12 40-WXC-C Card" section on page 10-67
80-WXC-C	The 80-WXC-C card has 14 ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "10.13 80-WXC-C Card" section on page 10-73.
40-SMR1-C	The 40-SMR1-C card has six sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "10.14 Single Module ROADM (SMR-C) Cards" section on page 10-80
40-SMR2-C	The 40-SMR2-C card has six sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the "10.14 Single Module ROADM (SMR-C) Cards" section on page 10-80
MMU	The MMU card has six sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the "10.15 MMU Card" section on page 10-90

10.1.2 Card Compatibility

Table 10-2 lists the Cisco Transport Controller (CTC) software compatibility for the ROADM cards.

Table 10-2 Software Release Compatibility for ROADM Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
32WSS	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
32WSS-L	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
40-WSS-C	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM
40-WSS-CE	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM
32DMX	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
32DMX-L	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
40-DMX-C	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM
40-DMX-CE	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM
40-MUX-C	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM
40-WXC-C	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM

Table 10-2 Software Release Compatibility for ROADM Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
80-WXC-C	No	No	No	No	No	No	No	No	No	No	No	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM	15454-M6, 15454-DWDM
40-SMR1-C	No	No	No	No	No	No	No	No	No	No	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
40-SMR2-C	No	No	No	No	No	No	No	No	No	No	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
MMU	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM

10.1.3 Interface Classes

The input interface cards have been grouped in classes listed in Table 10-3. The subsequent tables list the optical performance and output power of each interface class.

Table 10-3 Cisco ONS 15454 Card Interfaces Assigned to Input Power Classes

Input Power Class	Card
A	10-Gbps multirate transponder cards (TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L), 10-Gbps muxponder cards (MXP_2.5G_10G, MXP_2.5G_10E, MXP_MR_10DME_C, MXP_MR_10DME_L, MXP_2.5G_10E_C, and MXP_2.5G_10E_L) with forward error correction (FEC) enabled, 40-Gbps transponder cards (40E-TXP-C, and 40ME-TXP-C), and 40-Gbps muxponder cards (40G-MXP-C, 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C)
B	10-Gbps multirate transponder card (TXP_MR_10G) and muxponder card (MXP_2.5G_10G) without FEC
C	OC-192 LR ITU cards without FEC, 10-Gbps multirate transponder (TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L) and muxponder (MXP_2.5G_10E, MXP_2.5G_10E_L, and MXP_MR_10DME_L) cards with FEC disabled
D	2.5-Gbps multirate transponder card (TXP_MR_2.5G), both protected and unprotected, with FEC enabled
E	OC-48 100-GHz dense wavelength division multiplexing (DWDM) muxponder card (MXP_MR_2.5G) and 2.5-Gbps multirate transponder card (TXP_MR_2.5G), protected or unprotected; FEC disabled; and retime, reshape, and regenerate (3R) mode enabled
F	2.5-Gbps multirate transponder card (TXP_MR_2.5G), protected or unprotected, in regenerate and reshape (2R) mode
G	OC-48 ELR 100 GHz card
H	2/4 port GbE transponder (GBIC WDM 100GHz)
I	10-Gbps multirate transponder cards (TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L) and 10-Gbps muxponder cards (MXP_2.5G_10E, MXP_2.5G_10E_L, and MXP_MR_10DME_L) with enhanced FEC (E-FEC) enabled, 40-Gbps transponder cards (40E-TXP-C, and 40ME-TXP-C), and 40-Gbps muxponder cards (40G-MXP-C, 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C)
K	OC-192/STM-64 LR ITU cards without FEC, 100GHz 10Gbps Ethernet Xponder (GE_XP, GE_XPE, 10GE_XP, 10GE_XPE), Sonet/SDH add/drop (ADM_10G), OTU2 Xponder (OTU2_XP), with FEC disabled
L	40Gbps Duobinary CRS-1 DWDM ITU-T line card
M	2.5 Gbps DWDM ITU-T SPF
N	10Gbps enhanced full tunable transponder (TXP_MR_10E_C) and muxponder (MXP_2.5G_10E_C, MXP_MR_10DME_C) with E-FEC enabled
O	10Gbps Ethernet Xponder (GE_XP, GE_XPE, 10GE_XP, 10GE_XPE), 10Gbps Sonet/SDH add/drop (ADM_10G), OTU2 Xponder (OTU2_XP), with FEC enabled

Table 10-3 Cisco ONS 15454 Card Interfaces Assigned to Input Power Classes (continued)

Input Power Class	Card
P	10Gbps Ethernet Xponder (GE_XP, GE_XPE, 10GE_XP, 10GE_XPE), 10Gbps Sonet/SDH add/drop (ADM_10G), OTU2 Xponder (OTU2_XP), with E-FEC enabled
T	40Gbps DPSK CRS-1 DWDM ITU-T line card
V	OC-192/STM-64 LR ITU cards without FEC, full tunable 10Gbps Ethernet Xponder (GE_XP, GE_XPE, 10GE_XP, 10GE_XPE), Sonet/SDH add/drop (ADM_10G), OTU2 Xponder (OTU2_XP), with FEC disabled, full tunable
W	10Gbps Ethernet Xponder (GE_XP, GE_XPE, 10GE_XP, 10GE_XPE), Sonet/SDH add/drop (ADM_10G), OTU2 Xponder (OTU2_XP), with FEC enabled, full tunable
X	10Gbps Ethernet Xponder (GE_XP, GE_XPE, 10GE_XP, 10GE_XPE), Sonet/SDH add/drop (ADM_10G), OTU2 Xponder (OTU2_XP), with E-FEC enabled, full tunable
Y	10Gbps enhanced full tunable transponder (TXP_MR_10EX_C) and muxponder (MXP_2.5G_10EX_C, MXP_MR_10DMEX_C), with FEC enabled and maximum likelihood sequence estimator (MLSE) correction
Z	10Gbps enhanced full tunable transponder (TXP_MR_10EX_C) and muxponder (MXP_2.5G_10EX_C, MXP_MR_10DMEX_C), with E-FEC enabled and MLSE correction

Table 10-4 lists the optical performance parameters for 40-Gbps cards.

Table 10-4 40-Gbps Interface Optical Performance

Parameter	Class A		Class I	
Type	Power Limited	OSNR[1] Limited (if appl.)	Power Limited	OSNR Limited (if appl.)
Maximum bit rate	10 Gbps		10 Gbps	
Regeneration	3R		3R	
FEC	Yes		Yes (E-FEC)	
Threshold	Optimum		Optimum	
Maximum BER[2]	10^{-15}		10^{-15}	
OSNR[1] sensitivity	23 dB	9 dB	20 dB	8 dB
Power sensitivity	–24 dBm	–18 dBm	–26 dBm	–18 dBm
Power overload	–8 dBm		–8 dBm	
Transmitted Power Range[3]				
40-Gbps multirate transponder/40-Gbps FEC transponder (40E-TXP-C, and 40ME-TXP-C)	+2.5 to 3.5 dBm		—	

Table 10-4 40-Gbps Interface Optical Performance (continued)

Parameter	Class A		Class I	
Type	Power Limited	OSNR[1] Limited (if appl.)	Power Limited	OSNR Limited (if appl.)
OC-192 LR ITU	—		—	
Dispersion compensation tolerance	+/–800 ps/nm		+/–800 ps/nm	

1. OSNR = optical signal-to-noise ratio
2. BER = bit error rate
3. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

Table 10-5, Table 10-6, and Table 10-7 lists the optical performance parameters for 10-Gbps cards.

Table 10-5 10-Gbps Interface Optical Performance (Class A, B, C, I, and K)

Parameter	Class A		Class B		Class C		Class I		Class K	
Type	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited
Maximum bit rate	10 Gbps		10 Gbps		10 Gbps		10 Gbps		10 Gbps	
Regeneration	3R		3R		3R		3R		3R	
FEC	Yes		No		No		Yes (E-FEC)		No	
Threshold	Optimum		Average		Average		Optimum		Average	
Maximum BER[2]	10^{-15}		10^{-12}		10^{-12}		10^{-15}		10^{-12}	
OSNR[1] sensitivity	23 dB	8.5 dB	23 dB	19 dB	19 dB	19 dB	20 dB 6 dB		23 dB[3]	16 dB[3]
									23 dB[4]	17 dB[4]
									23 dB[5]	17 dB[5]
Power sensitivity	–24 dBm	–18 dBm	–21 dBm	–20 dBm	–22 dBm	–22 dBm	–26 dBm	–18 dBm	–24 dBm[3]	–17 dBm[3]
									–23 dBm[4]	–18 dBm[4]
									–23 dBm[5]	–17 dBm[5]
Power overload	–8 dBm		–8 dBm		–9 dBm		–8 dBm		–7 dBm	

Table 10-5 10-Gbps Interface Optical Performance (Class A, B, C, I, and K) (continued)

Parameter	Class A		Class B		Class C		Class I		Class K	
Type	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited
Transmitted Power Range[6]										
10-Gbps multirate transponder/ 10-Gbps FEC transponder	+2.5 to 3.5 dBm (for TXP_MR_10G) +3.0 to 6.0 dBm (for TXP_MR_10E)		+2.5 to 3.5 dBm		+3.0 to 6.0 dBm		+3.0 to 6.0 dBm		—	
OC-192 LR ITU	—		—		+3.0 to 6.0 dBm		—		–1.0 to +3.0 dBm	
10-Gbps Ethernet Xponder, Sonet/SDH Add/Drop, OTU2 Xponder	—		—		—		—		–1.0 to +3.0 dBm	
Dispersion compensation tolerance	+/–800 ps/nm		+/–1,000 ps/nm		+/–1,000 ps/nm		+/–800 ps/nm		–400 to +800 ps/nm	

1. OSNR = optical signal-to-noise ratio
2. BER = bit error rate
3. This value is for Xen Pak XFP used with Catalyst card.
4. This value is for XFP used with Catalyst, Xponder, and ADM-10G cards.
5. This value is for X2 XFP used with Catalyst card.
6. These values, decreased by patchcord and connector losses, are also the input power values for the optical add drop multiplexer (OADM) cards.

Table 10-6 10-Gbps Interface Optical Performance (Class N, O, P, and V)

Parameter	Class N		Class O		Class P		Class V	
Type	Power Limited	OSNR Limited	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited
Maximum bit rate	10 Gbps		10 Gbps		10 Gbps		10 Gbps	
Regeneration	3R		3R		3R		3R	
FEC	Yes (E-FEC)		Yes		Yes (E-FEC)		No	
Threshold	Optimum		Optimum		Optimum		Average	
Maximum BER[2]	10^{-15}		10^{-15}		10^{-15}		10^{-12}	
OSNR[1] sensitivity	19 dB	5 dB	11 dB	11 dB	23 dB	8 dB	23 dB	16 dB
Power sensitivity	–27 dBm	–20 dBm	–18 dBm	–18 dBm	–27 dBm	–18 dBm	–24 dBm	–18 dBm

Table 10-6 10-Gbps Interface Optical Performance (Class N, O, P, and V) (continued)

Parameter	Class N		Class O		Class P		Class V	
Type	Power Limited	OSNR Limited	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited
Power overload	–8 dBm		–7 dBm		–7 dBm		–7 dBm	
Transmitted Power Range[3]								
10-Gbps multirate transponder/10-Gbps FEC transponder	+3.0 to 6.0 dBm		—		—		—	
OC-192 LR ITU	—		—		—		0 to +3.0 dBm	
10-Gbps Ethernet Xponder, Sonet/SDH Add/Drop, OTU2 Xponder	—		–1.0 to +3.0 dBm		–1.0 to +3.0 dBm		0 to +3.0 dBm	
Dispersion compensation tolerance	+/–800 ps/nm		–500 to +1100 ps/nm		–500 to +1100 ps/nm		–500 to +1600 ps/nm	

1. OSNR = optical signal-to-noise ratio
2. BER = bit error rate
3. These values, decreased by patchcord and connector losses, are also the input power values for the optical add drop multiplexer (OADM) cards.

Table 10-7 10-Gbps Interface Optical Performance (Class W, X, Y, and Z)

Parameter	Class W		Class X		Class Y		Class Z	
Type	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited
Maximum bit rate	10 Gbps		10 Gbps		10 Gbps		10 Gbps	
Regeneration	3R		3R		3R		3R	
FEC	Yes		Yes (E-FEC)		Yes		Yes (E-FEC)	
Threshold	Optimum		Optimum		Optimum		Optimum	
Maximum BER[2]	10^{-15}		10^{-15}		10^{-15}		10^{-15}	
OSNR[1] sensitivity	8.5 dB	8.5 dB	19 dB	5 dB	23 dB	8 dB	19 dB	5.5 dB
Power sensitivity	–18 dBm	–18 dBm	–27 dBm	–20 dBm	–24 dBm	–20 dBm	–27 dBm	–20 dBm
Power overload	–7 dBm		–7 dBm		–8 dBm		–8 dBm	
Transmitted Power Range[3]								
10-Gbps multirate transponder/10-Gbps FEC transponder	—		—		+3.0 to 6.0 dBm		+3.0 to 6.0 dBm	
OC-192 LR ITU	—		—		—		—	

Table 10-7 10-Gbps Interface Optical Performance (Class W, X, Y, and Z) (continued)

Parameter	Class W		Class X		Class Y		Class Z	
Type	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR[1] Limited	Power Limited	OSNR Limited
10-Gbps Ethernet Xponder, Sonet/SDH Add/Drop, OTU2 Xponder	0 to +3.0 dBm		0 to +3.0 dBm		—		—	
Dispersion compensation tolerance	–500 to +1100 ps/nm		–500 to +1300 ps/nm		–800 to +1600 ps/nm		–2200 to +3700 ps/nm	

1. OSNR = optical signal-to-noise ratio
2. BER = bit error rate
3. These values, decreased by patchcord and connector losses, are also the input power values for the optical add drop multiplexer (OADM) cards.

Table 10-8 and Table 10-9 lists the optical interface performance parameters for 2.5-Gbps cards.

Table 10-8 2.5-Gbps Interface Optical Performance (Class D, E, and F)

Parameter	Class D		Class E		Class F	
Type	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited
Maximum bit rate	2.5 Gbps		2.5 Gbps		2.5 Gbps	
Regeneration	3R		3R		2R	
FEC	Yes		No		No	
Threshold	Average		Average		Average	
Maximum BER	10^{-15}		10^{-12}		10^{-12}	
OSNR sensitivity	14 dB	5 dB	14 dB	10 dB	15 dB	15 dB
Power sensitivity	–31 dBm	–25 dBm	–30 dBm	–23 dBm	–24 dBm	–24 dBm
Power overload	–9 dBm		–9 dBm		–9 dBm	
Transmitted Power Range[1]						
TXP_MR_2.5G and TXPP_MR_2.5G	–1.0 to 1.0 dBm		–1.0 to 1.0 dBm		–1.0 to 1.0 dBm	
MXP_MR_2.5G and MXPP_MR_2.5G	—		+2.0 to +4.0 dBm		—	
OC-48 ELR 100 GHz	—		—		—	
2/4 port GbE Transponder (GBIC WDM 100GHz)	—		—		—	
2.5 Gbps DWDM ITU-T SPF	—		—		—	
Dispersion compensation tolerance	–1200 to +5400 ps/nm		–1200 to +5400 ps/nm		–1200 to +3300 ps/nm	

1. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

Table 10-9 2.5-Gbps Interface Optical Performance (Class G, H, and M)

Parameter	Class G		Class H		Class M	
Type	**Power Limited**	**OSNR Limited**	**Power Limited**	**OSNR Limited**	**Power Limited**	**OSNR Limited**
Maximum bit rate	2.5 Gbps		1.25 Gbps		2.5 Gbps	
Regeneration	3R		3R		3R	
FEC	No		No		No	
Threshold	Average		Average		Average	
Maximum BER	10^{-12}		10^{-12}		10^{-12}	
OSNR sensitivity	14 dB	11 dB	13 dB	8 dB	14 dB	9 dB
Power sensitivity	–27 dBm	–23 dBm	–28 dBm	–18 dBm	–28 dBm	–22 dBm
Power overload	–9 dBm		–7 dBm		–9 dBm	
Transmitted Power Range[1]						
TXP_MR_2.5G	—		—		—	
TXPP_MR_2.5G	—					
MXP_MR_2.5G	–2.0 to 0 dBm					
MXPP_MR_2.5G	—					
OC-48 ELR 100 GHz	—		—		—	
2/4 port GbE Transponder (GBIC WDM 100GHz)	–1200 to +3300 ps/nm		0 to +3 dBm		—	
2.5 Gbps DWDM ITU-T SPF			—		0 to +4 dBm	
Dispersion compensation tolerance			–1000 to +3600 ps/nm		–800 to +2400 ps/nm	

1. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

10.1.4 Channel Allocation Plans

ONS 15454 DWDM ROADM cards are designed for use with specific channels in the C band and L band. In most cases, the channels for these cards are either numbered (for example, 1 to 32 or 1 to 40) or delimited (odd or even). Client interfaces must comply with these channel assignments to be compatible with the ONS 15454 system.

. The following cards operate in the C-band:

- 32WSS
- 32DMX
- 32DMX-C
- 40-MUX-C
- 40-WXC-C

- 80-WXC-C
- 40-SMR1-C
- 40-SMR2-C
- MMU

Table 10-10 lists the C-band channel IDs and wavelengths at ITU-T 50-GHz intervals. This is a comprehensive C-band channel table that encompasses present and future card capabilities.

Table 10-10 DWDM C-Band[1] Channel Allocation Plan with 50-GHz Spacing

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959

Table 10-10 DWDM C-Band[1] Channel Allocation Plan with 50-GHz Spacing (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

1. Channels on the C-band are 4-skip-1, starting at 1530.33 nm.

The following add drop cards utilize the L-band DWDM channels:

- 32WSS-L
- 32DMX-L

Table 10-11 lists the L-band channel IDs and wavelengths at ITU-T 50-GHz intervals. This is a comprehensive L-band channel table that encompasses present and future card capabilities.

Table 10-11 DWDM L-band[1] Channel Allocation Plan at 50 GHz Spacing

Channel Number	Frequency (THz)	Wavelength (nm)		Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83		41	188.85	1587.46
2	190.8	1571.24		42	188.8	1587.88
3	190.75	1571.65		43	188.75	1588.30
4	190.7	1572.06		44	188.7	1588.73
5	190.65	1572.48		45	188.65	1589.15
6	190.6	1572.89		46	188.6	1589.57
7	190.55	1573.30		47	188.55	1589.99
8	190.5	1573.71		48	188.5	1590.41
9	190.45	1574.13		49	188.45	1590.83
10	190.4	1574.54		50	188.4	1591.26
11	190.35	1574.95		51	188.35	1591.68
12	190.3	1575.37		52	188.3	1592.10
13	190.25	1575.78		53	188.25	1592.52

Table 10-11 DWDM L-band[1] Channel Allocation Plan at 50 GHz Spacing (continued)

Channel Number	Frequency (THz)	Wavelength (nm)		Channel Number	Frequency (THz)	Wavelength (nm)
14	190.2	1576.20		54	188.2	1592.95
15	190.15	1576.61		55	188.15	1593.37
16	190.1	1577.03		56	188.1	1593.79
17	190.05	1577.44		57	188.05	1594.22
18	190	1577.86		58	188	1594.64
19	189.95	1578.27		59	187.95	1595.06
20	189.9	1578.69		60	187.9	1595.49
21	189.85	1579.10		61	187.85	1595.91
22	189.8	1579.52		62	187.8	1596.34
23	189.75	1579.93		63	187.75	1596.76
24	189.7	1580.35		64	187.7	1597.19
25	189.65	1580.77		65	187.65	1597.62
26	189.6	1581.18		66	187.6	1598.04
27	189.55	1581.60		67	187.55	1598.47
28	189.5	1582.02		68	187.5	1598.89
29	189.45	1582.44		69	187.45	1599.32
30	189.4	1582.85		70	187.4	1599.75
31	189.35	1583.27		71	187.35	1600.17
32	189.3	1583.69		72	187.3	1600.60
33	189.25	1584.11		73	187.25	1601.03
34	189.2	1584.53		74	187.2	1601.46
35	189.15	1584.95		75	187.15	1601.88
36	189.1	1585.36		76	187.1	1602.31
37	189.05	1585.78		77	187.05	1602.74
38	189	1586.20		78	187	1603.17
39	188.95	1586.62		79	186.95	1603.60
40	188.9	1587.04		80	186.9	1604.03

1. Channels on the L-band are contiguous, starting at 1577.86 nm. The channels listed in this table begin with 1570.83 nm for backward compatibility with other ONS products.

10.2 Safety Labels

For information about safety labels, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

10.3 32WSS Card

(Cisco ONS 15454 only)

Note For 32WSS card specifications, see the "32WSS Card Specifications" section in the Hardware Specifications document.

The two-slot 32-Channel Wavelength Selective Switch (32WSS) card performs channel add/drop processing within the ONS 15454 DWDM node. The 32WSS card can be installed in the following pairs of slots:

- Slots 1 and 2
- Slots 3 and 4
- Slots 5 and 6
- Slots 12 and 13
- Slots 14 and 15
- Slots 16 and 17

10.3.1 Faceplate and Block Diagrams

The 32WSS has six types of ports:

- ADD RX ports (1 to 32): These ports are used for adding channels (listed in Table 10-13 on page 10-21). Each add channel is associated with an individual switch element that selects whether that channel is added. Each add port has optical power regulation provided by a variable optical attenuator (VOA). The 32WSS has four physical receive connectors that accept multifiber push-on (MPO) cables on its front panel for the client input interfaces. Each MPO cable breaks out into eight separate cables.
- EXP RX port: The EXP RX port receives an optical signal from another 32WSS card in the same network element (NE).
- EXP TX port: The EXP TX port sends an optical signal to the other 32WSS card within the NE.
- COM TX port: The COM TX (line input) port sends an aggregate optical signal to a booster amplifier card (for example, OPT-BST) for transmission outside of the NE.
- COM RX port: The COM RX port receives the optical signal from a preamplifier (such as the OPT-PRE) and sends it to the optical splitter.
- DROP TX port: The DROP TX port sends the split-off optical signal containing drop channels to the 32DMX card, where the channels are further processed and dropped.

Figure 10-1 shows the 32WSS card front panel and identifies the traffic flow through the ports.

Figure 10-1 32WSS Faceplate and Ports

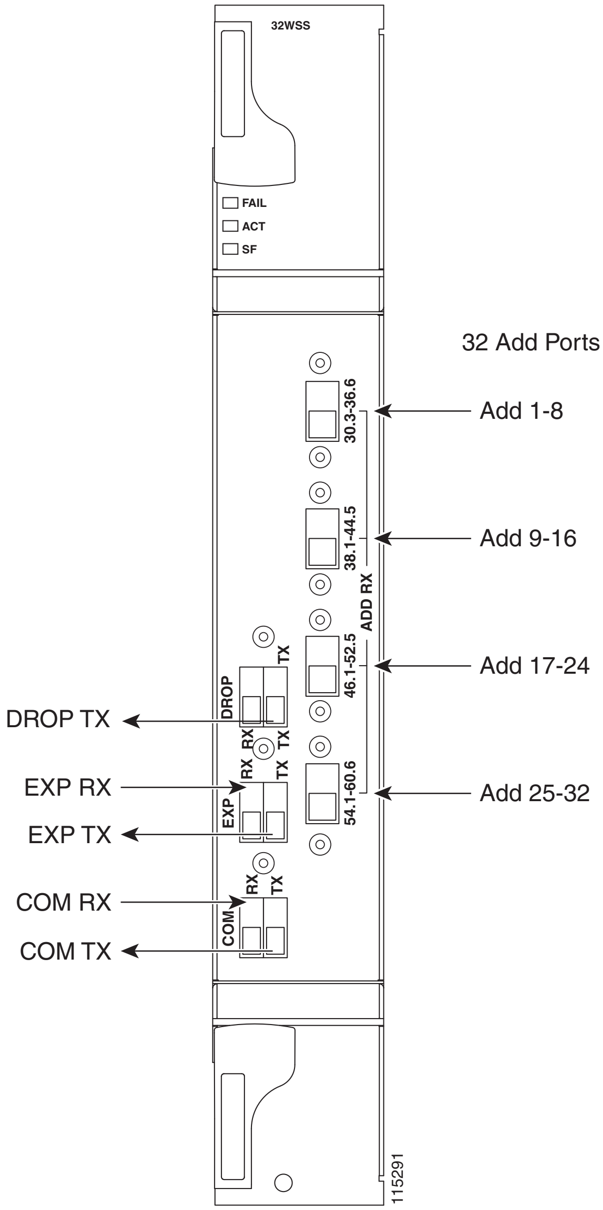
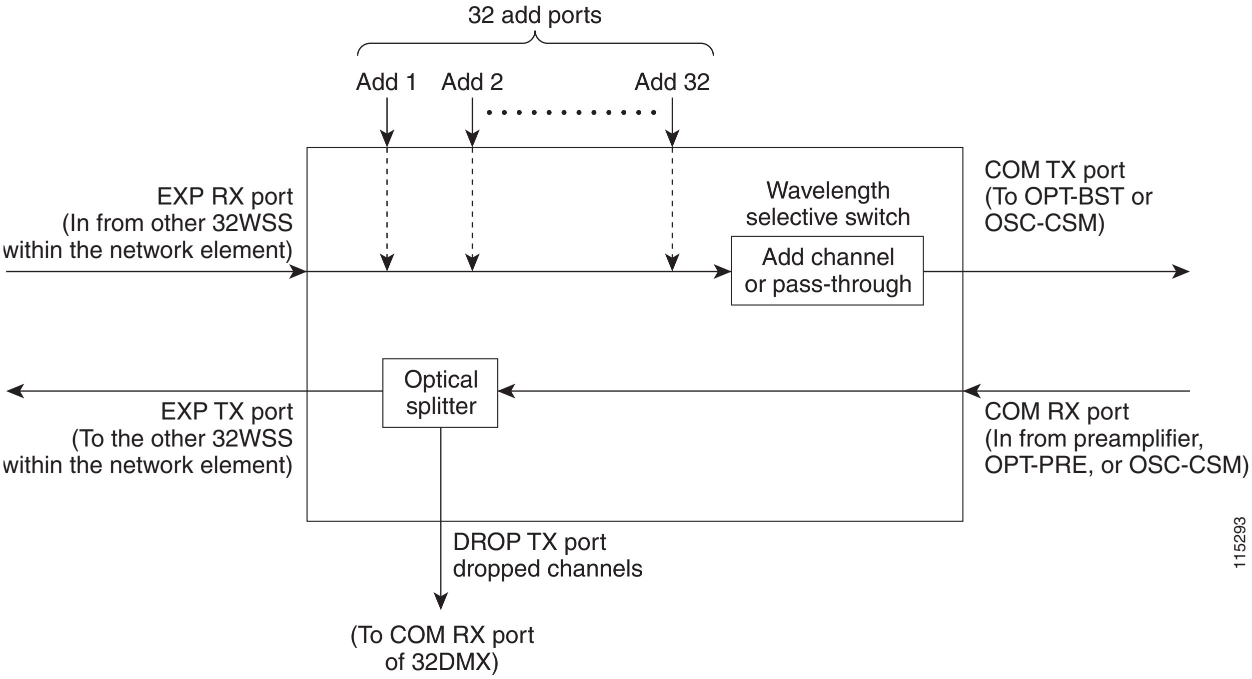


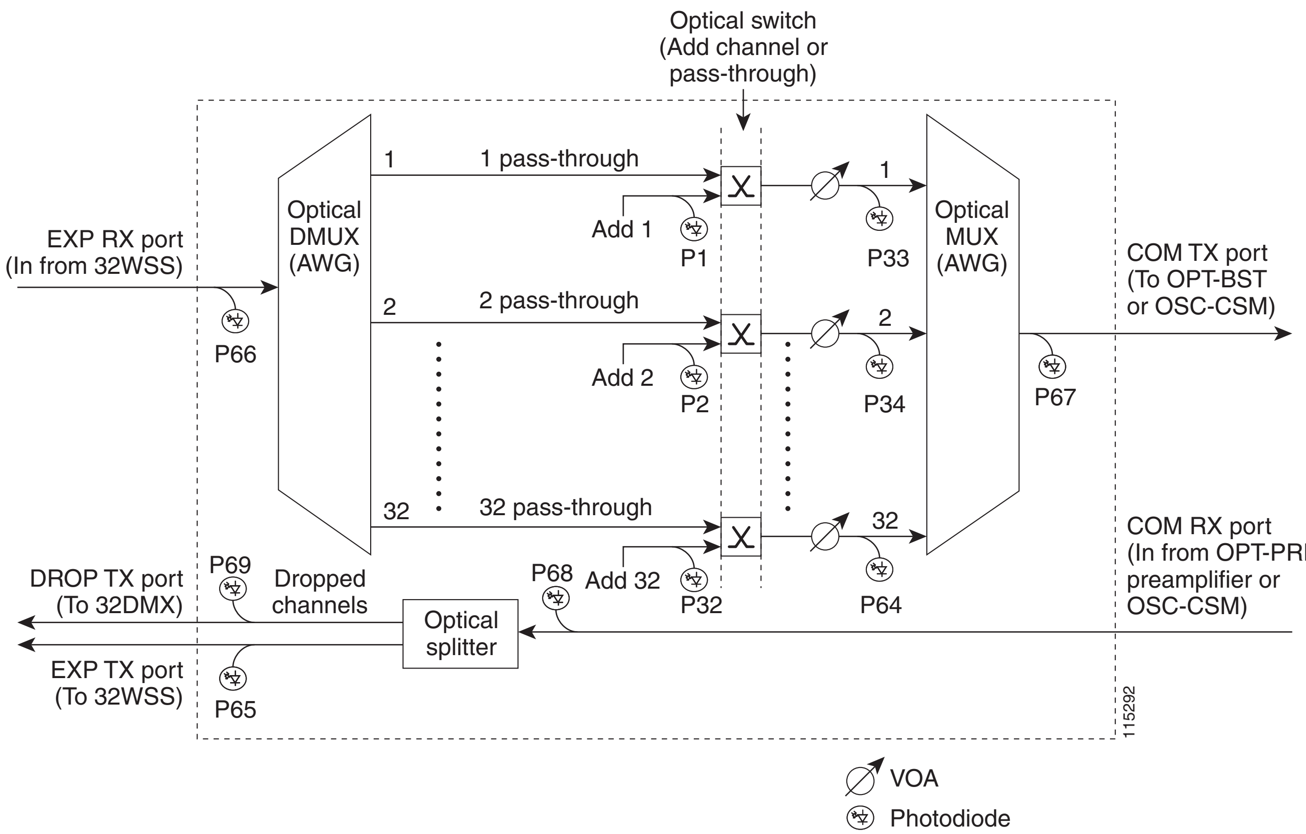
Figure 10-2 provides a high-level functional block diagram of the 32WSS card and Figure 10-3 shows how optical signals are processed on the EXP RX and COM RX ports.

Figure 10-2 32WSS Block Diagram



Aggregate optical signals that enter the EXP RX and COM RX port are processed in two ways: Add channel/pass-through and optical splitter processing. The optical processing stages are shown in Figure 10-3, which provides a detailed optical functional diagram of the 32WSS card.

Figure 10-3 32WSS Optical Block Diagram



The EXP RX PORT and COM RX PORT operate as follows:

- EXP RX Port Add Channel/Pass-through Processing

  The incoming optical signal is received at the EXP RX port from the other 32WSS card within the NE. The incoming aggregate optical signal is demultiplexed into 32 individual wavelengths, or channels. Each channel is then individually processed by the optical switch, which performs add/pass-through processing. By using software controls, the switch either selects the optical channel coming in from the demultiplexer (that is, the pass-through channel) or it selects the external ADD channel. If the ADD port channel is selected this channel is transmitted and the optical signal coming from the demultiplexer is blocked.

  After the optical switch stage, all of the channels are multiplexed into an aggregate optical signal, which is sent out on the COM TX port. The output is typically connected to an OPT-BST or OPT-BST-E card (in the event a booster amplifier is needed) or to an OSC-CSM card (if no amplification is needed).

- COM RX Port Optical Splitter Processing

  The COM RX port receives the incoming optical signal and directs it to the 32WSS card's optical splitter. The splitter optically diverts channels that are designated to be dropped to the DROP TX port. The DROP TX port is typically connected to the COM RX port of the 32DMX where the drop channels are being dropped. Channels that are not dropped pass-through the optical splitter and flow out of the 32WSS card EXP TX port. Typically, this optical signal is connected to the other 32WSS module within the NE.

- COM TX Port Monitoring

The COM TX value can be measured by either a physical or a virtual photodiode of the 15454-32WSS card. If the vendor ID of the 15454-32WSS card is between 1024 (0x400) and 2047 (0x800) the COM TX value is measured by physical photodiode. If the vendor ID of the 15454-32WSS card is greater than 2048 (0x800), the COM TX value is measured by the virtual photodiode. For COM TX values measured by virtual photodiode, check the values at the RX port in the downstream of the COM TX port (COM-RX port on OPT-BST or OSC-CSM card).

10.3.2 32WSS ROADM Functionality

The 32WSS card works in combination with the 32DMX card to implement ROADM functionality. As a ROADM node, the ONS 15454 can be configured to add or drop individual optical channels using CTC, Cisco Transport Planner, and Cisco Transport Manager (CTM). ROADM functionality using the 32WSS card requires two 32DMX single-slot cards and two 32WSS double-slot cards (totalling six slots needed in the ONS 15454 chassis).

For other cards' ROADM functionality, see that card's description in this chapter. For a diagram of a typical ROADM configuration, see the "12.1.3 ROADM Node" section on page 12-11.

Note A terminal site can be configured using only a 32WSS card and a 32DMX card plugged into the east or west side of the shelf.

10.3.3 32WSS Power Monitoring

Physical photodiodes P1 through P69 monitor the power for the 32WSS card. Table 10-12 shows how the returned power level values are calibrated to each port.

Table 10-12 32WSS Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	ADD (Power ADD)	ADD RX
P33–P64[1]	PASS THROUGH	COM TX
	ADD (Power)	COM TX
P65	OUT EXP	EXP TX
P66	IN EXP	EXP RX
P67	OUT COM	COM TX
P68	IN COM	COM RX
P69	DROP	DROP TX

1. P33–P64 monitor either ADD or PASSTHROUGH power, depending on the state of the optical switch

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide.*

10.3.4 32WSS Channel Allocation Plan

The 32WSS Card's channel labels, frequencies, and wavelengths are listed in Table 10-13.

Table 10-13 32WSS Channel Allocation Plan

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B30.3	30.3	195.9	1530.33
	31.1	195.8	1531.12
	31.9	195.7	1531.90
	32.6	195.6	1532.68
B34.2	34.2	195.4	1534.25
	35.0	195.3	1535.04
	35.8	195.2	1535.82
	36.1	195.1	1536.61
B38.1	38.1	194.9	1538.19
	38.9	194.8	1538.87
	39.7	194.7	1539.77
	40.5	194.6	1540.46
B42.1	42.1	194.4	1542.14
	42.9	194.3	1542.94
	43.7	194.2	1543.73
	44.5	194.1	1544.53
B46.1	46.1	193.9	1546.12
	46.9	193.8	1546.92
	47.7	193.7	1547.72
	48.5	193.6	1548.51
B50.1	50.1	193.4	1550.12
	50.9	193.3	1550.92
	51.7	193.2	1551.72
	52.5	193.1	1552.52
B54.1	54.1	192.9	1554.13
	54.9	192.8	1554.94
	55.7	192.7	1555.75
	56.5	192.6	1556.55
B58.1	58.1	192.4	1558.17
	58.9	192.3	1558.98
	59.7	192.2	1559.79
	60.6	192.1	1560.61

10.3.5 32WSS Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.3.6 Related Procedures for 32WSS Card

The following section lists procedures and tasks related to the configuration of the 32WSS card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G93 Modify the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Line Settings and PM Thresholds, page 20-65

10.4 32WSS-L Card

(Cisco ONS 15454 only)

Note For 32WSS-L card specifications, see the "32WSS-L Card Specifications" section in the Hardware Specifications document.

The two-slot 32-Channel Wavelength Selective Switch L-Band (32WSS-L) card performs channel add/drop processing within the ONS 15454 DWDM node. The 32WSS-L card is particularly well suited for use in networks that employ DS fiber or SMF-28 single-mode fiber.The 32WSS-L card can be installed in the following pairs of slots:

- Slots 1 and 2
- Slots 3 and 4
- Slots 5 and 6
- Slots 12 and 13
- Slots 14 and 15
- Slots16 and 17

10.4.1 Faceplate and Block Diagrams

The 32WSS-L card faceplate has six types of ports:

- ADD RX ports (1 to 32): These ports are used for adding channels (which are listed in Table 10-15 on page 10-28). Each add channel is associated with an individual switch element that selects whether the channel is added. Each add port has optical power regulation provided by a VOA.
- EXP RX port: The EXP RX port receives an optical signal from another 32WSS-L card in the same NE.
- EXP TX port: The EXP TX port sends an optical signal to the other 32WSS-L card within the NE.
- COM TX port: The COM TX port sends an aggregate optical signal to a booster amplifier card (for example, the OPT-BST card) for transmission outside of the NE.
- COM RX port: The COM RX port receives the optical signal from a preamplifier (such as the OPT-PRE) and sends it to the optical splitter.
- DROP TX port: The DROP TX port sends the split-off optical signal with drop channels to the 32DMX-L card, where the channels are further processed and dropped.

Figure 10-4 shows the 32WSS-L module front panel and identifies the traffic flow through the ports.

Figure 10-4 32WSS-L Faceplate and Ports

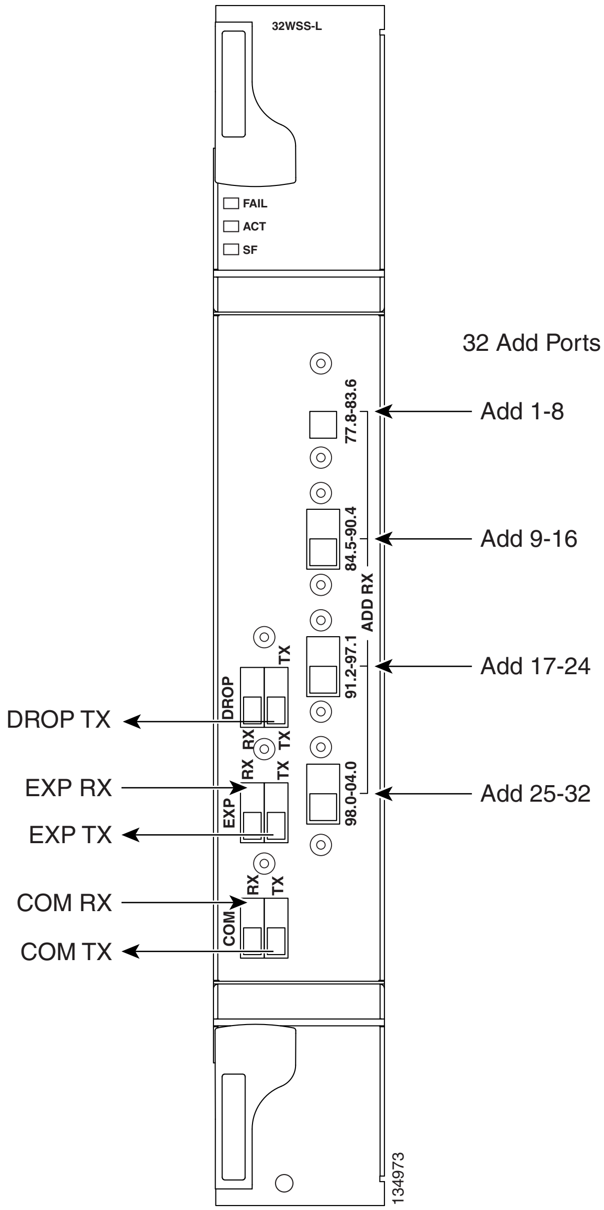
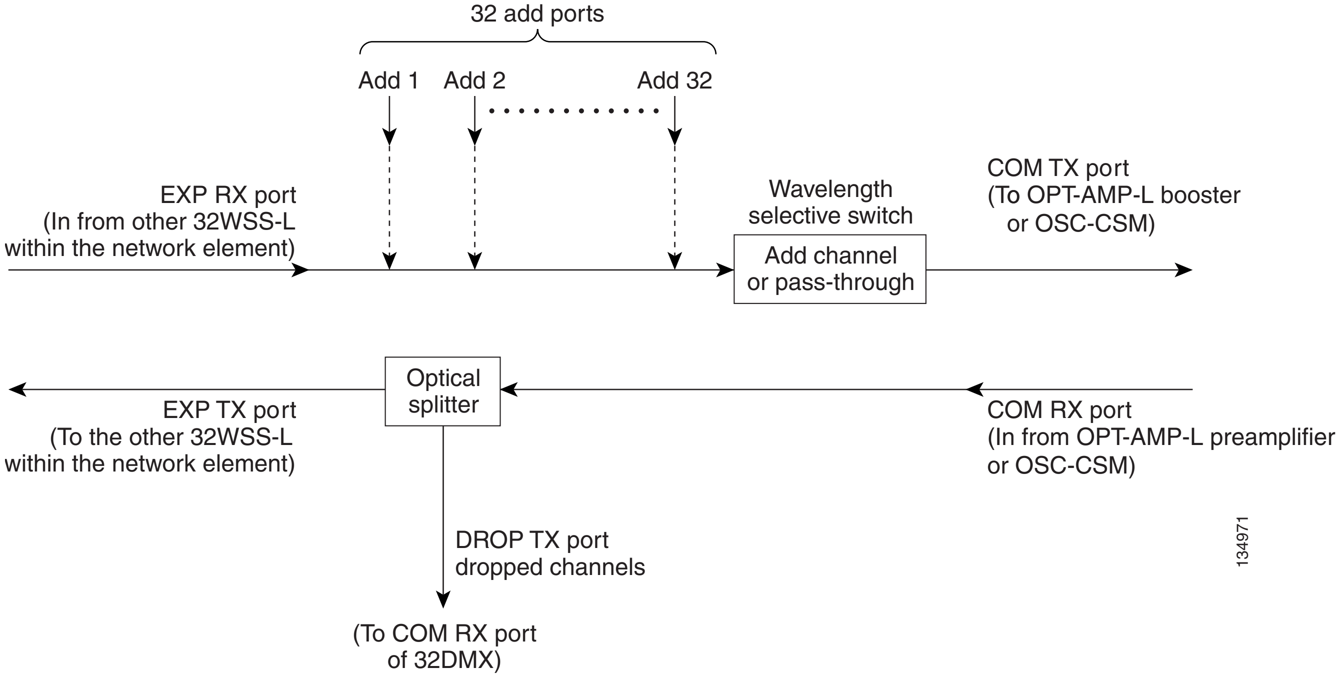


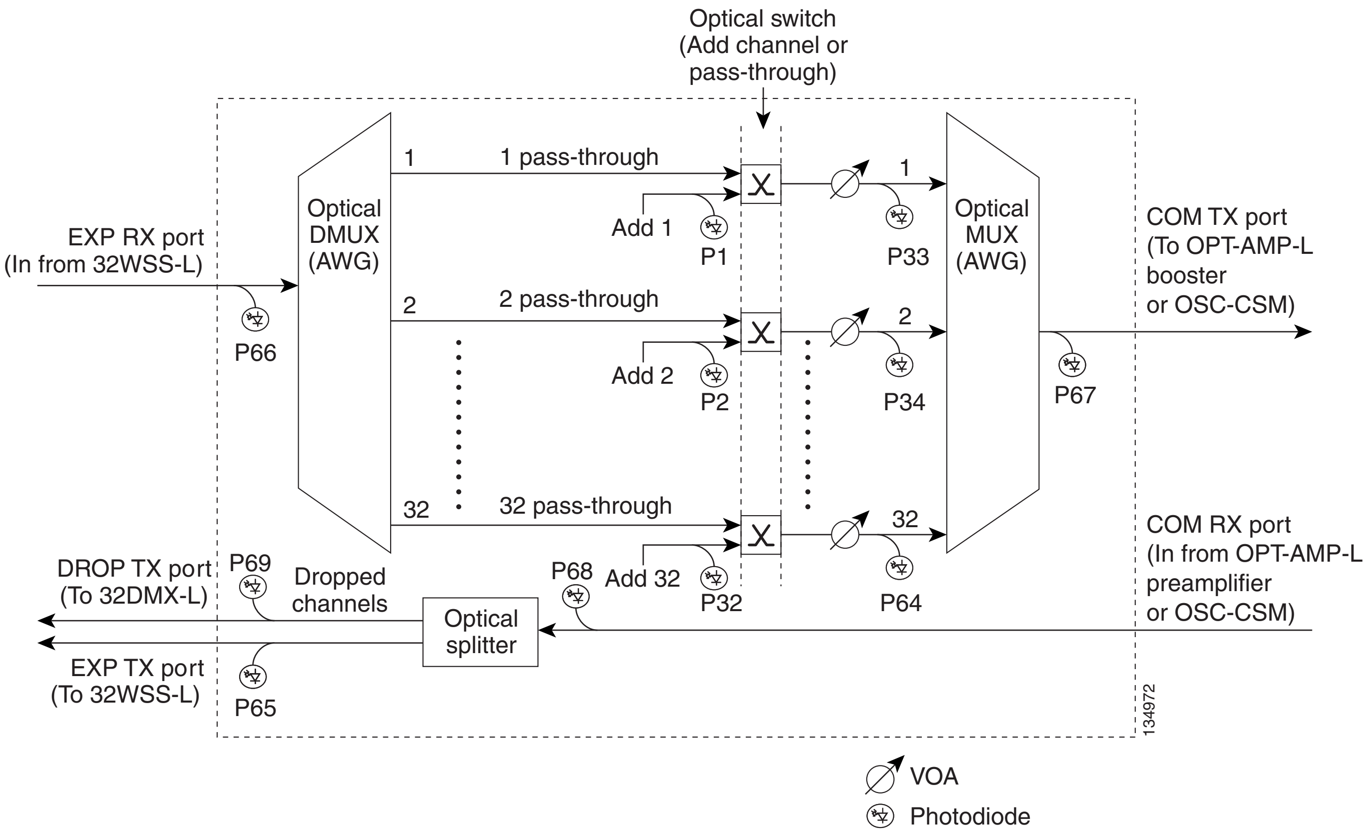
Figure 10-5 provides a high-level functional block diagram of the 32WSS-L card and Figure 10-6 on page 10-26 shows how optical signals are processed on the EXP RX and COM RX ports.

Figure 10-5 32WSS-L Block Diagram



Aggregate optical signals that enter the EXP RX and COM RX ports are processed in two ways: add channel/pass-through and optical splitter processing. The optical processing stages are shown in Figure 10-6, which provides a detailed optical functional diagram of the 32WSS-L card.

Figure 10-6 32WSS-L Optical Block Diagram



The EXP RX PORT and COM RX PORT operate as follows:

- EXP RX Port Add Channel/Pass-through Processing

  The incoming optical signal is received at the EXP RX port from the other 32WSS-L card within the NE. The incoming aggregate optical signal is demultiplexed into 32 individual wavelengths, or channels. Each channel is then individually processed by the optical switch, which performs add/pass-through processing. By using software controls, the switch either selects the optical channel coming in from the demultiplexer (that is, the pass-through channel) or it selects the external ADD channel. If the ADD port channel is selected this channel is transmitted and the optical signal coming from the demultiplexer is blocked.

  After the optical switch stage, all of the channels are multiplexed into an aggregate optical signal, which is sent out on the COM TX port. The output is typically connected to an OPT-AMP-L or OPT-BST-E card (in the event a booster amplifier is needed) or to an OSC-CSM card (if no amplification is needed).

- COM RX Port Optical Splitter Processing

  The COM RX port receives the incoming optical signal and directs it to the 32WSS-L card's optical splitter. The splitter optically diverts channels that are designated to be dropped to the DROP TX port. The DROP TX port is typically connected to the COM RX port of the 32DMX-L where the drop channels are being dropped. Channels that are not dropped pass-through the optical splitter and flow out of the 32WSS-L card EXP TX port. Typically, this optical signal is connected to the other 32WS-L module within the NE.

10.4.2 32WSS-L ROADM Functionality

The 32WSS-L works in combination with the 32DMX-L to implement L-band (1570 to 1620 nm) functionality. As a ROADM node, the ONS 15454 can be configured to add or drop individual optical channels using CTC, Cisco Transport Planner, and CTM. ROADM functionality using the 32WSS-L card requires two 32DMX-L single-slot cards and two 32WSS-L double-slot cards (totalling six slots needed in the ONS 15454 chassis).

For other cards' ROADM functionality, see that card's description in this chapter. For a diagram of a typical ROADM configuration, see the "12.1.3 ROADM Node" section on page 12-11.

Note A terminal site can be configured using a 32WSS-L card and a 32DMX-L card plugged into the east or west side of the shelf.

10.4.3 32WSS-L Power Monitoring

Physical photodiodes P1 through P69 monitor the power for the 32WSS-L card. Table 10-14 shows the returned power level values calibrated to each port.

Table 10-14 32WSS-L Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	ADD (Power ADD)	ADD RX
P33–P64[1]	PASS THROUGH	COM TX
	ADD (Power)	COM TX
P65	OUT EXP	EXP TX
P66	IN EXP	EXP RX
P67	OUT COM	COM TX
P68	IN COM	COM RX
P69	DROP	DROP TX

1. P33–P64 monitor either ADD or PASSTHROUGH power, depending on the state of the optical switch

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1.*

10.4.4 32WSS-L Channel Plan

The 32WSS-L card uses 32 banded channels on the ITU-T 100-GHz grid, as shown in Table 10-15.

Table 10-15 32WSS-L Channel Plan

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B77.8	77.8	190	1577.86
	78.6	189.9	1578.69
	79.5	189.8	1579.52
	80.3	189.7	1580.35
B81.1	81.1	189.6	1581.18
	82.0	189.5	1582.02
	82.8	189.4	1582.85
	83.6	189.3	1583.69
B84.5	84.5	189.2	1584.53
	85.3	189.1	1585.36
	86.2	189	1586.20
	87.0	188.9	1587.04
B87.8	87.8	188.8	1587.88
	88.7	188.7	1588.73
	89.5	188.6	1589.57
	90.4	188.5	1590.41
B91.2	91.2	188.4	591.26
	92.1	188.3	1592.10
	92.9	188.2	1592.95
	93.7	188.1	1593.79
B94.6	94.6	188	1594.64
	95.4	187.9	1595.49
	96.3	187.8	1596.34
	97.1	187.7	1597.19
B98.0	98.0	187.6	1598.04
	98.8	187.5	1598.89
	99.7	187.4	1599.75
	00.6	187.3	1600.60
B01.4	01.4	187.2	1601.46
	02.3	187.1	1602.31
	03.1	187	1603.17
	04.0	186.9	1604.03

10.4.5 32WSS-L Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.4.6 Related Procedures for 32WSS-L Card

The following section lists procedures and tasks related to the configuration of the 32WSS-L card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G93 Modify the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Line Settings and PM Thresholds, page 20-65

10.5 32DMX Card

(Cisco ONS 15454 only)

Note For 32DMX card specifications, see the "32DMX Card Specifications" section in the Hardware Specifications document.

The single-slot 32-Channel Demultiplexer (32DMX) card is an optical demultiplexer. The card receives an aggregate optical signal on its COM RX port and demultiplexes it into to (32) ITU-T 100-GHz-spaced channels. The 32DMX card can be installed in Slots 1 to 6 and in Slots 12 to 17.

10.5.1 Faceplate and Block Diagrams

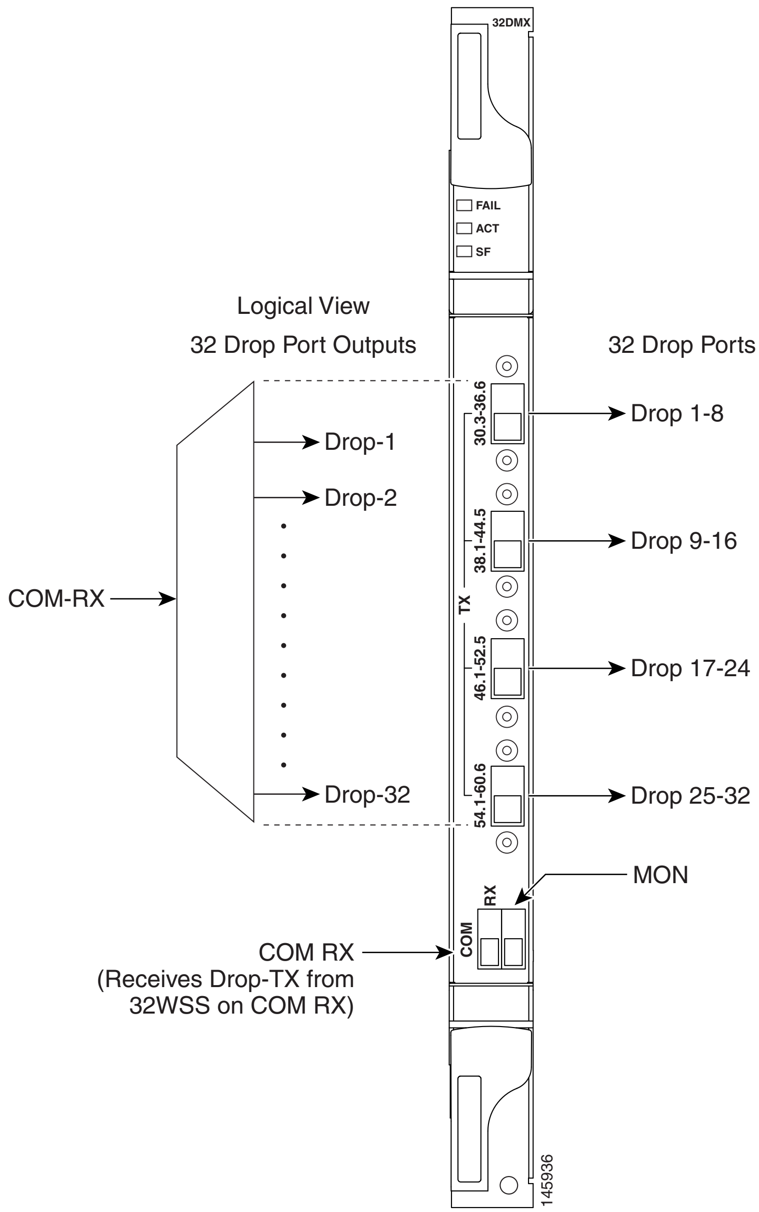
The 32DMX card has two types of ports:

- COM RX port: COM RX is the input port for the aggregate optical signal being demultiplexed. This port is supported by a VOA for optical power regulation and a photodiode for optical power monitoring.
- DROP TX ports (1 to 32): On its output, the 32DMX provides 32 drop ports (listed in Table 10-17 on page 10-32) that are typically used for dropping channels within the ROADM node. These ports are connected using four 8-fiber MPO ribbon connectors. The incoming optical signal to the demultiplexer comes into the COM RX port. This input port is connected using a single LC duplex optical connector.Each drop port has a photodiode for optical power monitoring. Unlike the two-slot

32DMX-O demultiplexer, the drop ports on the 32DMX do not have a VOA per channel for optical power regulation. For a description of the 32DMX-O card, see the "6.4 32DMX-O Card" section on page 6-14.

Figure 10-7 shows the 32DMX card front panel and the basic traffic flow through the ports.

Figure 10-7 32DMX Faceplate and Ports



A block diagram of the 32DMX card is shown in Figure 10-8.

Figure 10-8 32DMX Block Diagram

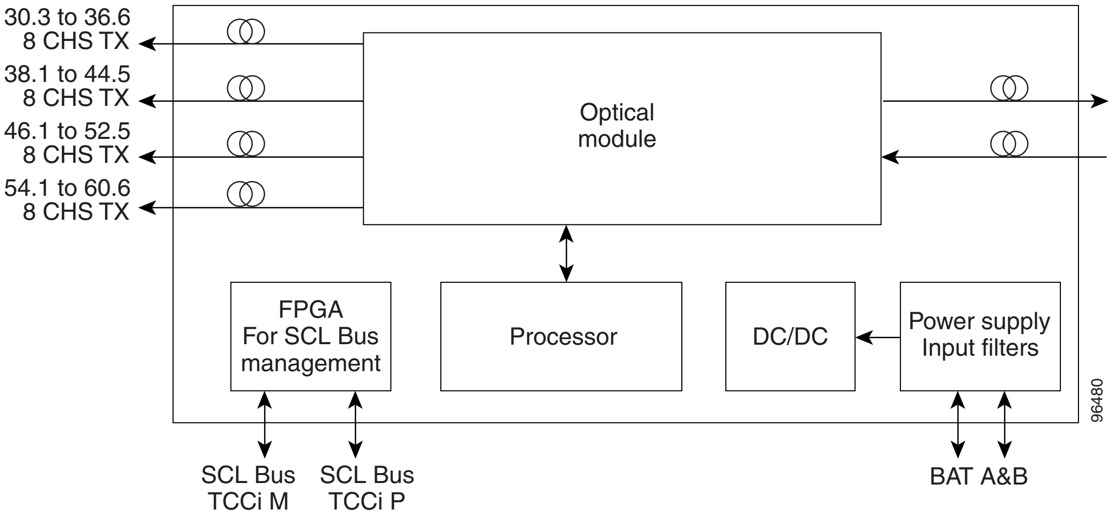
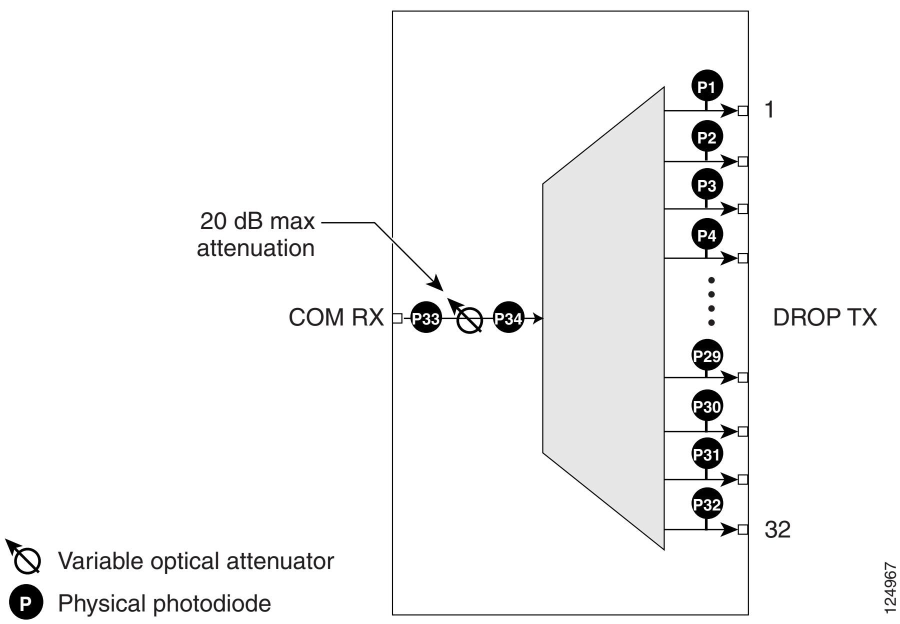


Figure 10-9 shows the 32DMX optical module functional block diagram.

Figure 10-9 32DMX Optical Module Functional Block Diagram



10.5.2 32DMX ROADM Functionality

The 32DMX card works in combination with the 32WSS card to implement ROADM functionality. As a ROADM node, the ONS 15454 can be configured to add or drop individual optical channels using CTC, Cisco Transport Planner, and CTM. ROADM functionality using the 32DMX card requires two 32DMX single-slot cards and two 32WSS double-slot cards (for six slots total in the ONS 15454 chassis).

For information about the ROADM functionality for other cards, see that card's description in this chapter. For a diagram of a typical ROADM configuration, see the "12.1.3 ROADM Node" section on page 12-11.

Note A terminal site can be configured using only a 32WSS card and a 32DMX card plugged into the east or west side of the shelf.

10.5.3 32DMX Power Monitoring

Physical photodiodes P1 through P33 monitor the power for the 32DMX card. The returned power level values are calibrated to the ports as shown in Table 10-16.

Table 10-16 32DMX Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	DROP	DROP TX
P33	INPUT COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

10.5.4 32DMX Channel Allocation Plan

The 32DMX card's channel labels, frequencies, and wavelengths are listed in Table 10-17.

Table 10-17 32DMX Channel Allocation Plan

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B30.3	30.3	195.9	1530.33
	31.1	195.8	1531.12
	31.9	195.7	1531.90
	32.6	195.6	1532.68
B34.2	34.2	195.4	1534.25
	35.0	195.3	1535.04
	35.8	195.2	1535.82
	36.1	195.1	1536.61
B38.1	38.1	194.9	1538.19
	38.9	194.8	1538.87
	39.7	194.7	1539.77
	40.5	194.6	1540.46

Table 10-17 32DMX Channel Allocation Plan (continued)

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B42.1	42.1	194.4	1542.14
	42.9	194.3	1542.94
	43.7	194.2	1543.73
	44.5	194.1	1544.53
B46.1	46.1	193.9	1546.12
	46.9	193.8	1546.92
	47.7	193.7	1547.72
	48.5	193.6	1548.51
B50.1	50.1	193.4	1550.12
	50.9	193.3	1550.92
	51.7	193.2	1551.72
	52.5	193.1	1552.52
B54.1	54.1	192.9	1554.13
	54.9	192.8	1554.94
	55.7	192.7	1555.75
	56.5	192.6	1556.55
B58.1	58.1	192.4	1558.17
	58.9	192.3	1558.98
	59.7	192.2	1559.79
	60.6	192.1	1560.61

10.5.5 32DMX Card Functions

- Card level indicators—Table G-4 on page G-9
- “G.4 Port-Level Indicators” section on page G-9

10.5.6 Related Procedures for 32DMX Card

The following section lists procedures and tasks related to the configuration of the 32DMX card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards

- NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds, page 20-54

10.6 32DMX-L Card

(Cisco ONS 15454 only)

Note For 32DMX-L card specifications, see the "32DMX-L Card Specifications" section in the Hardware Specifications document.

The single-slot 32-Channel Demultiplexer L-Band card (32DMX-L) is an L-band optical demultiplexer. The card receives an aggregate optical signal on its COM RX port and demultiplexes it into to (32) 100-GHz-spaced channels. The 32DMX-L card is particularly well suited for use in networks that employ DS fiber or SMF-28 single-mode fiber. The 32DMX-L card can be installed in Slots 1 to 6 and in Slots 12 to 17.

10.6.1 Faceplate and Block Diagrams

The 32DMX-L card has two types of ports:

- COM RX port: COM RX is the input port for the aggregate optical signal being demultiplexed. This port is supported by both a VOA for optical power regulation and a photodiode for optical power monitoring.
- DROP TX ports (1 to 32): On its output, the 32DMX-L card provides 32 drop ports (listed in Table 10-21 on page 10-42) that are typically used for dropping channels within the ROADM node. These ports are connected using four 8-fiber MPO ribbon connectors. Each drop port has a photodiode for optical power monitoring. Unlike the two-slot 32DMX-O demultiplexer, the drop ports on the 32DMX-L do not have a VOA per channel for optical power regulation. For a description of the 32DMX-O card, see the "6.4 32DMX-O Card" section on page 6-14.

Figure 10-10 shows the 32DMX-L card front panel and the basic traffic flow through the ports.

Figure 10-10 32DMX-L Faceplate and Ports

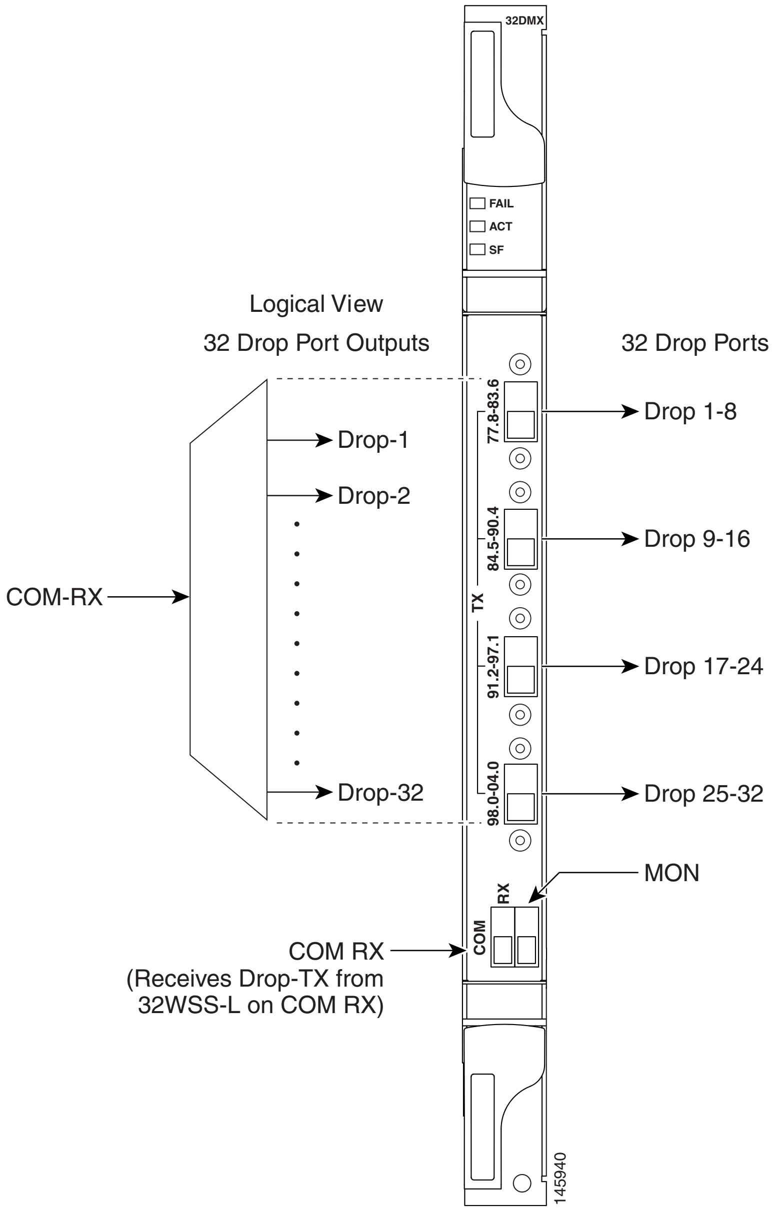


Figure 10-11 shows a block diagram of the 32DMX-L card.

Figure 10-11 32DMX-L Block Diagram

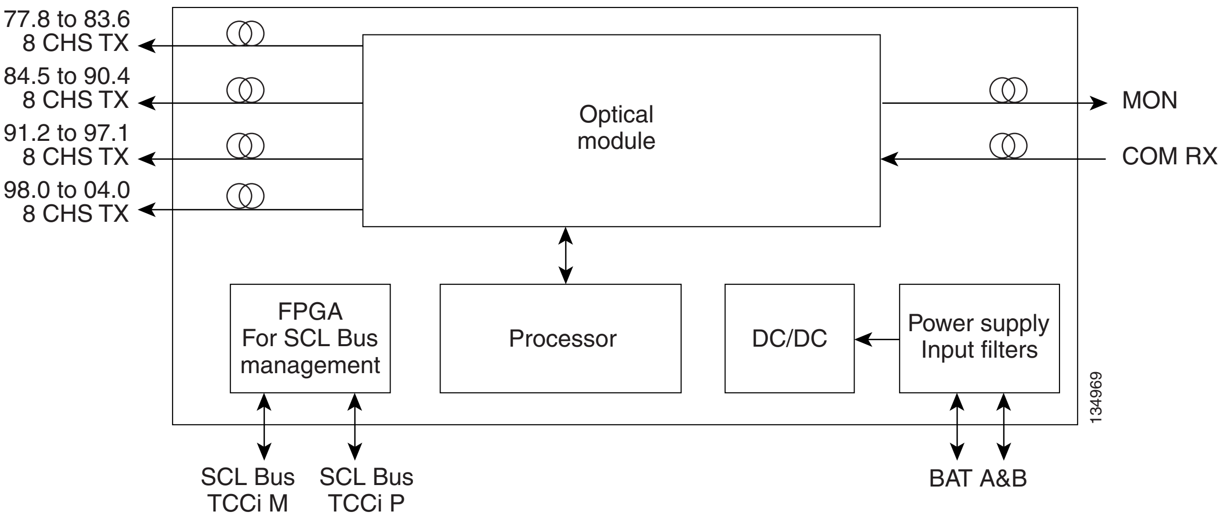
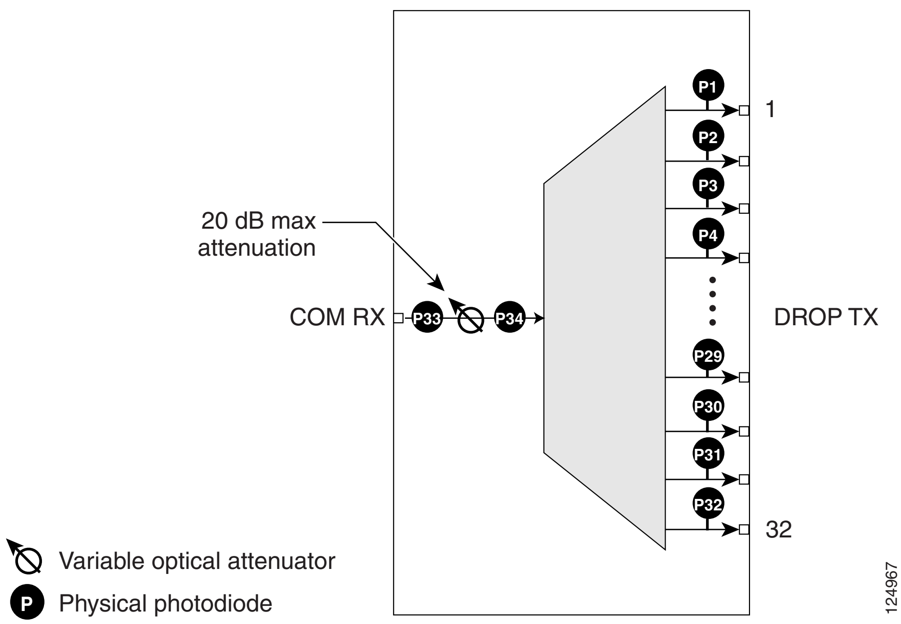


Figure 10-12 shows the 32DMX-L optical module functional block diagram.

Figure 10-12 32DMX-L Optical Module Functional Block Diagram



10.6.2 32DMX-L ROADM Functionality

The 32DMX-L card works in combination with the 32WSS-L card to implement ROADM functionality. AS a ROADM node, the ONS 15454 can be configured to add or drop individual optical channels using CTC, Cisco Transport Planner, and CTM. ROADM functionality using the 32DMX-L card requires two 32DMX-L single-slot cards and two 32WSS-L double-slot cards (for a total of six slots in the ONS 15454 chassis).

For information about ROADM functionality for other cards, see that card's description in this chapter. For a diagram of a typical ROADM configuration, see the "12.1.3 ROADM Node" section on page 12-11.

Note A terminal site can be configured using only a 32WSS-L card and a 32DMX-L card plugged into the east or west side of the shelf.

10.6.3 32DMX-L Power Monitoring

Physical photodiodes P1 through P33 monitor the power for the 32DMX-L card. The returned power level values are calibrated to the ports as shown in Table 10-18.

Table 10-18 32DMX-L Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	DROP	DROP TX
P33	INPUT COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

10.6.4 32DMX-L Channel Plan

The 32DMX-L card uses 32 banded channels on the ITU-T 100-GHz grid, as shown in Table 10-19.

Table 10-19 32DMX-L Channel Plan

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B77.8	77.8	190	1577.86
	78.6	189.9	1578.69
	79.5	189.8	1579.52
	80.3	189.7	1580.35
B81.1	81.1	189.6	1581.18
	82.0	189.5	1582.02
	82.8	189.4	1582.85
	83.6	189.3	1583.69
B84.5	84.5	189.2	1584.53
	85.3	189.1	1585.36
	86.2	189	1586.20
	87.0	188.9	1587.04

Table 10-19 32DMX-L Channel Plan (continued)

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B87.8	87.8	188.8	1587.88
	88.7	188.7	1588.73
	89.5	188.6	1589.57
	90.4	188.5	1590.41
B91.2	91.2	188.4	1591.26
	92.1	188.3	1592.10
	92.9	188.2	1592.95
	93.7	188.1	1593.79
B94.6	94.6	188	1594.64
	95.4	187.9	1595.49
	96.3	187.8	1596.34
	97.1	187.7	1597.19
B98.0	98.0	187.6	1598.04
	98.8	187.5	1598.89
	99.7	187.4	1599.75
	00.6	187.3	1600.60
B01.4	01.4	187.2	1601.46
	02.3	187.1	1602.31
	03.1	187	1603.17
	04.0	186.9	1604.03

10.6.5 32DMX-L Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.6.6 Related Procedures for 32DMX-L Card

The following section lists procedures and tasks related to the configuration of the 32DMX-L card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards

- NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds, page 20-54

10.7 40-DMX-C Card

(Cisco ONS 15454 and ONS 15454 M6 only)

Note For 40-DMX-C card specifications, see the "40-DMX-C Card Specifications" section in the Hardware Specifications document.

The single-slot 40-Channel Demultiplexer C-band (40-DMX-C) card demultiplexes 40 100-GHz-spaced channels identified in the channel plan (Table 10-21 on page 10-42), and sends them to dedicated output ports. The overall optical power can be adjusted using a single VOA that is common to all channels. The 40-DMX-C card is unidirectional, optically passive, and can be installed in Slots 1 to 6 and 12 to 17.

10.7.1 Faceplate and Block Diagrams

The 40-DMX-C has two types of ports:

- COM RX port: COM RX is the line input port for the aggregate optical signal being demultiplexed. This port is supported by a VOA for optical power regulation and a photodiode for per channel optical power monitoring.

  Note By default, the VOA is set to its maximum attenuation for safety purposes (for example, electrical power failure). A manual VOA setting is also available.

- DROP TX ports (1 to 40): On its output, the 40-DMX-C card provides 40 drop ports that are typically used for dropping channels within the ROADM node. These ports are connected using five physical connectors on the front panel that accept MPO client input cables. (MPO cables break out into eight separate cables.) The 40-DMX-C card also has one LC-PC-II optical connector for the main input.

Figure 10-13 shows the 40-DMX-C card faceplate.

Figure 10-13 40-DMX-C Faceplate

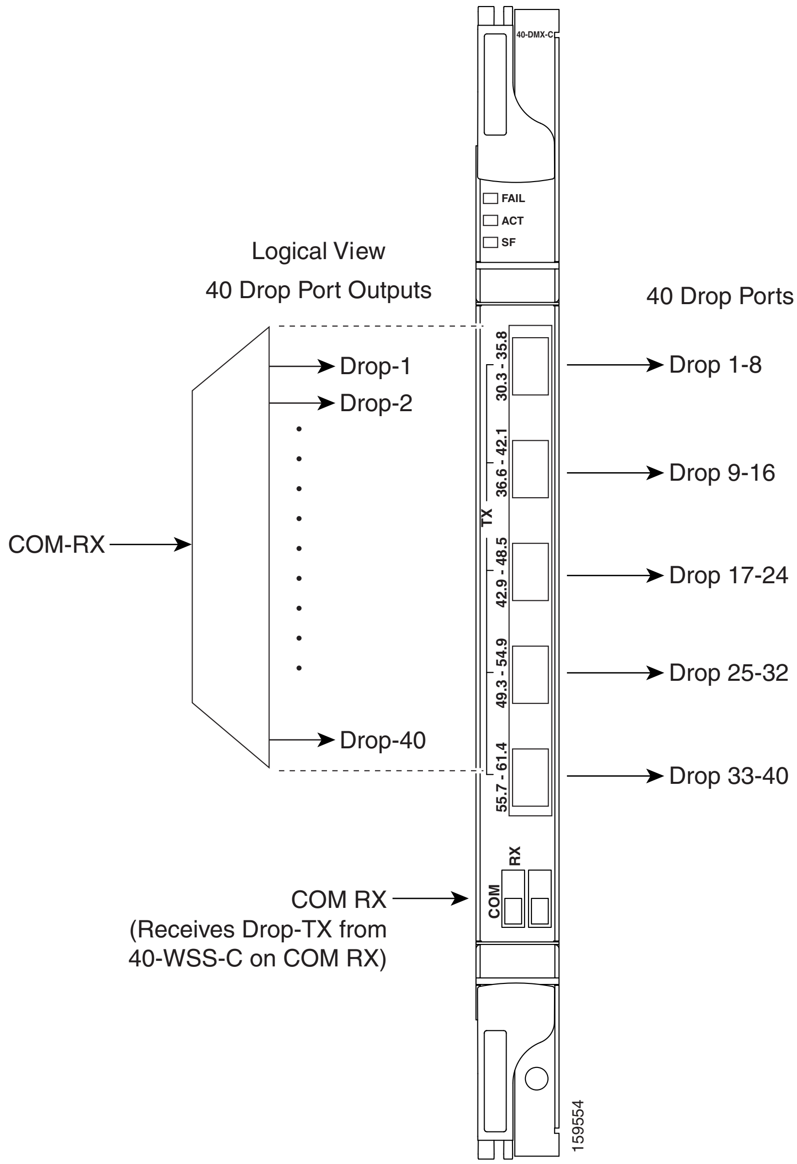


Figure 10-14 shows a block diagram of the 40-DMX-C card.

Figure 10-14 40-DMX-C Block Diagram

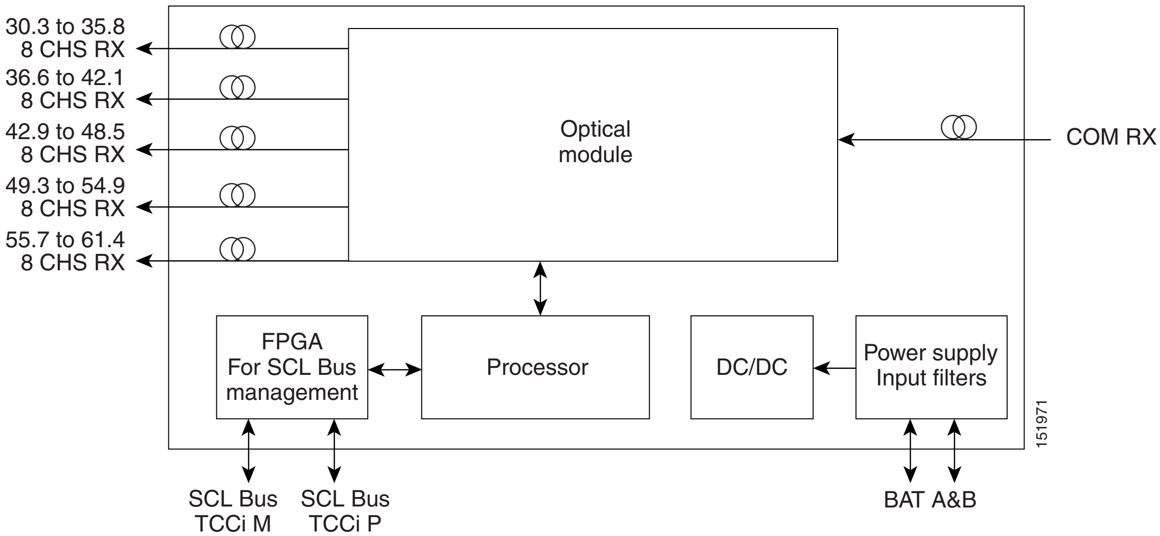
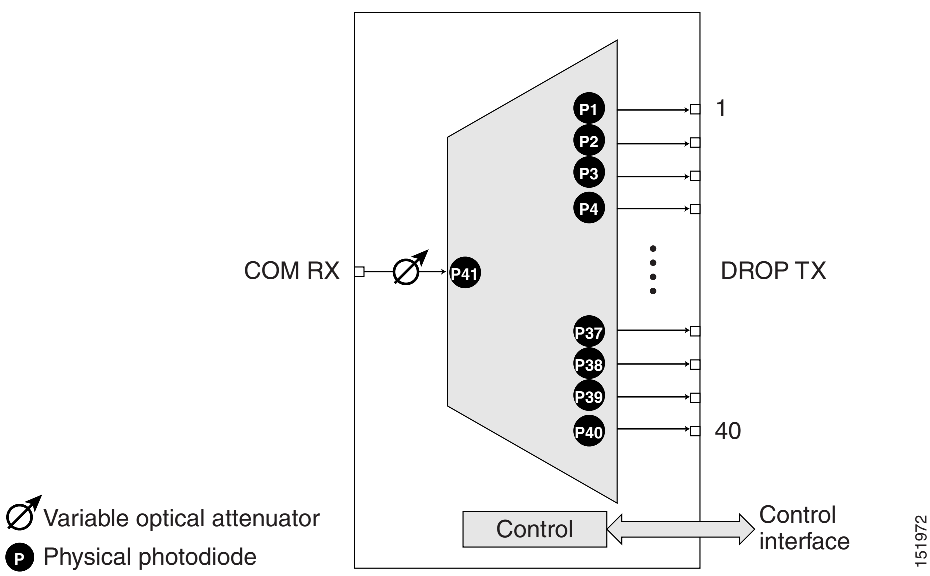


Figure 10-15 shows the 40-DMX-C optical module functional block diagram.

Figure 10-15 40-DMX-C Optical Module Functional Block Diagram



10.7.2 40-DMX-C ROADM Functionality

The 40-DMX-C card works in combination with the 40-WSS-C card to implement ROADM functionality. As a ROADM node, the ONS 15454 can be configured at the optical channel level using CTC, Cisco Transport Planner, and CTM. ROADM functionality using the 40-DMX-C card requires two single-slot 40-DMX-C cards and two 40-WSS-C double-slot cards (for a total of six slots in the ONS 15454 chassis).

For other cards' ROADM functionality, see that card's description in this chapter. For a diagram of a typical ROADM configuration, see the "12.1.3 ROADM Node" section on page 12-11.

10.7.3 40-DMX-C Power Monitoring

Physical photodiodes P1 through P40 monitor the power at the outputs of the 40-DMX-C card. P41 monitors the total multiplexed power at the input, calibrated to the COM-RX port. Table 10-20 shows the returned power level values calibrated to each port.

Table 10-20 40-DMX-C Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P40	DROP	DROP TX
P41	INPUT COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

10.7.4 40-DMX-C Channel Plan

Table 10-21 shows the 40 ITU-T 100-GHz-spaced, C-band channels (wavelengths) that are demultiplexed by the 40-DMX-C card.

Table 10-21 40-DMX-C Channel Plan

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B30.3	30.3	195.9	1530.33
	31.1	195.8	1531.12
	31.9	195.7	1531.90
	32.6	195.6	1532.68
	33.4	195.5	1533.47
B34.2	34.2	195.4	1534.25
	35.0	195.3	1535.04
	35.8	195.2	1535.82
	36.6	195.1	1536.61
	37.4	195	1537.40
B38.1	38.1	194.9	1538.19
	38.9	194.8	1538.98
	39.7	194.7	1539.77
	40.5	194.6	1540.56
	41.3	194.5	1541.35

Table 10-21 40-DMX-C Channel Plan (continued)

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B42.1	42.1	194.4	1542.14
	42.9	194.3	1542.94
	43.7	194.2	1543.73
	44.5	194.1	1544.53
	45.3	194	1545.32
B46.1	46.1	193.9	1546.12
	46.9	193.8	1546.92
	47.7	193.7	1547.72
	48.5	193.6	1548.51
	49.3	193.5	1549.32
B50.1	50.1	193.4	1550.12
	50.9	193.3	1550.92
	51.7	193.2	1551.72
	52.5	193.1	1552.52
	53.3	193	1553.33
B54.1	54.1	192.9	1554.13
	54.9	192.8	1554.94
	55.7	192.7	1555.75
	56.5	192.6	1556.55
	57.3	192.5	1557.36
B58.1	58.1	192.4	1558.17
	58.9	192.3	1558.98
	59.7	192.2	1559.79
	60.6	192.1	1560.61
	61.4	192	1561.42

10.7.5 40-DMX-C Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.7.6 Related Procedures for 40-DMX-C Card

The following section lists procedures and tasks related to the configuration of the 40-DMX-C card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113

- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds, page 20-54

10.8 40-DMX-CE Card

(Cisco ONS 15454 and ONS 15454 M6 only)

Note For 40-DMX-CE card specifications, see the "40-DMX-CE Card Specifications" section in the Hardware Specifications document.

The single-slot 40-Channel Demultiplexer C-band, even channels (40-DMX-CE) card demultiplexes 40 100-GHz-spaced even-numbered channels identified in the channel plan (Table 10-23 on page 10-47), and sends them to dedicated output ports. The overall optical power can be adjusted using a single VOA that is common to all channels. The 40-DMX-CE card is unidirectional, optically passive, and can be installed in Slots 1 to 6 and 12 to 17.

10.8.1 Faceplate and Block Diagrams

The 40-DMX-CE card has two types of ports:

- COM RX port: COM RX is the line input port for the aggregate optical signal being demultiplexed. This port is supported by a VOA for optical power regulation and a photodiode for per channel optical power monitoring.

  Note By default, the VOA is set to its maximum attenuation for safety purposes (for example, electrical power failure). A manual VOA setting is also available.

- DROP TX ports (1 to 40): On its output, the 40-DMX-CE card provides 40 drop ports that are typically used for dropping channels within the ROADM node. These ports are connected using five physical connectors on the front panel that accept MPO client input cables. (MPO cables break out into eight separate cables.) The 40-DMX-CE card also has one LC-PC-II optical connector for the main input.

Figure 10-16 shows the 40-DMX-CE card faceplate.

Figure 10-16 40-DMX-CE Card Faceplate

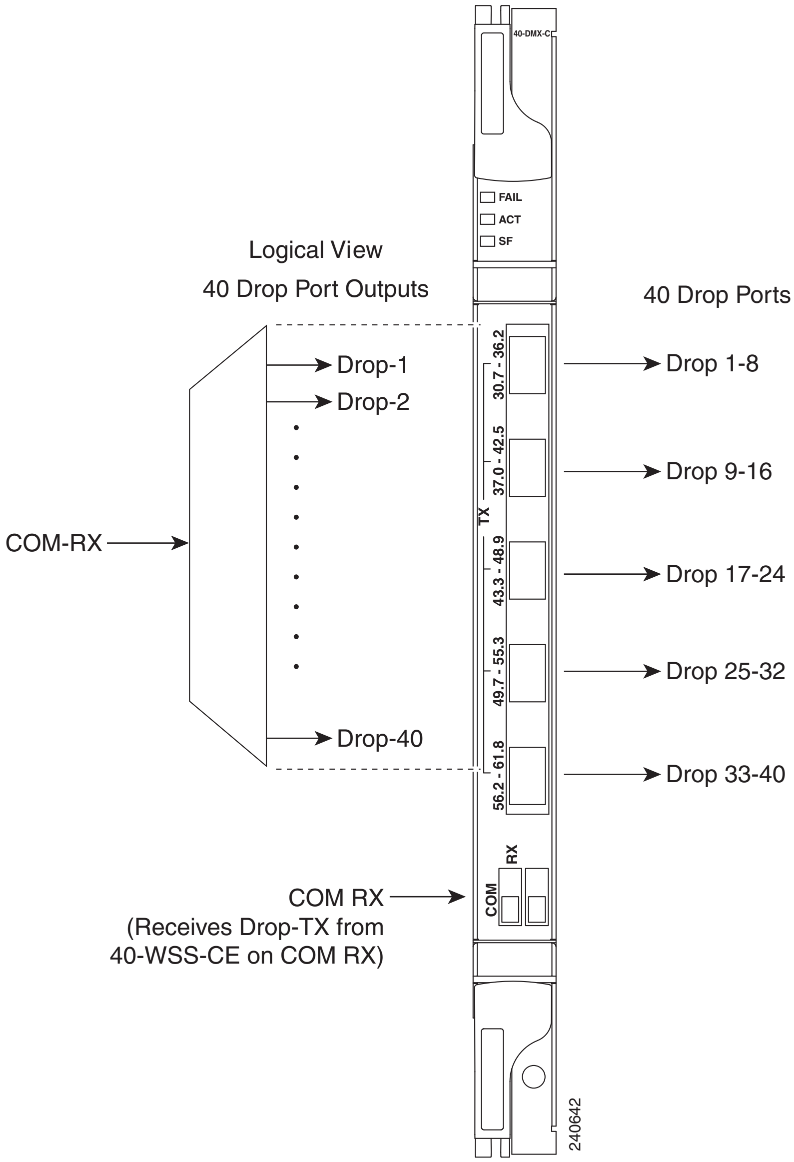


Figure 10-17 shows a block diagram of the 40-DMX-CE card.

Figure 10-17 40-DMX-CE Card Block Diagram

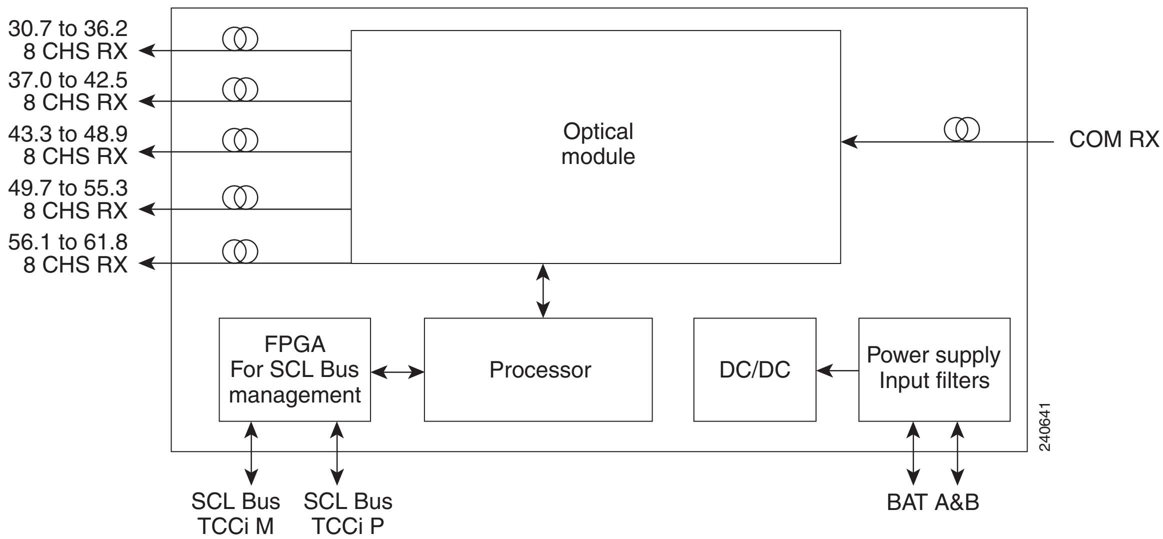
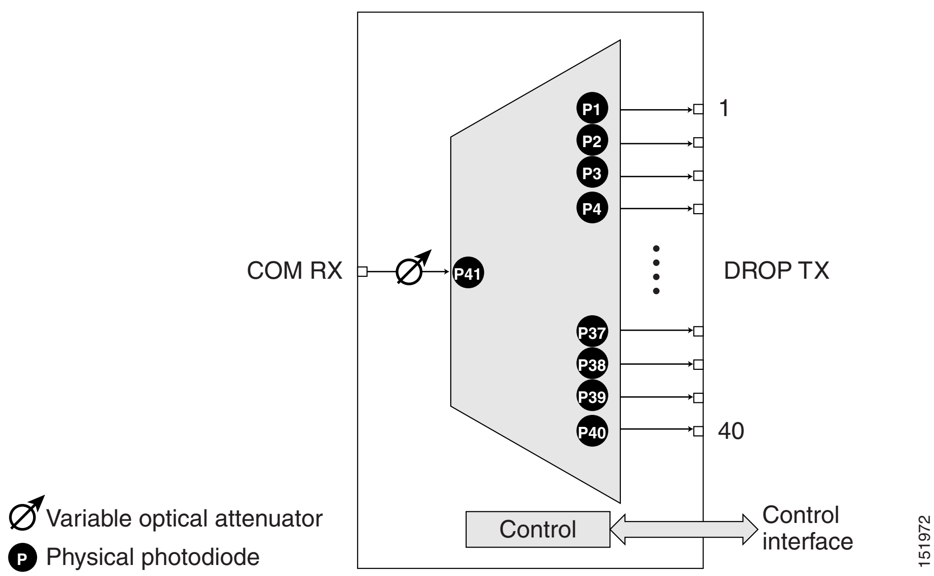


Figure 10-18 shows the 40-DMX-CE card optical module functional block diagram.

Figure 10-18 40-DMX-CE Card Optical Module Functional Block Diagram



10.8.2 40-DMX-CE Card ROADM Functionality

The 40-DMX-CE card works in combination with the 40-WSS-CE card to implement ROADM functionality. As a ROADM node, the ONS 15454 can be configured at the optical channel level using CTC, Cisco Transport Planner, and CTM. ROADM functionality using the 40-DMX-CE card requires two single-slot 40-DMX-CE cards and two 40-WSS-CE double-slot cards (for a total of six slots in the ONS 15454 chassis).

For the ROADM functionality of other cards, see the description of that card in this chapter. For a diagram of a typical ROADM configuration, see the "12.1.3 ROADM Node" section on page 12-11.

10.8.3 40-DMX-CE Card Power Monitoring

Physical photodiodes P1 through P40 monitor the power at the outputs of the 40-DMX-CE card. P41 monitors the total multiplexed power at the input, calibrated to the COM-RX port. Table 10-22 shows the returned power level values calibrated to each port.

Table 10-22 40-DMX-CE Card Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P40	DROP	DROP TX
P41	INPUT COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

10.8.4 40-DMX-CE Card Channel Plan

Table 10-23 shows the 40 ITU-T 100-GHz-spaced, C-band channels (wavelengths) that are demultiplexed by the 40-DMX-CE card.

Table 10-23 40-DMX-CE Card Channel Plan

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B30.7	30.7	195.85	1530.72
	31.5	195.75	1531.51
	32.3	195.65	1532.29
	33.1	195.55	1533.07
	33.9	195.45	1533.86
B34.6	34.6	195.35	1534.64
	35.4	195.25	1535.43
	36.2	195.15	1536.22
	37.0	195.05	1537.00
	37.8	194.95	1537.79
B38.6	38.6	194.85	1538.58
	39.4	194.75	1539.37
	40.1	194.65	1540.16
	40.9	194.55	1540.95
	41.8	194.45	1541.75

Table 10-23 40-DMX-CE Card Channel Plan (continued)

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B42.5	42.5	194.35	1542.54
	43.3	194.25	1543.33
	44.1	194.15	1544.13
	44.9	194.05	1544.92
	45.7	193.95	1545.72
B46.5	46.5	193.85	1546.52
	47.3	193.75	1547.32
	48.1	193.65	1548.11
	48.9	193.55	1548.91
	49.7	193.45	1549.72
B50.5	50.5	193.35	1550.52
	51.3	193.25	1551.32
	52.1	193.15	1552.12
	52.9	193.05	1552.93
	53.7	192.95	1553.73
B54.4	54.4	192.85	1554.54
	55.3	192.75	1555.34
	56.1	192.65	1556.15
	56.9	192.55	1556.96
	57.8	192.45	1557.77
B58.6	58.6	192.35	1558.58
	59.4	192.25	1559.39
	60.2	192.15	1560.20
	61.0	192.05	1561.01
	61.8	191.95	1561.83

10.8.5 40-DMX-CE Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.8.6 Related Procedures for 40-DMX-CE Card

The following section lists procedures and tasks related to the configuration of the 40-DMX-CE card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113

- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds, page 20-54

10.9 40-MUX-C Card

(Cisco ONS 15454 and ONS 15454 M6 only)

Note For 40-MUX-C card specifications, see the "40-MUX-C Card Specification" section in the Hardware Specifications document.

The single-slot 40-Channel Multiplexer C-band (40-MUX-C) card multiplexes forty ITU-T 100-GHz-spaced channels identified in the channel plan in Table 10-21 on page 10-42. The 40-MUX-C card can be installed in Slots 1 to 6 and 12 to 17. The 40-MUX-C card is typically used in hub nodes.

10.9.1 Faceplate and Block Diagrams

The 40-MUX-C card has two types of ports:

- COM TX port: COM TX is the line output port for the aggregate optical signal being multiplexed. This port is supported by both a VOA for optical power regulation and a photodiode for per channel optical power monitoring.

  Note By default, the VOA is set to its maximum attenuation for safety purposes (for example, electrical power failure). A manual VOA setting is also available.

- DROP RX ports (1 to 40): The 40-MUX-C card provides 40 input optical channels. These ports are connected using five physical receive connectors on the card's front panel that accept MPO cables for the client input interfaces. MPO cables break out into eight separate cables. The 40-DMX-C card also has one LC-PC-II optical connector for the main output. For the wavelength range, see Table 10-21 on page 10-42.

Figure 10-19 shows the 40-MUX-C card faceplate.

Figure 10-19 40-MUX-C Card Faceplate

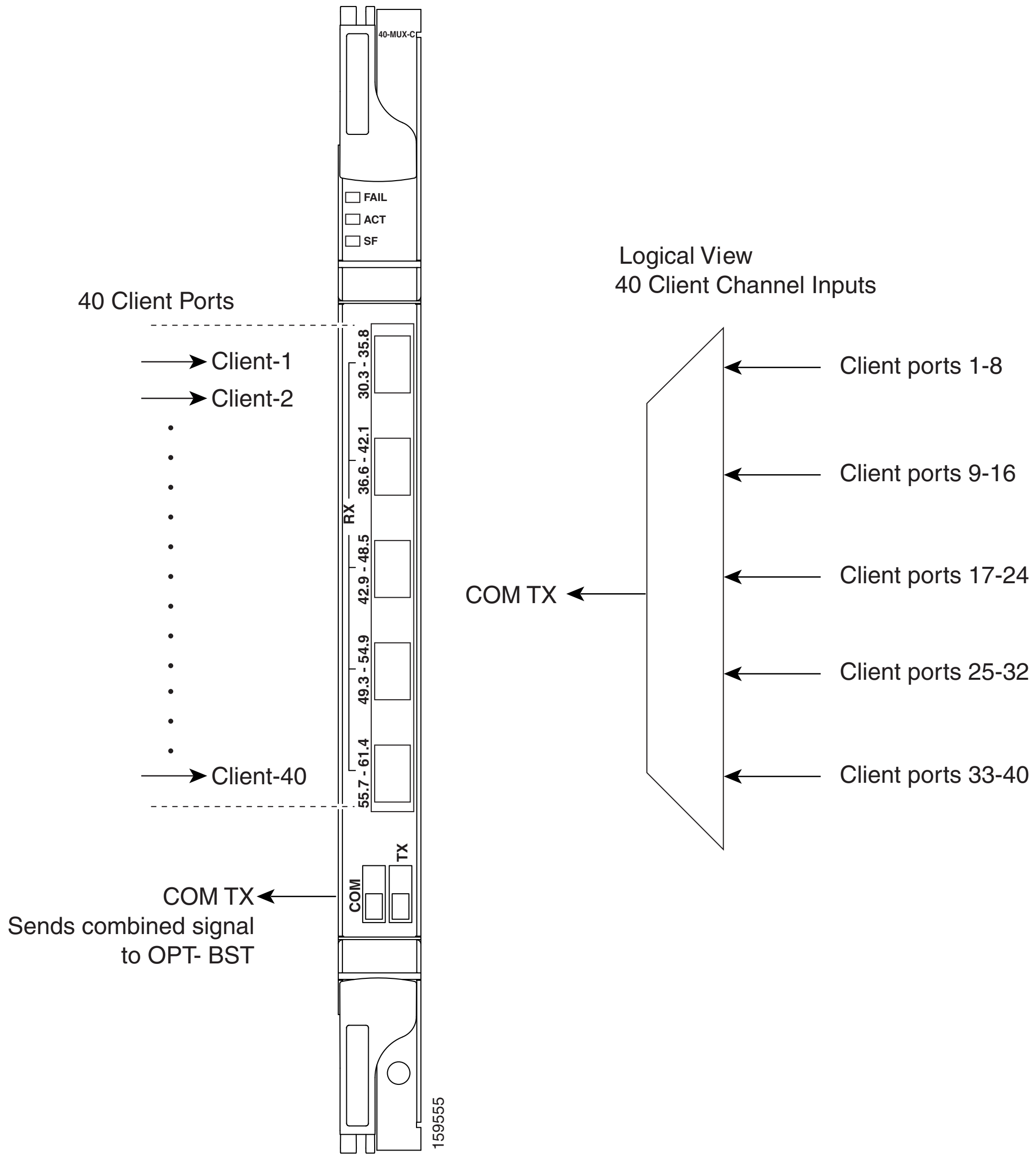


Figure 10-20 shows a block diagram of the 40-MUX-C card.

Figure 10-20 40-MUX-C Card Block Diagram

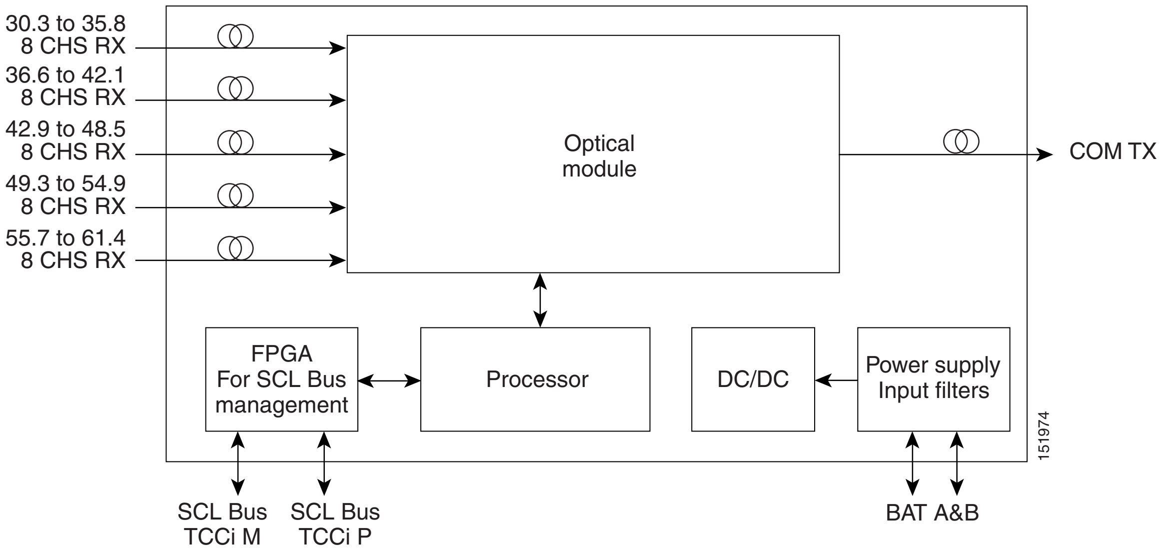
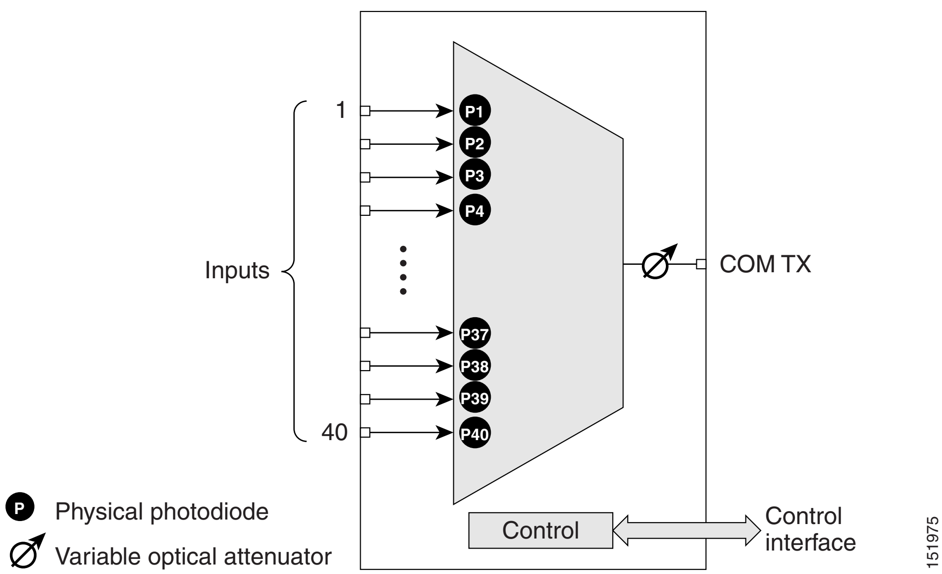


Figure 10-21 shows the 40-MUX-C optical module functional block diagram.

Figure 10-21 40-MUX-C Optical Module Functional Block Diagram



10.9.2 40-MUX-C Card Power Monitoring

Physical photodiodes P1 through P40 monitor the power of the individual input ports to the 40-MUX-C card. P41 monitors the total multiplexed output power, calibrated to the COM-TX port. Table 10-24 shows the returned power level values calibrated to each port.

Table 10-24 40-MUX-C Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P40	ADD	ADD RX
P41	OUTPUT COM	COM-TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

10.9.3 40-MUX-C Card Channel Plan

Table 10-25 shows the 40 ITU-T 100-GHz-spaced, C-band channels (wavelengths) that are multiplexed by the 40-MUX-C card.

Table 10-25 40-MUX-C Channel Plan

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B30.3	30.3	195.9	1530.33
	31.1	195.8	1531.12
	31.9	195.7	1531.90
	32.6	195.6	1532.68
	33.4	195.5	1533.47
B34.2	34.2	195.4	1534.25
	35.0	195.3	1535.04
	35.8	195.2	1535.82
	36.6	195.1	1536.61
	37.4	195	1537.40
B38.1	38.1	194.9	1538.19
	38.9	194.8	1538.98
	39.7	194.7	1539.77
	40.5	194.6	1540.56
	41.3	194.5	1541.35
B42.1	42.1	194.4	1542.14
	42.9	194.3	1542.94
	43.7	194.2	1543.73
	44.5	194.1	1544.53
	45.3	194	1545.32

Table 10-25 40-MUX-C Channel Plan (continued)

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B46.1	46.1	193.9	1546.12
	46.9	193.8	1546.92
	47.7	193.7	1547.72
	48.5	193.6	1548.51
	49.3	193.5	1549.32
B50.1	50.1	193.4	1550.12
	50.9	193.3	1550.92
	51.7	193.2	1551.72
	52.5	193.1	1552.52
	53.3	193	1553.33
B54.1	54.1	192.9	1554.13
	54.9	192.8	1554.94
	55.7	192.7	1555.75
	56.5	192.6	1556.55
	57.3	192.5	1557.36
B58.1	58.1	192.4	1558.17
	58.9	192.3	1558.98
	59.7	192.2	1559.79
	60.6	192.1	1560.61
	61.4	192	1561.42

10.9.4 40-MUX-C Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.9.5 Related Procedures for 40-MUX-C Card

The following section lists procedures and tasks related to the configuration of the 40-MUX-C card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2

- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds, page 20-54

10.10 40-WSS-C Card

(Cisco ONS 15454 and ONS 15454 M6 only)

Note For 40-WSS-C card specifications, see the "40-WSS-C Card Specifications" section in the Hardware Specifications document.

The double-slot 40-channel Wavelength Selective Switch C-Band (40-WSS-C) card switches 40 ITU-T 100-GHz-spaced channels identified in the channel plan (Table 10-21 on page 10-42) and sends them to dedicated output ports. The 40-WSS-C card is bidirectional and optically passive. The card can be installed in Slots 1 to 6 and 12 to 17

The 40-WSS-C features include:

- Receipt of an aggregate DWDM signal into 40 output optical channels from the Line receive port (EXP RX) in one direction and from the COM-RX port in the other direction.
- Per-channel optical power monitoring using photodiodes.
- Signal splitting in a 70%-to-30% ratio, sent to the 40-DMX-C for dropping signals, then to the other 40-WSS-C card.
- Aggregate DWDM signal monitoring and control through a variable optical attenuator (VOA). In the case of electrical power failure, the VOA is set to its maximum attenuation for safety purposes. A manual VOA setting is also available.

Within the 40-WSS-C card, the first AWG opens the spectrum and each wavelength is directed to one of the ports of a 1x2 optical switch. The same wavelength can be passed through or stopped. If the pass-through wavelength is stopped, a new channel can be added at the ADD port. The card's second AWG multiplexes all of the wavelengths, and the aggregate signal is output through the COM-TX port.

10.10.1 Faceplate and Block Diagrams

The 40-WSS-C has eight types of ports:

- ADD RX ports (1 to 40): These ports are used for adding channels. Each add channel is associated with an individual switch element that selects whether an individual channel is added. Each add port has optical power regulation provided by a VOA. The five connectors on the card faceplate accept MPO cables for the client input interfaces. MPO cables break out into eight separate cables. The 40-WSS-C card also has one LC-PC-II optical connector for the main input.
- COM RX: The COM RX port receives the optical signal from a preamplifier (such as the OPT-PRE) and sends it to the optical splitter.
- COM TX: The COM TX port sends an aggregate optical signal to a booster amplifier card (for example, the OPT-BST card) for transmission outside of the NE.

- EXP RX port: The EXP RX port receives an optical signal from another 40-WSS-C card in the same NE.
- EXP TX: The EXP TX port sends an optical signal to the other 40-WSS-C card within the NE.
- DROP TX port: The DROP TX port sends the split off optical signal that contains drop channels to the 40-DMX-C card, where the channels are further processed and dropped.

Figure 10-22 shows the 40-WSS-C card faceplate.

Figure 10-22 40-WSS-C Faceplate

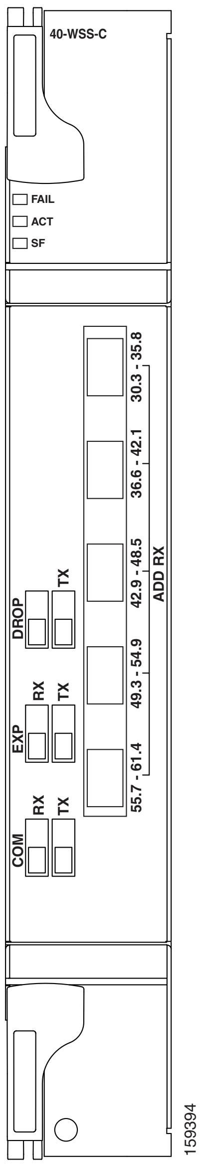
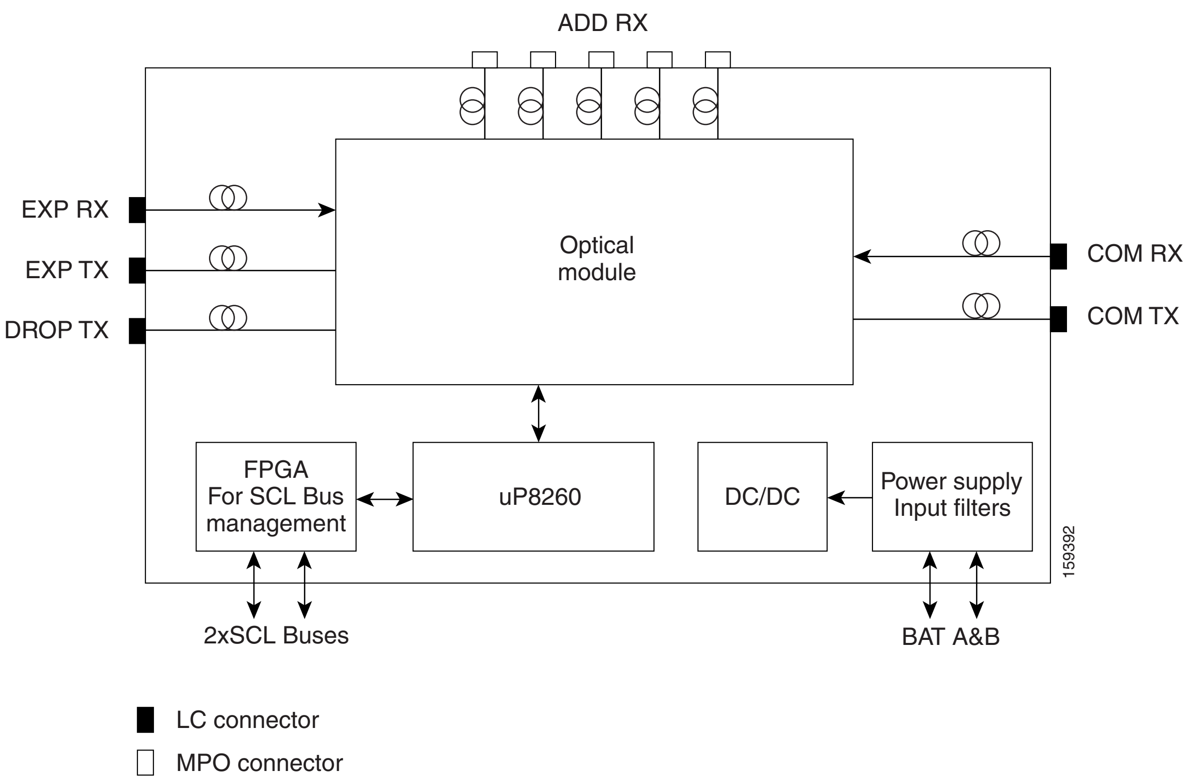


Figure 10-23 shows a block diagram of the 40-WSS-C card.

Figure 10-23 40-WSS-C Block Diagram

Figure 10-24 shows the 40-WSS-C optical module functional block diagram.

Figure 10-24 40-WSS-C Optical Module Functional Block Diagram



10.10.2 40-WSS-C ROADM Functionality

The 40-WSS-C card works in combination with the 40-DMX-C card to implement ROADM functionality. As a ROADM node, the ONS 15454 can be configured at the optical channel level using CTC, Cisco Transport Planner, and CTM. ROADM functionality using the 40-WSS-C card requires two 40-WSS-C double-slot cards and two 40-DMX-C single-slot cards (for a total of six slots in the ONS 15454 chassis).

For information about ROADM functionality for other cards, see that card's description in this chapter. For a diagram of a typical ROADM configuration, see the "12.1.3 ROADM Node" section on page 12-11.

10.10.3 40-WSS-C Power Monitoring

The 40-WSS-C has physical diodes that monitor power at various locations on the card. Table 10-26 lists the physical diode descriptions.

Table 10-26 40-WSS-C Physical Photodiode Port Calibration

Physical Photodiode	CTC Type Name	Calibrated to Port(s)
P1	DROP	DROP TX
P2	EXP	EXP RX
PD*i*3[1]	RX	Add *i* RX ports (that is, channel input Add *i* RX power), up to 40 ports and therefore 40 PDs[1]
PD*i*4[1]	TX	COM TX port (that is, per channel output COM TX power) up to 40 channels and therefore 40 PDs
PD5	COM	COM TX port (that is, total output COM TX power)

1. *i* indicates any channel from 01 through 40.

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

Additionally, the 40-WSS-C has two virtual diodes. Virtual diodes are monitor points for each physical photodiode; they are identified with a physical diode relative to the way that the physical diode is identified with one of the two interlink (ILK) ports. Table 10-27 lists the virtual diodes.

Table 10-27 40-WSS-C Virtual Photodiode Port Calibration

Virtual Photodiode	CTC Type Name	Calibrated to Port(s)
VPD1	COM	COM RX port (total input COM RX power)
VPD2	EXP	EXP TX port (total output EXP TX power)

10.10.4 40-WSS-C Channel Plan

Table 10-28 shows the 40 ITU-T 100-GHz-spaced, C-band channels (wavelengths) that are switched by the 40-WSS-C card.

Table 10-28 40-WSS-C Channel Plan

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B30.3	30.3	195.9	1530.33
	31.1	195.8	1531.12
	31.9	195.7	1531.90
	32.6	195.6	1532.68
	33.4	195.5	1533.47
B34.2	34.2	195.4	1534.25
	35.0	195.3	1535.04
	35.8	195.2	1535.82
	36.6	195.1	1536.61
	37.4	195	1537.40

Table 10-28 40-WSS-C Channel Plan (continued)

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B38.1	38.1	194.9	1538.19
	38.9	194.8	1538.98
	39.7	194.7	1539.77
	40.5	194.6	1540.56
	41.3	194.5	1541.35
B42.1	42.1	194.4	1542.14
	42.9	194.3	1542.94
	43.7	194.2	1543.73
	44.5	194.1	1544.53
	45.3	194	1545.32
B46.1	46.1	193.9	1546.12
	46.9	193.8	1546.92
	47.7	193.7	1547.72
	48.5	193.6	1548.51
	49.3	193.5	1549.32
B50.1	50.1	193.4	1550.12
	50.9	193.3	1550.92
	51.7	193.2	1551.72
	52.5	193.1	1552.52
	53.3	193	1553.33
B54.1	54.1	192.9	1554.13
	54.9	192.8	1554.94
	55.7	192.7	1555.75
	56.5	192.6	1556.55
	57.3	192.5	1557.36
B58.1	58.1	192.4	1558.17
	58.9	192.3	1558.98
	59.7	192.2	1559.79
	60.6	192.1	1560.61
	61.4	192	1561.42

10.10.5 40-WSS-C Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.10.6 Related Procedures for 40-WSS-C Card

The following section lists procedures and tasks related to the configuration of the 40-WSS-C card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G93 Modify the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Line Settings and PM Thresholds, page 20-65

10.11 40-WSS-CE Card

(Cisco ONS 15454 and ONS 15454 M6 only)

Note For 40-WSS-CE card specifications, see the "40-WSS-CE Card Specifications" section in the Hardware Specifications document.

The double-slot 40-channel Wavelength Selective Switch Even-Channel C-Band (40-WSS-CE) card switches 40 ITU-T 100-GHz-spaced channels identified in the channel plan (Table 10-31 on page 10-65) and sends them to dedicated output ports. The 40-WSS-CE card is bidirectional and optically passive. The card can be installed in Slots 1 to 6 and 12 to 17.

The 40-WSS-CE features include:

- Receipt of an aggregate DWDM signal into 40 output optical channels from the Line receive port (EXP RX) in one direction and from the COM-RX port in the other direction.
- Per-channel optical power monitoring using photodiodes.
- Signal splitting in a 70-to-30 percent ratio, sent to the 40-DMX-CE card for dropping signals, then to the other 40-WSS-CE card.
- Aggregate DWDM signal monitoring and control through a VOA. In the case of electrical power failure, the VOA is set to its maximum attenuation for safety purposes. A manual VOA setting is also available.

Within the 40-WSS-CE card, the first AWG opens the spectrum and each wavelength is directed to one of the ports of a 1x2 optical switch. The same wavelength can be passed through or stopped. If the pass-through wavelength is stopped, a new channel can be added at the ADD port. The card's second AWG multiplexes all of the wavelengths, and the aggregate signal is output through the COM-TX port.

10.11.1 Faceplate and Block Diagrams

The 40-WSS-CE card has eight types of ports:

- ADD RX ports (1 to 40): These ports are used for adding channels. Each add channel is associated with an individual switch element that selects whether an individual channel is added. Each add port has optical power regulation provided by a VOA. The five connectors on the card faceplate accept MPO cables for the client input interfaces. MPO cables break out into eight separate cables. The 40-WSS-CE card also has one LC-PC-II optical connector for the main input.
- COM RX: The COM RX port receives the optical signal from a preamplifier (such as the OPT-PRE) and sends it to the optical splitter.
- COM TX: The COM TX port sends an aggregate optical signal to a booster amplifier card (for example, the OPT-BST card) for transmission outside of the NE.
- EXP RX port: The EXP RX port receives an optical signal from another 40-WSS-CE card in the same NE.
- EXP TX: The EXP TX port sends an optical signal to the other 40-WSS-CE card within the NE.
- DROP TX port: The DROP TX port sends the split off optical signal that contains drop channels to the 40-DMX-C card, where the channels are further processed and dropped.

Figure 10-25 shows the 40-WSS-CE card faceplate.

Figure 10-25 40-WSS-CE Faceplate

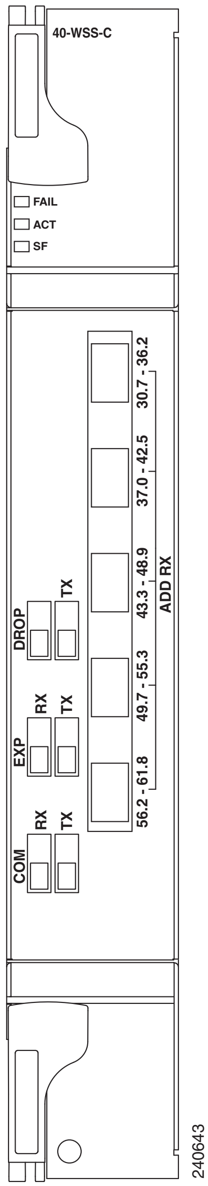
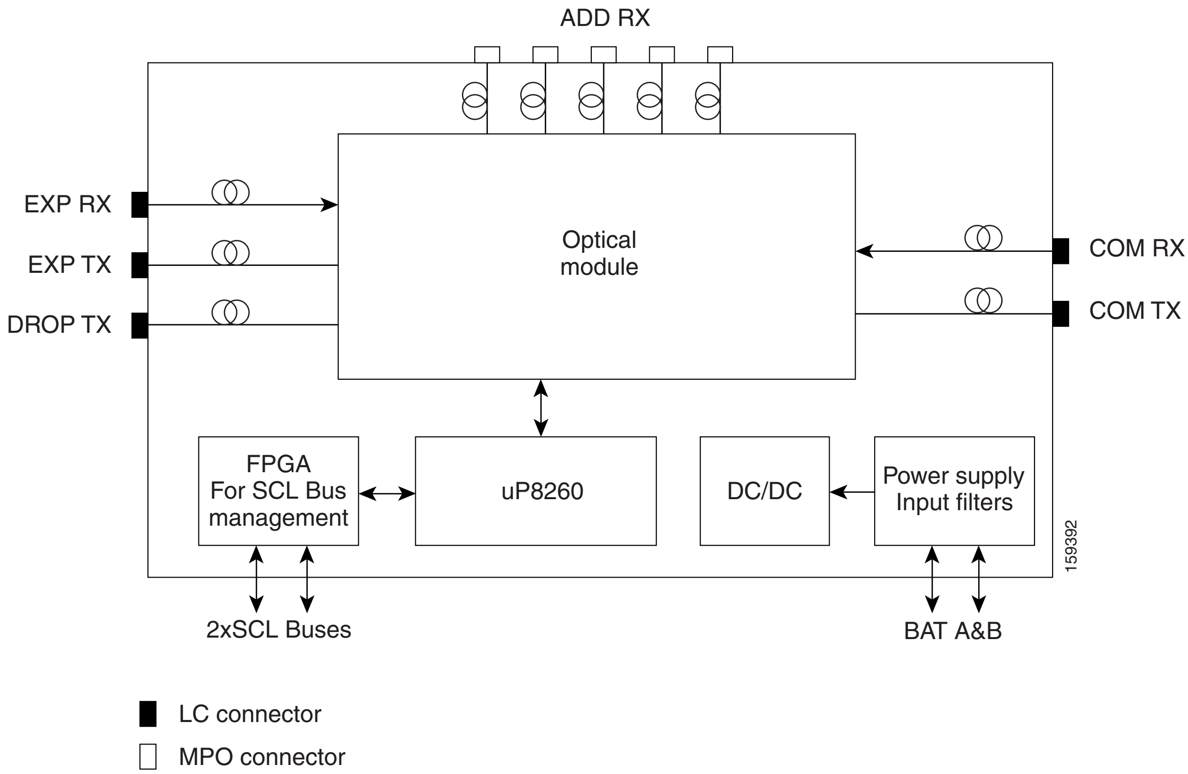


Figure 10-26 shows a block diagram of the 40-WSS-CE card.

Figure 10-26 40-WSS-CE Block Diagram

Figure 10-27 shows the 40-WSS-CE optical module functional block diagram.

Figure 10-27 40-WSS-CE Card Optical Module Functional Block Diagram



10.11.2 40-WSS-CE Card ROADM Functionality

The 40-WSS-CE card works in combination with the 40-DMX-CE card to implement ROADM functionality. As a ROADM node, the ONS 15454 can be configured at the optical channel level using CTC, Cisco Transport Planner, and CTM. ROADM functionality using the 40-WSS-CE card requires two 40-WSS-CE double-slot cards and two 40-DMX-CE single-slot cards (for a total of six slots in the ONS 15454 chassis).

For information about ROADM functionality for another cards, see the description of that card in this chapter. For a diagram of a typical ROADM configuration, see the "12.1.3 ROADM Node" section on page 12-11.

10.11.3 40-WSS-CE Card Power Monitoring

The 40-WSS-CE card has physical diodes that monitor power at various locations on the card. Table 10-29 lists the physical diode descriptions.

Table 10-29 40-WSS-CE Physical Photodiode Port Calibration

Physical Photodiode	CTC Type Name	Calibrated to Port(s)
P1	DROP	DROP TX
P2	EXP	EXP RX
PD*i*3[1]	RX	Add *i* RX ports (that is, channel input Add *i* RX power), up to 40 ports and therefore 40 PDs[1]
PD*i*4[1]	TX	COM TX port (that is, per channel output COM TX power) up to 40 channels and therefore 40 PDs
PD5	COM	COM TX port (that is, total output COM TX power)

1. *i* indicates any channel from 01 through 40.

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

Additionally, the 40-WSS-CE card has two virtual diodes. Virtual diodes are monitor points for each physical photodiode; they are identified with a physical diode relative to the way that the physical diode is identified with one of the two interlink (ILK) ports. Table 10-30 lists the virtual diodes.

Table 10-30 40-WSS-CE Virtual Photodiode Port Calibration

Virtual Photodiode	CTC Type Name	Calibrated to Port(s)
VPD1	COM	COM RX port (total input COM RX power)
VPD2	EXP	EXP TX port (total output EXP TX power)

10.11.4 40-WSS-CE Card Channel Plan

Table 10-31 shows the 40 ITU-T 100-GHz-spaced, C-band channels (wavelengths) that are switched by the 40-WSS-CE card.

Table 10-31 40-WSS-CE Channel Plan

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B30.7	30.7	195.85	1530.72
	31.5	195.75	1531.51
	32.3	195.65	1532.29
	33.1	195.55	1533.07
	33.9	195.45	1533.86
B34.6	34.6	195.35	1534.64
	35.4	195.25	1535.43
	36.2	195.15	1536.22
	37.0	195.05	1537.00
	37.8	194.95	1537.79

Table 10-31 40-WSS-CE Channel Plan (continued)

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B38.6	38.6	194.85	1538.58
	39.4	194.75	1539.37
	40.1	194.65	1540.16
	40.9	194.55	1540.95
	41.8	194.45	1541.75
B42.5	42.5	194.35	1542.54
	43.3	194.25	1543.33
	44.1	194.15	1544.13
	44.9	194.05	1544.92
	45.7	193.95	1545.72
B46.5	46.5	193.85	1546.52
	47.3	193.75	1547.32
	48.1	193.65	1548.11
	48.9	193.55	1548.91
	49.7	193.45	1549.72
B50.5	50.5	193.35	1550.52
	51.3	193.25	1551.32
	52.1	193.15	1552.12
	52.9	193.05	1552.93
	53.7	192.95	1553.73
B54.4	54.4	192.85	1554.54
	55.3	192.75	1555.34
	56.1	192.65	1556.15
	56.9	192.55	1556.96
	57.8	192.45	1557.77
B58.6	58.6	192.35	1558.58
	59.4	192.25	1559.39
	60.2	192.15	1560.20
	61.0	192.05	1561.01
	61.8	191.95	1561.83

10.11.5 40-WSS-CE Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.11.6 Related Procedures for 40-WSS-CE Card

The following section lists procedures and tasks related to the configuration of the 40-WSS-CE card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G93 Modify the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Line Settings and PM Thresholds, page 20-65

10.12 40-WXC-C Card

(Cisco ONS 15454 and ONS 15454 M6 only)

Note For 40-WXC-C card specifications, see the "40-WXC-C Card Specifications" section in the Hardware Specifications document.

The double-slot 40-channel Wavelength Cross-Connect C-band (40-WXC-C) card selectively sends any wavelength combination coming from nine input ports to a common output port. The device can manage up to 41 channels spaced at 100GHz on each port according to the channel grid in Table 10-10 on page 10-13. Each channel can be selected from any input. The card is optically passive and provides bidirectional capability. It can be installed in Slots 1 to 6 and 12 to 17.

.The 40-WXC-C card provides the following features:

- Demultiplexing, selection, and multiplexing of DWDM aggregate signal from input ports to common output port.
- Aggregate DWDM signal monitoring and control through a VOA.
- VOAs are deployed in every channel path in order to regulate the channel's optical power. In the case of an electrical power failure, VOAs are set to their maximum attenuation value, or to a fixed and configurable one. The VOA can also be set manually.
- Per-channel optical power monitoring using photodiodes.

The 40-WXC-C card acts as a selector element with the following characteristics:

- It is able to select a wavelength from one input port and pass the wavelength through to the common out port. Simultaneously, the card can block the same wavelength coming from the other eight input ports.
- It is able to stop wavelengths from all nine inputs.
- It is able to monitor optical power and control path attenuation using per channel VOA independently of the wavelength input-to-out port connection.

10.12.1 Faceplate and Block Diagram

The 40-WXC-C card has six types of ports:

- COM RX: The COM RX port receives the optical signal from a preamplifier (such as the OPT-PRE) and sends it to the optical splitter.
- COM TX: The COM TX port sends an aggregate optical signal to a booster amplifier card (for example, the OPT-BST card) for transmission outside of the NE.
- EXP TX: The EXP TX port sends an optical signal to the other 40-WXC-C card within the NE.
- MON TX: The optical service channel (OSC) monitor.
- ADD/DROP RX: The 40-WXC-C card provides 40 input optical channels. For the wavelength range, see Table 10-34 on page 10-72.
- ADD/DROP TX: The DROP TX port sends the split off optical signal that contains drop channels to the 40-WXC-C card, where the channels are further processed and dropped.

Figure 10-28 shows the 40-WXC-C card faceplate.

Figure 10-28 40-WXC-C Faceplate

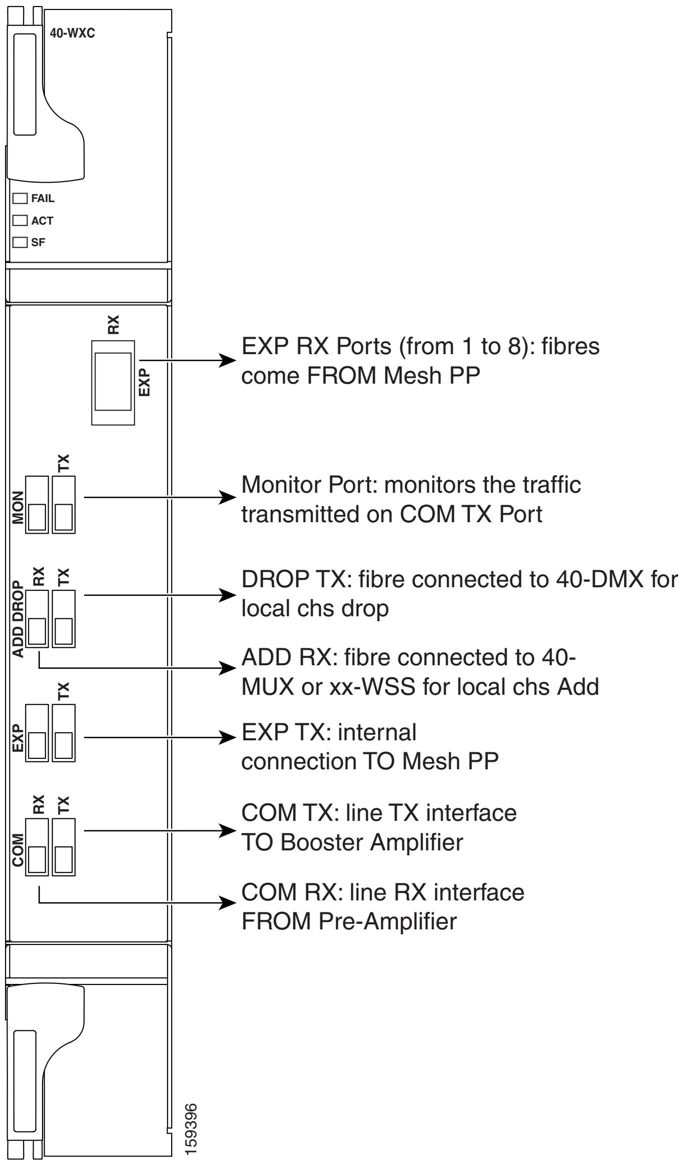
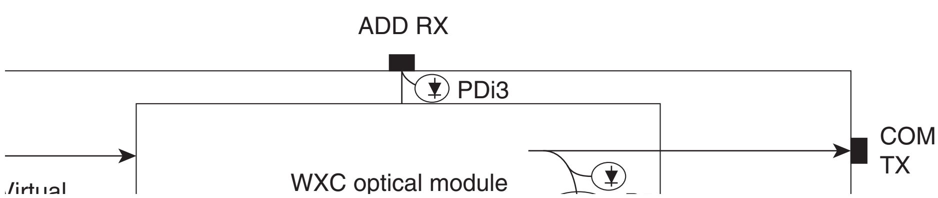


Figure 10-29 shows the 40-WXC-C optical module functional block diagram.

Figure 10-29 40-WXC-C Optical Module Functional Block Diagram



10.12.2 40-WXC-C Power Monitoring

The 40-WXC-C has 83 physical diodes (P1 through P40) that monitor power at the outputs of the card. Table 10-32 describes the physical diodes.

Table 10-32 40-WXC-C Physical Photodiode Port Calibration

Physical Photodiode	CTC Type Name	Calibrated to Port(s)
P1	DROP	DROP TX
P2	EXP	EXP RX
PD*i*3[1]	RX	Add *i* RX ports (that is, channel input Add *i* RX power), up to 40 ports and therefore 40 PDs[1]
PD*i*4[1]	TX	COM TX port (that is, per channel output COM TX power) up to 40 channels and therefore 40 PDs
PD5	COM	COM TX port (that is, total output COM TX power)

1. *i* indicates any channel from 01 through 40.

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

Additionally, the 40-WXC-C has two virtual diodes. Virtual diodes are monitor points for each physical photodiode; they are identified with a physical diode relative to the way that the physical diode is identified with one of the two interlink (ILK) ports. Table 10-33 lists the virtual diodes.

Table 10-33 40-WXC-C Virtual Photodiode Port Calibration

Virtual Photodiode	CTC Type Name	Calibrated to Port(s)
VPD1	COM	COM RX port (total input COM RX power)
VPD2	EXP	EXP TX port (total output EXP TX power)

The usage of WXC and mesh PP power readings to troubleshoot a LOS-P in WXC COM TX port in Side A is described in the following example. The example is explained assuming a single wavelength 1558.17 in the setup that comes from Side H to Side A. If there is more than one wavelength, then there is a risk of dropping traffic when pulling common fibers. The example is explained below:

When the wavelength from side H is 1558.17, you can check the power reading at WXC EXP TX port of the WXC card and verify the consistency with side H pre output power and WXC COMRX-EXPTX port loss. You can also check with a power meter connected to the 8th fiber (since it is from side H) of an MPO-FC (or LC) cable connected to the TAP-TX port of the MESH-PP. This value should be consistent with the previous reading, less than the insertion loss of the installed PP-MESH. If it is consistent, the issue is with the MPO between side A WXC and PP-MESH. If it is not consistent, the issue is with the PP-MESH or the LC-LC from side H. With only the PP-MESH already tested during installation, the only issue can be with the patch cord b.

You can check if the 1558.17 wavelength from side H is unequalized (that is, if the channel is not aligned with the linear fit of the power values of the other channels) by keeping the DMX COM-RX port of side H in maintenance, and checking both the signal and ASE levels of CHAN-TX ports of the DMX card. If the channel is equalized (that is, if the channel is aligned with the linear fit of the power values of the other channels), then the issue is in the WXC side A that cannot properly regulate the VOA for such channel. If the channel is unequalized, then the issue is on a remote node.

Note With an OSA or a spare 40 DMX, you can see the light coming from all the sides from TAP-TX of the PP-MESH.

10.12.3 40-WXC-C Channel Plan

Table 10-34 shows the 40 ITU-T 100-GHz-spaced, C-band channels (wavelengths) that are cross connected by the 40-WXC-C card.

Table 10-34 40-WXC-C Channel Plan

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
Ch. 0[1]	29.5	196	1529.55
B30.3	30.3	195.9	1530.33
	31.1	195.8	1531.12
	31.9	195.7	1531.90
	32.6	195.6	1532.68
	33.4	195.5	1533.47
B34.2	34.2	195.4	1534.25
	35.0	195.3	1535.04
	35.8	195.2	1535.82
	36.6	195.1	1536.61
	37.4	195	1537.40
B38.1	38.1	194.9	1538.19
	38.9	194.8	1538.98
	39.7	194.7	1539.77
	40.5	194.6	1540.56
	41.3	194.5	1541.35
B42.1	42.1	194.4	1542.14
	42.9	194.3	1542.94
	43.7	194.2	1543.73
	44.5	194.1	1544.53
	45.3	194	1545.32
B46.1	46.1	193.9	1546.12
	46.9	193.8	1546.92
	47.7	193.7	1547.72
	48.5	193.6	1548.51
	49.3	193.5	1549.32
B50.1	50.1	193.4	1550.12
	50.9	193.3	1550.92
	51.7	193.2	1551.72
	52.5	193.1	1552.52
	53.3	193	1553.33

Table 10-34 40-WXC-C Channel Plan (continued)

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B54.1	54.1	192.9	1554.13
	54.9	192.8	1554.94
	55.7	192.7	1555.75
	56.5	192.6	1556.55
	57.3	192.5	1557.36
B58.1	58.1	192.4	1558.17
	58.9	192.3	1558.98
	59.7	192.2	1559.79
	60.6	192.1	1560.61
	61.4	192	1561.42

1. This channel is unused by the 40-WXC-C

10.12.4 40-WXC-C Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.12.5 Related Procedures for 40-WXC-C Card

The following section lists procedures and tasks related to the configuration of the 40-WXC-C card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G185 Install Fiber-Optic Cables between Mesh Nodes, page 14-101
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G174 Modify the 40-WXC-C or 80-WXC-C Line Settings and PM Thresholds, page 20-79

10.13 80-WXC-C Card

(Cisco ONS 15454 and ONS 15454 M6 only)

Note For 80-WXC-C card specifications, see the "80-WXC-C Card Specifications" section in the Hardware Specifications document.

The double-slot 80-channel Wavelength Cross-Connect C-band (80-WXC-C) card manages up to 80 ITU-T 100-GHz-spaced channels identified in the channel plan (Table 10-10 on page 10-13) and sends them to dedicated output ports. Each channel can be selected from any input port to any output port. The card is optically passive, and provides bidirectional capability. It can be installed in Slots 1 to 5 and 12 to 16 the ONS 15454 chassis and Slots 2 to 6 in the ONS 15454 M6 chassis.

The 80-WXC-C card provides the following functionalities:

- When used in the multiplexer or bidirectional mode, the 80-WXC-C card allows selection of a single wavelength or any combination of wavelengths from any of the nine input ports to the common output port.
- When used in the bidirectional mode, the output wavelength from the COM-RX port is split to manage the express and drop wavelengths.
- When used in the demultiplexer mode, the 80-WXC-C card, allows selection of a single wavelength or a combination of wavelengths from the common input port to any of the nine output ports.
- Automatic VOA shutdown (AVS) blocking state on each wavelength and port.
- Per-channel (closed loop) power regulation on the output port based on OCM block feedback.
- Per-channel (open loop) attenuation regulation on the output port which is not based on the OCM feedback.

The OCM unit provides per-channel optical power monitoring on the following ports:

- COM port in output direction
- COM port in input direction
- DROP-TX port in output direction
- Eight Express/Add/Drop (EAD) ports and one Add/Drop (AD) port in both input and output directions

10.13.1 Faceplate and Block Diagram

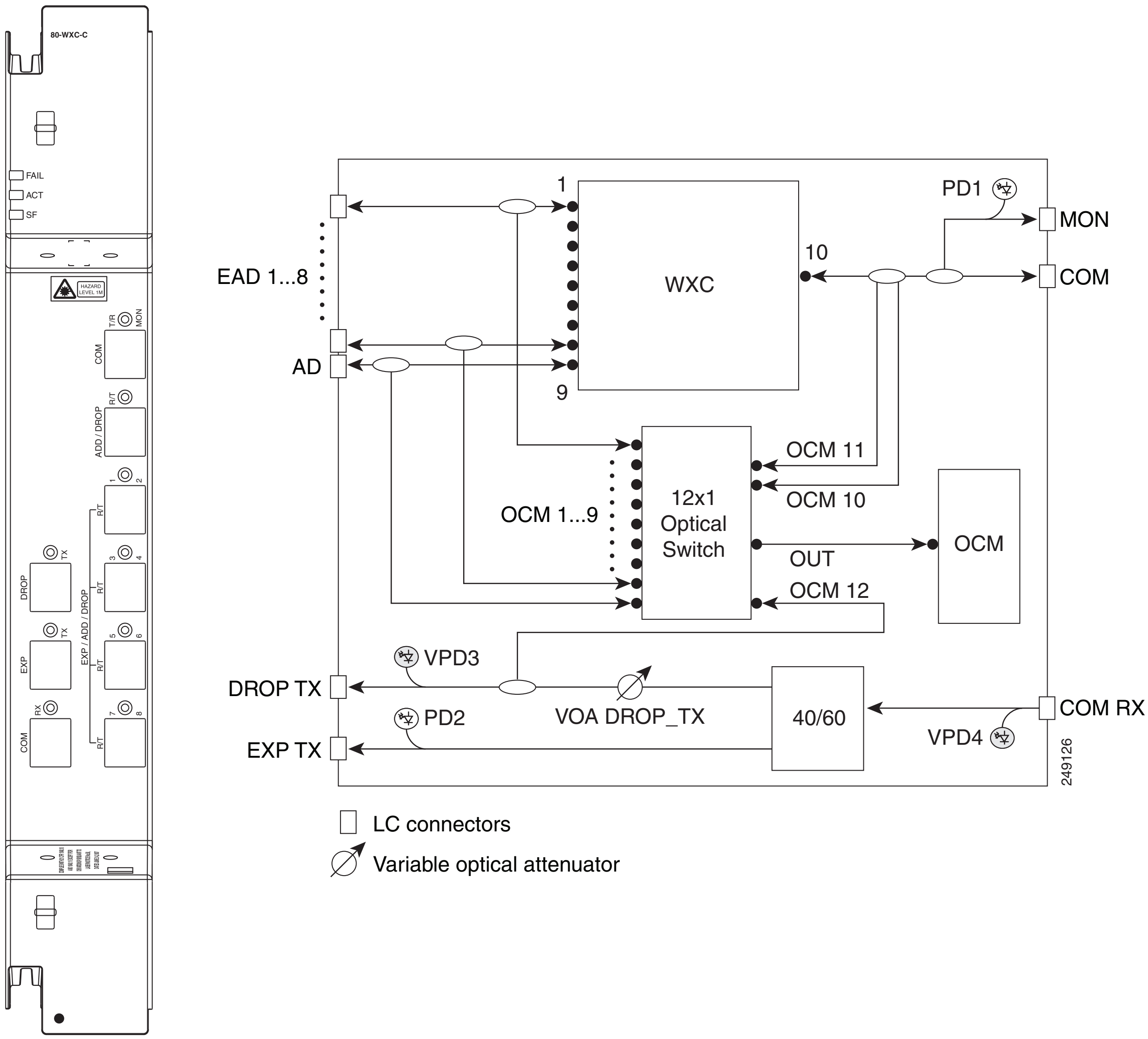
The 80-WXC-C card has 14 types of ports:

- MON: The MON port monitors power on the COM T/R port.
- COM RX: The COM RX port receives the optical signal from a preamplifier (such as the OPT-PRE) and sends it to the optical splitter.
- DROP TX: In the bidirectional mode, the DROP TX port sends the optical signal to the demultiplexer.
- EXP TX: The EXP TX port sends the split off optical signal that contains pass-through channels to the other side of the NE.
- COM T/R: The COM port is bidirectional. It functions as a COM TX port in the multiplexer mode and as a COM RX port in the demultiplexer mode.
- AD T/R: The AD port functions as ADD RX port in bidirectional and multiplexer modes and as a DROP port in the demultiplexer mode.

- EAD T/R *i* (where i = 1 to 8): The EAD ports function as EXP ports in the bidirectional mode, as ADD ports in the multiplexer mode, and as DROP ports in the demultiplexer mode.

Figure 10-30 shows the 80-WXC-C card faceplate and the optical module functional block diagram.

Figure 10-30 80-WXC-C Faceplate and the Optical Module Functional Block Diagram



The different units of the 80-WXC-C card are:

- 40/60 splitter with VOA on drop path—The preamplifier output signal from the preamplifier is split in a 40%-to-60% ratio; 40% is sent on the drop path (DROP-TX port) and 60% is sent on the pass-through path (EXP-TX port). The VOA equipped on the drop path is used to match the power range of the receiver photodiode without the need for bulk attenuation. If a channel is expected to be dropped in the 80-WXC-C card, the pass-through channel is stopped after the EXP-TX port either by a 40-WSS-C or a 40-WXC-C card.
- 50 Ghz 10 port WXC—The WXC block is optically passive and has bidirectional capability. The WXC block can selectively send any wavelength combination coming from the eight input EAD ports and one AD port to a common (COM) output port, when used as a multiplexer, whereas it can selectively send any wavelength combination coming from its common (COM) input port to any of the eight output EAD ports and one AD port, when used as a demultiplexer. The WXC block can manage (on each port) up to 80 channels according to the channel grid reported in Table 10-37. Each channel can be selected from any input and routed to any output.
- 50 Ghz Optical Channel Monitor (OCM)—The OCM provides per channel power monitoring on the COM T/R, DROP-TX, AD, and EAD*i* (*i*=1 to 8) ports. The power value for each wavelength is refreshed after a variable timer depending on the port and card activity.

10.13.2 80-WXC-C Power Monitoring

The 80-WXC-C has two physical photodiodes and an OCM unit that monitors power at the different ports of the card. Table 10-35 describes the physical photodiodes.

Table 10-35 80-WXC-C Port Calibration

Physical Photodiode	CTC Type Name	Calibrated to Port(s)
PD1	COM Total Power	COM
PD2	EXP-TX Total Power	EXP-TX
OCM1	EAD 1 Per-Channel and Total Power	EAD-1
OCM2	EAD 2 Per-Channel and Total Power	EAD-2
OCM3	EAD 3 Per-Channel and Total Power	EAD-3
OCM4	EAD 4 Per-Channel and Total Power	EAD-4
OCM5	EAD 5 Per-Channel and Total Power	EAD-5
OCM6	EAD 6 Per-Channel and Total Power	EAD-6
OCM7	EAD 7 Per-Channel and Total Power	EAD-7
OCM8	EAD 8 Per-Channel and Total Power	EAD-8
OCM9	AD Per-Channel and Total Power	AD
OCM10	Output Per-Channel and Total Power	COM
OCM11	Input Per-Channel and Total Power	COM
OCM12	Drop Per-Channel and Total Power	DROP-TX

For information on the associated TL1 AIDs for the optical power monitoring points, see the “CTC Port Numbers and TL1 Aids” section in the *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

Additionally, the 80-WXC-C has two virtual photodiodes. Table 10-36 lists the virtual photodiodes.

Table 10-36 80-WXC-C Virtual Photodiode Port Calibration

Virtual Photodiode	CTC Type Name	Calibrated to Port(s)
VPD3	DROP-TX Total Power	DROP-TX
VPD4	COM-RX Total Power	COM-RX

10.13.3 80-WXC-C Channel Plan

Table 10-37 shows the 80 ITU-T 50-GHz-spaced, C-band channels (wavelengths) that are cross connected by the 80-WXC-C card.

Table 10-37 80-WXC-C Channel Plan

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
Ch. 0[1]	-	196	1529.55
30.3	30.3	195.9	1530.33
	30.7	195.85	1530.72
	31.1	195.8	1531.12
	31.5	195.75	1531.51
	31.9	195.7	1531.90
	32.3	195.65	1532.29
	32.7	195.6	1532.68
	33.1	195.55	1533.07
	33.5	195.5	1533.47
	33.9	195.45	1533.86
34.3	34.3	195.4	1534.25
	34.6	195.35	1534.64
	35.0	195.3	1535.04
	35.4	195.25	1535.43
	35.8	195.2	1535.82
	36.2	195.15	1536.22
	36.6	195.1	1536.61
	37.0	195.05	1537
	37.4	195	1537.40
	37.8	194.95	1537.79

Table 10-37 80-WXC-C Channel Plan (continued)

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
38.2	38.2	194.9	1538.19
	38.6	194.85	1538.58
	39.0	194.8	1538.98
	39.4	194.75	1539.37
	39.8	194.7	1539.77
	40.2	194.65	1540.16
	40.6	194.6	1540.56
	41.0	194.55	1540.95
	41.3	194.5	1541.35
	41.7	194.45	1541.75
42.1	42.1	194.4	1542.14
	42.5	194.35	1542.94
	42.9	194.3	1542.94
	43.3	194.25	1543.33
	43.7	194.2	1543.73
	44.1	194.15	1544.13
	44.5	194.1	1544.53
	44.9	194.05	1544.92
	45.3	194	1545.32
	45.7	193.95	1545.72
46.1	46.1	193.9	1546.12
	46.5	193.85	1546.52
	46.9	193.8	1546.92
	47.3	193.75	1547.32
	47.7	193.7	1547.72
	48.1	193.65	1548.11
	48.5	193.6	1548.51
	48.9	193.55	1548.91
	49.3	193.5	1549.32
	49.7	193.45	1549.72

Table 10-37 80-WXC-C Channel Plan (continued)

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
50.1	50.1	193.4	1550.12
	50.5	193.35	1550.52
	50.9	193.3	1550.92
	51.3	193.25	1551.32
	51.7	193.2	1551.72
	52.1	193.15	1552.12
	52.5	193.1	1552.52
	52.9	193.05	1552.93
	53.3	193	1553.33
	53.7	192.95	1553.73
54.1	54.1	192.9	1554.13
	54.5	192.85	1554.54
	54.9	192.8	1554.94
	55.3	192.75	1555.34
	55.7	192.7	1555.75
	56.2	192.65	1556.15
	56.6	192.6	1556.55
	57.0	192.55	1556.96
	57.4	192.5	1557.36
	57.8	192.45	1557.77
58.2	58.2	192.4	1558.17
	58.6	192.35	1558.58
	59.0	192.3	1558.98
	59.4	192.25	1559.39
	59.8	192.2	1559.79
	60.2	192.15	1560.20
	60.6	192.1	1560.61
	61.0	192.05	1561.01
	61.4	192	1561.42
	61.8	191.95	1561.83

1. This channel is unused by the 80-WXC-C

10.13.4 80-WXC-C Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.13.5 Related Procedures for 80-WXC-C Card

The following section lists procedures and tasks related to the configuration of the 80-WXC-C card:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G185 Install Fiber-Optic Cables between Mesh Nodes, page 14-101
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G174 Modify the 40-WXC-C or 80-WXC-C Line Settings and PM Thresholds, page 20-79

10.14 Single Module ROADM (SMR-C) Cards

Note For the 40-SMR1-C or 40-SMR2-C card specifications, see the "40-SMR1-C Card Specifications" or "40-SMR2-C Card Specifications" section in the Hardware Specifications document.

Note For 40-SMR1-C and 40-SMR2-C safety label information, see the "10.2 Safety Labels" section on page 10-15.

The single-slot 40-channel single module ROADM (SMR-C) cards integrate the following functional blocks onto a single line card:

- Optical preamplifier
- Optical booster amplifier
- Optical service channel (OSC) filter
- 2x1 wavelength cross-connect (WXC) or a 4x1 WXC
- Optical channel monitor (OCM)

The SMR-C cards are available in two versions:

- 10.14.2 40-SMR1-C Card
- 10.14.3 40-SMR2-C Card

The SMR-C cards can manage up to 40 channels spaced at 100GHz on each port according to the channel grid in Table 10-10. The cards can be installed in Slots 1 to 6 and 12 to 17.

10.14.1 SMR-C Card Key Features

The optical amplifier units in the SMR-C cards provide the following features:

- Embedded gain flattening filter

- Mid-stage access for dispersion compensation unit (only applicable for preamplifier erbium-doped fiber amplifier [EDFA])
- Fixed output power mode
- Fixed gain mode
- Nondistorting low-frequency transfer function
- Amplified spontaneous emissions (ASE) compensation in fixed gain and fixed output power mode
- Fast transient suppression
- Programmable tilt (only applicable for preamplifier EDFA)
- Full monitoring and alarm handling capability
- Optical safety support through signal loss detection and alarm at any input port, fast power down control, and reduced maximum output power in safe power mode.
- EDFA section calculates the signal power, by taking into account the expected ASE power contribution to the total output power. The signal output power or the signal gain can be used as feedback signals for the EDFA pump power control loop.

The 1x2 WXC unit (40-SMR1-C card) provides the following features:

- Selection of individual wavelength of the aggregated 100GHz signal from either the EXP-RX or ADD-RX ports
- Automatic VOA shutdown (AVS) blocking state on each wavelength and port
- Per-channel power regulation based on external OCM unit
- Open loop path attenuation control for each wavelength and port

The 1x4 WXC unit (40-SMR2-C card) provides the following features:

- Selection of individual wavelength of the aggregated 100GHz signal from either the EXP*i*-RX (where *i* = 1, 2, 3) or ADD-RX ports
- Automatic VOA shutdown (AVS) blocking state on each wavelength and port
- Per-channel power regulation based on external OCM unit
- Open loop path attenuation control for each wavelength and port

The OCM unit provides per channel optical power monitoring at EXP-RX, ADD-RX, DROP-TX, and LINE-TX ports.

10.14.2 40-SMR1-C Card

The 40-SMR1-C card includes a 100Ghz 1x2 WXC unit with integrated preamplifier unit (single EDFA).

10.14.2.1 Faceplate and Block Diagram

The 40-SMR1-C card has the following types of ports:

- MON RX: The MON RX port monitors power on the EXP-TX output port.
- MON TX: The MON TX port monitors power on the LINE-TX output port.
- DC RX: The DC RX port receives the optical signal from the dispersion compensating unit (DCU) and sends it to the second stage preamplifier input.
- DC TX: The DC TX port sends the optical signal from the first stage preamplifier output to the DCU.

- OSC RX: The OSC RX port is the OSC add input port.
- OSC TX: The OSC TX port is the OSC drop output port.
- ADD/DROP RX: The ADD RX port receives the optical signal from the multiplexer section of the NE and sends it to the 1x2 WXC unit.
- ADD/DROP TX: The DROP TX port sends the split off optical signal to the demultiplexer section of the NE.
- LINE RX: The LINE RX port is the input signal port.
- LINE TX: The LINE TX port is the output signal port.
- EXP RX: The EXP RX port receives the optical signal from the other side of the NE and sends it to the 1x2 WXC unit.
- EXP TX: The EXP TX port sends the split off optical signal that contains pass-through channels to the other side of the NE.

Figure 10-31 shows the 40-SMR1-C card faceplate.

Figure 10-31 40-SMR1-C Faceplate

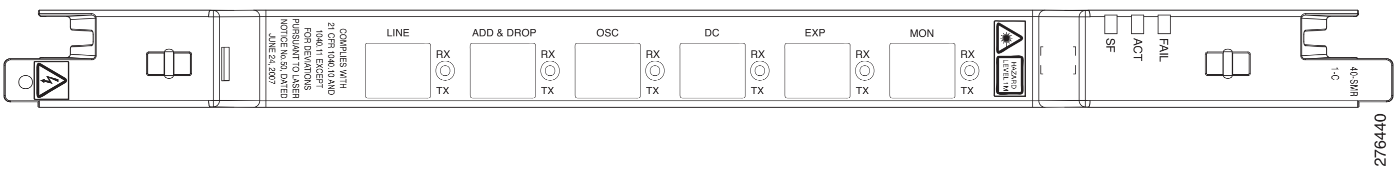
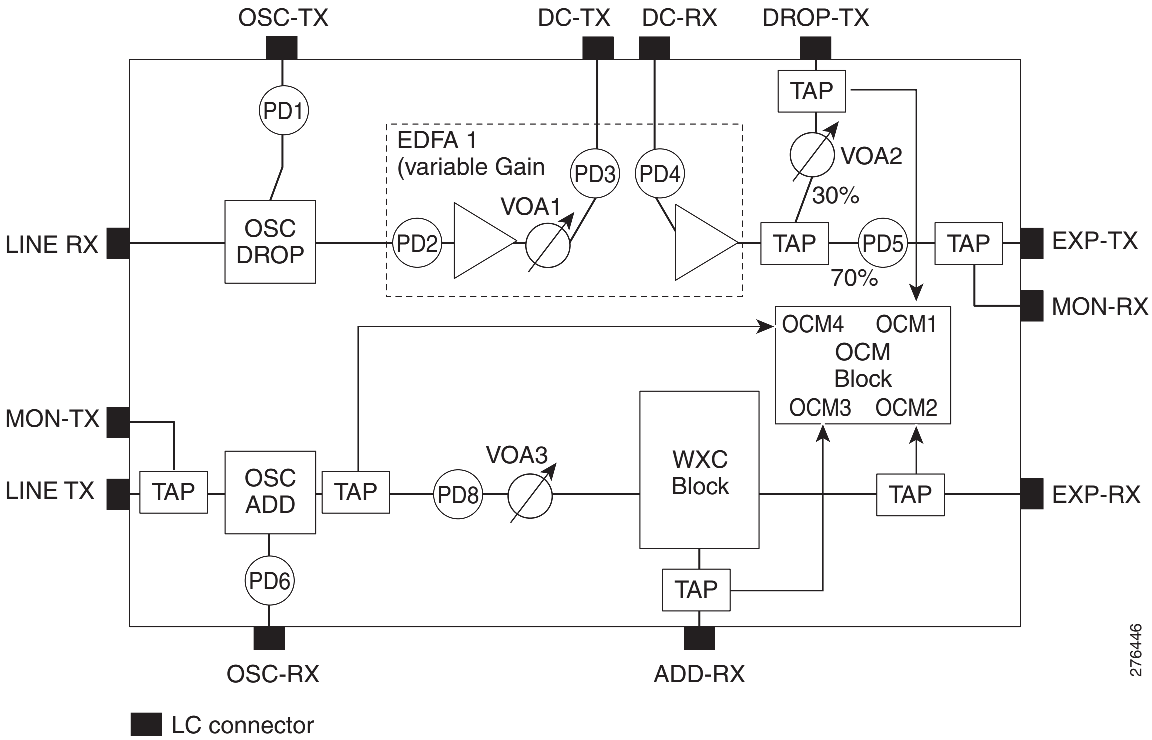


Figure 10-32 shows a block diagram of the 40-SMR1-C card.

Figure 10-32 40-SMR1-C Block Diagram



The different units of the 40-SMR1-C card are:

- OSC filter—The OSC filter allows to add an OSC channel to the C-band in the transmission path and to drop an OSC channel on the receiving path. The OSCM card that is connected to the OSC-TX and OSC-RX ports generates the OSC channel.
- Double-stage variable gain EDFA preamplifier—The double-stage preamplifier allows the insertion of a DCU between the DC-TX and DC-RX ports to compensate for chromatic dispersion. It is also equipped with built-in variable optical attenuator (VOA) and gain flattening filter (GFF) that provides tilt compensation and enables the use of this device over an extended range of span losses (5 dB to 35 dB).
- 70/30 splitter and VOA—The output signal from the preamplifier is split in a 70%-to-30% ratio, 70% is sent on the pass-through path (EXP-TX port) and 30% is sent on the drop path (DROP-TX port). The VOA equipped on the drop path is used to match the power range of the receiver photo diode without the need for bulk attenuation. If a channel is expected to be dropped in the 40-SMR1-C card, the pass-through channel is stopped after the EXP-TX port either by a 40-WSS-C, 40-SMR1-C, or 40-SMR2-C card.
- 1x2 WXC—The 1x2 WXC aggregates on its output port a 100-GHz-spaced optical channel received from either its ADD-RX or EXP-RX port. In addition to the switching function, the 1x2 WXC allows to set a different per channel power for each of the managed wavelengths and also monitor the optical power.
- OCM—The OCM provides per channel power monitoring on the DROP-RX, EXP-RX, ADD-RX, and LINE-TX ports. The power value for each wavelength is refreshed after a variable timer depending on the port and card activity.

10.14.2.2 40-SMR1-C Power Monitoring

The 40-SMR1-C card has seven physical diodes (PD1 through PD6 and PD8) and an OCM unit that monitors power at the input and output ports of the card (see Table 10-38).

Table 10-38 40-SMR1-C Port Calibration

Physical Photodiode	CTC Type Name	Calibrated to Port(s)
PD1	LINE	LINE-RX
PD2	LINE	LINE-RX
PD3	DC	DC-TX
PD4	DC	DC-RX
PD5	EXP	EXP-TX
PD6	OSC	OSC-RX
PD8	LINE	LINE-TX
OCM1	LINE OCH	LINE-TX
OCM2	DROP OCH	DROP-TX
OCM3	ADD OCH	ADD-RX
OCM4	EXP OCH	EXP-RX

10.14.2.3 40-SMR1-C Channel Plan

Table 10-39 shows the 40 ITU-T 100-GHz-spaced, C-band channels (wavelengths) supported by the 40-SMR1-C card.

Table 10-39 40-SMR1-C Channel Plan

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B30.3	30.3	195.9	1530.33
	31.1	195.8	1531.12
	31.9	195.7	1531.90
	32.6	195.6	1532.68
	33.4	195.5	1533.47
B34.2	34.2	195.4	1534.25
	35.0	195.3	1535.04
	35.8	195.2	1535.82
	36.6	195.1	1536.61
	37.4	195	1537.40

Table 10-39 40-SMR1-C Channel Plan (continued)

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B38.1	38.1	194.9	1538.19
	38.9	194.8	1538.98
	39.7	194.7	1539.77
	40.5	194.6	1540.56
	41.3	194.5	1541.35
B42.1	42.1	194.4	1542.14
	42.9	194.3	1542.94
	43.7	194.2	1543.73
	44.5	194.1	1544.53
	45.3	194	1545.32
B46.1	46.1	193.9	1546.12
	46.9	193.8	1546.92
	47.7	193.7	1547.72
	48.5	193.6	1548.51
	49.3	193.5	1549.32
B50.1	50.1	193.4	1550.12
	50.9	193.3	1550.92
	51.7	193.2	1551.72
	52.5	193.1	1552.52
	53.3	193	1553.33
B54.1	54.1	192.9	1554.13
	54.9	192.8	1554.94
	55.7	192.7	1555.75
	56.5	192.6	1556.55
	57.3	192.5	1557.36
B58.1	58.1	192.4	1558.17
	58.9	192.3	1558.98
	59.7	192.2	1559.79
	60.6	192.1	1560.61
	61.4	192	1561.42

10.14.3 40-SMR2-C Card

The 40-SMR2-C card includes a 100Ghz 1x4 WXC unit with integrated preamplifier and booster amplifier units (double EDFA).

10.14.3.1 Faceplate and Block Diagram

The 40-SMR2-C card has the following types of ports:

- MON RX: The MON RX port monitors power on the EXP-TX output port.
- MON TX: The MON TX port monitors power on the LINE-TX output port.
- DC RX: The DC RX port receives the optical signal from the dispersion compensating unit (DCU) and sends it to the second stage preamplifier input.
- DC TX: The DC TX port sends the optical signal from the first stage preamplifier output to the DCU.
- OSC RX: The OSC RX port is the OSC add input port.
- OSC TX: The OSC TX port is the OSC drop output port.
- ADD/DROP RX: The ADD RX port receives the optical signal from the multiplexer section of the NE and sends it to the 1x4 WXC unit.
- ADD/DROP TX: The DROP TX port sends the split off optical signal to the demultiplexer section of the NE.
- LINE RX: The LINE RX port is the input signal port.
- LINE TX: The LINE TX port is the output signal port.
- EXP TX: The EXP TX port sends the split off optical signal that contains pass-through channels to the other side of the NE.
- EXP*i*-RX (where *i* = 1, 2, 3): The EXP*i*-RX port receives the optical signal from the other side of the NE and sends it to the 1x4 WXC unit.

Figure 10-31 shows the 40-SMR2-C card faceplate.

Figure 10-33 40-SMR2-C Faceplate

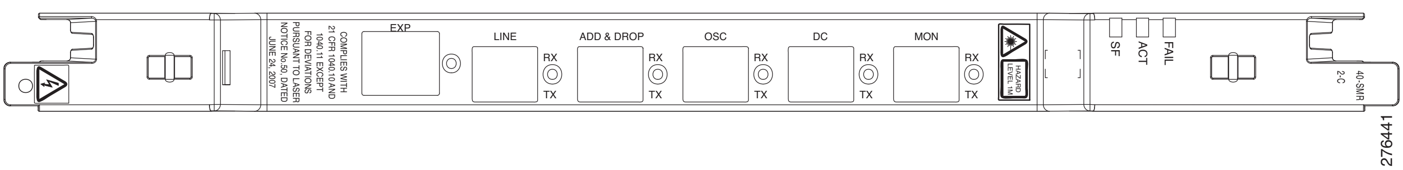
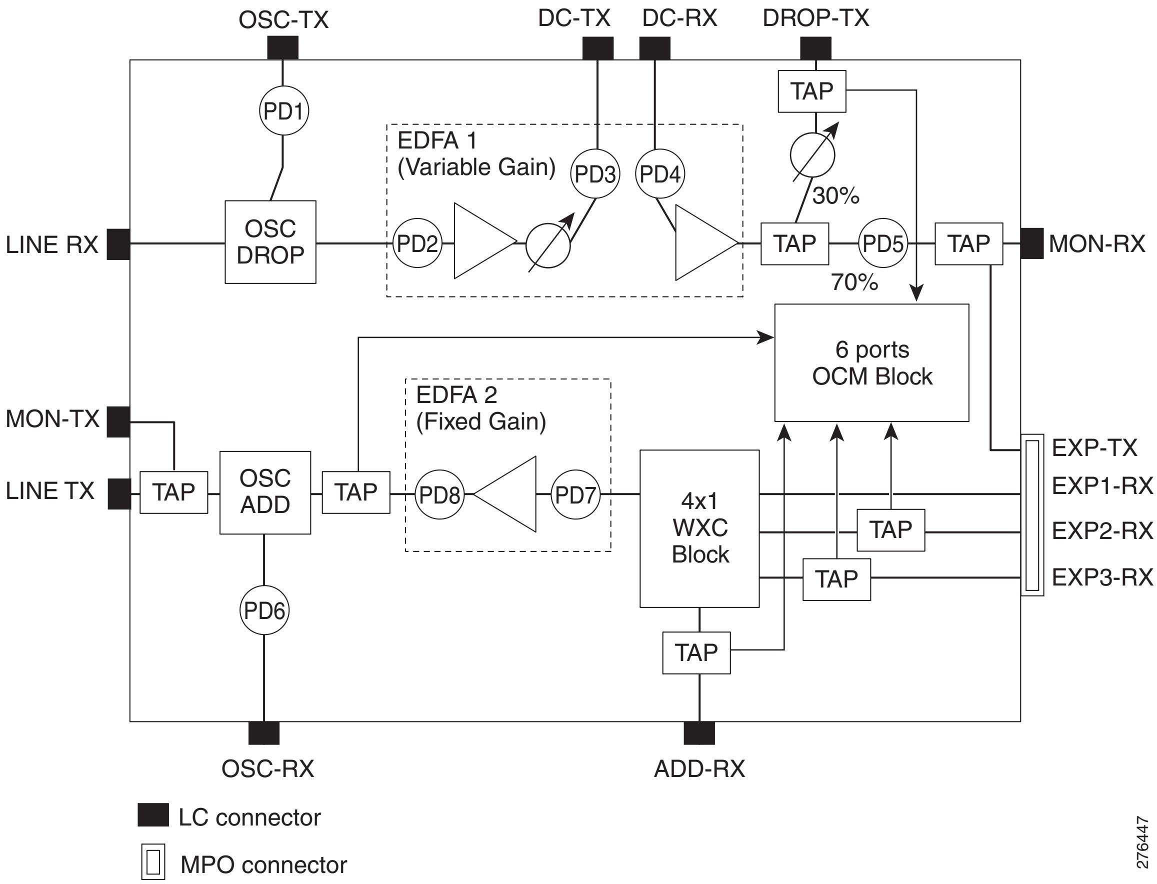


Figure 10-32 shows a block diagram of the 40-SMR2-C card.

Figure 10-34 40-SMR2-C Block Diagram



The different units of the 40-SMR2-C card are:

- OSC filter—The OSC filter allows to add an OSC channel to the C-band in the transmission path and to drop an OSC channel on the receiving path. The OSCM card that is connected to the OSC-TX and OSC-RX ports generates the OSC channel.
- Double-stage variable gain EDFA preamplifier—The double-stage preamplifier allows the insertion of a DCU between the DC-TX and DC-RX ports to compensate for chromatic dispersion. It is also equipped with built-in variable optical attenuator (VOA) and gain flattening filter (GFF) that provides tilt compensation and enables the use of this device over an extended range of span losses (5 dB to 35 dB).
- 70/30 splitter and VOA—The output signal from the preamplifier is split in a 70%-to-30% ratio, 70% is sent on the pass-through path (EXP-TX port) and 30% is sent on the drop path (DROP-TX port). The VOA equipped on the drop path is used to match the power range of the receiver photo diode without the need for bulk attenuation. If a channel is expected to be dropped in the 40-SMR2-C card, the pass-through channel is stopped after the EXP-TX port by a 40-WSS-C, 40-SMR1-C, or 40-SMR2-C card.
- 1x4 WXC—The 1x4 WXC aggregates on its output port a 100-GHz-spaced optical channel received from either its ADD-RX or EXP*i*-RX (where *i* = 1, 2, 3) port. In addition to the switching function, the 1x4 WXC allows to set a different per channel power for each of the managed wavelengths and also monitor the optical power.

- Single-stage fixed gain EDFA booster amplifier—The booster amplifier amplifies the output signal from the 1x4 WXC unit before transmitting it into the fiber. Since it is a fixed gain (17 dB) amplifier, it does not allow gain tilt control.
- OCM—The OCM provides per channel power monitoring on the DROP-RX, EXP*i*-RX (where *i* = 1, 2, 3), ADD-RX, and LINE-TX ports. The power value for each wavelength is refreshed after a variable timer depending on the port and card activity.

10.14.3.2 40-SMR2-C Power Monitoring

The 40-SMR2-C card has eight physical diodes (PD1 through PD8) and an OCM unit that monitors power at the input and output ports of the card (see Table 10-40).

Table 10-40 40-SMR2-C Port Calibration

Physical Photodiode	CTC Type Name	Calibrated to Port(s)
PD1	LINE	LINE-RX
PD2	LINE	LINE-RX
PD3	DC	DC-TX
PD4	DC	DC-RX
PD5	EXP	EXP-TX
PD6	OSC	OSC-RX
PD7	Not reported on CTC	Internal port
PD8	LINE	LINE-TX
OCM1	LINE OCH	LINE-TX
OCM2	DROP OCH	DROP-TX
OCM3	ADD OCH	ADD-RX
OCM4	EXP-1 OCH	EXP1-RX
OCM5	EXP-2 OCH	EXP2-RX
OCM6	EXP-3 OCH	EXP3-RX

10.14.3.3 40-SMR2-C Channel Plan

Table 10-41 shows the 40 ITU-T 100-GHz-spaced, C-band channels (wavelengths) supported by the 40-SMR2-C card.

Table 10-41 40-SMR2-C Channel Plan

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B30.3	30.3	195.9	1530.33
	31.1	195.8	1531.12
	31.9	195.7	1531.90
	32.6	195.6	1532.68
	33.4	195.5	1533.47

Table 10-41 40-SMR2-C Channel Plan (continued)

Band ID	Channel Label	Frequency (GHz)	Wavelength (nm)
B34.2	34.2	195.4	1534.25
	35.0	195.3	1535.04
	35.8	195.2	1535.82
	36.6	195.1	1536.61
	37.4	195	1537.40
B38.1	38.1	194.9	1538.19
	38.9	194.8	1538.98
	39.7	194.7	1539.77
	40.5	194.6	1540.56
	41.3	194.5	1541.35
B42.1	42.1	194.4	1542.14
	42.9	194.3	1542.94
	43.7	194.2	1543.73
	44.5	194.1	1544.53
	45.3	194	1545.32
B46.1	46.1	193.9	1546.12
	46.9	193.8	1546.92
	47.7	193.7	1547.72
	48.5	193.6	1548.51
	49.3	193.5	1549.32
B50.1	50.1	193.4	1550.12
	50.9	193.3	1550.92
	51.7	193.2	1551.72
	52.5	193.1	1552.52
	53.3	193	1553.33
B54.1	54.1	192.9	1554.13
	54.9	192.8	1554.94
	55.7	192.7	1555.75
	56.5	192.6	1556.55
	57.3	192.5	1557.36
B58.1	58.1	192.4	1558.17
	58.9	192.3	1558.98
	59.7	192.2	1559.79
	60.6	192.1	1560.61
	61.4	192	1561.42

10.14.4 40-SMR1-C and 40-SMR2-C Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.14.5 Related Procedures for 40-SMR1-C and 40-SMR2-C Card

The following section lists procedures and tasks related to the configuration of the 40-SMR-1C and 40-SMR-2C cards:

- NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82
- NTP-G185 Install Fiber-Optic Cables between Mesh Nodes, page 14-101
- NTP-G152 Create and Verify Internal Patchcords, page 14-113
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G243 Perform the Two-Degree ROADM Node with 40-SMR-1-C and OPT-AMP-17-C Cards Acceptance Test, page 21-148
- NTP-G244 Perform the Four Degree ROADM Node with 40-SMR-2-C Cards Acceptance Test, page 21-152
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- DLP- G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards
- NTP-G241 Modify the 40-SMR1-C and 40-SMR2-C Line Settings and PM Thresholds, page 20-94

10.15 MMU Card

(Cisco ONS 15454 only)

The single-slot Mesh Multi-Ring Upgrade Module (MMU) card supports multiring and mesh upgrades for ROADM nodes in both the C-band and the L-band. Mesh/multiring upgrade is the capability to optically bypass a given wavelength from one section of the network or ring to another one without requiring 3R regeneration. In each node, you need to install one east MMU and one west MMU. The card can be installed in Slots 1 through 6 and 12 through 17.

Note For MMU card specifications, see the "MMU Card Specifications" section in the Hardware Specifications document.

10.15.1 Faceplate and Block Diagram

The MMU has six types of ports:

- EXP RX port: The EXP RX port receives the optical signal from the ROADM section available on the NE.

- EXP TX port: The EXP TX port sends the optical signal to the ROADM section available on the NE.
- EXP-A RX port: The EXP-A RX port receives the optical signal from the ROADM section available on other NEs or rings.
- EXP-A TX port: The EXP-A TX port sends the optical signal to the ROADM section available on other NEs or rings.
- COM TX port: The COM TX port sends the optical signal to the fiber stage section.
- COM RX port: The COM RX port receives the optical signal from the fiber stage section.

Figure 10-35 shows the MMU card faceplate.

Figure 10-35 MMU Faceplate and Ports

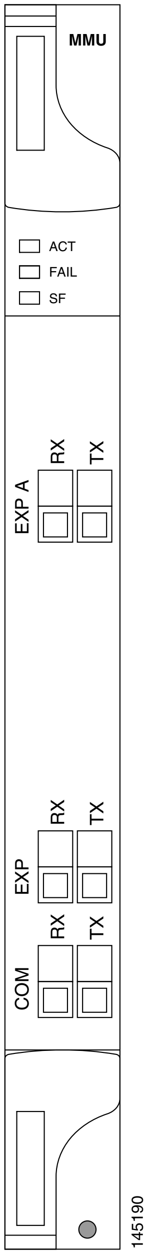
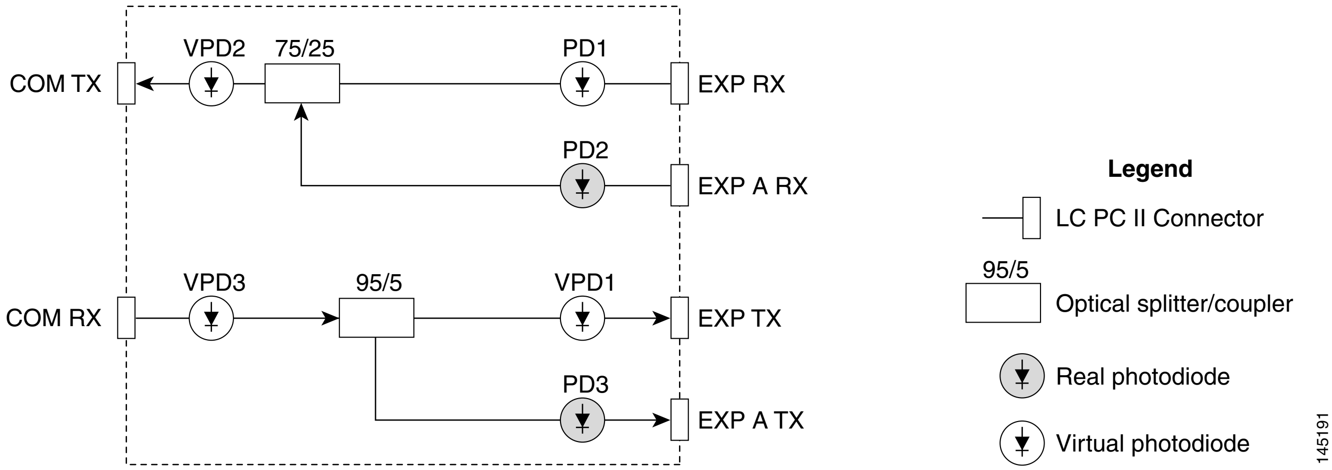


Figure 10-36 provides a high-level functional block diagram of the MMU card.

Figure 10-36 MMU Block Diagram



10.15.2 MMU Power Monitoring

Physical photodiodes P1 through P3 monitor the power for the MMU card. The returned power level values are calibrated to the ports as shown in Table 10-42. VP1 to VP3 are virtual photodiodes that have been created by adding (by software computation) the relevant path insertion losses of the optical splitters (stored in the module) to the real photodiode (P1 to P3) measurement.

Table 10-42 MMU Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	1 (EXP-RX)	EXP RX
P2	5 (EXP A-RX)	EXP A RX
P3	6 (EXP A-TX)	EXP A TX
VP1	2 (EXP-TX)	EXP TX
VP2	4 (COM-TX)	COM TX
VP3	3 (COM-RX)	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the "CTC Port Numbers and TL1 Aids" section in *Cisco ONS SONET TL1 Command Guide, Release 9.2.1*.

10.15.3 MMU Card Functions

- Card level indicators—Table G-4 on page G-9
- "G.4 Port-Level Indicators" section on page G-9

10.15.4 Related Procedures for MMU Card

The following section lists procedures and tasks related to the configuration of the MMU card:

- NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
- NTP-G37 Run Automatic Node Setup, page 14-127
- NTP-G51 Verify DWDM Node Turn Up, page 15-2
- NTP-G149 Modify the MMU Line Settings and PM Thresholds, page 20-114

CHAPTER 11

Provision Transponder and Muxponder Cards

Note The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This chapter describes Cisco ONS 15454 transponder (TXP), muxponder (MXP), GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, OTU2_XP, AR_MXP, and AR_XP cards, as well as their associated plug-in modules (Small Form-factor Pluggables [SFPs or XFPs]). For card safety and compliance information, see the *Regulatory Compliance and Safety Information for Cisco CPT and Cisco ONS Platforms*.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Note The cards described in this chapter are supported on the Cisco ONS 15454, Cisco ONS 15454 M6, Cisco ONS 15454 M2 platforms, unless noted otherwise.

Note The procedures and tasks described in this chapter for the Cisco ONS 15454 platform is applicable to the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, unless noted otherwise.

Chapter topics include:

Note Cisco ONS 15454 DWDM supports IBM's 5G DDR (Double Data Rate) InfiniBand[1] interfaces.

1. 5G DDR InfiniBand is referred to as IB_5G.

11.1 Card Overview

The card overview section lists the cards described in this chapter and provides compatibility information.

Note Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. The cards are then installed into slots displaying the same symbols. For a list of slots and symbols, see the "Card Slot Requirements" section in the *Cisco ONS 15454 Hardware Installation Guide*.

The purpose of a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, OTU2_XP, AR_MXP, or AR_XP card is to convert the "gray" optical client interface signals into trunk signals that operate in the "colored" dense wavelength division multiplexing (DWDM) wavelength range. Client-facing gray optical signals generally operate at shorter wavelengths, whereas DWDM colored optical signals are in the longer wavelength range (for example, 1490 nm = violet; 1510 nm = blue; 1530 nm = green; 1550 nm = yellow; 1570 nm = orange; 1590 nm = red; 1610 nm = brown). Some of the newer client-facing SFPs, however, operate in the colored region. Transponding or muxponding is the process of converting the signals between the client and trunk wavelengths.

An MXP generally handles several client signals. It aggregates, or multiplexes, lower rate client signals together and sends them out over a higher rate trunk port. Likewise, it demultiplexes optical signals coming in on a trunk and sends them out to individual client ports. A TXP converts a single client signal to a single trunk signal and converts a single incoming trunk signal to a single client signal. GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards can be provisioned as TXPs, as MXPs, or as Layer 2 switches.

All of the TXP and MXP cards perform optical to electrical to optical (OEO) conversion. As a result, they are not optically transparent cards. The reason for this is that the cards must operate on the signals passing through them, so it is necessary to do an OEO conversion.

On the other hand, the termination mode for all of the TXPs and MXPs, which is done at the electrical level, can be configured to be transparent. In this case, neither the Line nor the Section overhead is terminated. The cards can also be configured so that either Line or Section overhead can be terminated, or both can be terminated.

Note The MXP_2.5G_10G card, by design, when configured in the transparent termination mode, actually does terminate some of the bytes. See Table G-17 on page G-33 for details.

11.1.1 Card Summary

Table 11-1 lists and summarizes the functions of each TXP, TXPP, MXP, MXPP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP card.

Table 11-1 Cisco ONS 15454 Transponder and Muxponder Cards

Card	Port Description	For Additional Information
TXP_MR_10G	The TXP_MR_10G card has two sets of ports located on the faceplate.	See the "11.3 TXP_MR_10G Card" section on page 11-11.
TXP_MR_10E	The TXP_MR_10E card has two sets of ports located on the faceplate.	See the "11.4 TXP_MR_10E Card" section on page 11-14.

Table 11-1 Cisco ONS 15454 Transponder and Muxponder Cards (continued)

Card	Port Description	For Additional Information
TXP_MR_10E_C and TXP_MR_10E_L	The TXP_MR_10E_C and TXP_MR_10E_L cards have two sets of ports located on the faceplate.	See the "11.5 TXP_MR_10E_C and TXP_MR_10E_L Cards" section on page 11-16.
TXP_MR_2.5G	The TXP_MR_2.5G card has two sets of ports located on the faceplate.	See the "11.6 TXP_MR_2.5G and TXPP_MR_2.5G Cards" section on page 11-18.
TXPP_MR_2.5G	The TXPP_MR_2.5G card has three sets of ports located on the faceplate.	See the "11.6 TXP_MR_2.5G and TXPP_MR_2.5G Cards" section on page 11-18.
40E-TXP-C, and 40ME-TXP-C	The 40E-TXP-C and 40ME-TXP-C cards have two ports located on the face plate.	See the "11.7 40E-TXP-C and 40ME-TXP-C Cards" section on page 11-23.
MXP_2.5G_10G	The MXP_2.5G_10G card has nine sets of ports located on the faceplate.	See the "11.8 MXP_2.5G_10G Card" section on page 11-25.
MXP_2.5G_10E	The MXP_2.5G_10E card has nine sets of ports located on the faceplate.	See the "11.9 MXP_2.5G_10E Card" section on page 11-28.
MXP_2.5G_10E_C and MXP_2.5G_10E_L	The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards have nine sets of ports located on the faceplate.	See the "11.10 MXP_2.5G_10E_C and MXP_2.5G_10E_L Cards" section on page 11-32.
MXP_MR_2.5G	The MXP_MR_2.5G card has nine sets of ports located on the faceplate.	See the "11.11 MXP_MR_2.5G and MXPP_MR_2.5G Cards" section on page 11-39.
MXPP_MR_2.5G	The MXPP_MR_2.5G card has ten sets of ports located on the faceplate.	See the "11.11 MXP_MR_2.5G and MXPP_MR_2.5G Cards" section on page 11-39.
MXP_MR_10DME_C and MXP_MR_10DME_L	The MXP_MR_10DME_C and MXP_MR_10DME_L cards have eight sets of ports located on the faceplate.	See the "11.12 MXP_MR_10DME_C and MXP_MR_10DME_L Cards" section on page 11-44.
40G-MXP-C 40E-MXP-C and 40ME-MXP-C	The 40G-MXP-C, 40E-MXP-C and 40ME-MXP-C cards have five ports located on the faceplate.	See the "11.13 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards" section on page 11-52.
AR_MXP and AR_XP	The AR_MXP and AR_XP cards have ten ports located on the faceplate.	See the 11.20 AR_MXP and AR_XP Cards, page 11-119.
GE_XP and GE_XPE	The GE_XP and GE_XPE cards have twenty Gigabit Ethernet client ports and two 10 Gigabit Ethernet trunk ports.	See the "11.14 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards" section on page 11-58.
10GE_XP and 10GE_XPE	The 10GE_XP and 10GE_XPE cards have two 10 Gigabit Ethernet client ports and two 10 Gigabit Ethernet trunk ports.	See the "11.14 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards" section on page 11-58.
ADM-10G	The ADM-10G card has 19 sets of ports located on the faceplate.	See the "11.15 ADM-10G Card" section on page 11-83.
OTU2_XP	The OTU2_XP card has four ports located on the faceplate.	See the "11.16 OTU2_XP Card" section on page 11-97.
TXP_MR_10EX_C	The TXP_MR_10EX_C card has two sets of ports located on the faceplate.	See the "11.17 TXP_MR_10EX_C Card" section on page 11-105.

Table 11-1 Cisco ONS 15454 Transponder and Muxponder Cards (continued)

Card	Port Description	For Additional Information
MXP_2.5G_10EX_C	The MXP_2.5G_10EX_C card has nine sets of ports located on the faceplate.	See the "11.18 MXP_2.5G_10EX_C card" section on page 11-108.
MXP_MR_10DMEX_C	The MXP_MR_10DMEX_C card has eight sets of ports located on the faceplate.	See the "11.19 MXP_MR_10DMEX_C Card" section on page 11-112.

11.1.2 Card Compatibility

Table 11-2 lists the platform and Cisco Transport Controller (CTC) software compatibility for each TXP, TXPP, MXP, MXPP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP card.

Table 11-2 Platform and Software Release Compatibility for Transponder and Muxponder Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
TXP_MR_10G	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
TXP_MR_10E	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
TXP_MR_10E_C	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
TXP_MR_10E_L	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
TXP_MR_2.5G	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
TXPP_MR_2.5G	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
MXP_2.5G_10G	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
MXP_2.5G_10E	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM

Table 11-2 Platform and Software Release Compatibility for Transponder and Muxponder Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
MXP_2.5G_10E_C	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
MXP_2.5G_10E_L	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
MXP_MR_2.5G	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
MXPP_MR_2.5G	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
MXP_MR_10DME_C	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
MXP_MR_10DME_L	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM
GE_XP	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM

Table 11-2 Platform and Software Release Compatibility for Transponder and Muxponder Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
10GE_XP	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
GE_XPE	No	No	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
10GE_XPE	No	No	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
ADM-10G	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
OTU2_XP	No	No	No	No	No	No	No	No	No	15454-DWDM	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
TXP_MR_10EX_C	No	No	No	No	No	No	No	No	No	No	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM

Table 11-2 Platform and Software Release Compatibility for Transponder and Muxponder Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
MXP_2.5G_10EX_C	No	No	No	No	No	No	No	No	No	No	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
MXP_MR_10DMEX_C	No	No	No	No	No	No	No	No	No	No	15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
40E-TXP-C	No	No	No	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
40ME-TXP-C	No	No	No	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
40G-MXP-C	No	No	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
40E-MXP-C	No	No	No	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM

Table 11-2 Platform and Software Release Compatibility for Transponder and Muxponder Cards

Card Name	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2	R8.0	R8.5	R9.0	R9.1	R9.2	R9.2.1	R9.3	R9.4
40ME-MXP-C	No	No	No	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM	15454-M2, 15454-M6, 15454-DWDM
AR_MXP	No	No	No	No	No	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6, 15454-DWDM
AR_XP	No	No	No	No	No	No	No	No	No	No	No	No	No	No	15454-M2, 15454-M6, 15454-DWDM

Older versions of the TXP_MR_10E_C, TXP_MR_2.5G, TXPP_MR_2.5G, and MXP_2.5G_10E_C cards cannot be installed in the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 shelves because of an incompatible backplane connector.

The following table describes the version numbers of the cards that are compatible with the ONS 15454 M2 and ONS 15454 M6 shelves. The version numbers can be viewed from the HW Rev field in the Inventory tab.

Table 11-3 Version Number Compatibility for Transponder and Muxponder Cards

Card	Version Number
TXP_MR_2.5G	Version 06 or later of the different Unit Part Number
TXPP_MR_2.5G	Version 06 or later of the different Unit Part Number
MXP_2.5G_10E_C	Version 04 or later of the 800-26774 Part Number
TXP_MR_10E_C	Version 04 or later of the 800-26772 Part Number

11.2 Safety Labels

For information about safety labels, see the “G.1 Safety Labels” section on page G-1.

11.3 TXP_MR_10G Card

(Cisco ONS 15454 only)

The TXP_MR_10G processes one 10-Gbps signal (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side). It provides one 10-Gbps port per card that can be provisioned for an STM-64/OC-192 short reach (1310-nm) signal, compliant with ITU-T G.707, ITU-T G.709, ITU-T G.691, and Telcordia GR-253-CORE, or a 10GBASE-LR signal compliant with IEEE 802.3.

The TXP_MR_10G card is tunable over two neighboring wavelengths in the 1550-nm, ITU 100-GHz range. It is available in 16 different versions, each of which covers two wavelengths, for a total coverage of 32 different wavelengths in the 1550-nm range.

Note ITU-T G.709 specifies a form of forward error correction (FEC) that uses a “wrapper” approach. The digital wrapper lets you transparently take in a signal on the client side, wrap a frame around it and restore it to its original form. FEC enables longer fiber links because errors caused by the optical signal degrading with distance are corrected.

The trunk port operates at 9.95328 Gbps (or 10.70923 Gbps with ITU-T G.709 Digital Wrapper/FEC) and at 10.3125 Gbps (or 11.095 Gbps with ITU-T G.709 Digital Wrapper/FEC) over unamplified distances up to 80 km (50 miles) with different types of fiber such as C-SMF or dispersion compensated fiber limited by loss and/or dispersion.

Caution Because the transponder has no capability to look into the payload and detect circuits, a TXP_MR_10G card does not display circuits under card view.

Caution You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10G card in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_10G card. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_10G card.

You can install TXP_MR_10G cards in Slots 1 to 6 and 12 to 17 and provision this card in a linear configuration. TXP_MR_10G cards cannot be provisioned as a bidirectional line switched ring (BLSR)/Multiplex Section - Shared Protection Ring (MS-SPRing), a path protection/single node control point (SNCP), or a regenerator. They can only be used in the middle of BLSR/MS-SPRing and 1+1 spans when the card is configured for transparent termination mode.

The TXP_MR_10G port features a 1550-nm laser for the trunk port and a 1310-nm laser for the for the client port and contains two transmit and receive connector pairs (labeled) on the card faceplate.

The MTU setting is used to display the OverSizePkts counters on the receiving trunk and client port interfaces. Traffic of frame sizes up to 65535 bytes pass without any packet drops, from the client port to the trunk port and vice versa irrespective of the MTU setting.

The TXP_MR_10G card has the following available wavelengths and versions:

- ITU grid blue band:
  - 1538.19 to 1538.98 nm, 10T-L1-38.1
  - 1539.77 to 1540.56 nm, 10T-L1-39.7
  - 1530.33 to 1531.12 nm, 10T-L1-30.3
  - 1531.90 to 1532.68 nm, 10T-L1-31.9

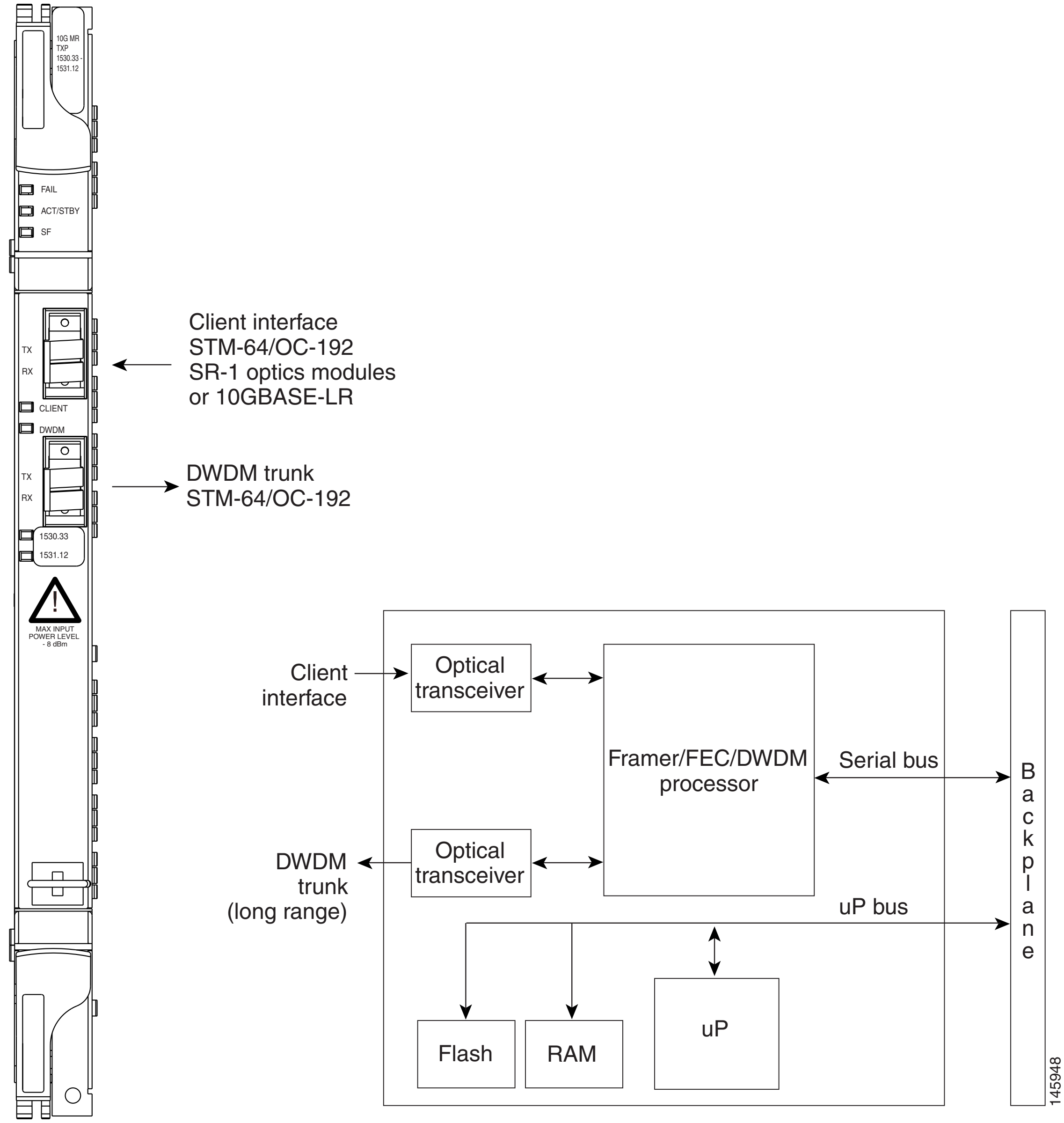
- 1534.25 to 1535.04 nm, 10T-L1-34.2
- 1535.82 to 1536.61 nm, 10T-L1-35.8
- 1542.14 to 1542.94 nm, 10T-L1-42.1
- 1543.73 to 1544.53 nm, 10T-L1-43.73

- ITU grid red band:
  - 1554.13 to 1554.94 nm, 10T-L1-54.1
  - 1555.75 to 1556.55 nm, 10T-L1-55.7
  - 1546.12 to 1546.92 nm, 10T-L1-46.1
  - 1547.72 to 1548.51 nm, 10T-L1-47.7
  - 1550.12 to 1550.92 nm, 10T-L1-50.1
  - 1551.72 to 1552.52 nm, 10T-L1-51.7
  - 1558.17 to 1558.98 nm, 10T-L1-58.1
  - 1559.79 to 1560.61 nm, 10T-L1-59.7

11.3.1 Faceplate and Block Diagram

Figure 11-1 shows the TXP_MR_10G faceplate and block diagram.

Figure 11-1 TXP_MR_10G Faceplate and Block Diagram



For information about safety labels for the card, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

11.3.2 TXP_MR_10G Functions

The functions of the TXP_MR_10G card are:

- G.2 Automatic Laser Shutdown, page G-6
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-7 on page G-10

11.3.3 Related Procedures for TXP_MR_10G Card

The following is the list of procedures and tasks related to the configuration of the TXP_MR_10G card:

- NTP-G96 Provision the 10G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds, page 11-191
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G75 Monitor Transponder and Muxponder Performance

11.4 TXP_MR_10E Card

(Cisco ONS 15454 only)

The card is fully backward compatible with the TXP_MR_10G card. It processes one 10-Gbps signal (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side) that is tunable over four wavelength channels (spaced at 100 GHz on the ITU grid) in the C band and tunable over eight wavelength channels (spaced at 50 GHz on the ITU grid) in the L band. There are eight versions of the C-band card, with each version covering four wavelengths, for a total coverage of 32 wavelengths. There are five versions of the L-band card, with each version covering eight wavelengths, for a total coverage of 40 wavelengths.

You can install TXP_MR_10E cards in Slots 1 to 6 and 12 to 17 and provision the cards in a linear configuration, BLSR/MS-SPRing, path protection/SNCP, or a regenerator. The card can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the card is configured for transparent termination mode.

The TXP_MR_10E card features a 1550-nm tunable laser (C band) or a 1580-nm tunable laser (L band) for the trunk port and a separately orderable ONS-XC-10G-S1 1310-nm or ONS-XC-10G-L2 1550-nm laser XFP module for the client port.

Note When the ONS-XC-10G-L2 XFP is installed, the TXP_MR_10E card must be installed in Slots 6, 7, 12 or 13)

On its faceplate, the TXP_MR_10E card contains two transmit and receive connector pairs, one for the trunk port and one for the client port. Each connector pair is labeled.

11.4.1 Key Features

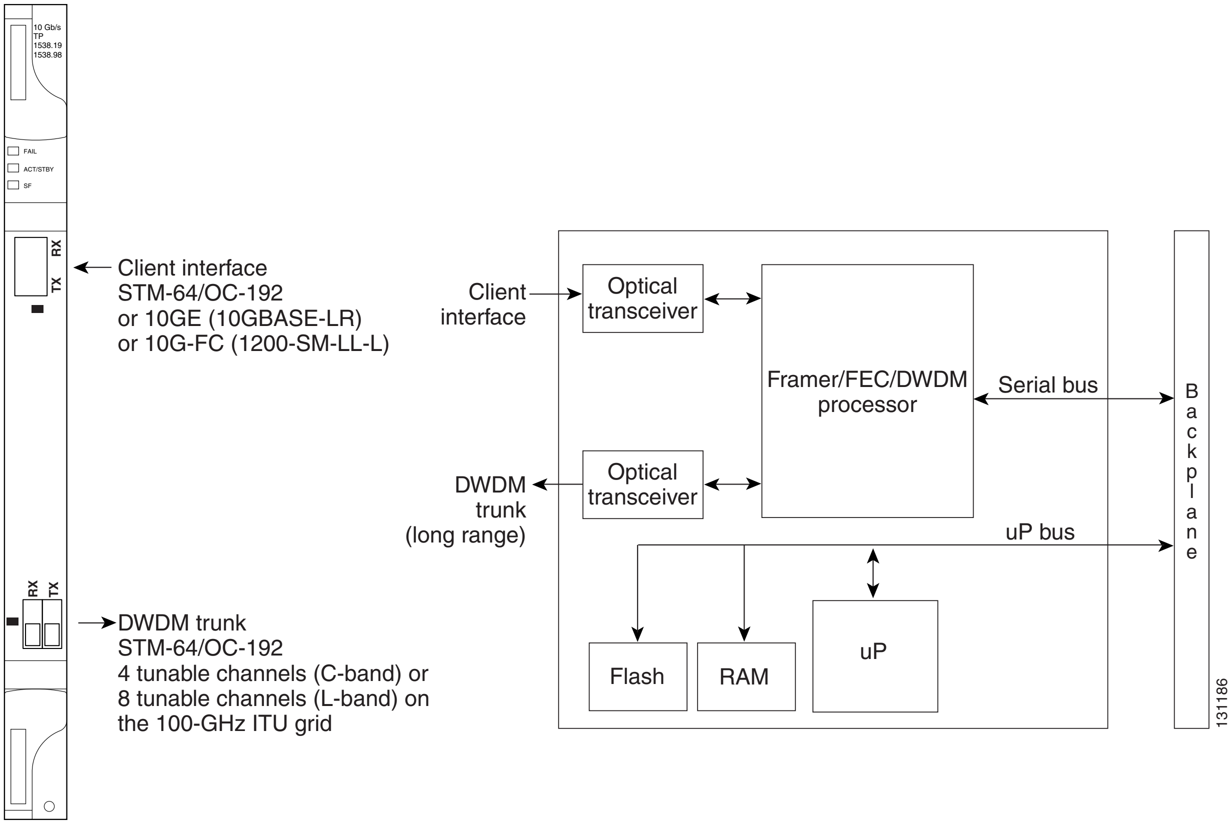
The key features of the TXP_MR_10E card are:

- A tri-rate client interface (available through the ONS-XC-10G-S1 XFP, ordered separately)
  - OC-192 (SR1)
  - 10GE (10GBASE-LR)
  - 10G-FC (1200-SM-LL-L)
- OC-192 to ITU-T G.709 OTU2 provisionable synchronous and asynchronous mapping
- The MTU setting is used to display the OverSizePkts counters on the receiving trunk and client port interfaces. Traffic of frame sizes up to 65535 bytes pass without any packet drops, from the client port to the trunk port and vice versa irrespective of the MTU setting.

11.4.2 Faceplate and Block Diagram

Figure 11-2 shows the TXP_MR_10E faceplate and block diagram.

Figure 11-2 TXP_MR_10E Faceplate and Block Diagram



For information about safety labels for the card, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Caution You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10E card in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_10E card. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_10E card.

11.4.3 TXP_MR_10E Functions

The functions of the TXP_MR_10E card are:

- G.2 Automatic Laser Shutdown, page G-6
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-6 on page G-10
- G.5 Client Interface, page G-14
- G.7 DWDM Trunk Interface, page G-15

- G.8 Enhanced FEC (E-FEC) Feature, page G-16
- G.9 FEC and E-FEC Modes, page G-16
- G.10 Client-to-Trunk Mapping, page G-17

11.4.4 Related Procedures for TXP_MR_10E Card

The following is the list of procedures and tasks related to the configuration of the TXP_MR_10E card:

- NTP-G96 Provision the 10G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds, page 11-191
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G75 Monitor Transponder and Muxponder Performance

11.5 TXP_MR_10E_C and TXP_MR_10E_L Cards

TXP_MR_10E_L: (Cisco ONS 15454 only)

The TXP_MR_10E_C and TXP_MR_10E_L cards are multirate transponders for the ONS 15454 platform. The cards are fully backward compatible with the TXP_MR_10G and TXP_MR_10E cards. They processes one 10-Gbps signal (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side). The TXP_MR_10E_C is tunable over the entire set of C-band wavelength channels (82 channels spaced at 50 GHz on the ITU grid). The TXP_MR_10E_L is tunable over the entire set of L-band wavelength channels (80 channels spaced at 50 GHz on the ITU grid) and is particularly well suited for use in networks that employ DS fiber or SMF-28 single-mode fiber.

The advantage of these cards over previous versions (TXP_MR_10G and TXP_MR_10E) is that there is only one version of each card (one C-band version and one L-band version) instead of several versions needed to cover each band.

You can install TXP_MR_10E_C and TXP_MR_10E_L cards in Slots 1 to 6 and 12 to 17 and provision the cards in a linear configuration, BLSR/MS-SPRing, path protection/SNCP, or a regenerator. The cards can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the cards are configured for transparent termination mode.

The TXP_MR_10E_C and TXP_MR_10E_L cards feature a universal transponder 2 (UT2) 1550-nm tunable laser (C band) or a UT2 1580-nm tunable laser (L band) for the trunk port and a separately orderable ONS-XC-10G-S1 1310-nm or ONS-XC-10G-L2 1550-nm laser XFP module for the client port.

Note When the ONS-XC-10G-L2 XFP is installed, the TXP_MR_10E_C or TXP_MR_10E-L card is required to be installed in a high-speed slot (slot 6, 7, 12, or 13)

On its faceplate, the TXP_MR_10E_C and TXP_MR_10E_L cards contain two transmit and receive connector pairs, one for the trunk port and one for the client port. Each connector pair is labeled.

11.5.1 Key Features

The key features of the TXP_MR_10E_C and TXP_MR_10E_L cards are:

- A tri-rate client interface (available through the ONS-XC-10G-S1 XFP, ordered separately):

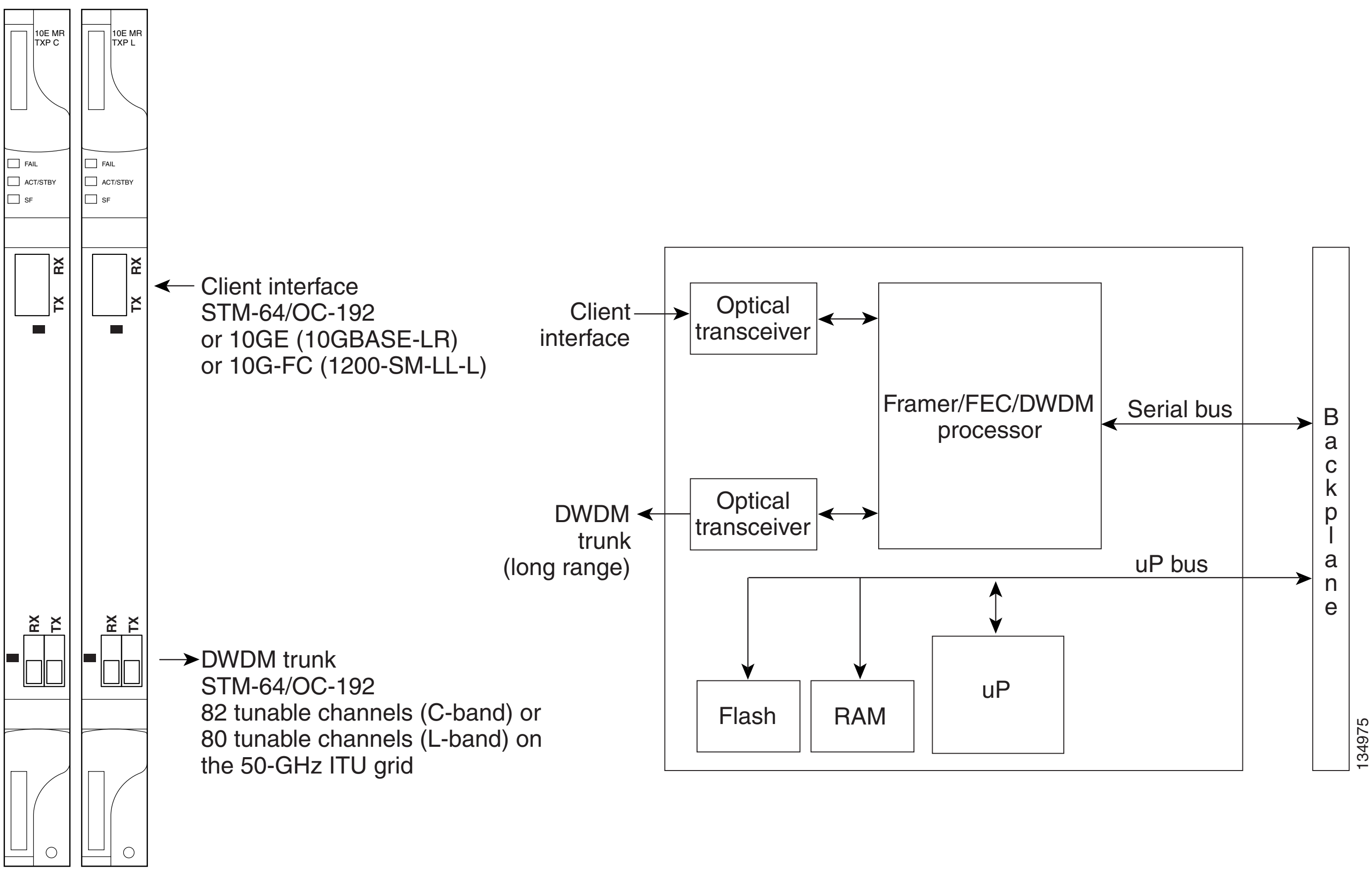
- OC-192 (SR1)
- 10GE (10GBASE-LR)
- 10G-FC (1200-SM-LL-L)

- A UT2 module tunable through the entire C band (TXP_MR_10E_C card) or L band (TXP_MR_10E_L card). The channels are spaced at 50 GHz on the ITU grid.
- OC-192 to ITU-T G.709 OTU2 provisionable synchronous and asynchronous mapping.
- The MTU setting is used to display the OverSizePkts counters on the receiving trunk and client port interfaces. Traffic of frame sizes up to 65535 bytes pass without any packet drops, from the client port to the trunk port and vice versa irrespective of the MTU setting.

11.5.2 Faceplates and Block Diagram

Figure 11-3 shows the TXP_MR_10E_C and TXP_MR_10E_L faceplates and block diagram.

Figure 11-3 TXP_MR_10E_C and TXP_MR_10E_L Faceplates and Block Diagram



For information about safety labels for the cards, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Caution You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10E_C or TXP_MR_10E_L card in a loopback on the trunk port. Do not use direct fiber loopbacks with the cards. Using direct fiber loopbacks causes irreparable damage to the cards.

11.5.3 TXP_MR_10E_C and TXP_MR_10E_L Functions

The functions of the TXP_MR_10E_C and TXP_MR_10E_L cards are:

- G.2 Automatic Laser Shutdown, page G-6
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-6 on page G-10.
- G.5 Client Interface, page G-14
- G.7 DWDM Trunk Interface, page G-15
- G.8 Enhanced FEC (E-FEC) Feature, page G-16
- G.9 FEC and E-FEC Modes, page G-16
- G.10 Client-to-Trunk Mapping, page G-17

11.5.4 Related Procedures for TXP_MR_10E_C and TXP_MR_10E_L Cards

The following is the list of procedures and tasks related to the configuration for both TXP_MR_10E_C and TXP_MR_10E_L:

- NTP-G96 Provision the 10G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds, page 11-191
- DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing, page 21-25
- NTP-G75 Monitor Transponder and Muxponder Performance

11.6 TXP_MR_2.5G and TXPP_MR_2.5G Cards

The TXP_MR_2.5G card processes one 8-Mbps to 2.488-Gbps signal (client side) into one 8-Mbps to 2.5-Gbps, 100-GHz DWDM signal (trunk side). It provides one long-reach STM-16/OC-48 port per card, compliant with ITU-T G.707, ITU-T G.709, ITU-T G.957, and Telcordia GR-253-CORE.

The TXPP_MR_2.5G card processes one 8-Mbps to 2.488-Gbps signal (client side) into two 8-Mbps to 2.5-Gbps, 100-GHz DWDM signals (trunk side). It provides two long-reach STM-16/OC-48 ports per card, compliant with ITU-T G.707, ITU-T G.957, and Telcordia GR-253-CORE.

The TXP_MR_2.5G and TXPP_MR_2.5G cards are tunable over four wavelengths in the 1550-nm, ITU 100-GHz range. They are available in eight versions, each of which covers four wavelengths, for a total coverage of 32 different wavelengths in the 1550-nm range.

Note ITU-T G.709 specifies a form of FEC that uses a "wrapper" approach. The digital wrapper lets you transparently take in a signal on the client side, wrap a frame around it, and restore it to its original form. FEC enables longer fiber links because errors caused by the optical signal degrading with distance are corrected.

The trunk/line port operates at up to 2.488 Gbps (or up to 2.66 Gbps with ITU-T G.709 Digital Wrapper/FEC) over unamplified distances up to 360 km (223.7 miles) with different types of fiber such as C-SMF or higher if dispersion compensation is used.

Caution Because the transponder has no capability to look into the payload and detect circuits, a TXP_MR_2.5G or TXPP_MR_2.5G card does not display circuits under card view.

The TXP_MR_2.5G and TXPP_MR_2.5G cards support 2R (retime, regenerate) and 3R (retime, reshape, and regenerate) modes of operation where the client signal is mapped into a ITU-T G.709 frame. The mapping function is simply done by placing a digital wrapper around the client signal. Only OC-48/STM-16 client signals are fully ITU-T G.709 compliant, and the output bit rate depends on the input client signal. Table 11-46 shows the possible combinations of client interfaces, input bit rates, 2R and 3R modes, and ITU-T G.709 monitoring.

Table 11-4 2R and 3R Mode and ITU-T G.709 Compliance by Client Interface

Client Interface	Input Bit Rate	3R vs. 2R	ITU-T G.709
OC-48/STM-16	2.488 Gbps	3R	On or Off
DV-6000	2.38 Gbps	2R	—
2 Gigabit Fibre Channel (2G-FC)/fiber connectivity (FICON)	2.125 Gbps	3R[1]	On or Off
High-Definition Television (HDTV)	1.48 Gbps	2R	—
Gigabit Ethernet (GE)	1.25 Gbps	3R	On or Off
1 Gigabit Fibre Channel (1G-FC)/FICON	1.06 Gbps	3R	On or Off
OC-12/STM-4	622 Mbps	3R	On or Off
OC-3/STM-1	155 Mbps	3R	On or Off
Enterprise System Connection (ESCON)	200 Mbps	2R	—
SDI/D1/DVB-ASI video	270 Mbps	2R	—
ISC-1 Compat	1.06 Gbps	2R	Off
ISC-3	1.06 or 2.125 Gbps	2R	—
ETR_CLO	16 Mbps	2R	—

1. No monitoring

Note ITU-T G.709 and FEC support is disabled for all the 2R payload types in the TXP_MR_2.5G and TXPP_MR_2.5G cards.

The output bit rate is calculated for the trunk bit rate by using the 255/238 ratio as specified in ITU-T G.709 for OTU1. Table 11-5 lists the calculated trunk bit rates for the client interfaces with ITU-T G.709 enabled.

Table 11-5 Trunk Bit Rates With ITU-T G.709 Enabled

Client Interface	ITU-T G.709 Disabled	ITU-T G.709 Enabled
OC-48/STM-16	2.488 Gbps	2.66 Gbps
2G-FC	2.125 Gbps	2.27 Gbps
GE	1.25 Gbps	1.34 Gbps
1G-FC	1.06 Gbps	1.14 Gbps
OC-12/STM-3	622 Mbps	666.43 Mbps
OC-3/STM-1	155 Mbps	166.07 Mbps

For 2R operation mode, the TXP_MR_2.5G and TXPP_MR_2.5G cards have the ability to pass data through transparently from client side interfaces to a trunk side interface, which resides on an ITU grid. The data might vary at any bit rate from 200-Mbps up to 2.38-Gbps, including ESCON, DVB-ASI, ISC-1, and video signals. In this pass-through mode, no performance monitoring (PM) or digital wrapping of the incoming signal is provided, except for the usual PM outputs from the SFPs. Similarly, this card has the ability to pass data through transparently from the trunk side interfaces to the client side interfaces with bit rates varying from 200-Mbps up to 2.38-Gbps. Again, no PM or digital wrapping of received signals is available in this pass-through mode.

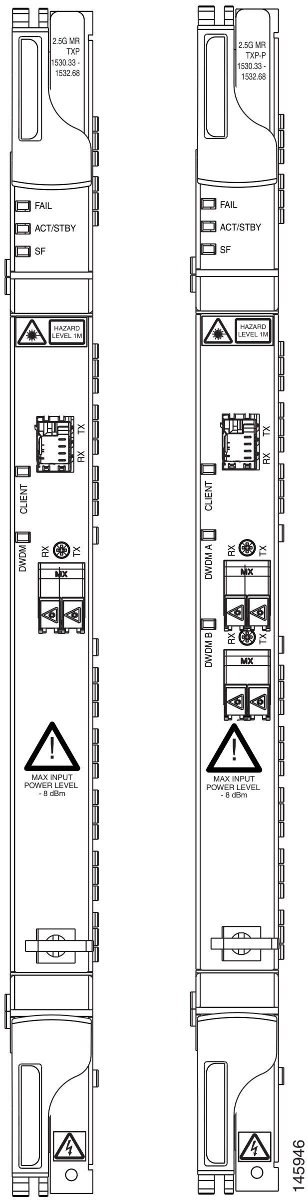
For 3R operation mode, the TXP_MR_2.5G and TXPP_MR_2.5G cards apply a digital wrapper to the incoming client interface signals (OC-N/STM-N, 1G-FC, 2G-FC, GE). PM is available on all of these signals except for 2G-FC, and varies depending upon the type of signal. For client inputs other than OC-48/STM-16, a digital wrapper might be applied but the resulting signal is not ITU-T G.709 compliant. The card applies a digital wrapper that is scaled to the frequency of the input signal.

The TXP_MR_2.5G and TXPP_MR_2.5G cards have the ability to take digitally wrapped signals in from the trunk interface, remove the digital wrapper, and send the unwrapped data through to the client interface. PM of the ITU-T G.709 OH and SONET/SDH OH is implemented.

11.6.1 Faceplates and Block Diagram

Figure 11-4 shows the TXP_MR_2.5G and TXPP_MR_2.5G faceplates.

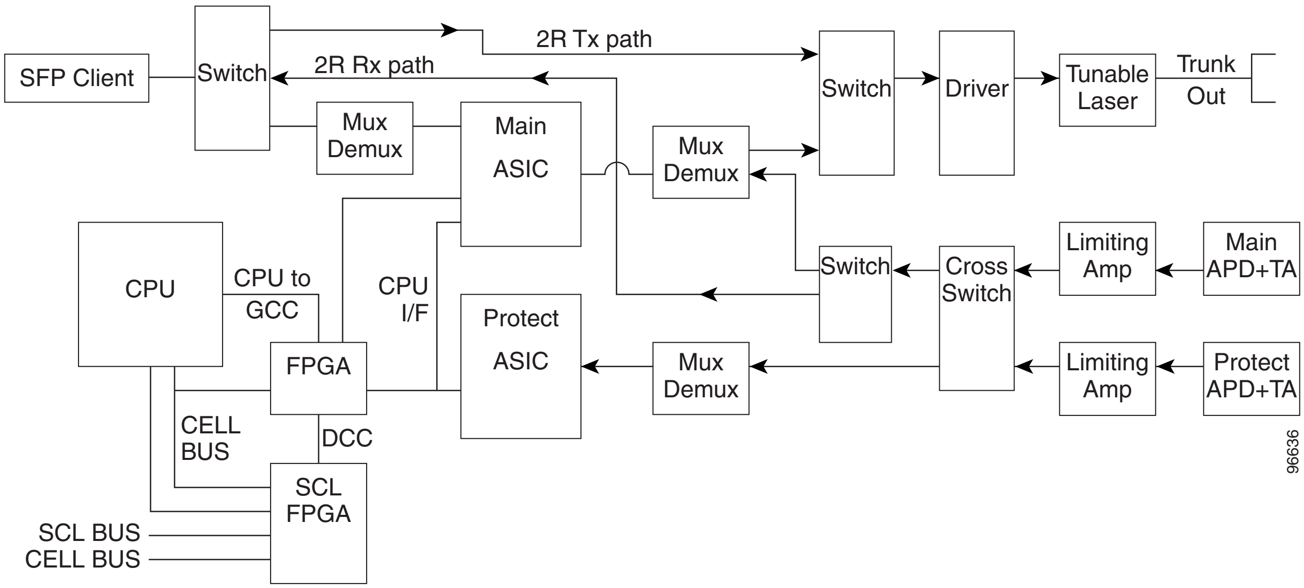
Figure 11-4 TXP_MR_2.5G and TXPP_MR_2.5G Faceplates



For information about safety labels for the cards, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Figure 11-5 shows a block diagram of the TXP_MR_2.5G and TXPP_MR_2.5G cards.

Figure 11-5 TXP_MR_2.5G and TXPP_MR_2.5G Block Diagram



Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the TXP_MR_2.5G and TXPP_MR_2.5G cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_2.5G and TXPP_MR_2.5G cards. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_2.5G and TXPP_MR_2.5G cards.

You can install TXP_MR_2.5G and TXPP_MR_2.5G cards in Slots 1 to 6 and 12 to 17. You can provision this card in a linear configuration. TXP_MR_10G and TXPP_MR_2.5G cards cannot be provisioned as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. They can be used in the middle of BLSR/MS-SPRing or 1+1 spans only when the card is configured for transparent termination mode.

The TXP_MR_2.5G card features a 1550-nm laser for the trunk/line port and a 1310-nm laser for the client port. It contains two transmit and receive connector pairs (labeled) on the card faceplate. The card uses dual LC connectors for optical cable termination.

The TXPP_MR_2.5G card features a 1550-nm laser for the trunk/line port and a 1310-nm or 850-nm laser (depending on the SFP) for the client port and contains three transmit and receive connector pairs (labeled) on the card faceplate. The card uses dual LC connectors for optical cable termination.

11.6.2 TXP_MR_2.5G and TXPP_MR_2.5G Functions

The functions of the TXP_MR_2.5G and TXPP_MR_2.5G cards are:

- G.2 Automatic Laser Shutdown, page G-6
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-6 on page G-10 (for TXP_MR_2.5G)
- Port level indicators—Table G-8 on page G-11 (for TXPP_MR_2.5G)

11.6.3 Related Procedures for TXP_MR_2.5G and TXPP_MR_2.5G Cards

The following is the list of procedures and tasks related to the configuration for both TXP_MR_2.5G and TXPP_MR_2.5G:

- NTP-G98 Provision the 2.5G Multirate Transponder Card Line Settings and PM Parameter Thresholds, page 11-171
- NTP-G33 Create a Y-Cable Protection Group, page 11-162 (TXP_MR_2.5G only)
- NTP-G75 Monitor Transponder and Muxponder Performance

11.7 40E-TXP-C and 40ME-TXP-C Cards

The 40E-TXP-C and 40ME-TXP-C cards process a single 40-Gbps signal (client side) into a single 40-Gbps, 50-GHz DWDM signal (trunk side). It provides one 40-Gbps port per card that can be provisioned for an OC-768/STM-256 very short reach (1550-nm) signal compliant with ITU-T G.707, ITU-T G.691, and Telcordia GR-253-CORE, 40G Ethernet LAN signal compliant with IEEE 802.3ba, or OTU3 signal compliant with ITU-T G.709.

The trunk port of the 40E-TXP-C and 40ME-TXP-C cards are tunable between 1529.55 nm through 1561.83 nm, ITU 50-GHz range.

ITU-T G.709 specifies a form of forward error correction (FEC) that uses a “wrapper” approach. The digital wrapper lets you transparently take in a signal on the client side, wrap a frame around it and restore it to its original form. FEC enables longer fiber links because errors caused by the optical signal degrading with distance are corrected.

Caution You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the 40E-TXP-C, and 40ME-TXP-C cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the 40E-TXP-C, and 40ME-TXP-C cards. Using direct fiber loopbacks causes irreparable damage to the these cards.

You can install and provision the 40E-TXP-C, and 40ME-TXP-C cards in a linear configuration in:

- Slots 1 to 5 and 12 to 16 in ONS 15454 DWDM chassis
- Slot 2 in ONS 15454 M2 chassis
- Slots 2 to 6 in ONS 15454 M6 chassis

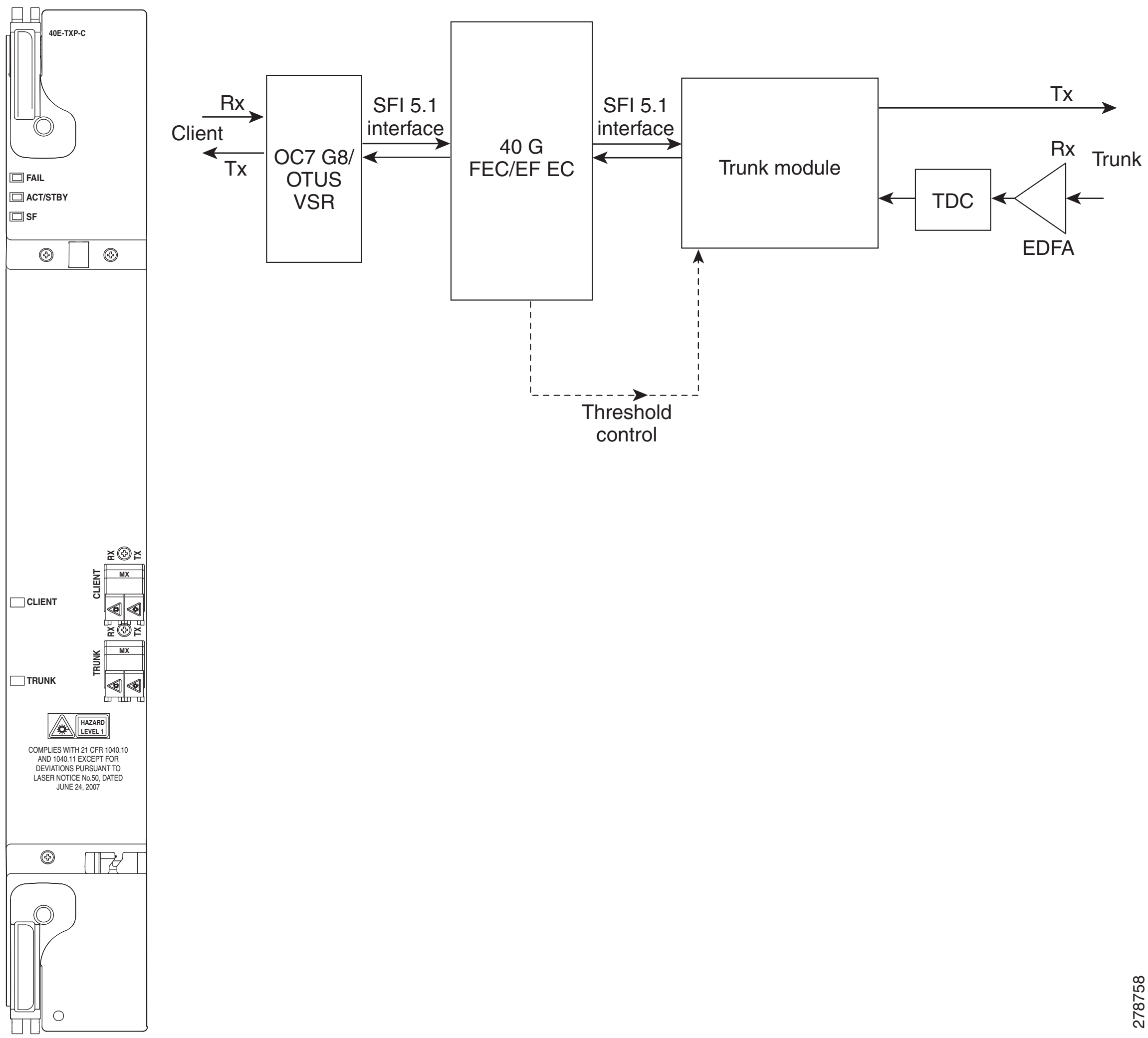
When a protection switch occurs on the 40E-TXP-C, and 40ME-TXP-C cards, the recovery from PSM protection switch takes about 3 to 4 minutes.

Note The maximum ambient operating temperature for 40E-TXP-C, and 40ME-TXP-C cards is 50^0 Celsius.

11.7.1 Faceplates and Block Diagram

Figure 11-6 shows the 40E-TXP-C and 40ME-TXP-C faceplate and block diagram.

Figure 11-6 40E-TXP-C and 40ME-TXP-C Faceplate and Block Diagram



For information about safety labels for the card, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

11.7.2 40E-TXP-C and 40ME-TXP-C Functions

The functions of the 40E-TXP-C and 40ME-TXP-C cards are:

- G.2 Automatic Laser Shutdown, page G-6 (supported on a client interface)
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-6 on page G-10.

11.7.3 Related Procedures for 40E-TXP-C and 40ME-TXP-C Cards

The following is the list of procedures and tasks related to the configuration of 40E-TXP-C and 40ME-TXP-C:

- NTP-G292 Provision the 40G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds, page 11-217
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G75 Monitor Transponder and Muxponder Performance

11.8 MXP_2.5G_10G Card

(Cisco ONS 15454 only)

The MXP_2.5G_10G card multiplexes/demultiplexes four 2.5-Gbps signals (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side). It provides one extended long-range STM-64/OC-192 port per card on the trunk side (compliant with ITU-T G.707, ITU-T G.709, ITU-T G.957, and Telcordia GR-253-CORE) and four intermediate- or short-range OC-48/STM-16 ports per card on the client side. The port operates at 9.95328 Gbps over unamplified distances up to 80 km (50 miles) with different types of fiber such as C-SMF or dispersion compensated fiber limited by loss and/or dispersion.

Client ports on the MXP_2.5G_10G card are also interoperable with SONET OC-1 (STS-1) fiber optic signals defined in Telcordia GR-253-CORE. An OC-1 signal is the equivalent of one DS-3 channel transmitted across optical fiber. OC-1 is primarily used for trunk interfaces to phone switches in the United States. There is no SDH equivalent for SONET OC-1.

The MXP_2.5G_10G card is tunable over two neighboring wavelengths in the 1550-nm, ITU 100-GHz range. It is available in 16 different versions, each of which covers two wavelengths, for a total coverage of 32 different wavelengths in the 1550-nm range.

Note ITU-T G.709 specifies a form of FEC that uses a "wrapper" approach. The digital wrapper lets you transparently take in a signal on the client side, wrap a frame around it and restore it to its original form. FEC enables longer fiber links because errors caused by the optical signal degrading with distance are corrected.

The port can also operate at 10.70923 Gbps in ITU-T G.709 Digital Wrapper/FEC mode.

Caution Because the transponder has no capability to look into the payload and detect circuits, an MXP_2.5G_10G card does not display circuits under card view.

Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_2.5G_10G card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_2.5G_10G card. Using direct fiber loopbacks causes irreparable damage to the MXP_2.5G_10G card.

You can install MXP_2.5G_10G cards in Slots 1 to 6 and 12 to 17.

Caution Do not install an MXP_2.5G_10G card in Slot 3 if you have installed a DS3/EC1-48 card in Slots 1or 2. Likewise, do not install an MXP_2.5G_10G card in Slot 17 if you have installed a DS3/EC1-48 card in Slots 15 or 16. If you do, the cards will interact and cause DS-3 bit errors.

You can provision this card in a linear configuration. MXP_2.5G_10G cards cannot be provisioned as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. They can be used in the middle of BLSR/MS-SPRing or 1+1 spans only when the card is configured for transparent termination mode.

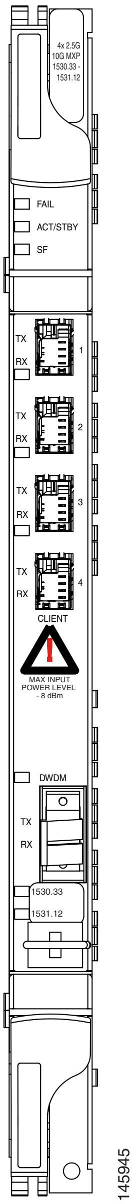
The MXP_2.5G_10G port features a 1550-nm laser on the trunk port and four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The card uses a dual LC connector on the trunk side and SFP connectors on the client side for optical cable termination.

Note When you create a 4xOC-48 OCHCC circuit, you need to select the G.709 and Synchronous options. A 4xOC-48 OCHCC circuit is supported by G.709 and synchronous mode. This is necessary to provision a 4xOC-48 OCHCC circuit.

11.8.1 Faceplates and Block Diagram

Figure 11-7 shows the MXP_2.5G_10G faceplate.

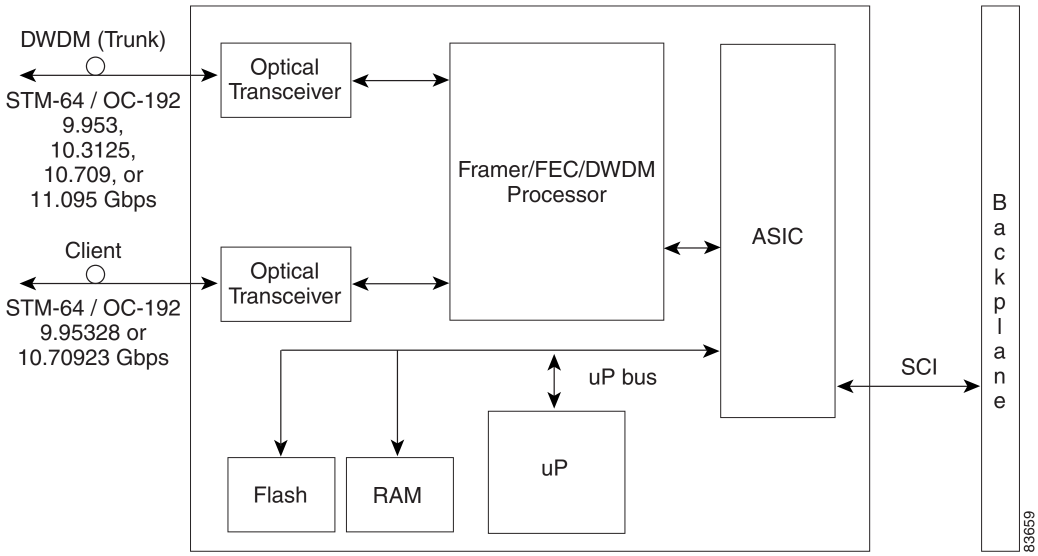
Figure 11-7 MXP_2.5G_10G Faceplate



For information about safety labels for the card, see the "G.1.1 Class 1 Laser Product Cards" section on page G-1.

Figure 11-8 shows a block diagram of the MXP_2.5G_10G card.

Figure 11-8 MXP_2.5G_10G Card Block Diagram



11.8.2 MXP_2.5G_10G Functions

The functions of the MXP_2.5G_10G card are:

- G.11 Timing Synchronization, page G-17
- G.2 Automatic Laser Shutdown, page G-6
- Card level indicators—Table G-1 on page G-7
- Port level indicators— Table G-7 on page G-10

11.8.3 Related Procedures for MXP_2.5G_10G Card

The following is the list of procedures and tasks related to the configuration of MXP_2.5G_10G:

- NTP-G97 Modify the 4x2.5G Muxponder Card Line Settings and PM Parameter Thresholds, page 11-262
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G75 Monitor Transponder and Muxponder Performance

11.9 MXP_2.5G_10E Card

The faceplate designation of the card is “4x2.5G 10E MXP.” The MXP_2.5G_10E card is a DWDM muxponder for the ONS 15454 platform that supports full transparent termination the client side. The card multiplexes four 2.5 Gbps client signals (4 x OC48/STM-16 SFP) into a single 10-Gbps DWDM optical signal on the trunk side. The MXP_2.5G_10E provides wavelength transmission service for the four incoming 2.5 Gbps client interfaces. The MXP_2.5G_10E muxponder passes all SONET/SDH overhead bytes transparently.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up generic communications channels (GCCs) for data communications, enable FEC, or facilitate performance monitoring.

The MXP_2.5G_10E works with optical transport network (OTN) devices defined in ITU-T G.709. The card supports ODU1 to OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. See the "G.12 Multiplexing Function" section on page G-18.

The MXP_2.5G_10E card is not compatible with the MXP_2.5G_10G card, which does not support full transparent termination. You can install MXP_2.5G_10E cards in Slots 1 to 6 and 12 to 17. You can provision this card in a linear configuration, as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. The card can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the card is configured for transparent termination mode.

The MXP_2.5G_10E features a 1550-nm laser on the trunk port and four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The card uses a dual LC connector on the trunk side and uses SFP modules on the client side for optical cable termination. The SFP pluggable modules are short reach (SR) or intermediate reach (IR) and support an LC fiber connector.

Note When you create a 4xOC-48 OCHCC circuit, you need to select the G.709 and Synchronous options. A 4xOC-48 OCHCC circuit is supported by G.709 and synchronous mode. This is necessary to provision a 4xOC-48 OCHCC circuit.

11.9.1 Key Features

The MXP_2.5G_10E card has the following high level features:

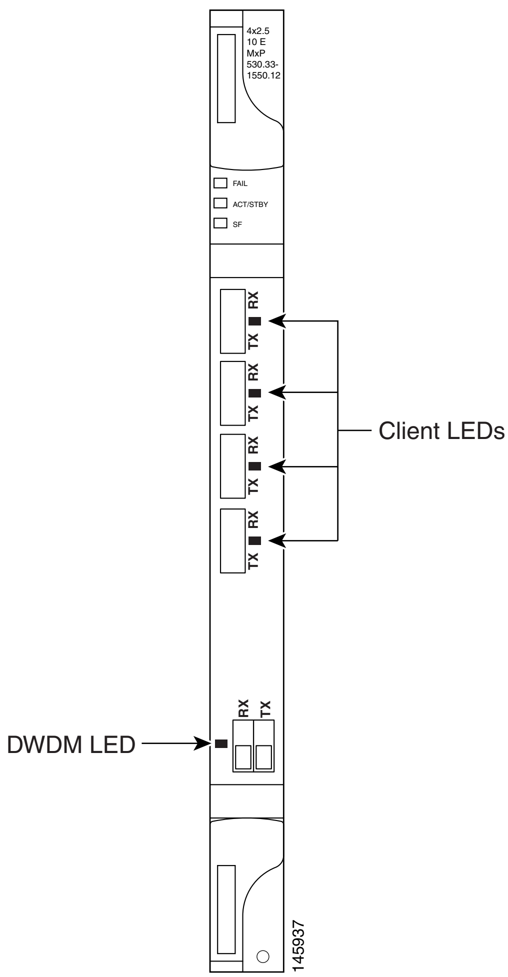
- Four 2.5 Gbps client interfaces (OC-48/STM-16) and one 10 Gbps trunk. The four OC-48 signals are mapped into a ITU-T G.709 OTU2 signal using standard ITU-T G.709 multiplexing.
- Onboard E-FEC processor: The processor supports both standard Reed-Solomon (RS, specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm. A new block code (BCH) algorithm implemented in E-FEC allows recovery of an input BER up to 1E-3.
- Pluggable client interface optic modules: The MXP_2.5G_10E card has modular interfaces. Two types of optics modules can be plugged into the card. These include an OC-48/STM 16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).
- High level provisioning support: The MXP_2.5G_10E card is initially provisioned using Cisco TransportPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- Link monitoring and management: The MXP_2.5G_10E card uses standard OC-48 OH (overhead) bytes to monitor and manage incoming interfaces. The card passes the incoming SDH/SONET data stream and its overhead bytes transparently.

- Control of layered SONET/SDH transport overhead: The card is provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- Automatic timing source synchronization: The MXP_2.5G_10E normally synchronizes from the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE is not available, the MXP_2.5G_10E automatically synchronizes to one of the input client interface clocks.
- Configurable squelching policy: The card can be configured to squelch the client interface output if there is LOS at the DWDM receiver or if there is a remote fault. In the event of a remote fault, the card manages multiplex section alarm indication signal (MS-AIS) insertion.

11.9.2 Faceplates and Block Diagram

Figure 11-9 shows the MXP_2.5G_10E faceplate.

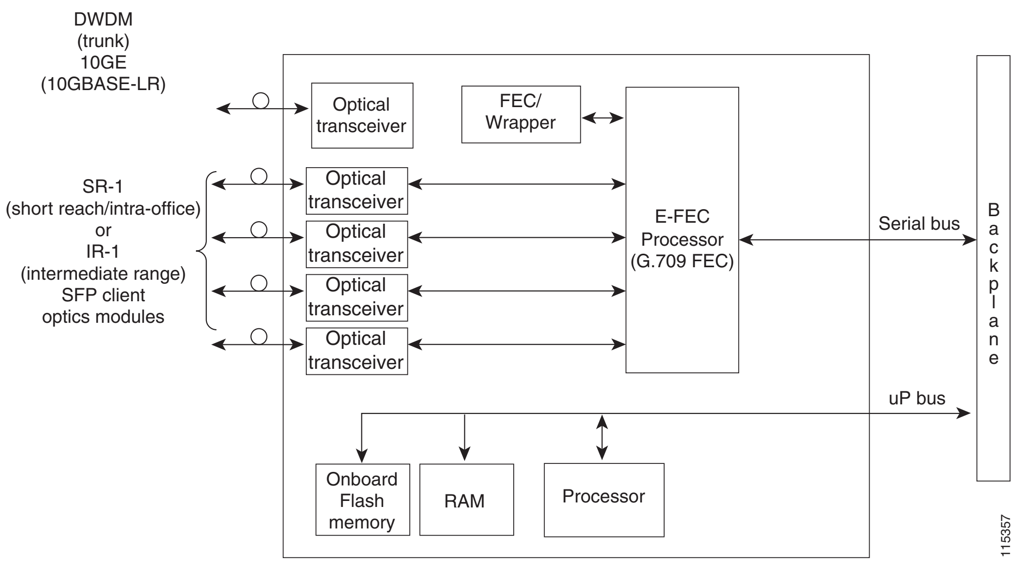
Figure 11-9 MXP_2.5G_10E Faceplate



For information about safety labels for the card, see the "G.1.1 Class 1 Laser Product Cards" section on page G-1.

Figure 11-10 shows a block diagram of the MXP_2.5G_10E card.

Figure 11-10 MXP_2.5G_10E Block Diagram



11.9.3 MXP_2.5G_10E Functions

The functions of the MXP_2.5G_10E card are:

- G.5 Client Interface, page G-14
- G.6 DWDM Interface, page G-15
- G.12 Multiplexing Function, page G-18
- G.11 Timing Synchronization, page G-17
- G.8 Enhanced FEC (E-FEC) Feature, page G-16
- G.9 FEC and E-FEC Modes, page G-16
- G.13 SONET/SDH Overhead Byte Processing, page G-19
- G.13 SONET/SDH Overhead Byte Processing, page G-19
- G.14 Client Interface Monitoring, page G-19
- G.2 Automatic Laser Shutdown, page G-6
- G.15 Jitter, page G-19
- G.16 Lamp Test, page G-19
- G.17 Onboard Traffic Generation, page G-19
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-6 on page G-10.

11.9.3.1 Wavelength Identification

The card uses trunk lasers that are wave-locked, which allows the trunk transmitter to operate on the ITU grid effectively. Table 11-6 describes the required trunk transmit laser wavelengths. The laser is tunable over eight wavelengths at 50-GHz spacing or four at 100-GHz spacing.

Table 11-6 MXP_2.5G_10E Trunk Wavelengths

Band	Wavelength (nm)	Band	Wavelength (nm)
30.3	1530.33	46.1	1546.12
30.3	1531.12	46.1	1546.92
30.3	1531.90	46.1	1547.72
30.3	1532.68	46.1	1548.51
34.2	1534.25	50.1	1550.12
34.2	1535.04	50.1	1550.92
34.2	1535.82	50.1	1551.72
34.2	1536.61	50.1	1552.52
38.1	1538.19	54.1	1554.13
38.1	1538.98	54.1	1554.94
38.1	1539.77	54.1	1555.75
38.1	1540.56	54.1	1556.55
42.1	1542.14	58.1	1558.17
42.1	1542.94	58.1	1558.98
42.1	1543.73	58.1	1559.79
42.1	1544.53	58.1	1560.61

11.9.4 Related Procedures for MXP_2.5G_10E Card

The following is the list of procedures and tasks related to the configuration of MXP_2.5G_10E Card:

- NTP-G97 Modify the 4x2.5G Muxponder Card Line Settings and PM Parameter Thresholds, page 11-262
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G75 Monitor Transponder and Muxponder Performance

11.10 MXP_2.5G_10E_C and MXP_2.5G_10E_L Cards

MXP_2.5G_10E_L: (Cisco ONS 15454 only)

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards are DWDM muxponders for the ONS 15454 platform that support transparent termination mode on the client side. The faceplate designation of the cards is “4x2.5G 10E MXP C” for the MXP_2.5G_10E_C card and “4x2.5G 10E MXP L” for the MXP_2.5G_10E_L card. The cards multiplex four 2.5-Gbps client signals (4 x OC48/STM-16 SFP) into a single 10-Gbps DWDM optical signal on the trunk side. The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards provide wavelength transmission service for the four incoming 2.5 Gbps client interfaces. The MXP_2.5G_10E_C and MXP_2.5G_10E_L muxponders pass all SONET/SDH overhead bytes transparently.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate PM.

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards work with OTN devices defined in ITU-T G.709. The cards support ODU1 to OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. See the "G.12 Multiplexing Function" section on page G-18.

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards are not compatible with the MXP_2.5G_10G card, which does not support transparent termination mode.

You can install MXP_2.5G_10E_C and MXP_2.5G_10E_L cards in Slots 1 to 6 and 12 to 17. You can provision a card in a linear configuration, as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. The cards can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the cards are configured for transparent termination mode.

The MXP_2.5G_10E_C card features a tunable 1550-nm C-band laser on the trunk port. The laser is tunable across 82 wavelengths on the ITU grid with 50-GHz spacing between wavelengths. The MXP_2.5G_10E_L features a tunable 1580-nm L-band laser on the trunk port. The laser is tunable across 80 wavelengths on the ITU grid, also with 50-GHz spacing. Each card features four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The cards uses dual LC connectors on the trunk side and use SFP modules on the client side for optical cable termination. The SFP pluggable modules are SR or IR and support an LC fiber connector.

Note When you create a 4xOC-48 OCHCC circuit, you need to select the G.709 and Synchronous options. A 4xOC-48 OCHCC circuit is supported by G.709 and synchronous mode. This is necessary to provision a 4xOC-48 OCHCC circuit.

11.10.1 Key Features

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards have the following high level features:

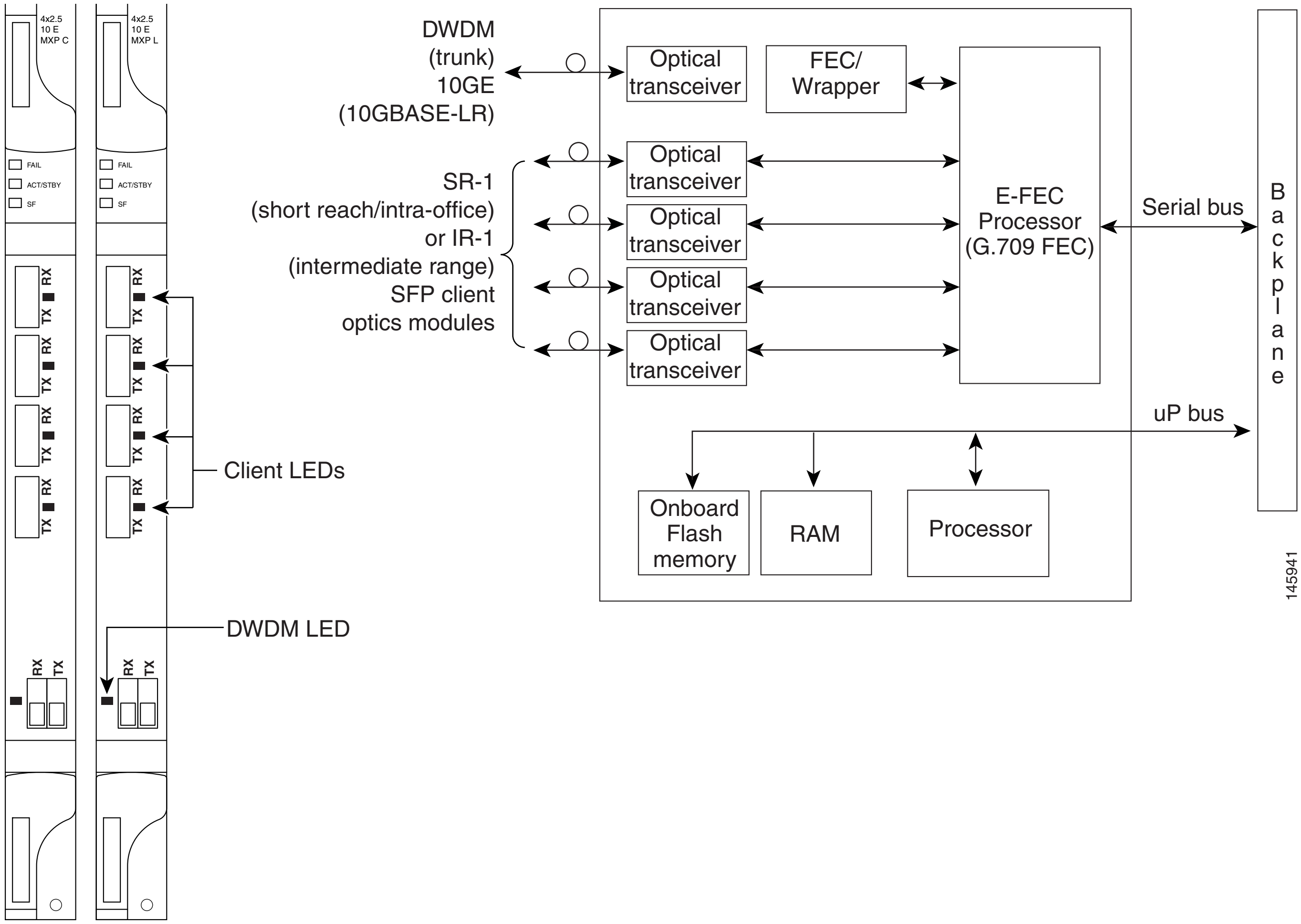
- Four 2.5 Gbps client interfaces (OC-48/STM-16) and one 10 Gbps trunk. The four OC-48 signals are mapped into a ITU-T G.709 OTU2 signal using standard ITU-T G.709 multiplexing.
- Onboard E-FEC processor: The processor supports both standard RS (specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm. A new BCH algorithm implemented in E-FEC allows recovery of an input BER up to 1E-3.
- Pluggable client interface optic modules: The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards have modular interfaces. Two types of optics modules can be plugged into the card. These include an OC-48/STM 16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).

- High level provisioning support: The cards are initially provisioned using Cisco TransportPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- Link monitoring and management: The cards use standard OC-48 OH (overhead) bytes to monitor and manage incoming interfaces. The cards pass the incoming SDH/SONET data stream and its overhead bytes transparently.
- Control of layered SONET/SDH transport overhead: The cards are provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- Automatic timing source synchronization: The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards normally synchronize from the TCC2/TCC2P/TCC3 card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P/TCC3 is not available, the cards automatically synchronize to one of the input client interface clocks.
- Configurable squelching policy: The cards can be configured to squelch the client interface output if there is LOS at the DWDM receiver or if there is a remote fault. In the event of a remote fault, the card manages MS-AIS insertion.
- The cards are tunable across the full C band (MXP_2.5G_10E_C) or full L band (MXP_2.5G_10E_L), thus eliminating the need to use different versions of each card to provide tunability across specific wavelengths in a band.

11.10.2 Faceplates and Block Diagram

Figure 11-11 shows the MXP_2.5G_10E_C and MXP_2.5G_10E_L faceplates and block diagram.

Figure 11-11 MXP_2.5G_10E _C and MXP_2.5G_10E_L Faceplates and Block Diagram



For information about safety labels for the cards, see the "G.1.1 Class 1 Laser Product Cards" section on page G-1.

11.10.3 MXP_2.5G_10E_C and MXP_2.5G_10E_L Functions

The functions of the MXP_2.5G_10E_C and MXP_2.5G_10E_L cards are:

- G.5 Client Interface, page G-14
- G.6 DWDM Interface, page G-15
- G.12 Multiplexing Function, page G-18
- G.11 Timing Synchronization, page G-17
- G.8 Enhanced FEC (E-FEC) Feature, page G-16
- G.9 FEC and E-FEC Modes, page G-16
- G.13 SONET/SDH Overhead Byte Processing, page G-19
- G.13 SONET/SDH Overhead Byte Processing, page G-19
- G.14 Client Interface Monitoring, page G-19

- G.2 Automatic Laser Shutdown, page G-6
- G.15 Jitter, page G-19
- G.16 Lamp Test, page G-19
- G.17 Onboard Traffic Generation, page G-19
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-6 on page G-10.

11.10.3.1 Wavelength Identification

The card uses trunk lasers that are wavelocked, which allows the trunk transmitter to operate on the ITU grid effectively. Both the MXP_2.5G_10E_C and MXP_2.5G_10E_L cards implement the UT2 module. The MXP_2.5G_10E_C card uses a C-band version of the UT2 and the MXP_2.5G_10E_L card uses an L-band version.

Table 11-7 describes the required trunk transmit laser wavelengths for the MXP_2.5G_10E_C card. The laser is tunable over 82 wavelengths in the C band at 50-GHz spacing on the ITU grid.

Table 11-7 MXP_2.5G_10E_C Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134

Table 11-7 MXP_2.5G_10E_C Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

Table 11-8 describes the required trunk transmit laser wavelengths for the MXP_2.5G_10E_L card. The laser is fully tunable over 80 wavelengths in the L band at 50-GHz spacing on the ITU grid.

Table 11-8 MXP_2.5G_10E_L Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26

Table 11-8 MXP_2.5G_10E_L Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

11.10.4 Related Procedures for MXP_2.5G_10E_C and MXP_2.5G_10E_L Cards

The following is the list of procedures and tasks related to the configuration of MXP_2.5G_10E_C and MXP_2.5G_10E_L cards:

- NTP-G97 Modify the 4x2.5G Muxponder Card Line Settings and PM Parameter Thresholds, page 11-262
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G75 Monitor Transponder and Muxponder Performance

11.11 MXP_MR_2.5G and MXPP_MR_2.5G Cards

The MXP_MR_2.5G card aggregates a mix and match of client Storage Area Network (SAN) service client inputs (GE, FICON, Fibre Channel, and ESCON) into one 2.5 Gbps STM-16/OC-48 DWDM signal on the trunk side. It provides one long-reach STM-16/OC-48 port per card and is compliant with Telcordia GR-253-CORE.

Note In Software Release 7.0 and later, two additional operating modes have been made available to the user: pure ESCON (all 8 ports running ESCON), and mixed mode (Port 1 running FC/GE/FICON, and Ports 5 through 8 running ESCON). When the card is part of a system running Software Release 6.0 or below, only one operating mode, (FC/GE) is available for use.

The 2.5-Gbps Multirate Muxponder–Protected–100 GHz–Tunable 15xx.xx-15yy.yy (MXPP_MR_2.5G) card aggregates various client SAN service client inputs (GE, FICON, Fibre Channel, and ESCON) into one 2.5 Gbps STM-16/OC-48 DWDM signal on the trunk side. It provides two long-reach STM-16/OC-48 ports per card and is compliant with ITU-T G.957 and Telcordia GR-253-CORE.

Because the cards are tunable to one of four adjacent grid channels on a 100-GHz spacing, each card is available in eight versions, with 15xx.xx representing the first wavelength and 15yy.yy representing the last wavelength of the four available on the card. In total, 32 DWDM wavelengths are covered in accordance with the ITU-T 100-GHz grid standard, G.692, and Telcordia GR-2918-CORE, Issue 2. The card versions along with their corresponding wavelengths are shown in Table 11-9.

Table 11-9 Card Versions

Card Version	Frequency Channels at 100 GHz (0.8 nm) Spacing			
1530.33–1532.68	1530.33 nm	1531.12 nm	1531.90 nm	1532.68 nm
1534.25–1536.61	1534.25 nm	1535.04 nm	1535.82 nm	1536.61 nm
1538.19–1540.56	1538.19 nm	1538.98 nm	1539.77 nm	1540.56 nm
1542.14–1544.53	1542.14 nm	1542.94 nm	1543.73 nm	1544.53 nm
1546.12–1548.51	1546.12 nm	1546.92 nm	1547.72 nm	1548.51 nm
1550.12–1552.52	1550.12 nm	1550.92 nm	1551.72 nm	1552.52 nm
1554.13–1556.55	1554.13 nm	1554.94 nm	1555.75 nm	1556.55 nm
1558.17–1560.61	1558.17 nm	1558.98 nm	1559.79 nm	1560.61 nm

The muxponders are intended to be used in applications with long DWDM metro or regional unregenerated spans. Long transmission distances are achieved through the use of flat gain optical amplifiers.

The client interface supports the following payload types:

- 2G FC

- 1G FC
- 2G FICON
- 1G FICON
- GE
- ESCON

Note Because the client payload cannot oversubscribe the trunk, a mix of client signals can be accepted, up to a maximum limit of 2.5 Gbps.

Table 11-10 shows the input data rate for each client interface, and the encapsulation method. The current version of the ITU-T Transparent Generic Framing Procedure (GFP-T) G.7041 supports transparent mapping of 8B/10B block-coded protocols, including Gigabit Ethernet, Fibre Channel, and FICON.

In addition to the GFP mapping, 1-Gbps traffic on Port 1 or 2 of the high-speed serializer/deserializer (SERDES) is mapped to an STS-24c channel. If two 1-Gbps client signals are present at Port 1 and Port 2 of the SERDES, the Port 1 signal is mapped into the first STS-24c channel and the Port 2 signal into the second STS-24c channel. The two channels are then mapped into an OC-48 trunk channel.

Table 11-10 MXP_MR_2.5G and MXPP_MR_2.5G Client Interface Data Rates and Encapsulation

Client Interface	Input Data Rate	ITU-T GFP-T G.7041 Encapsulation
2G FC	2.125 Gbps	Yes
1G FC	1.06 Gbps	Yes
2G FICON	2.125 Gbps	Yes
1G FICON	1.06 Gbps	Yes
GE	1.25 Gbps	Yes
ESCON	0.2 Gbps	Yes

Table 11-11 shows some of the mix and match possibilities on the various client ports. The table is intended to show the full client payload configurations for the card.

Table 11-11 Client Data Rates and Ports

Mode	Port(s)	Aggregate Data Rate
2G FC	1	2.125 Gbps
1G FC	1, 2	2.125 Gbps
2G FICON	1	2.125 Gbps
1G FICON	1, 2	2.125 Gbps
GE	1, 2	2.5 Gbps
1G FC ESCON (mixed mode)	1 5, 6, 7, 8	1.06 Gbps 0.8 Gbps 1.86 Gbps total

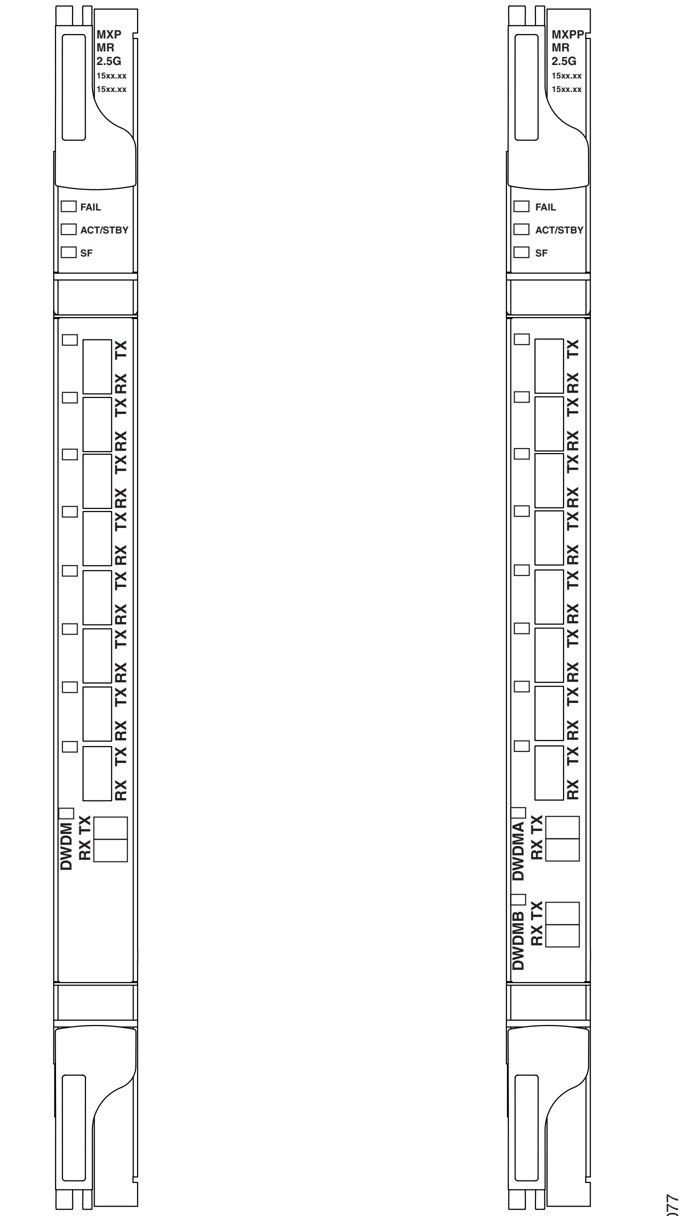
Table 11-11 Client Data Rates and Ports (continued)

Mode	Port(s)	Aggregate Data Rate
1G FICON ESCON (mixed mode)	1 5, 6, 7, 8	1.06 Gbps 0.8 Gbps 1.86 Gbps total
GE ESCON (mixed mode)	1 5, 6, 7, 8	1.25 Gbps 0.8 Gbps Total 2.05 Gbps
ESCON	1, 2, 3, 4, 5, 6, 7, 8	1.6 Gbps

11.11.1 Faceplates and Block Diagram

Figure 11-12 shows the MXP_MR_2.5G and MXPP_MR_2.5G faceplates.

Figure 11-12 MXP_MR_2.5G and MXPP_MR_2.5G Faceplates



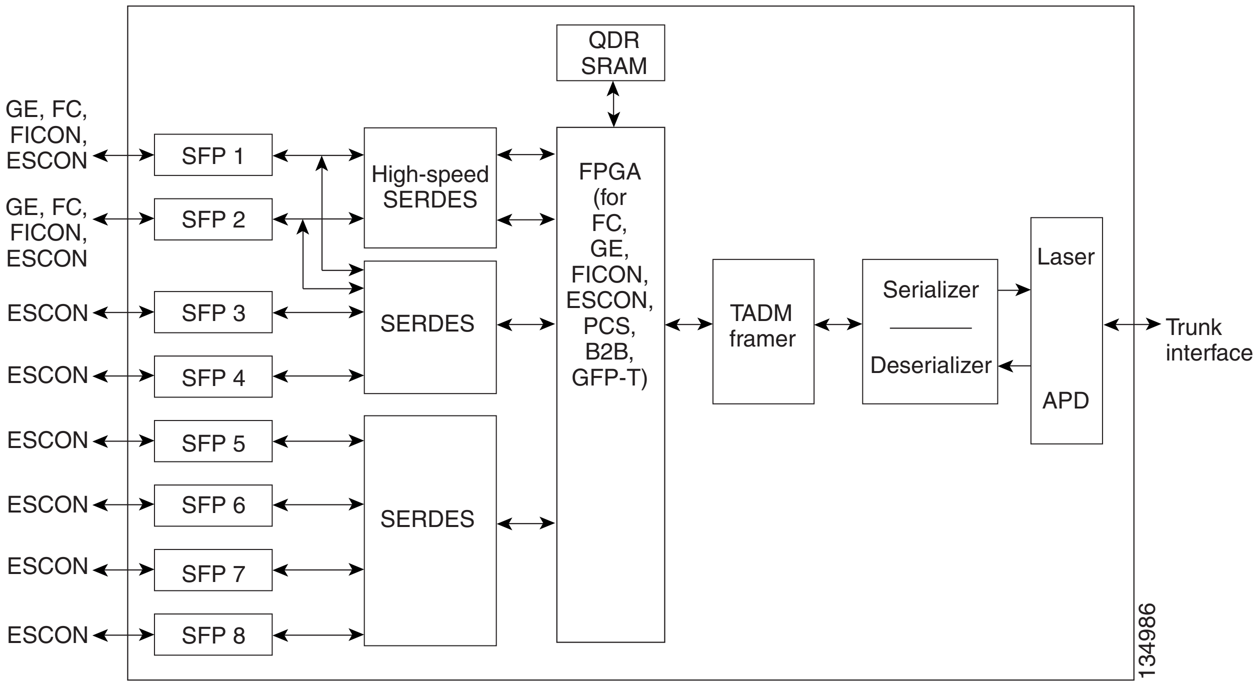
For information about safety labels for the cards, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Figure 11-13 shows a block diagram of the MXP_MR_2.5G card. The card has eight SFP client interfaces. Ports 1 and 2 can be used for GE, FC, FICON, or ESCON. Ports 3 through 8 are used for ESCON client interfaces. There are two SERDES blocks dedicated to the high-speed interfaces (GE, FC, FICON, and ESCON) and two SERDES blocks for the ESCON interfaces. A FPGA is provided to support different configurations for different modes of operation. This FPGA has a Universal Test and Operations Physical Interface for ATM (UTOPIA) interface. A transceiver add/drop multiplexer

(TADM) chip supports framing. Finally, the output signal is serialized and connected to the trunk front end with a direct modulation laser. The trunk receive signal is converted into an electrical signal with an avalanche photodiode (APD), is deserialized, and is then sent to the TADM framer and FPGA.

The MXPP_MR_2.5G is the same, except a 50/50 splitter divides the power at the trunk interface. In the receive direction, there are two APDs, two SERDES blocks, and two TADM framers. This is necessary to monitor both the working and protect paths. A switch selects one of the two paths to connect to the client interface.

Figure 11-13 MXP_MR_2.5G and MXPP_MR_2.5G Block Diagram



Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_MR_2.5G and MXPP_MR_2.5G cards in a loopback configuration on the trunk port. Do not use direct fiber loopbacks with the MXP_MR_2.5G and MXPP_MR_2.5G cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_2.5G and MXPP_MR_2.5G cards.

11.11.2 MXP_MR_2.5G and MXPP_MR_2.5G Functions

The functions of the MXP_MR_2.5G and MXPP_MR_2.5G cards are:

- G.18 Performance Monitoring, page G-20
- G.19 Distance Extension, page G-20
- G.20 Slot Compatibility, page G-20
- G.21 Interoperability with Cisco MDS Switches, page G-20
- G.22 Client and Trunk Ports, page G-20
- G.2 Automatic Laser Shutdown, page G-6

- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-10 on page G-12

11.11.3 Related Procedures for MXP_MR_2.5G and MXPP_MR_2.5G Cards

The following is the list of procedures and tasks related to the configuration of MXP_MR_2.5G and MXPP_MR_2.5G cards:

- NTP-G99 Modify the 2.5G Data Muxponder Card Line Settings and PM Parameter Thresholds, page 11-283
- NTP-G33 Create a Y-Cable Protection Group, page 11-162 (MXP_MR_2.5G only)
- NTP-G75 Monitor Transponder and Muxponder Performance

11.12 MXP_MR_10DME_C and MXP_MR_10DME_L Cards

MXP_MR_10DME_L: (Cisco ONS 15454 only)

The MXP_MR_10DME_C and MXP_MR_10DME_L cards aggregate a mix of client SAN service client inputs (GE, FICON, and Fibre Channel) into one 10.0 Gbps STM-64/OC-192 DWDM signal on the trunk side. It provides one long-reach STM-64/OC-192 port per card and is compliant with Telcordia GR-253-CORE and ITU-T G.957.

The cards support aggregation of the following signal types:

- 1-Gigabit Fibre Channel
- 2-Gigabit Fibre Channel
- 4-Gigabit Fibre Channel
- 1-Gigabit Ethernet
- 1-Gigabit ISC-Compatible (ISC-1)
- 2-Gigabit ISC-Peer (ISC-3)

Note On the card faceplates, the MXP_MR_10DME_C and MXP_MR_10DME_L cards are displayed as 10DME_C and 10DME_L, respectively.

Caution The card can be damaged by dropping it. Handle it safely.

The MXP_MR_10DME_C and MXP_MR_10DME_L muxponders pass all SONET/SDH overhead bytes transparently.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate PM. The MXP_MR_10DME_C and MXP_MR_10DME_L cards work with the OTN devices defined in ITU-T G.709. The cards support ODU1 to OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. See the "G.12 Multiplexing Function" section on page G-18.

Note Because the client payload cannot oversubscribe the trunk, a mix of client signals can be accepted, up to a maximum limit of 10 Gbps.

You can install MXP_MR_10DME_C and MXP_MR_10DME_L cards in Slots 1 to 6 and 12 to 17.

Note The MXP_MR_10DME_C and MXP_MR_10DME_L cards are not compatible with the MXP_2.5G_10G card, which does not support transparent termination mode.

The MXP_MR_10DME_C card features a tunable 1550-nm C-band laser on the trunk port. The laser is tunable across 82 wavelengths on the ITU grid with 50-GHz spacing between wavelengths. The MXP_MR_10DME_L features a tunable 1580-nm L-band laser on the trunk port. The laser is tunable across 80 wavelengths on the ITU grid, also with 50-GHz spacing. Each card features four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The cards uses dual LC connectors on the trunk side and use SFP modules on the client side for optical cable termination. The SFP pluggable modules are SR or IR and support an LC fiber connector.

Table 11-12 shows the input data rate for each client interface, and the encapsulation method. The current version of the GFP-T G.7041 supports transparent mapping of 8B/10B block-coded protocols, including Gigabit Ethernet, Fibre Channel, ISC, and FICON.

In addition to the GFP mapping, 1-Gbps traffic on Port 1 or 2 of the high-speed SERDES is mapped to an STS-24c channel. If two 1-Gbps client signals are present at Port 1 and Port 2 of the high-speed SERDES, the Port 1 signal is mapped into the first STS-24c channel and the Port 2 signal into the second STS-24c channel. The two channels are then mapped into an OC-48 trunk channel.

Table 11-12 MXP_MR_10DME_C and MXP_MR_10DME_L Client Interface Data Rates and Encapsulation

Client Interface	Input Data Rate	GFP-T G.7041 Encapsulation
2G FC	2.125 Gbps	Yes
1G FC	1.06 Gbps	Yes
2G FICON/2G ISC-Compatible (ISC-1)/ 2G ISC-Peer (ISC-3)	2.125 Gbps	Yes
1G FICON/1G ISC-Compatible (ISC-1)/ 1G ISC-Peer (ISC-3)	1.06 Gbps	Yes
Gigabit Ethernet	1.25 Gbps	Yes

There are two FPGAs on each MXP_MR_10DME_C and MXP_MR_10DME_L, and a group of four ports is mapped to each FPGA. Group 1 consists of Ports 1 through 4, and Group 2 consists of Ports 5 through 8. Table 11-13 shows some of the mix and match possibilities on the various client data rates for Ports 1 through 4, and Ports 5 through 8. An X indicates that the data rate is supported in that port.

Table 11-13 Supported Client Data Rates for Ports 1 through 4 and Ports 5 through 8

Port (Group 1)	Port (Group 2)	Gigabit Ethernet	1G FC	2G FC	4G FC
1	5	X	X	X	X
2	6	X	X	—	—

Table 11-13 Supported Client Data Rates for Ports 1 through 4 and Ports 5 through 8 (continued)

Port (Group 1)	Port (Group 2)	Gigabit Ethernet	1G FC	2G FC	4G FC
3	7	X	X	X	—
4	8	X	X	—	—

GFP-T PM is available through RMON and trunk PM is managed according to Telcordia GR-253-CORE and ITU G.783/826. Client PM is achieved through RMON for FC and GE.

A buffer-to-buffer credit management scheme provides FC flow control. With this feature enabled, a port indicates the number of frames that can be sent to it (its buffer credit), before the sender is required to stop transmitting and wait for the receipt of a "ready" indication The MXP_MR_10DME_C and MXP_MR_10DME_L cards support FC credit-based flow control with a buffer-to-buffer credit extension of up to 1600 km (994.1 miles) for 1G FC, up to 800 km (497.1 miles) for 2G FC, or up to 400 km (248.5 miles) for 4G FC. The feature can be enabled or disabled.

The MXP_MR_10DME_C and MXP_MR_10DME_L cards feature a 1550-nm laser for the trunk/line port and a 1310-nm or 850-nm laser (depending on the SFP) for the client ports. The cards contains eight 12.5 degree downward tilt SFP modules for the client interfaces. For optical termination, each SFP uses two LC connectors, which are labeled TX and RX on the faceplate. The trunk port is a dual-LC connector with a 45 degree downward angle.

The throughput of the MXP_MR_10DME_C and MXP_MR_10DME_L cards is affected by the following parameters:

- Distance extension—If distance extension is enabled on the card, it provides more throughput but more latency. If distance extension is disabled on the card, the buffer to buffer credits on the storage switch affects the throughput; higher the buffer to buffer credits higher is the throughput.

  Note For each link to operate at the maximum throughput, it requires a minimum number of buffer credits to be available on the devices which the link connects to. The number of buffer credits required is a function of the distance between the storage switch extension ports and the link bandwidth, that is, 1G, 2G, or 4G. These buffer credits are provided by either the storage switch (if distance extension is disabled) or by both the storage switch and the card (if distance extension is enabled).

- Forward Error Correction (FEC)—If Enhanced FEC (E-FEC) is enabled on the trunk port of the card, the throughout is significantly reduced in comparison to standard FEC being set on the trunk port.

  Note If distance extension is enabled on the card, the FEC status does not usually affect the throughput of the card.

- Payload size—The throughput of the card decreases with decrease in payload size.

The resultant throughput of the card is usually the combined effect of the above parameters.

11.12.1 Key Features

The MXP_MR_10DME_C and MXP_MR_10DME_L cards have the following high-level features:

- Onboard E-FEC processor: The processor supports both standard RS (specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm. A new BCH algorithm implemented in E-FEC allows recovery of an input BER up to 1E-3.
- Pluggable client interface optic modules: The MXP_MR_10DME_C and MXP_MR_10DME_L cards have modular interfaces. Two types of optics modules can be plugged into the card. These include an OC-48/STM 16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).
- Y-cable protection: Supports Y-cable protection between the same card type only, on ports with the same port number and signal rate. See the "G.35.1.1 Y-Cable Protection" section on page G-27 for more detailed information.
- High level provisioning support: The cards are initially provisioned using Cisco TransportPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- ALS: A safety mechanism used in the event of a fiber cut. For details regarding ALS provisioning for the MXP_MR_10DME_C and MXP_MR_10DME_L cards, see the "NTP-G162 Change the ALS Maintenance Settings" section on page 11-449.
- Link monitoring and management: The cards use standard OC-48 OH bytes to monitor and manage incoming interfaces. The cards pass the incoming SDH/SONET data stream and its OH bytes transparently.
- Control of layered SONET/SDH transport overhead: The cards are provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- Automatic timing source synchronization: The MXP_MR_10DME_C and MXP_MR_10DME_L cards normally synchronize from the TCC2/TCC2P/TCC3 card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P/TCC3 is not available, the cards automatically synchronize to one of the input client interface clocks.

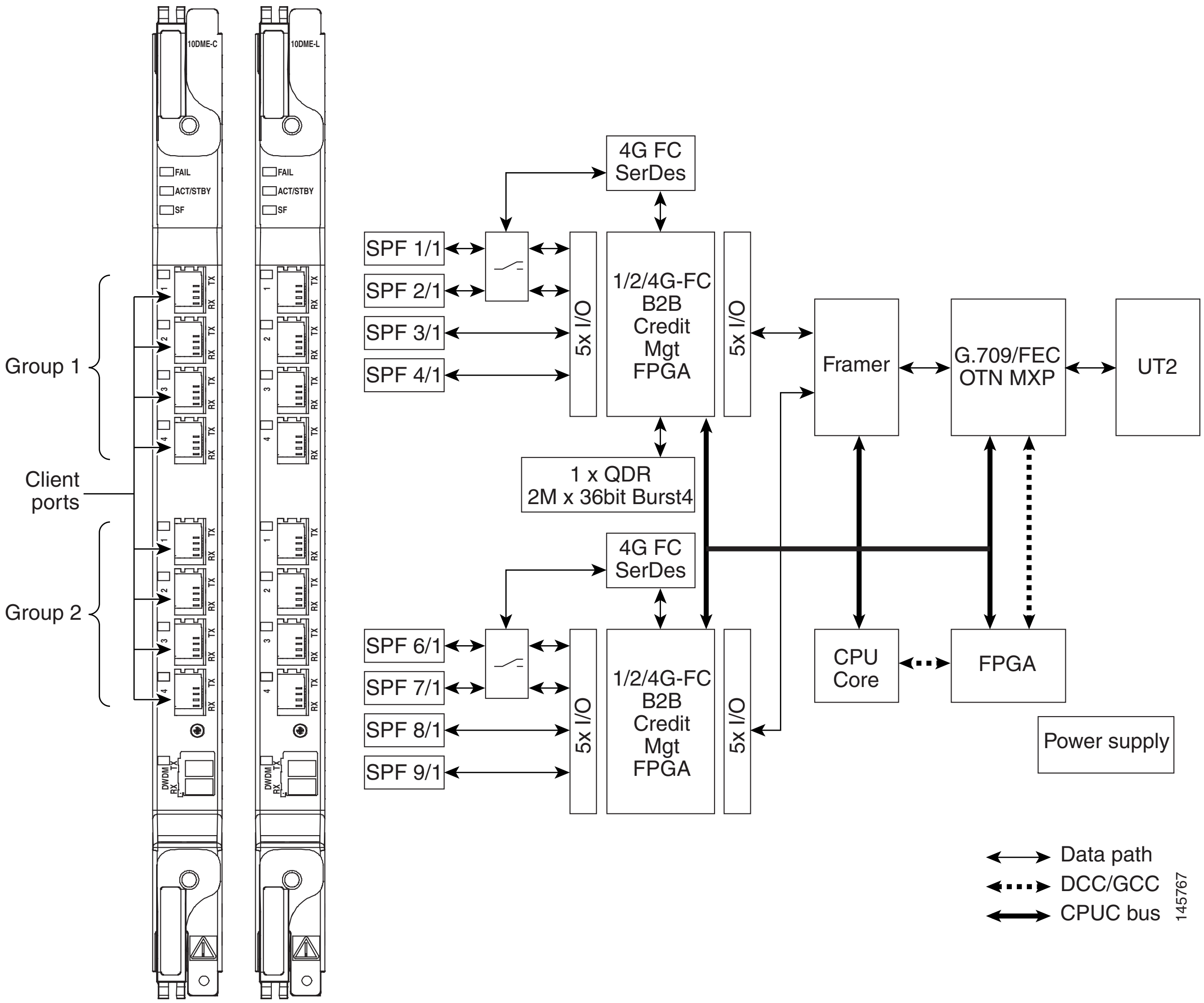
Note MXP_MR_10DME_C and MXP_MR_10DME_L cards cannot be used for line timing.

- Configurable squelching policy: The cards can be configured to squelch the client interface output if there is LOS at the DWDM receiver or if there is a remote fault. In the event of a remote fault, the card manages MS-AIS insertion.
- The cards are tunable across the full C band (MXP_MR_10DME_C) or full L band (MXP_MR_10DME_L), thus eliminating the need to use different versions of each card to provide tunability across specific wavelengths in a band.
- You can provision a string (port name) for each fiber channel/FICON interface on the MXP_MR_10DME_C and MXP_MR_10DME_L cards, which allows the MDS Fabric Manager to create a link association between that SAN port and a SAN port on a Cisco MDS 9000 switch.
- From Software Release 9.0, the fast switch feature of MXP_MR_10DME_C and MXP_MR_10DME_L cards along with the buffer-to-buffer credit recovery feature of MDS switches, prevents reinitialization of ISL links during Y-cable switchovers.

11.12.2 Faceplates and Block Diagram

Figure 11-14 shows the MXP_MR_10DME_C and MXP_MR_10DME_L faceplates and block diagram.

Figure 11-14 MXP_MR_10DME_C and MXP_MR_10DME_L Faceplates and Block Diagram



For information about safety labels for the cards, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_10DME_C and MXP_MR_10DME_L cards.

11.12.3 MXP_MR_10DME_C and MXP_MR_10DME_L Functions

The functions of the MXP_MR_10DME_C and MXP_MR_10DME_L cards are:

- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-9 on page G-11

11.12.3.1 Wavelength Identification

The card uses trunk lasers that are wavelocked, which allows the trunk transmitter to operate on the ITU grid effectively. Both the MXP_MR_10DME_C and MXP_MR_10DME_L cards implement the UT2 module. The MXP_MR_10DME_C card uses a C-band version of the UT2 and the MXP_MR_10DME_L card uses an L-band version.

Table 11-14 describes the required trunk transmit laser wavelengths for the MXP_MR_10DME_C card. The laser is tunable over 82 wavelengths in the C band at 50-GHz spacing on the ITU grid.

Table 11-14 MXP_MR_10DME_C Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537

Table 11-14 MXP_MR_10DME_C Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

Table 11-15 describes the required trunk transmit laser wavelengths for the MXP_MR_10DME_L card. The laser is fully tunable over 80 wavelengths in the L band at 50-GHz spacing on the ITU grid.

Table 11-15 MXP_MR_10DME_L Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68

Table 11-15 MXP_MR_10DME_L Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

11.12.4 Related Procedures for MXP_MR_10DME_C and MXP_MR_10DME_L Cards

The following is the list of procedures and tasks related to the configuration of MXP_MR_10DME_C and MXP_MR_10DME_L cards:

- NTP-G148 Modify the 10G Data Muxponder Card Line Settings and PM Parameter Thresholds, page 11-301
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G75 Monitor Transponder and Muxponder Performance

11.13 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards aggregate a variety of client service inputs (GigabitEthernet, fibre channel, OTU2, OTU2e, and OC-192) into a single 40-Gbps OTU3/OTU3e signal on the trunk side. You can either have 40E-MXP-C, or 40ME-MXP-C card based on your requirement, though the CTC name 40E-MXP-C is common for both. The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards support aggregation of the following signals:

- With overclock enabled on the trunk port:
  - 10-Gigabit Fibre Channel
  - OTU2e
- With overclock disabled on the trunk port:
  - 8-Gigabit Fibre Channel
  - 10-GigabitEthernet LAN-Phy (GFP framing)
  - 10-GigabitEthernet LAN-Phy (WIS framing)
  - OC-192/STM-64
  - OTU2

Caution Handle the card with care. Dropping or misuse of the card could result in permanent damage.

The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C muxponders pass all SONET/SDH overhead bytes transparently, section, or line termination.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate performance monitoring. The 40G-MXP-C, 40E-MXP-C and 40ME-MXP-C cards work with the OTN devices defined in ITU-T G.709. The card supports ODTU23 multiplexing, an industry standard method for asynchronously mapping client payloads into a digitally wrapped envelope. See the "G.12 Multiplexing Function" section on page G-18.

You can install and provision the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards in a linear configuration in:

- Slots 1 to 5 and 12 to 16 in ONS 15454 DWDM chassis
- Slot 2 in ONS 15454 M2 chassis
- Slots 2 to 6 in ONS 15454 M6 chassis

The client ports of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards interoperates with all the existing TXP/MXP (OTU2 trunk) cards.

The auto negotiation is not supported on the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards in 8G FC client mode. Hence, during interoperation, the auto negotiation of the 8G-FC client port of the other device connected to 8G-FC client port on 40G-MXP-C, 40E-MXP-C, or 40ME-MXP-C card must be set to Fixed/Disabled.

The client port of 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards does not interoperate with OTU2_XP card when the signal rate is OTU1e (11.049 Gbps) and the "No Fixed Stuff" option is enabled on the trunk port of OTU2_XP card.

For OTU2 and OTU2e client protocols, Enhanced FEC (EFEC) is not supported on Port 1 of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards. Table 11-16 lists the FEC configuration supported on OTU2/OTU2e protocol for 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.

Table 11-16 Client Interface Data Rates for 40G-MXP-C, 40E-MXP-C and 40ME-MXP-C Cards

40G-MXP-C, 40E-MXP-C and 40ME-MXP-C Client Port	FEC Configuration Supported on OTU2/OTU2e Client Protocol
Port 1	Only Standard FEC
Port 2	Standard and Enhanced FEC
Port 3	Standard and Enhanced FEC
Port 4	Standard and Enhanced FEC

When setting up the card for the first time, or when the card comes up after clearing the LOS-P condition due to fiber cut, the trunk port of the 40G-MXP-C card takes about 6 minutes to lock a signal. The trunk port of the 40G-MXP-C card raises an OTUK-LOF alarm when the card is comes up. The alarm clears when the trunk port locks the signal.

When a protection switch occurs on the 40E-TXP-C and 40ME-TXP-C cards, the recovery from PSM protection switch takes about 3 to 4 minutes.

The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards is tunable over C-band on the trunk port. The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards support pluggable XFPs on the client ports on the card faceplate. The card uses dual LC connectors on the trunk side, and XFP modules on the client side for optical cable termination. The XFP pluggable modules are SR, LR, MM, DWDM, or CWDM and support an LC fiber connector. The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards contains four XFP modules for the client interfaces. For optical termination, each XFP uses two LC connectors, which are labeled TX and RX on the faceplate. The trunk port is a dual LC connector facing downward at 45 degrees.

Table 11-17 shows the input data rate for each client interface.

Table 11-17 Client Interface Input Data Rates for 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Client Interface	Input Data Rate
8-Gigabit Fibre Channel	8.48 Gbps
10-Gigabit Fibre Channel	10.519 Gbps
10-GigabitEthernet LAN-Phy	10.312 Gbps
10-GigabitEthernet WAN-Phy	9.953 Gbps
OC-192/STM-64	9.953 Gbps
OTU2	10.709 Gbps
OTU2e	11.096 Gbps

11.13.1 Key Features

The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards provides the following key features:

- The 40G-MXP-C card uses the RZ-DQPSK 40G modulation format.
- The 40E-MXP-C and 40ME-MXP-C cards uses the CP-DQPSK modulation format.
- Onboard E-FEC processor—The E-FEC functionality improves the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (239,255) correction algorithm. A new BCH algorithm implemented (according to G.975.1 I.7) in E-FEC allows recovery of an input BER up to 1E-3. The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards support both the standard RS (specified in ITU-T G.709) and E-FEC standard, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces.
- Y-cable protection—Supports Y-cable protection only between the same card type on ports with the same port number and signal rate. For more information on Y-cable protection, seethe "G.35.1 Y-Cable and Splitter Protection" section on page G-27.

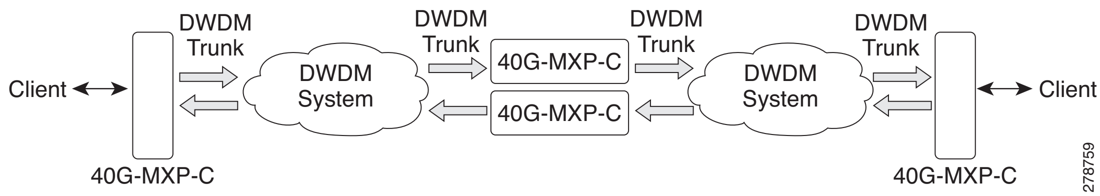
Note Y-cable cannot be created on a 10 GE port when WIS framing is enabled on the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.

- Unidirectional regeneration—The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards supports unidirectional regeneration configuration. Each 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C card in the configuration regenerates the signal received from another 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C card in one direction.

Note When you configure the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards in the Unidirectional Regen mode, ensure that the payload is not configured on the pluggable port modules of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C card.

Figure 11-15 shows a typical unidirectional regeneration configuration.

Figure 11-15 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards in Unidirectional Regeneration Configuration

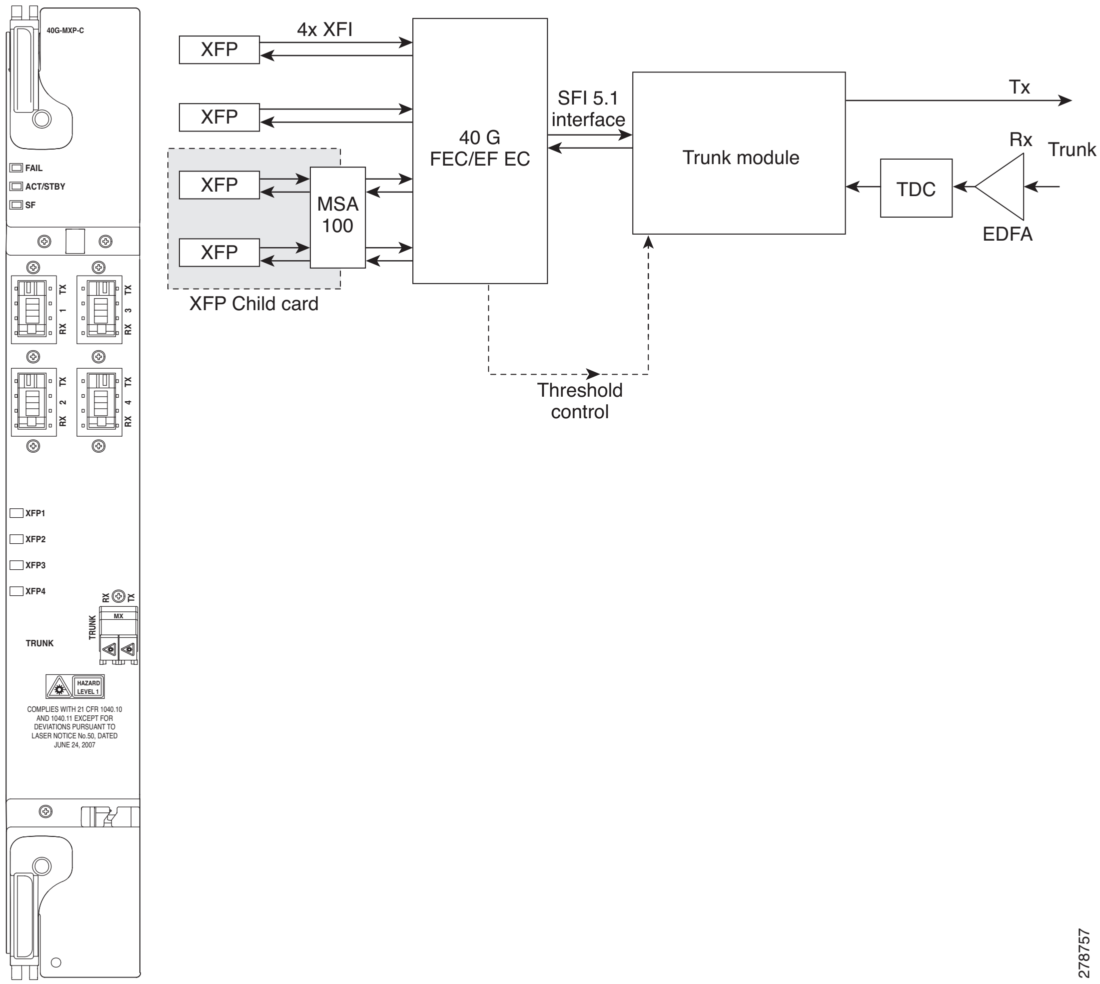


- High level provisioning support—The cards are initially provisioned using Cisco Transport Planner software. Subsequently, the card can be monitored and provisioned using CTC software.
- Automatic Laser Shutdown (ALS)—A safety mechanism, Automatic Laser Shutdown (ALS), is used in the event of a fiber cut. The Auto Restart ALS option is supported only for OC-192/STM-64 and OTU2 payloads. The Manual Restart ALS option is supported for all payloads. For more information on provisioning ALS for the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards, see the "NTP-G162 Change the ALS Maintenance Settings" section on page 11-449.
- Control of layered SONET/SDH transport overhead—The cards are provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- Automatic timing source synchronization—The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards synchronize to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards. Because of a maintenance or upgrade activity, if the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards are not available, the cards automatically synchronize to one of the input client interface clocks.
- Squelching policy—The cards are set to squelch the client interface output if there is LOS at the DWDM receiver, or if there is a remote fault. In the event of a remote fault, the card manages MS-AIS insertion.
- The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards are tunable across the full C-band wavelength.

11.13.2 Faceplate and Block Diagram

Figure 11-16 shows the faceplate and block diagram of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.

Figure 11-16 Faceplate and Block Diagram of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards



For information about safety labels for the cards, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the cards. Using direct fiber loopbacks causes irreparable damage to the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.

11.13.3 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Functions

The functions of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards are:

- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-9 on page G-11

11.13.3.1 Wavelength Identification

The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards use trunk lasers that are wavelocked, which allows the trunk transmitter to operate on the ITU grid effectively. These cards implement the UT2 module; they use a C-band version of the UT2.

Table 11-18 lists the required trunk transmit laser wavelengths for the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards. The laser is tunable over 82 wavelengths in the C-band at 50-GHz spacing on the ITU grid.

Table 11-18 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747

Table 11-18 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

11.13.4 Related Procedures for 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

The following is the list of procedures and tasks related to the configuration of 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards:

- NTP-G293 Modify the 40G Muxponder Card Line Settings and PM Parameter Thresholds, page 11-323
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G75 Monitor Transponder and Muxponder Performance

11.14 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards

GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards are Gigabit Ethernet Xponders for the ONS 15454 ANSI and ETSI platforms.

Note GE_XPE card is the enhanced version of the GE_XP card and 10GE_XPE card is the enhanced version of the 10GE_XP card.

The cards aggregate Ethernet packets received on the client ports for transport on C-band trunk ports that operate on a 100-GHz grid. The trunk ports operate with ITU-T G.709 framing and either FEC or E-FEC. The GE_XP and 10GE_XP cards are designed for bulk point-to-point transport over 10GE LAN PHY wavelengths for Video-on-Demand (VOD), or broadcast video across protected 10GE LAN PHY wavelengths. The GE_XPE and 10GE_XPE cards are designed for bulk GE_XPE or 10GE_XPE point-to-point, point-to-multipoint, multipoint-to-multipoint transport over 10GE LAN PHY wavelengths for Video-on-Demand (VOD), or broadcast video across protected 10GE LAN PHY wavelengths.

You can install and provision the GE_XP, and GE_XPE cards in a linear configuration in:

- Slots 1 to 5 and 12 to 16 in ONS 15454 DWDM chassis
- Slot 2 in ONS 15454 M2 chassis
- Slots 2 to 6 in ONS 15454 M6 chassis

The 10GE_XP and 10GE_XPE cards can be installed in Slots 1 through 6 or 12 through 17. The GE_XP and GE_XPE are double-slot cards with twenty Gigabit Ethernet client ports and two 10 Gigabit Ethernet trunk ports. The 10GE_XP and 10GE_XPE are single-slot cards with two 10 Gigabit Ethernet client ports and two 10 Gigabit Ethernet trunk ports. The client ports support SX, LX, and ZX SFPs and SR and 10GBASE-LR XFPs. (LR2 XFPs are not supported.) The trunk ports support a DWDM XFP.

The RAD pluggables (ONS-SC-E3-T3-PW= and ONS-SC-E1-T1-PW=) do not support:

- No loopbacks (Terminal or Facility)
- RAI (Remote Alarm Indication) alarm
- AIS and LOS alarm

Caution A fan-tray assembly (15454E-CC-FTA for the ETSI shelf, or 15454-CC-FTA for the ANSI shelf) must be installed in a shelf where a GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed.

GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards can be provisioned to perform different Gigabit Ethernet transport roles. All the cards can work as Layer 2 switches. However, the 10GE_XP and 10GE_XPE cards can also perform as a 10 Gigabit Ethernet transponders (10GE TXP mode), and the GE_XP and GE_XPE can perform as a 10 Gigabit Ethernet or 20 Gigabit Ethernet muxponders (10GE MXP or 20GE MXP mode). Table 11-19 shows the card modes supported by each card.

Note Changing the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card mode requires the ports to be in a OOS-DSBL (ANSI) or Locked, disabled (ETSI) service state. In addition, no circuits can be provisioned on the cards when the mode is being changed.

Table 11-19 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Modes

Card Mode	Cards	Description
Layer 2 Ethernet switch	GE_XP 10GE_XP GE_XPE 10GE_XPE	Provides capability to switch between any two ports irrespective of client or trunk port. Supported Ethernet protocols and services include 1+1 protection, QoS (Quality of Service), CoS (Class of Service), QinQ, MAC learning, MAC address retrieval, service provider VLANs (SVLANs), IGMP snooping and Multicast VLAN Registration (MVR), link integrity, and other Ethernet switch services.
10GE TXP	10GE_XP 10GE_XPE	Provides a point-to-point application in which each 10 Gigabit Ethernet client port is mapped to a 10 Gigabit Ethernet trunk port.
10GE MXP 20GE MXP	GE_XP GE_XPE	Provides the ability to multiplex the twenty Gigabit Ethernet client ports on the card to one or both of its 10 Gigabit Ethernet trunk ports. The card can be provisioned as a single MXP with twenty Gigabit Ethernet client ports mapped to one trunk port (Port 21) or as two MXPs with ten Gigabit Ethernet client ports mapped to a trunk port (Ports 1 to 10 mapped to Port 21, and Ports 11-20 mapped to Port 22).

11.14.1 Key Features

The GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards have the following high-level features:

- Link Aggregation Control Protocol (LACP) that allows you to bundle several physical ports together to form a single logical channel.
- Ethernet Connectivity Fault Management (CFM) protocol that facilitates proactive connectivity monitoring, fault verification, and fault isolation.

- Ethernet Operations, Administration, and Maintenance (OAM) protocol that facilitates link monitoring, remote failure indication, and remote loopback.
- Resilient Ethernet Protocol (REP) that controls network loops, handles link failures, and improves convergence time.
- Configurable service VLANs (SVLANs) and customer VLANs (CVLANs).
- Ingress rate limiting that can be applied on both SVLANs and CVLANs. You can create SVLAN and CVLAN profiles and can associate a SVLAN profile to both UNI and NNI ports; however, you can associate a CVLAN profile only to UNI ports.
- CVLAN rate limiting that is supported for QinQ service in selective add mode.
- Differentiated Services Code Point (DSCP) to class of service (CoS) mapping that you can configure for each port. You can configure the CoS of the outer VLAN based on the incoming DSCP bits. This feature is supported only on GE_XPE and 10GE_XPE cards.
- Ports, in Layer 2 switch mode, can be provisioned as network-to-network interfaces (NNIs) or user-network interfaces (UNIs) to facilitate service provider to customer traffic management.
- Broadcast drop-and-continue capability for VOD and broadcast video applications.
- Gigabit Ethernet MXP, TXP, and Layer 2 switch capability over the ONS 15454 DWDM platform.
- Compatible with the ONS 15454 ANSI high-density shelf assembly, the ONS 15454 ETSI shelf assembly, ONS 15454 ETSI high-density shelf assembly, ONS 15454 M2, and the ONS 15454 M6 shelf assemblies. Compatible with TCC2, TCC2P, TCC3, TNC, TNCE, TSC, and TSCE cards.
- Far-End Laser Control (FELC) that is supported on copper SFPs from Release 8.52 and later releases. For more information on FELC, see the "G.36 Far-End Laser Control" section on page G-32.
- Layer 2 switch mode that provides VLAN translation, QinQ, ingress CoS, egress QoS, Fast Ethernet protection switching, and other Layer 2 Ethernet services.
- Interoperable with TXP_MR_10E and TXP_MR_10E_C cards. Also interoperable with Cisco Catalyst 6500 and Cisco 7600 series Gigabit Ethernet, 10 GE interfaces and CRS-1 10GE interfaces.
- The GE_XP and GE_XPE cards have twenty Gigabit Ethernet client ports and two 10 Gigabit Ethernet trunk ports. The 10GE_XP and 10GE_XPE cards have two 10 Gigabit Ethernet client ports and two 10 Gigabit Ethernet trunk ports. The client Gigabit Ethernet signals are mapped into an ITU-T G.709 OTU2 signal using standard ITU-T G.709 multiplexing when configured in one of the MXP modes (10GE MXP or 20GE MXP).
- ITU-T G.709 framing with standard Reed-Soloman (RS) (255,237) FEC. Performance monitoring and ITU-T G.709 Optical Data Unit (ODU) synchronous and asynchronous mapping. E-FEC with ITU-T G.709 ODU and 2.7 Gbps with greater than 8 dB coding gain.
- IEEE 802.3 frame format that is supported for 10 Gigabit Ethernet interfaces. The minimum frame size is 64 bytes. The maximum frame size is user-provisionable.
- MAC learning capability in Layer 2 switch mode.
- MAC address retrieval in cards provisioned in the L2-over-DWDM mode.
- When a port is in UNI mode, tagging can be configured as transparent or selective. In transparent mode, only SVLANs in the VLAN database of the node can be configured. In selective mode, a CVLAN- to-SVLAN relationship can be defined.
- Layer 2 VLAN port mapping that allows the cards to be configured as multiple Gigabit Ethernet TXPs and MXPs.
- Y-cable protection is configurable in TXP and MXP modes.

- Two protection schemes are available in Layer 2 mode. They are:
  - 1+1 protection—Protection scheme to address card, port, or shelf failures for client ports.
  - Fast Automatic Protection—Protection scheme to address card, port, or shelf failures for trunk ports.
- End-to-end Ethernet link integrity.
- Pluggable client interface optic modules (SFPs and XFPs)—Client ports support tri-rate SX, LX, and ZX SFPs, and 10-Gbps SR1 XFPs.
- Pluggable trunk interface optic modules; trunk ports support the DWDM XFP.
- Internet Group Management Protocol (IGMP) snooping that restricts the flooding of multicast traffic by forwarding multicast traffic to those interfaces where a multicast device is present.
- Multicast VLAN Registration (MVR) for applications using wide-scale deployment of multicast traffic across an Ethernet ring-based service provider network.
- Ingress CoS that assigns a CoS value to the port from 0 (highest) to 7 (lowest) and accepts CoS of incoming frames.
- Egress QoS that defines the QoS capabilities for the egress port.
- MAC address learning that facilitates switch processing.
- Storm Control that limits the number of packets passing through a port. You can define the maximum number of packets allowed per second for the following types of traffic: Broadcast, Multicast, and Unicast. The threshold for each type of traffic is independent and the maximum number of packets allowed per second for each type of traffic is 16777215.

11.14.2 Protocol Compatibility list

Table 11-20 lists the protocol compatibility for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

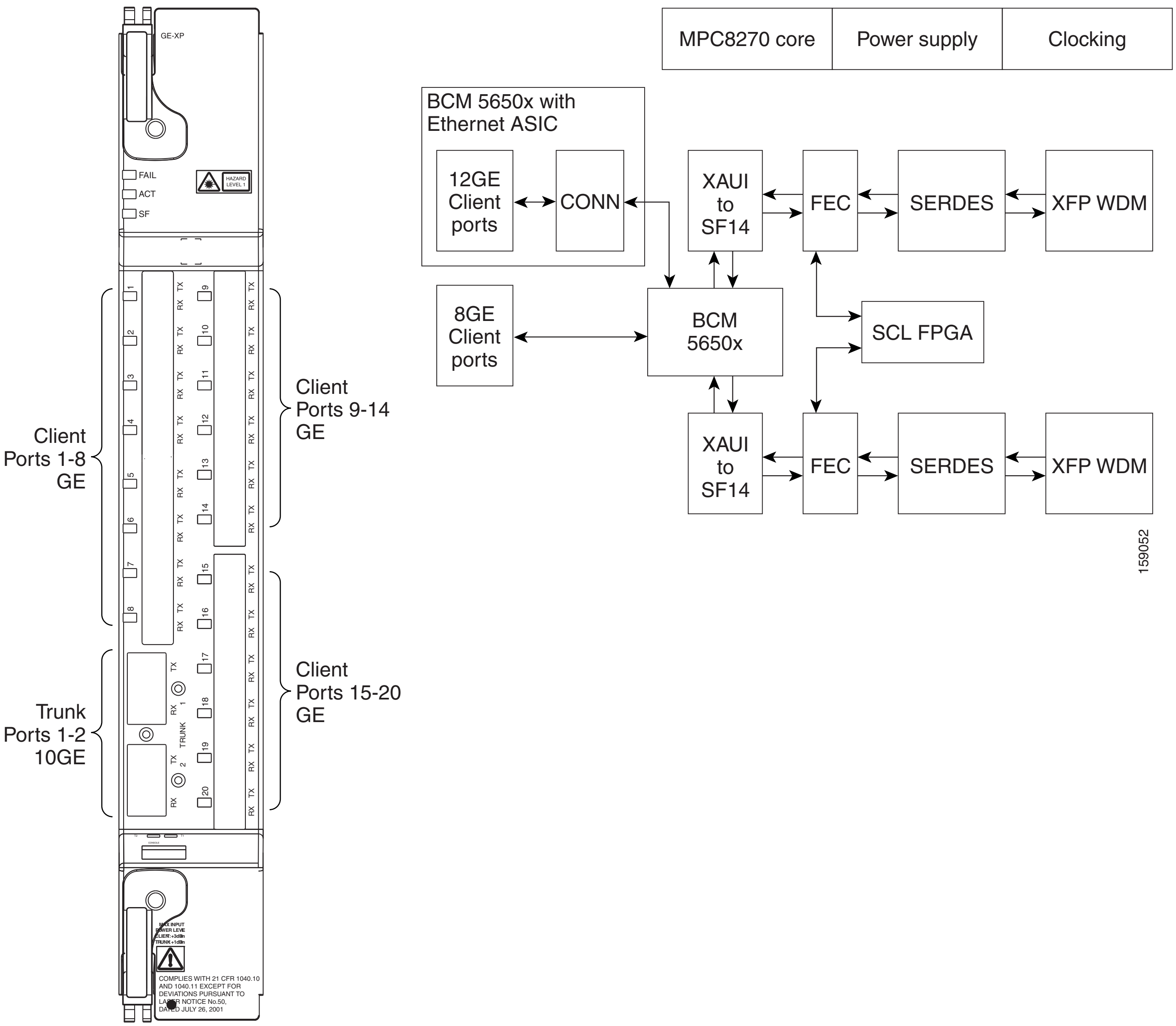
Table 11-20 Protocol Compatibility List for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards

Protocol	L1	1+1	FAPS	IGMP	REP	LACP	CFM	EFM
L1		No	Yes	Yes	No	No	Yes	No
1+1	No		Yes	Yes	No	No	Yes	No
FAPS	Yes	Yes		Yes	No	No	Yes	No
IGMP	Yes	Yes	Yes		Yes	No	Yes	No
REP	No	No	No	Yes		No	Yes	No
LACP	No	No	No	No	No		No	No
CFM	Yes	Yes	Yes	Yes	Yes	No		No
EFM	No	No	No	No	No	No	No	

11.14.3 Faceplate and Block Diagram

Figure 11-17 shows the GE_XP faceplate and block diagram. The GE_XPE faceplate and block diagram looks the same.

Figure 11-17 GE_XP and GE_XPE Faceplates and Block Diagram

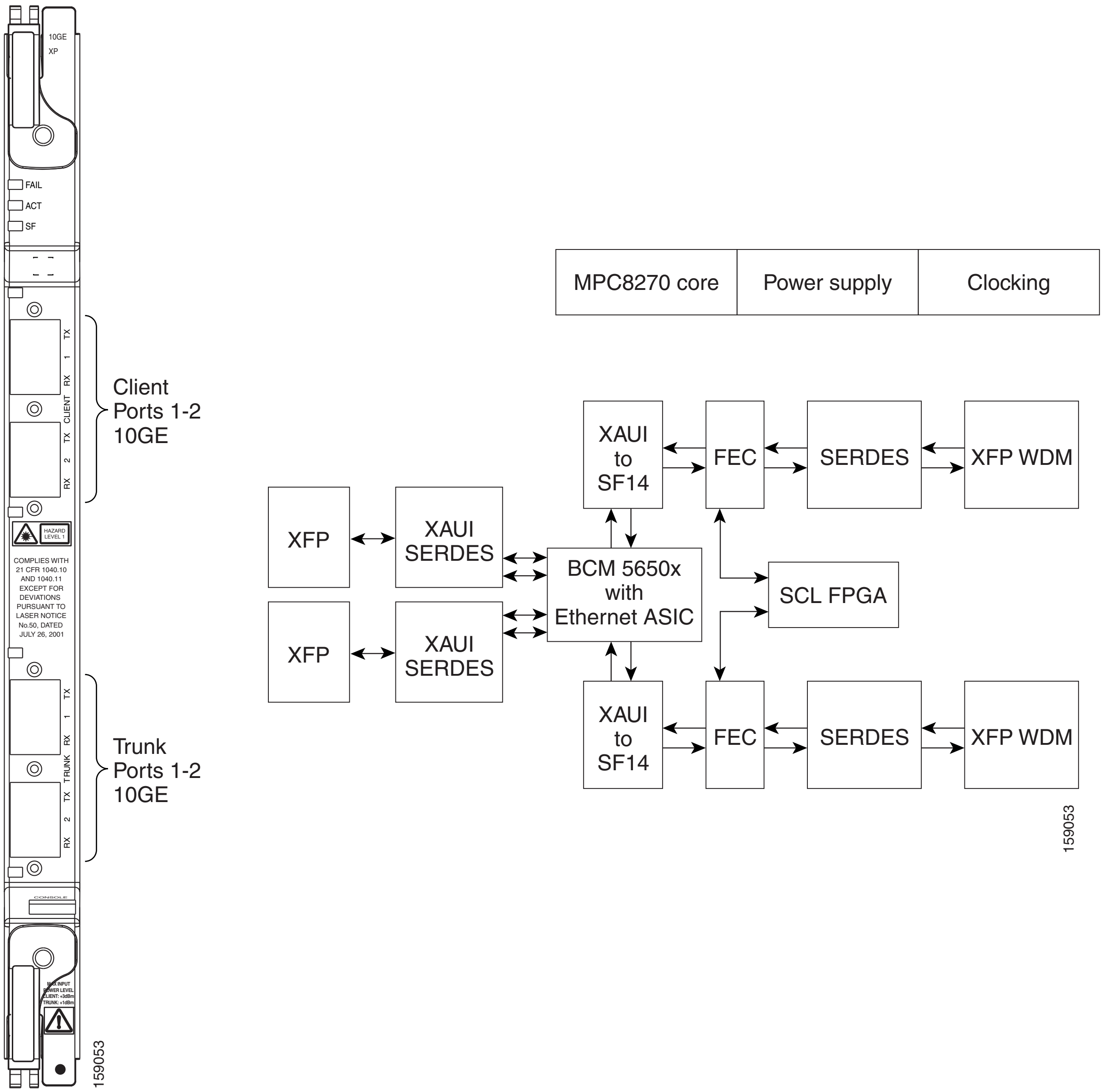


The GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards have two trunk ports. The GE_XP and GE_XPE trunk ports are displayed as follows:

- Trunk 1 and Trunk 2 on the faceplate
- 21-1 and 22-1 on CTC
- 21 (Trunk) and 22 (Trunk) on the Optics Thresholds table

Figure 11-18 shows the 10GE_XP faceplate and block diagram. The 10 GE_XPE faceplate and block diagram looks the same.

Figure 11-18 10GE_XP and 10GE_XPE Faceplates and Block Diagram



The 10GE_XP and 10GE_XPE card trunk ports are displayed as follows:

- Trunk 1 and Trunk 2 on the faceplate
- 3-1 and 4-1 on CTC
- 3 (Trunk) and 4 (Trunk) on the Optics Thresholds table

For information about safety labels for the cards, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the cards. Using direct fiber loopbacks causes irreparable damage to the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

11.14.4 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Functions

The functions of the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards are:

- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-9 on page G-11

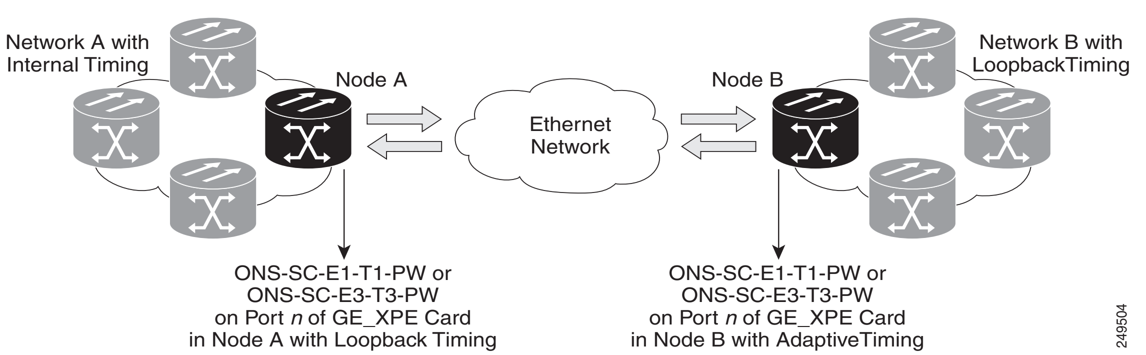
11.14.4.1 Client Interface

The client interface is implemented with separately orderable SFP or XFP modules. The client interfaces support the following tri-rate SFPs and XFPs using dual LC connectors and multimode fiber:

- SFP - GE/1G-FC/2G-FC - 850 nm - MM - LC (PID ONS-SE-G2F-SX)
- SFP - GE/1G-FC/2G-FC 1300 nm - SM - LC (PID ONS-SE-G2F-LX)
- SFP - GE/1G-FC/2G-FC 1300 nm - SM - LC (PID ONS-SE-G2F-ZX)
- SFP - 10/100/1000Base-T - Copper (PID ONS-SE-ZE-EL) Intra office up to 100;
  Cable: RJ45 STP CAT5, CAT5E, and CAT6
- SFP - 1000Base BX D/Gigabit Ethernet 1550 nm - SM - LC (PID ONS-SE-GE-BXD)
- SFP - 1000Base BX U/Gigabit Ethernet 1550 nm - SM - LC (PID ONS-SE-GE-BXU)
- SFP - Fast Ethernet 1310 nm - SM - LC (PID ONS-SI-100-LX10)
- SFP - Fast Ethernet 1310 nm - MM - LC (PID ONS-SI-100-FX)
- SFP - Fast Ethernet over DS1/E1 - SM - LC (PID ONS-SC-EOP1) (GE_XPE only)
- SFP - Fast Ethernet over DS3/E3 - SM - LC (PID ONS-SC-EOP3) (GE_XPE only)
- SFP - E1/DS1 over Fast Ethernet - SM - LC (PID ONS-SC-E1-T1-PW) (GE_XPE only)
- SFP - E3/DS3 PDH over Fast Ethernet - SM - LC (PID ONS-SC-E3-T3-PW) (GE_XPE only)

Note The recommended topology for using ONS-SC-E1-T1-PW and ONS-SC-E3-T3-PW SFPs is shown in Figure 11-19.

Figure 11-19 Recommended Topology for Using ONS-SC-E1-T1-PW and ONS -SC-E3-T3-PW SFPs



The client interfaces support the following dual-rate XFP using dual LC connectors and single-mode fiber:

- XFP - OC-192/STM-64/10GE/10-FC/OTU2 - 1310 SR - SM LC (PID: ONS-XC-10G-S1)
- XFP - 10GE - 1550 nm - SM - LC (PID ONS-XC-10G-L2)
- XFP - 10GE - 1550 nm - SM - LC (PID ONS-XC-10G-C)

Note If ONS-XC-10G-C XFP is used on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards on client port 1, the maximum temperature at which the system qualifies is +45 degree Celsius.

The client interfaces support the following multimode XFP using dual LC connectors and multi-mode fiber:

- XFP - OC-192/10GFC/10GE - 850 nm MM LC (PID ONS-XC-10G-SR-MM)

11.14.4.2 DWDM Trunk Interface

The GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards have two 10 Gigabit Ethernet trunk ports operating at 10 Gigabit Ethernet (10.3125 Gbps) or 10 Gigabit Ethernet into OTU2 (nonstandard 11.0957 Gbps). The ports are compliant with ITU-T G.707, ITU-T G.709, and Telcordia GR-253-CORE standards. The ports are capable of carrying C-band and L-band wavelengths through insertion of DWDM XFPs. Forty channels are available in the 1550-nm C band 100-GHz ITU grid, and forty channels are available in the L band.

11.14.4.3 Configuration Management

The GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards support the following configuration management parameters:

- Port name—User-assigned text string.
- Admin State/Service State—Administrative and service states to manage and view port status.
- MTU—Provisionable maximum transfer unit (MTU) to set the maximum number of bytes per frames accepted on the port.
- Mode—Provisional port mode, either Autonegotiation or the port speed.
- Flow Control—Flow control according to IEEE 802.1x pause frame specification can be enabled or disabled for TX and RX ports.
- Bandwidth—Provisionable maximum bandwidth allowed for the port.
- Ingress CoS—Assigns a CoS value to the port from 0 (highest) to 7 (lowest) and accepts CoS of incoming frames.
- Egress QoS—Defines the QoS capabilities at the egress port.
- NIM—Defines the port network interface management type based on Metro Ethernet Forum specifications. Ports can be defined as UNI or NNI.
- MAC Learning—MAC address learning to facilitate switch processing.
- VLAN tagging provided according to the IEEE 802.1Q standard.

Note When the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards are provisioned in a MXP or TXP mode, only the following parameters are available: Port Name, State, MTU, Mode, Flow control, and Bandwidth.

11.14.4.4 Security

GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card ports can be provisioned to block traffic from a user-defined set of MAC addresses. The remaining traffic is normally switched. You can manually specify the set of blocked MAC addresses for each port. Each port of the card can receive traffic from a limited predefined set of MAC addresses. The remaining traffic will be dropped. This capability is a subset of the Cisco IOS “Port Security” feature.

11.14.4.5 Card Protection

The following card protection schemes are available for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

- Y-Cable Protection—See the “G.35.1.1 Y-Cable Protection” section on page G-27.
- 1+1 Protection—See the “G.35.2 1+1 Protection” section on page G-30.
- Layer 2 Over DWDM Protection—See the “G.35.3 Layer 2 Over DWDM Protection” section on page G-31.

11.14.4.5.1 Related Procedures for Card Protection

The following are the related procedures for creating card protection on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards:

- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G198 Create 1+1 Protection for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards, page 11-168
- DLP-G381 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Layer 2 Protection Settings, page 11-394

11.14.5 IGMP Snooping

As networks increase in size, multicast routing becomes critically important as a means to determine which segments require multicast traffic and which do not. IP multicasting allows IP traffic to be propagated from one source to a number of destinations, or from many sources to many destinations. Rather than sending one packet to each destination, one packet is sent to the multicast group identified by a single IP destination group address. GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards can learn up to a maximum of 1024 multicast groups. This includes groups on all the VLANs.

Internet Group Management Protocol (IGMP) snooping restricts the flooding of multicast traffic by forwarding multicast traffic to those interfaces where a multicast device is present.

When the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card receives an IGMP leave group message from a host, it removes the host port from the multicast forwarding table after generating group specific queries to ensure that no other hosts interested in traffic for the particular group are present on that port. Even in the absence of any “leave” message, the cards have a timeout mechanism to update the group table with the latest information. After a card relays IGMP queries from the multicast router, it deletes entries periodically if it does not receive any IGMP membership reports from the multicast clients.

In a multicast router, general queries are sent on a VLAN when Protocol Independent Multicast (PIM) is enabled on the VLAN. The GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card forwards queries to all ports belonging to the VLAN. All hosts interested in this multicast traffic send Join requests and are added to the forwarding table entry. The Join requests are forwarded only to router ports. By default, these router ports are learned dynamically. However, they can also be statically configured at the port level in which case the static configuration overrides dynamic learning.

For information about interaction of IGMP with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62.

11.14.5.1 IGMP Snooping Guidelines and Restrictions

The following guidelines and restrictions apply to IGMP snooping on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards:

- IGMP snooping V2 is supported as specified in RFC 4541.
- IGMP snooping V3 is not supported and the packets are flooded in the SVLAN.
- Layer 2 multicast groups learned through IGMP snooping are dynamic.
- GE_XP and 10GE_XP cards support IGMP snooping on 128 stacked VLANs and GE_XPE and 10GE_XPE cards support up to 256 stacked VLANs that are enabled.
- IGMP snooping can be configured per SVLAN or CVLAN. By default, IGMP snooping is disabled on all SVLANs and CVLANs.
- IGMP snooping on CVLAN is enabled only when:
  - MVR is enabled.
  - UNI ports are in selective add and selective translate modes. For each UNI port, a CVLAN must be specified for which IGMP snooping is to be enabled.
- IGMP snooping can be enabled only on one CVLAN per port. If you enable IGMP snooping on CVLAN, you cannot enable IGMP snooping on the associated SVLAN and vice versa. The number of VLANs that can be enabled for IGMP snooping cannot exceed 128.
- When IGMP snooping is enabled on double-tagged packets, CVLAN has to be the same on all ports attached to the same SVLAN.
- When IGMP snooping is working with the Fast Automatic Protection Switch (FAPS) in a ring-based setup, it is advisable to configure all NNI ports as static router ports. This minimizes the multicast traffic hit when a FAPS switchover occurs.

The following conditions are raised from IGMP snooping at the card:

- MCAST-MAC-TABLE-FULL—This condition is raised when the multicast table is full and a new join request is received. This table is cleared when at least one entry gets cleared from the multicast table after the alarm is raised.
- MCAST-MAC-ALIASING—This condition is raised when there are multiple L3 addresses that map to the same L2 address in a VLAN. This is a transient condition.

For more information on severity level of these conditions and procedure to clear these alarms, refer to the *Cisco ONS 15454 Troubleshooting Guide*.

11.14.5.2 Fast-Leave Processing

Note Fast-Leave processing is also known as Immediate-Leave.

IGMP snooping Fast-Leave processing allows the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE to remove an interface that sends a leave message from the forwarding table without first sending group specific queries to the interface. When you enable IGMP Fast-Leave processing, the card immediately removes a port from the IP multicast group when it detects an IGMP, version 2 (IGMPv2) leave message on that port.

11.14.5.3 Static Router Port Configuration

Multicast-capable ports are added to the forwarding table for every IP multicast entry. The card learns of such ports through the PIM method.

11.14.5.4 Report Suppression

Report suppression is used to avoid a storm of responses to an IGMP query. When this feature is enabled, a single IGMP report is sent to each multicast group in response to a single query. Whenever an IGMP snooping report is received, report suppression happens if the report suppression timer is running. The Report suppression timer is started when the first report is received for a general query. Then this time is set to the response time specified in general query.

11.14.5.5 IGMP Statistics and Counters

An entry in a counter contains multicasting statistical information for the IGMP snooping capable GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card. It provides statistical information about IGMP messages that have been transmitted and received. IGMP statistics and counters can be viewed via CTC from the Performance > Ether Ports > Statistics tab.

This information can be stored in the following counters:

- cisTxGeneralQueries—Number of general queries transmitted through an interface.
- cisTxGroupSpecificQueries—Total group specific queries transmitted through an interface.
- cisTxReports—Total membership reports transmitted through an interface.
- cisTxLeaves—Total Leave messages transmitted through an interface.
- cisRxGeneralQueries—Total general queries received at an interface.
- cisRxGroupSpecificQueries—Total Group Specific Queries received at an interface.
- cisRxReports—Total Membership Reports received at an interface.
- cisRxLeaves—Total Leave messages received at an interface.
- cisRxValidPackets—Total valid IGMP packets received at an interface.
- cisRxInvalidPackets—Total number of packets that are not valid IGMP messages received at an interface.

11.14.5.6 Related Procedure for Enabling IGMP Snooping

To enable IGMP snooping on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the "NTP-G204 Enable IGMP Snooping on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards" section on page 11-412.

11.14.6 Multicast VLAN Registration

Multicast VLAN Registration (MVR) is designed for applications using wide-scale deployment of multicast traffic across an Ethernet-ring-based service provider network (for example, the broadcast of multiple television channels over a service-provider network). MVR allows a subscriber on a port to subscribe and unsubscribe to a multicast stream on the network-wide multicast VLAN. It allows the single multicast VLAN to be shared in the network while subscribers remain in separate VLANs. MVR provides the ability to continuously send multicast streams in the multicast VLAN, but to isolate the streams from the subscriber VLANs for bandwidth and security reasons.

MVR assumes that subscriber ports subscribe and unsubscribe (“Join” and “Leave”) these multicast streams by sending out IGMP Join and Leave messages. These messages can originate from an IGMP version-2-compatible host with an Ethernet connection. MVR operates on the underlying mechanism of IGMP snooping. MVR works only when IGMP snooping is enabled.

The card identifies the MVR IP multicast streams and their associated MAC addresses in the card forwarding table, intercepts the IGMP messages, and modifies the forwarding table to include or remove the subscriber as a receiver of the multicast stream, even though the receivers is in a different VLAN than the source. This forwarding behavior selectively allows traffic to cross between different VLANs.

Note When MVR is configured, the port facing the router must be configured as NNI in order to allow the router to generate or send multicast stream to the host with the SVLAN. If router port is configured as UNI, the MVR will not work properly.

11.14.6.1 Related Procedure for Enabling MVR

To enable MVR on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the “NTP-G206 Enable MVR on a GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card” section on page 11-414.

11.14.7 MAC Address Learning

The GE_XPE and 10 GE_XPE cards support 32K MAC addresses. MAC address learning can be enabled or disabled per SVLAN on GE_XPE and 10 GE_XPE cards. The cards learn the MAC address of packets they receive on each port and add the MAC address and its associated port number to the MAC address learning table. As stations are added or removed from the network, the GE_XPE and 10 GE_XPE cards update the MAC address learning table, adding new dynamic addresses and aging out those that are currently not in use.

MAC address learning can be enabled or disabled per SVLAN. When the configuration is changed from enable to disable, all the related MAC addresses are cleared. The following conditions apply:

- If MAC address learning is enabled on per port basis, the MAC address learning is not enabled on all VLANs, but only on VLANs that have MAC address learning enabled.
- If per port MAC address learning is disabled then the MAC address learning is disabled on all VLANs, even if it is enabled on some of the VLAN supported by the port.
- If the per port MAC address learning is configured on GE-XP and 10 GE-XP cards, before upgrading to GE-XPE or 10 GE-XPE cards, enable MAC address learning per SVLAN. Failing to do so disables MAC address learning.

11.14.7.1 Related Procedure for MAC Address Learning

To enable MAC address learning on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the "DLP-G221 Enable MAC Address Learning on SVLANs for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards" section on page 11-402.

11.14.8 MAC Address Retrieval

MAC addresses learned can be retrieved or cleared on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards provisioned in L2-over-DWDM mode. The MAC addresses can be retrieved using the CTC or TL1 interface.

GE_XPE and 10GE_XPE cards support 32K MAC addresses and GE_XP and 10GE_XP cards support 16K MAC addresses. To avoid delay in processing requests, the learned MAC addresses are retrieved using an SVLAN range. The valid SVLAN range is from 1 to 4093.

The MAC addresses of the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards can also be retrieved. The card MAC addresses are static and are used for troubleshooting activities. One MAC address is assigned to each client, trunk, and CPU ports of the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card. These internal MAC addresses can be used to determine if the packets received on the far-end node are generated by GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

For MAC address retrieval, the following conditions apply:

- The cards must be provisioned in L2-over-DWDM mode.
- MAC address learning must be enabled per SVLAN on GE_XPE or 10 GE_XPE cards.
- MAC address learning must be enabled per port on GE_XP or 10 GE_XP cards.

11.14.8.1 Related Procedure for MAC Address Retrieving

To retrieve and clear MAC addresses on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the "NTP-G237 Retrieve and Clear MAC Addresses on SVLANs for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards" section on page 11-404.

11.14.9 Link Integrity

The GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card support end-to-end Ethernet link integrity. This capability is integral to providing an Ethernet private line service and correct operation of Layer 2 and Layer 3 protocols on the attached Ethernet devices.

The link integrity feature propagates a trunk fault on all the affected SVLAN circuits in order to squelch the far end client interface. Ethernet-Advanced IP Services (E-AIS) packets are generated on a per-port/SVLAN basis. An E-AIS format is compliant with ITU Y.1731.

Note E-AIS packets are marked with a CoS value of 7 (also called .1p bits). Ensure that the network is not overloaded and there is sufficient bandwidth for this queue in order to avoid packet drops.

When link integrity is enabled on a per-port SVLAN basis, E-AIS packets are generated when the following alarms are raised;

- LOS-P

- OTUKLOF/LOM
- SIGLOSS
- SYNCHLOSS
- OOS
- PPM not present

When link integrity is enabled, GE_XP and 10 GE_XP card supports up to128 SVLANs and GE_XPE, 10 GE_XPE can support up to 256 SVLANs.

11.14.9.1 Related Procedure for Enabling Link Integrity

To enable link integrity on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the "NTP-G205 Enable Link Integrity on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards" section on page 11-407.

11.14.10 Ingress CoS

Ingress CoS functionality enables differentiated services across the GE_XPE and 10GE_XPE cards. A wide range of networking requirements can be provisioned by specifying the class of service applicable to each transmitted traffic.

When a CVLAN is configured as ingress CoS, the per-port settings are not considered. A maximum of 128 CVLAN and CoS relationships can be configured.

11.14.10.1 Related Procedure for Enabling Ingress CoS

To enable Ingress CoS on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the:

- "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" section on page 11-382
- "DLP-G612 Modify the Parameters of the Channel Group Using CTC" section on page 11-348

11.14.11 CVLAN Rate Limiting

CVLAN rate limiting is supported on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards. CVLAN rate limiting is supported for QinQ service in selective add mode. The following limitations and restrictions apply to CVLAN rate limiting:

- CVLAN rate limiting is not supported for the following service types:
  - Selective translate mode
  - Transparent mode
  - Selective double add mode
  - Selective translate add mode
  - Untagged packets
  - CVLAN range
  - Services associated with the channel group
- CVLAN rate limiting and SVLAN rate limiting cannot be applied to the same service instance.

- Pseudo-IOS command line interface (PCLI) is not supported for CVLAN rate limiting.
- A VLAN profile with Link Integrity option enabled cannot be used to perform CVLAN rate limiting.
- On GE_XP and 10 GE_XP cards, CVLAN rate limiting can be applied to up to 128 services. However, the number of provisionable CVLAN rate limiting service instances is equal to 192 minus the number of SVLAN rate limiting service instances present on the card (subject to a minimum of 64 CVLAN rate limiting service instances).
- On GE_XPE and 10 GE_XPE cards, CVLAN rate limiting can be applied to up to 256 services. However, the number of provisionable CVLAN rate limiting service instances is equal to 384 minus the number of SVLAN rate limiting service instances present on the card (subject to a minimum of 128 CVLAN rate limiting service instances).

11.14.11.1 Related Procedure for Provisioning CVLAN Rate

To provision CVLAN rate on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the "NTP-G289 Provision CVLAN Rate Limiting on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card" section on page 11-409.

11.14.12 DSCP to CoS Mapping

DSCP to CoS mapping can be configured for each port. You can configure the CoS of the outer VLAN based on the incoming DSCP bits. This feature is supported only on GE_XPE and 10GE_XPE cards. PCLI is not supported for DSCP to CoS mapping.

DSCP to CoS mapping is supported for the following service types:

- Selective add mode
- Selective translate mode
- Transparent mode
- Selective double add mode
- Selective translate add mode
- Untagged packets
- CVLAN range
- Services associated with the channel group

11.14.12.1 Related Procedure for Provisioning CoS Based on DSCP

To provision CoS based on DSCP on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" section on page 11-400.

11.14.13 Link Aggregation Control Protocol

Link Aggregation Control Protocol (LACP) is part of the IEEE802.3ad standard that allows you to bundle several physical ports together to form a single logical channel. LACP allows a network device such as a switch to negotiate an automatic bundling of links by sending LACP packets to the peer device.

LACP allows you to form a single Layer 2 link automatically from two or more Ethernet links. This protocol ensures that both ends of the Ethernet link are functional and agree to be members of the aggregation group before the link is added to the group. LACP must be enabled at both ends of the link to be operational.

For more information on LACP, refer to the IEEE802.3ad standard. For information about interaction of LACP with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62.

11.14.13.1 Advantages of LACP

LACP provides the following advantages:

- High-speed network that transfers more data than any single port or device.
- High reliability and redundancy. If a port fails, traffic continues on the remaining ports.
- Hashing algorithm that allows to apply load balancing policies on the bundled ports.

11.14.13.2 Functions of LACP

LACP performs the following functions in the system:

- Maintains configuration information to control aggregation.
- Exchanges configuration information with other peer devices.
- Attaches or detaches ports from the link aggregation group based on the exchanged configuration information.
- Enables data flow when both sides of the aggregation group are synchronized.

11.14.13.3 Modes of LACP

LACP can be configured in the following modes:

- On — Default. In this mode, the ports do not exchange LACP packets with the partner ports.
- Active — In this mode, the ports send LACP packets at regular intervals to the partner ports.
- Passive — In this mode, the ports do not send LACP packets until the partner sends LACP packets. After receiving the LACP packets from the partner ports, the ports send LACP packets.

11.14.13.4 Parameters of LACP

LACP uses the following parameters to control aggregation:

- System Identifier—A unique identification assigned to each system. It is the concatenation of the system priority and a globally administered individual MAC address.
- Port Identification—A unique identifier for each physical port in the system. It is the concatenation of the port priority and the port number.
- Port Capability Identification—An integer, called a key, that identifies the capability of one port to aggregate with another port. There are two types of keys:
  - Administrative key—The network administrator configures this key.
  - Operational key—The LACP assigns this key to a port, based on its aggregation capability.
- Aggregation Identifier—A unique integer that is assigned to each aggregator and is used for identification within the system.

11.14.13.5 Unicast Hashing Schemes

LACP supports the following unicast hashing schemes:

- Ucast SA VLAN Incoming Port
- Ucast DA VLAN Incoming Port
- Ucast SA DA VLAN Incoming port
- Ucast Src IP TCP UDP
- Ucast Dst IP TCP UDP
- Ucast Src Dst IP TCP UDP

Note Unicast hashing schemes apply to unicast traffic streams only when the destination MAC address is already learned by the card. Hence, MAC learning must be enabled to support load balancing as per the configured hashing scheme. If the destination MAC address is not learned, the hashing scheme is Ucast Src Dst IP TCP UDP.

11.14.13.6 LACP Limitations and Restrictions

The LACP on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards has the following limitations and restrictions:

- Hot standby link state is not supported on the channel group.
- Marker protocol generator is not supported.
- ALS cannot be configured on the channel group.
- Loopback configuration cannot be applied on the channel group.

11.14.13.7 Related Procedure for LACP

To provision Channel Group using LACP, see the "NTP-G281 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Channel Group Settings" section on page 11-346.

11.14.14 Ethernet Connectivity Fault Management

Ethernet Connectivity Fault Management (CFM) is part of the IEEE 802.1ag standard. The Ethernet CFM is an end-to-end per service instance that supports the Ethernet layer Operations, Administration, and Management (OAM) protocol. It includes proactive connectivity monitoring, link trace on a per service basis, fault verification, and fault isolation for large Ethernet metropolitan-area networks (MANs) and WANs.

CFM is disabled on the card by default. CFM is enabled on all the ports by default.

For more information on CFM, refer to the IEEE 802.1ag standard. For information about interaction of CFM with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62. The following sections contain conceptual information about Ethernet CFM.

11.14.14.1 Maintenance Domain

A maintenance domain is an administrative domain that manages and administers a network. You can assign a unique maintenance level (from 0 to 7) to define the hierarchical relationship between domains. The larger the domain, the higher the maintenance level for that domain. For example, a service provider domain would be larger than an operator domain and might have a maintenance level of 6, while the operator domain maintenance level would be 3 or 4.

Maintenance domains cannot intersect or overlap because that would require more than one entity to manage it, which is not allowed. Domains can touch or nest if the outer domain has a higher maintenance level than the nested domain. Maintenance levels of nesting domains must be communicated among the administrating organizations. For example, one approach would be to have the service provider assign maintenance levels to operators.

The CFM protocol supports up to eight maintenance domains on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

11.14.14.2 Maintenance Association

A maintenance association identifies a service within the maintenance domain. You can have any number of maintenance associations within each maintenance domain. The CFM protocol supports up to 1500 maintenance associations on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

Note Each maintenance association is mapped to a maintenance domain. This mapping is done to configure a Maintenance End Point (MEP). The CFM protocol supports up to 1000 mappings on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

11.14.14.3 Maintenance End Points

Maintenance End Points (MEPs) reside at the edge of the maintenance domain and are active elements of the Ethernet CFM. MEPs transmit Continuity Check messages at periodic intervals and receive similar messages from other MEPs within a domain. MEPs also transmit Loopback and Traceroute messages at the request of the administrator. MEPs confine CFM messages within the boundary of a maintenance domain through the maintenance level. There are two types of MEPs:

- Up (Inwards, towards the bridge)
- Down (Outwards, towards the wire).

You can create up to 255 MEPs and MIPs together on GE_XP and 10GE_XP cards. You can create up to 500 MEPs and MIPs together on GE_XPE and 10GE_XPE cards.

The MEP continuity check database (CCDB) stores information that is received from other MEPs in the maintenance domain. The card can store up to 4000 MEP CCDB entries.

11.14.14.4 Maintenance Intermediate Points

Maintenance Intermediate Points (MIPs) are internal to the maintenance domain and are passive elements of the Ethernet CFM. They store information received from MEPs and respond to Linktrace and Loopback CFM messages. MIPs forward CFM frames received from MEPs and other MIPs, drop all CFM frames at a lower level, and forward all CFM frames at a higher level.

You can create up to 255 MEPs and MIPs together on GE_XP and 10GE_XP cards. You can create up to 500 MEPs and MIPs together on GE_XPE and 10GE_XPE cards.

The MIP CCDB maintains the information received for all MEPs in the maintenance domain. The card can store up to 4000 MIP CCDB entries.

11.14.14.5 CFM Messages

The Ethernet CFM on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards supports the following messages:

- Continuity Check—These messages are exchanged periodically among MEPs. They allow MEPs to discover other MEPs within a domain and allow MIPs to discover MEPs. These messages are confined to a domain.
- Loopback—These messages are unicast messages that a MEP transmits, at the request of an administrator, to verify connectivity to a specific maintenance point. A reply to a loopback message indicates whether a destination is reachable.
- Traceroute—These messages are multicast messages that a MEP transmits, at the request of an administrator, to track the path to a destination MEP.

11.14.14.6 CFM Limitations and Restrictions

The CFM on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards has the following limitations and restrictions:

- CFM is not supported on channel groups.
- CFM is not enabled on protected ports running REP, FAPS, and 1+1.
- Y.1731 enhancements including AIS, LCK, and performance monitoring messages along with CFM are not supported.
- IEEE CFM MIB is not supported.
- L1 and CFM are mutually exclusive on a SVLAN because LI and CFM use the same MAC address.
- MAC security and CFM are mutually exclusive on the card due to hardware resource constraints.

11.14.14.7 Related Procedure for Ethernet CFM

For information about the supported Ethernet CFM features on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the “NTP-G283 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card CFM Settings” section on page 11-357.

11.14.15 Ethernet OAM

The Ethernet OAM protocol is part of the IEEE 802.3ah standard and is used for installing, monitoring, and troubleshooting Ethernet MANs and Ethernet WANs. This protocol relies on an optional sublayer in the data link layer of the OSI model. The Ethernet OAM protocol was developed for Ethernet in the First Mile (EFM) applications. The terms Ethernet OAM and EFM are interchangeably used and both mean the same.

Normal link operation does not require Ethernet OAM. You can implement Ethernet OAM on any full-duplex point-to-point or emulated point-to-point Ethernet link for a network or part of a network (specified interfaces). OAM frames, called OAM Protocol Data Units (OAM PDUs), use the slow protocol destination MAC address 0180.c200.0002. OAM PDUs are intercepted by the MAC sublayer and cannot propagate beyond a single hop within an Ethernet network.

Ethernet OAM is disabled on all interfaces by default. When Ethernet OAM is enabled on an interface, link monitoring is automatically turned on.

For more information on Ethernet OAM protocol, refer to IEEE 802.3ah standard. For information about interaction of Ethernet OAM with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62.

11.14.15.1 Components of the Ethernet OAM

Ethernet OAM consists of two major components, the OAM Client and the OAM Sublayer.

11.14.15.1.1 OAM Client

The OAM client establishes and manages the Ethernet OAM on a link. The OAM client also enables and configures the OAM sublayer. During the OAM discovery phase, the OAM client monitors the OAM PDUs received from the remote peer and enables OAM functionality. After the discovery phase, the OAM client manages the rules of response to OAM PDUs and the OAM remote loopback mode.

11.14.15.1.2 OAM Sublayer

The OAM sublayer presents two standard IEEE 802.3 MAC service interfaces:

- One interface facing toward the superior sub-layers, which include the MAC client (or link aggregation).
- Other interface facing toward the subordinate MAC control sublayer.

The OAM sublayer provides a dedicated interface for passing OAM control information and OAM PDUs to and from the client.

11.14.15.2 Benefits of the Ethernet OAM

Ethernet OAM provides the following benefits:

- Competitive advantage for service providers
- Standardized mechanism to monitor the health of a link and perform diagnostics

11.14.15.3 Features of the Ethernet OAM

The Ethernet OAM protocol has the following OAM features:

- Discovery—Identifies devices in the network and their OAM capabilities. The Discovery feature uses periodic OAM PDUs to advertise the OAM mode, configuration, and capabilities. An optional phase allows the local station to accept or reject the configuration of the peer OAM entity.
- Link Monitoring—Detects and indicates link faults under a variety of conditions. It uses the event notification OAM PDU to notify the remote OAM device when it detects problems on the link.
- Remote Failure Indication—Allows an OAM entity to convey the failure conditions to its peer through specific flags in the OAM PDU.
- Remote Loopback—Ensures link quality with a remote peer during installation or troubleshooting.

11.14.15.4 Ethernet OAM Limitations and Restrictions

The Ethernet OAM on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards has the following limitations and restrictions:

- CFM, REP, link integrity, LACP, FAPS, IGMP on SVLAN and L2 1+1 protection are not supported with EFM.
- IEEE EFM MIB is not supported.
- EFM cannot be enabled or disabled at the card level.
- Unidirectional functionality is not supported.
- Errored Symbol Period, Rx CRC errors, Tx CRC errors are not supported.
- OAM PDUs are limited to 1 frame per second.
- Dying Gasp and critical events are not supported.

Note Dying Gasp RFI is not generated on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards. However, if the peer device sends a dying gasp RFI, the card detects it and raises an alarm.

11.14.15.5 Related Procedure for Ethernet OAM

For information about the supported Ethernet OAM features on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the "NTP-G285 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card EFM Settings" section on page 11-369.

11.14.16 Resilient Ethernet Protocol

The Resilient Ethernet Protocol (REP) is a protocol used to control network loops, handle link failures, and improve convergence time.

REP performs the following tasks:

- Controls a group of ports connected in a segment.
- Ensures that the segment does not create any bridging loops.
- Responds to link failures within the segment.
- Supports VLAN load balancing.

For information about interaction of REP with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62.

11.14.16.1 REP Segments

A REP segment is a chain of ports connected to each other and configured with a segment ID. Each segment consists of regular segment ports and two edge ports. A GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card can have up to 2 ports that belong to the same segment, and each segment port can have only one external neighbor port.

A segment protects only against a single link failure. Any more failures within the segment result in loss of connectivity.

11.14.16.2 Characteristics of REP Segments

REP segments have the following characteristics:

- If all the ports in the segment are operational, one port blocks traffic for each VLAN. If VLAN load balancing is configured, two ports in the segment control the blocked state of VLANs.
- If any port in the segment is not operational, all the other operational ports forward traffic on all VLANs to ensure connectivity.
- In case of a link failure, the alternate ports are immediately unblocked. When the failed link comes up, a logically blocked port per VLAN is selected with minimal disruption to the network.

11.14.16.3 REP Port States

Ports in REP segments take one of three roles or states: Failed, Open, or Alternate.

- A port configured as a regular segment port starts as a failed port.
- When the neighbor adjacencies are determined, the port transitions to the alternate port state, blocking all the VLANs on the interface. Blocked port negotiations occur and when the segment settles, one blocked port remains in the alternate role and all the other ports become open ports.
- When a failure occurs in a link, all the ports move to the failed state. When the alternate port receives the failure notification, it changes to the open state, forwarding all VLANs.

11.14.16.4 Link Adjacency

Each segment port creates an adjacency with its immediate neighbor. Link failures are detected and acted upon locally. If a port detects a problem with its neighbor, the port declares itself non-operational and REP converges to a new topology.

REP Link Status Layer (LSL) detects its neighbor port and establishes connectivity within the segment. All VLANs are blocked on an interface until the neighbor port is identified. After the neighbor port is identified, REP determines the neighbor port that must be the alternate port and the ports that must forward traffic.

Each port in a segment has a unique port ID. When a segment port starts, the LSL layer sends packets that include the segment ID and the port ID.

A segment port does not become operational if the following conditions are satisfied:

- No neighbor port has the same segment ID or more than one neighbor port has the same segment ID.
- The neighbor port does not acknowledge the local port as a peer.

11.14.16.5 Fast Reconvergence

REP runs on a physical link and not on per VLAN. Only one hello message is required for all VLANs that reduces the load on the protocol.

REP Hardware Flood Layer (HFL) is a transmission mechanism that floods packets in hardware on an admin VLAN. HFL avoids the delay that is caused by relaying messages in software. HFL is used for fast reconvergence in the order of 50 to 200 milliseconds.

11.14.16.6 VLAN Load Balancing

You must configure two edge ports in the segment for VLAN load balancing. One edge port in the REP segment acts as the primary edge port; the other edge port as the secondary edge port. The primary edge port always participates in VLAN load balancing in the segment. VLAN load balancing is achieved by blocking certain VLANs at a configured alternate port and all the other VLANs at the primary edge port.

11.14.16.7 REP Configuration Sequence

You must perform the following tasks in sequence to configure REP:

- Configure the REP administrative VLAN or use the default VLAN 1. The range of REP admin VLAN is 1 to 4093. VLAN 4094 is not allowed.
- Add ports to the segment in interface configuration mode.
- Enable REP on ports and assign a segment ID to it. REP is disabled on all ports by default. The range of segment ID is 1 to 1024.
- Configure two edge ports in the segment; one port as the primary edge port and the other as the secondary edge port.
- If you configure two ports in a segment as the primary edge port, for example, ports on different switches, REP selects one of the ports to serve as the primary edge port based on port priority. The Primary option is enabled only on edge ports.
- Configure the primary edge port to send segment topology change notifications (STCNs) and VLAN load balancing to another port or to other segments. STCNs and VLAN load balancing configurations are enabled only for edge ports.

Note A port can belong to only one segment. Only two ports can belong to the same segment. Both the ports must be either regular ports or edge ports. However, if the No-neighbor port is configured, one port can be an edge port and another port can be a regular port.

11.14.16.8 REP Supported Interfaces

REP supports the following interfaces:

- REP is supported on client (UNI) and trunk (NNI) ports.
- Enabling REP on client ports allows protection at the access or aggregation layer when the cards are connected to the L2 network.
- Enabling REP on trunk ports allows protection at the edge layer when the cards are connected in a ring.

11.14.16.9 REP Limitations and Restrictions

The REP on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards has the following limitations and restrictions:

- Fast re-convergence and VLAN load balancing are not supported on UNI ports in transparent mode.
- Native VLAN is not supported.
- CFM, EFM, link integrity, LACP, FAPS, and L2 1+1 protection are not supported on ports that are configured as part of REP segment and vice versa.

- When a node installed with GE_XP, GE_XPE, 10GE_XP, or 10GE_XPE cards configured with REP or LACP is upgraded, traffic loss may occur. This traffic loss is due to reconvergence when the cards soft reset during the upgrade process.
- NNI ports cannot be configured as the primary edge port or blocking port at the access or aggregation layer.
- Only three REP segments can be configured on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
- Consider the following configuration:

  More than one REP closed segment is configured on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards and the same HFL admin VLAN is enabled on the switches.

  If two different segments are configured on more than one common switch, the following consequences happen.
  - Layer 1 loop
  - Flooding of HFL packets across segments if one REP segment fails
  - Segment goes down due to LSL time out even if the segment does not have faults

  Hence, it is recommended not to configure two different segments on more than one common switch.
- Consider the following configuration:
  - VLAN Load Balancing is configured on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards by specifying the VLB preempt delay.
  - Primary and secondary edge ports are configured on the same switch.
  - HFL or LSL is activated.

  This configuration leads to high convergence time during manual premption, VLB activation, and deactivation (400 to 700 milliseconds).

11.14.16.10 Related Procedure for Managing the REP Settings

To manage the REP settings on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, see the "NTP-G287 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card REP Settings" section on page 11-374.

11.14.17 Related Procedures for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards

The following is the list of procedures and tasks related to the configuration of the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards:

- NTP-G165 Modify the GE_XP, 10GE_XP, GE_XPE, 10GE_XPE Cards Ethernet Parameters, Line Settings, and PM Thresholds, page 11-381
- NTP-G311 Provision the Storm Control Settings for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards, page 11-406
- NTP-G208 Provision SVLAN Rate Limiting on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card, page 11-410
- NTP-G314 Add a GE_XP or 10GE_XP Card on a FAPS Ring, page 11-424
- NTP-G75 Monitor Transponder and Muxponder Performance

11.15 ADM-10G Card

The ADM-10G card operates on ONS 15454 SONET, ONS 15454 SDH, ONS 15454 M2, ONS 15454 M6, and DWDM networks to carry optical signals and Gigabit Ethernet signals over DWDM wavelengths for transport. The card aggregates lower bit-rate client SONET or SDH signals (OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, or Gigabit Ethernet) onto a C-band tunable DWDM trunk operating at a higher OC-192/STM-64 rate. In a DWDM network, the ADM-10G card transports traffic over DWDM by mapping Gigabit Ethernet and SONET or SDH circuits onto the same wavelength with multiple protection options.

You can install and provision the ADM-10G card in a linear configuration in:

- Slots 1 to 5 and 12 to 16 in standard and high-density ONS 15454 ANSI shelves (15454-SA-ANSI or 15454-SA-HD), the ETSI ONS 15454 standard shelf assembly, or the ONS 15454 ETSI high-density shelf assembly
- Slot 2 in ONS 15454 M2 chassis
- Slots 2 to 6 in ONS 15454 M6 chassis

Caution Fan-tray assembly 15454E-CC-FTA (ETSI shelf)/15454-CC-FTA (ANSI shelf) must be installed in a shelf where the ADM-10G card is installed.

The card is compliant with ITU-T G.825 and ITU-T G.783 for SDH signals. It supports concatenated and non-concatenated AU-4 mapped STM-1, STM-4, and STM-16 signals as specified in ITU-T G.707. The card also complies with Section 5.6 of Telcordia GR-253-CORE and supports synchronous transport signal (STS) mapped OC-3, OC-12, and OC-48 signals as specified in the standard.

The client SFP and trunk XFP are compliant with interface requirements in Telcordia GR-253-CORE, ITU-T G.957 and/or ITU-T G.959.1, and IEEE 802.3.

11.15.1 Key Features

The ADM-10G card has the following high-level features:

- Operates with the TCC2, TCC2P, TCC3, TNC, TNCE, TSC, or TSCE.
- Interoperable with TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10EX_C, and OTU2_XP cards.
- Has built-in OC-192/STM-64 add/drop multiplexing function including client, trunk, and STS cross-connect.
- Supports both single-card and double-card (ADM-10G peer group) configuration.
- Supports path protection/SNCP on client and trunk ports for both single-card and double-card configuration. The card does not support path protection/SNCP between a client port and a trunk port. Path protection/SNCP is supported only between two client ports or two trunk ports.
- Supports 1+1 protection on client ports for double-card configuration only.
- Supports SONET, SDH, and Gigabit Ethernet protocols on client SFPs.
- Supports XFP DWDM trunk interface single wavelengths.
- Returns zero bit errors when a TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card switches from active to standby or when manual or forced protection switches occur.
- Has 16 SFP-based client interfaces (gray, colored, coarse wavelength division multiplexing (CWDM), and DWDM optics available).

- Supports STM1, STM4, STM16, and Gigabit Ethernet client signals (8 Gigabit Ethernet maximum).
- Has one XFP-based trunk interface supporting E-FEC/FEC and ITU-T G.709 for double-card configuration.
- Has two XFP-based trunk interface supporting E-FEC/FEC and ITU-T G.709 for single-card configuration.
- Has two SR XFP interlink interfaces supporting redundancy connection with protection board and pass-through traffic for double-card configuration.
- Supports frame-mapped generic framing procedure (GFP-F) and LEX mapping for Ethernet over SONET or SDH.
- Can be installed or pulled from operation, in any slot, without impacting other service cards in the shelf.
- Supports client to client hairpinning, that is, creation of circuits between two client ports for both single-card and double-card configuration. See the "11.15.11 Circuit Provisioning" section on page 11-90 for more detailed information.

11.15.2 ADM-10G POS Encapsulation, Framing, and CRC

The ADM-10G card supports Cisco EoS LEX (LEX) and generic framing procedure framing (GFP-F) encapsulation on 8 POS ports corresponding to 8 GigE ports (Port 1 to Port 8) in both single-card and double-card (ADM-10G peer group) configuration.

You can provision framing on the ADM-10G card as either the default GFP-F or LEX framing. With GFP-F framing, you can configure a 32-bit cyclic redundancy check (CRC) or none (no CRC) (the default). LEX framing supports 16-bit or 32-bit CRC configuration. The framing type cannot be changed when there is a circuit on the port.

On the CTC, navigate to card view and click the Provisioning > Line> Ethernet Tab. To see the various parameters that can be configured on the ethernet ports, see the "CTC Display of ethernet Port Provisioning Status" section in the *Cisco ONS 15454 and Cisco ONS 15454 SDH Ethernet Card Software Feature and Configuration Guide*. Parameters such as, admin state, service state, framing type, CRC, MTU and soak time for a port can be configured.

It is possible to create an end-to-end circuit between equipment supporting different kinds of encapsulation (for example, LEX on one side and GFP-F on other side). But, under such circumstances, traffic does not pass through, and an alarm is raised if there is a mismatch.

11.15.2.1 POS Overview

Ethernet data packets need to be framed and encapsulated into a SONET/SDH frame for transport across the SONET/SDH network. This framing and encapsulation process is known as packet over SONET/SDH (POS).

The Ethernet frame comes into the ADM-10G card on a standard Gigabit Ethernet port and is processed through the card's framing mechanism and encapsulated into a POS frame. When the POS frame exits, the ADM-10G card is in a POS circuit, and this circuit is treated as any other SONET circuit (STS) or SDH circuit (VC) in the ONS node. It is cross-connected and rides the SONET/SDH signal out the port of an optical card and across the SONET/SDH network.

The destination of the POS circuit is a card or a device that supports the POS interface. Data packets in the destination card frames are removed and processed into ethernet frames. The Ethernet frames are then sent to a standard Ethernet port of the card and transmitted onto an Ethernet network.

11.15.2.2 POS Framing Modes

A POS framing mode is the type of framing mechanism employed by the ADM-10G card to frame and encapsulate data packets into a POS signal. These data packets were originally encapsulated in Ethernet frames that entered the standard Gigabit Ethernet interface of the ADM-10G card.

11.15.2.2.1 GFP-F Framing

The GFP-F framing represent standard mapped Ethernet over GFP-F according to ITU-T G.7041. GFP-F defines a standard-based mapping of different types of services onto SONET/SDH. GFP-F maps one variable length data packet onto one GFP packet. GFP-F comprises of common functions and payload specific functions. Common functions are those shared by all payloads. Payload-specific functions are different depending on the payload type. GFP-F is detailed in the ITU recommendation G.7041.

11.15.2.2.2 LEX Framing

LEX encapsulation is a HDLC frame based Cisco Proprietary protocol, where the field is set to values specified in Internet Engineering Task Force (IETF) RFC 1841. HDLC is one of the most popular Layer 2 protocols. The HDLC frame uses the zero insertion/deletion process (commonly known as bit stuffing) to ensure that the bit pattern of the delimiter flag does not occur in the fields between flags. The HDLC frame is synchronous and therefore relies on the physical layer to provide a method of clocking and synchronizing the transmission and reception of frames. The HDLC framing mechanism is detailed in the IETF's RFC 1662, "PPP in HDLC-like Framing."

11.15.2.3 GFP Interoperability

The ADM-10G card defaults to GFP-F encapsulation that is compliant with ITU-T G.7041. This mode allows the card to operate with ONS 15310-CL, ONS 15310-MA, ONS 15310-MA SDH, or ONS 15454 data cards (for example, ONS 15454 CE100T-8 or ML1000-2 cards). GFP encapsulation also allows the ADM-10G card to interoperate with other vendors Gigabit Ethernet interfaces that adhere to the ITU-T G.7041 standard.

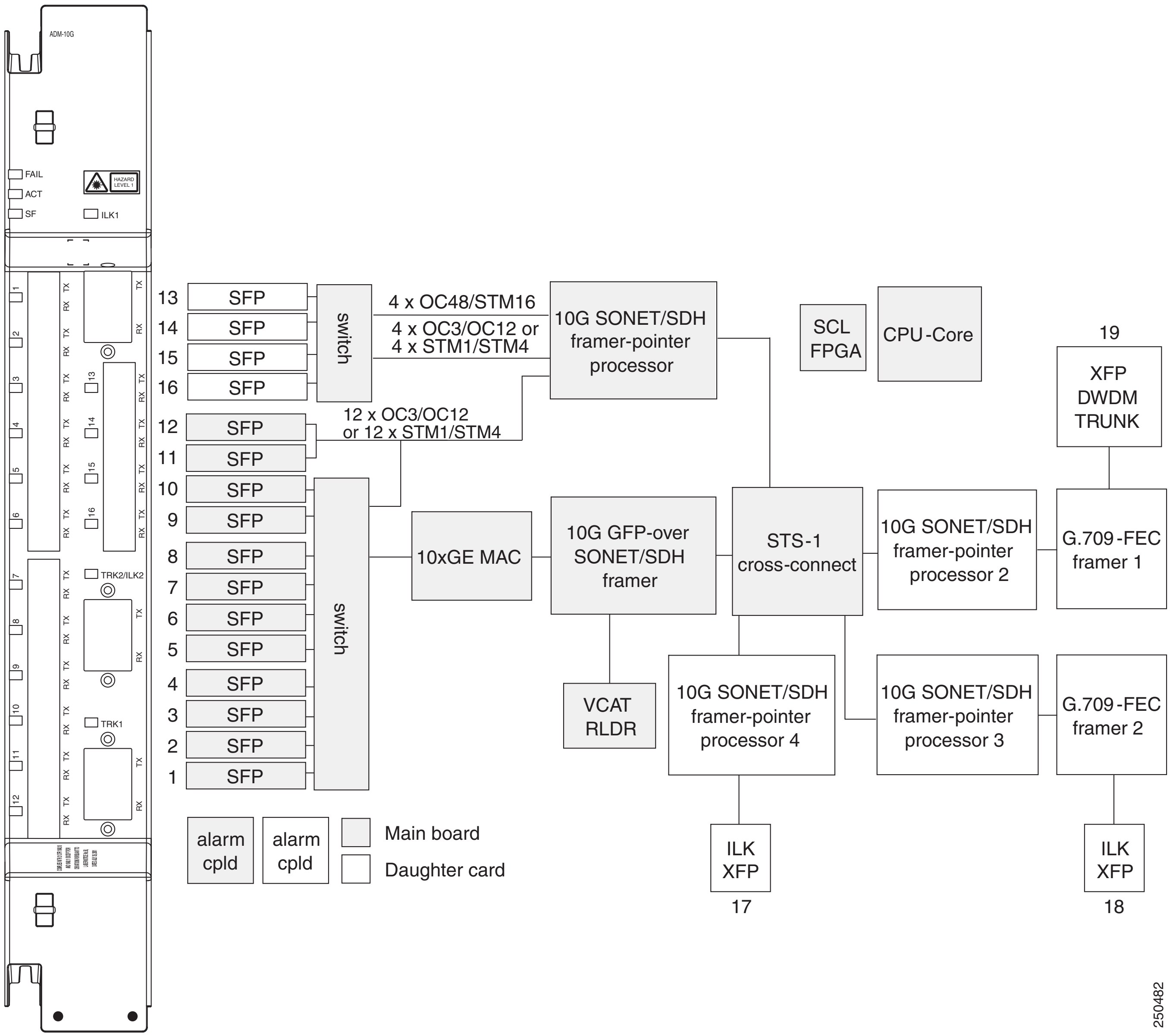
11.15.2.4 LEX Interoperability

The LEX encapsulation is compliant with RFC 1841. This mode allows the card to operate with ONS 15310-CL, ONS 15310-MA, ONS 15310-MA SDH, or ONS 15454 data cards (for example, G1000-4/G1K-4 cards, CE-1000-4, ONS 15454 CE100T-8 or ML1000-2 cards).

11.15.3 Faceplate and Block Diagram

Figure 11-20 shows the ADM-10G card faceplate.

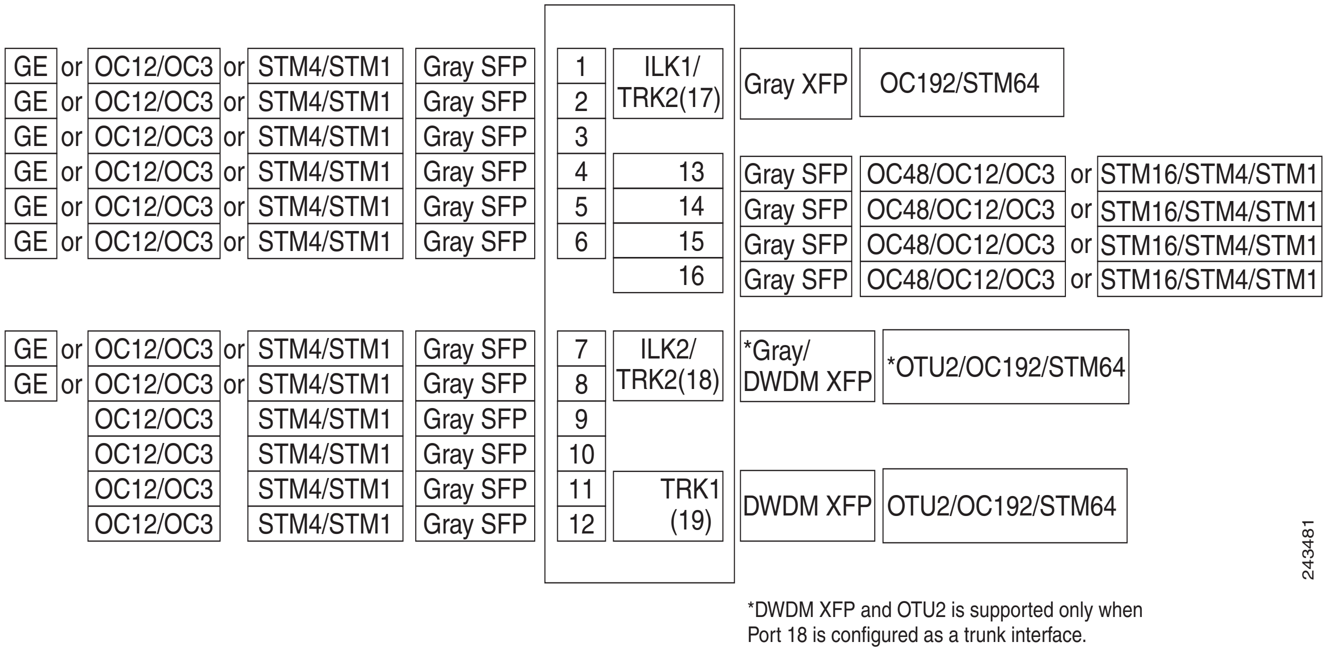
Figure 11-20 ADM-10G Card Faceplate and Block Diagram



11.15.4 Port Configuration Rules

ADM-10G card client and trunk port capacities are shown in Figure 11-21.

Figure 11-21 ADM-10G Card Port Capacities



Port 17 acts as trunk2 or ILK1 interface based on single-card or double-card configuration.

11.15.5 Client Interfaces

The ADM-10G card uses LC optical port connectors and, as shown in Figure 11-21, supports up to 16 SFPs that can be utilized for OC-N/STM-N traffic. Eight of the SFPs can be used for Gigabit Ethernet. The interfaces can support any mix of OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, or Gigabit Ethernet of any reach, such as SX, LX, ZX, SR, IR, or LR. The interfaces support a capacity of:

- 4 x OC-48/STM-16
- 16 x OC-12/STM-4
- 16 x OC-3/STM-1
- 8 x GE

The supported client SFPs and XFPs are:

- Gray SFPs
  - 1000Base-SX SFP 850 nm (ONS-SE-G2F-SX=)
  - 1000Base-LX SFP 1310 nm (ONS-SE-G2F-LX=)
  - OC48/STM16 IR1, OC12/STM4 SR1, OC3/STM1 SR1, GE-LX multirate SFP 1310 nm (ONS-SE-Z1=)
  - OC3/STM1 IR1, OC12/STM4 IR1 multirate SFP 1310 nm (ONS-SI-622-I1=)
  - OC48/STM16 SR1 SFP 1310 nm (ONS-SI-2G-S1=)
  - OC48/STM16 IR1 SFP 1310 nm (ONS-SI-2G-I1=)
  - OC48/STM16, 1550 LR2, SM LC (ONS-SE-2G-L2=)

- Colored DWDM SFPs
  - 1000Base-ZX SFP 1550 nm (ONS-SI-GE-ZX=)
  - OC3/STM1 LR2 SFP 1550 nm (ONS-SI-155-L2=)
  - OC48/STM16 LR2 SFP 1550 nm (ONS-SI-2G-L2=)
  - OC48/STM16 SFP (ONS-SC-2G-xx.x)

Note xx.x = 28.7 to 60.6. ONS-SC-2G-28.7, ONS-SC-2G-33.4, ONS-SC-2G-41.3, ONS-SC-2G-49.3, and ONS-SC-2G-57.3 are supported from Release 8.5 and later.

- CWDM SFPs
  - OC48/STM16/GE CWDM SFP (ONS-SC-Z3-xxxx)
- XFPs
  - OC-192/STM-64/10GE XFP 1550 nm (ONS-XC-10G-I2)

11.15.6 Interlink Interfaces

Two 2R interlink interfaces, called ILK1 (Port 17) and ILK2 (Port 18), are provided for creation of ADM-10G peer groups in double-card configurations. In a single-card configuration, Port 17 (OC-192/STM-64) and Port 18 (OC-192/STM-64 or OTU2 payload) must be configured as trunk interfaces. In a double-card configuration (ADM-10G peer group), Ports 17 and 18 must be configured as ILK1 and ILK2 interfaces, respectively. Physically cabling these ports between two ADM-10G cards, located on the same shelf, allows you to configure them as an ADM-10G peer group.The ILK ports carry 10 Gb of traffic each.

The interlink interfaces support STM64 SR1 (ONS-XC-10G-S1=) XFP and 10GE BASE SR (ONS-XC-10G-SR-MM=) XFPs.

11.15.7 DWDM Trunk Interface

The ADM-10G card supports OC-192/STM-64 signal transport and ITU-T G.709 digital wrapping according to the ITU-T G.709 standard.The ADM-10G card supports three trunk XFPs:

- Two DWDM trunks, and one trunk interface in a single-card configuration.
- One DWDM trunk XFP in a double-card configuration.

The supported DWDM trunk XFPs are:

- 10G DWDM (ONS-XC-10G-xx.x=) (colored XFP)
- STM64 SR1 (ONS-XC-10G-S1=) (gray XFP)

11.15.8 Configuration Management

When using OC-48/STM-16 traffic, some contiguous port configurations, listed in Table 11-21, are unavailable due to hardware limitations. This limitation does not impact the Gigabit Ethernet payload.

Note The ADM-10G card cannot be used in the same shelf with SONET or SDH cross-connect cards.

Table 11-21 OC-48/STM-16 Configuration Limitations

OC-48/STM-16 Port Number	Ports Restricted from Optical Traffic
OC-48/STM-16 on Port 13	No OC-N/STM-N on Port 1 through Port 3
OC-48/STM-16 on Port 14	No OC-N/STM-N on Port 4 through Port 6
OC-48/STM-16 on Port 15	No OC-N/STM-N on Port 7 through Port 9
OC-48/STM-16 on Port 16	No OC-N/STM-N on Port 10 through Port 12

Note The total traffic rate for each trunk cannot exceed OC-192/STM-64 on each ADM-10G card, or for each ADM-10G peer group.

Note Gigabit Ethernet is supported on Ports 1 through 8. Ports 9 through Port 12 support only OC-3/STM-1 or OC-12/STM-4.

Additionally, the following guidelines apply to the ADM-10G card:

- Trunk Port 17 supports OC-192/STM-64.
- Trunk Ports 18 and 19 support OC-192/STM-64 and OTU2.
- The interlink port supports OC-192/STM-64.
- Up to six ADM-10G cards can be installed in one shelf.
- Up to 24 ADM-10G cards can be installed per network element (NE) regardless of whether the card is installed in one shelf or in multiple shelves.
- The card can be used in all 15454-SA-ANSI and 15454-SA-HD shelves as well as ETSI ONS 15454 standard and high-density shelves.
- A lamp test function can be activated from CTC to ensure that all LEDs are functional.
- The card can operate as a working protected or working non-protected card.
- In a redundant configuration, an active card hardware or software failure triggers a switch to the standby card. This switch is detected within 10 ms and is completed within 50 ms.
- ADM-10G cards support jumbo frames with MTU sizes of 64 to 9,216 bytes; the maximum is 9,216.
- After receiving a link or path failure, the ADM-10G card can shut down only the downstream Gigabit Ethernet port.

Note In ADM-10G cards, the Gigabit Ethernet port does not support flow control.

11.15.9 Security

The ADM-10G card that an SFP or XFP is plugged into implements the Cisco Standard Security Code Check Algorithm that keys on the vendor ID and serial number.

If a pluggable port module (PPM) is plugged into a port on the card but fails the security code check because it is not a Cisco PPM, a minor NON-CISCO-PPM alarm is raised.

If a PPM with an unqualified product ID is plugged into a port on this card—that is, the PPM passes the security code as a Cisco PPM but it has not been qualified for use on the ADM-10G card— a minor UNQUAL-PPM alarm is raised.

11.15.10 Protection

The ADM-10G card supports 1+1 and SONET path protection and SDH SNCP protection architectures in compliance with Telcordia GR-253-CORE, Telcordia GR-1400-CORE, and ITU-T G.841 specifications.

11.15.10.1 Circuit Protection Schemes

The ADM-10G card supports path protection/SNCP circuits at the STS/VC4 (high order) level and can be configured to switch based on signal degrade calculations. The card supports path protection/SNCP on client and trunk ports for both single-card and double-card configuration.

Note The ADM-10G card supports path protection/SNCP between client ports and trunk port 17. The card does not support path protection/SNCP between client ports and trunk ports 18 or 19. The card does not support path protection/SNCP between port 17 and trunk ports 18 and 19.

The card allows open-ended path protection/SNCP configurations incorporating other vendor equipment. In an open-ended path protection/SNCP, you can specify one source point and two possible endpoints (or two possible source points and one endpoint) and the legs can include other vendor equipment. The source and endpoints are part of the network discovered by CTC.

11.15.10.2 Port Protection Schemes

The ADM-10G card supports unidirectional and bidirectional 1+1 APS protection schemes on client ports for double-card configuration (ADM-10G peer group) only. 1+1 APS protection scheme is not supported in single-card configuration. For 1+1 optical client port protection, you can configure the system to use any pair of like facility interfaces that are on different cards of the ADM-10G peer group.

11.15.11 Circuit Provisioning

The ADM-10G card supports STS circuit provisioning both in single-card and double-card (ADM-10G peer group) configuration. The card allows you to create STS circuits between:

- Client and trunk ports
- Two trunk ports
- Two client ports (client-to-client hairpinning)

Note Circuits between two trunk ports are called pass-through circuits.

For an ADM-10G card in single-card configuration, if you are creating STS circuits between two client ports, the following limitation must be considered:

- Gigabit Ethernet to Gigabit Ethernet connections are not supported.

For an ADM-10G card that is part of an ADM-10G peer group, if you are creating STS circuits between two client ports or between client and trunk ports, the following limitations must be considered:

- Gigabit Ethernet to Gigabit Ethernet connections are not supported.
- Optical channel (OC) to OC, OC to Gigabit Ethernet, and Gigabit Ethernet to OC connections between two peer group cards are supported. Peer group connections use interlink port bandwidth, hence, depending on the availability/fragmentation of the interlink port bandwidth, it may not be possible to create an STS circuit from the Gigabit Ethernet/OC client port to the peer card trunk port. This is because, contiguous STSs (that is, STS-3c, STS-12c, STS-24c, and so on) must be available on the interlink port for circuit creation.

Note There are no limitations to create an STS circuit between two trunk ports.

The two ADM-10G cards used in a paired mode use interlink ports ILK1 (Port 17) and ILK2 (Port 18). A CCAT or VCAT circuit created between the peer ADM-10G cards uses the ILK1 port if the source or destination is Port 19. The circuits created with a single ADM-10G card uses the ILK2 port.

If the circuit is of type STS-*n*c (where *n* is an integer and can take values 3,6,9,12,18,24,36,48,96) and uses the ILK2 port, then the starting timeslot needs to use specific timeslots for traffic to flow. The timeslots can be 12*m*+1 for STS-12c circuits and 48*m*+1 (where *m* is an integer and can take values 0,1,2,3...) for STS-48c circuits. The timeslots can be 3*m*+1 for the other STS-*n*c circuits.

The following example illustrates how to use the correct timeslot for an ILK2 port:

If there is no circuit on the ILK2 port and a STS-3c circuit is created, the circuit uses timeslots 1 to 3. An STS-12c circuit must be created on the ILK2 port later. The STS-12c circuit must have used timeslots 4 to 15. However, the STS-12c circuit uses timeslots starting from 12m+1 (1, 13, 25, and so on) as defined in the above rule. Therefore, before creating the STS-12c circuit, dummy circuits must be created in CTC that consumes STS-9 bandwidth.

11.15.12 ADM-10G CCAT and VCAT Characteristics

The ADM-10G card supports high-order (HO) contiguous concatenation (CCAT) and HO virtual concatenation (VCAT) circuits on 8 GigE ports (Port 1 to Port 8) in both single-card and double-card (ADM-10G peer group) configuration.

To enable end-to-end connectivity in a VCAT circuit that traverses through a third-party network, you can use Open-Ended VCAT circuit creation.

The ADM-10G card supports flexible non-LCAS VCAT groups (VCGs). With flexible VCGs, the ADM-10G can perform the following operations:

- Add or remove members from groups
- Put members into or out of service, which also adds/removes them from the group
- Add or remove cross-connect circuits from VCGs

Any operation on the VCG member is service effecting (for instance, adding or removing members from the VCG). Adding or removing cross-connect circuits is not service-affecting, if the associated members are not in the group

The ADM-10G card allows independent routing and protection preferences for each member of a VCAT circuit. You can also control the amount of VCAT circuit capacity that is fully protected, unprotected, or uses Protection Channel Access (PCA) (when PCA is available). Alarms are supported on a per-member as well as per virtual concatenation group (VCG) basis.

The ADM-10G card supports both automatic and manual routing for VCAT circuit, that is, all members are manually or automatically routed. Bidirectional VCAT circuits are symmetric, which means that the same number of members travel in each direction. With automatic routing, you can specify the constraints for individual members; with manual routing, you can select different spans for different members. Two types of automatic and manual routing are available for VCAT members: common fiber routing and split routing.

The ADM-10G card supports VCAT common fiber routing and VCAT split fiber (diverse) routing. With VCAT split fiber routing, each member can be routed independently through the SONET or SDH or DWDM network instead of having to follow the same path as required by CCAT and VCAT common fiber routing. This allows a more efficient use of network bandwidth, but the different path lengths and different delays encountered may cause slightly different arrival times for the individual members of the VCG. The VCAT differential delay is this relative arrival time measurement between members of a VCG. The maximum tolerable VCAT split fiber routing differential delay for the ADM-10G card is approximately 55 milliseconds. A loss of alignment alarm is generated if the maximum differential delay supported is exceeded.

The differential delay compensation function is automatically enabled when you choose split fiber routing during the CTC circuit configuration process. CCAT and VCAT common fiber routing do not enable or need differential delay support.

Caution Protection switches with switching time of less than 60 milliseconds are not guaranteed with the differential delay compensation function enabled. The compensation time is added to the switching time.

Note For TL1, EXPBUFFERS parameter must be set to ON in the ENT-VCG command to enable support for split fiber routing.

Available Circuit Sizes

Table 11-22 and Table 11-23 show the circuit sizes available for the ADM-10G card.

Table 11-22 Supported SONET Circuit Sizes of ADM-10G card on ONS 15454

CCAT	VCAT High Order
STS-1	STS-1-1*n*V (*n*= 1 to 21)
STS-3c	STS-3c-*m*v (*m*= 1 to 7)
STS-6c	
STS-9c	
STS-12c	
STS-24c	

Table 11-23 Supported SDH Circuit Sizes of ADM-10G card on ONS 15454 SDH

CCAT	VCAT High Order
VC-4	VC-4-*m*v (*m*= 1 to 7)
VC-4-2c	
VC-4-3c	
VC-4-4c	
VC-4-8c	

Note In ADM-10G cards, the Gigabit Ethernet port does not support flow control. When less than seven VC-4s are configured for the port, with the client traffic expected to be below the line rate, a burst in traffic beyond the supposed bandwidth leads to packet loss. It is, therefore, recommended to use an external flow control mechanism with less than seven VC-4s configured. Connecting a GE-XP or GE-XPE card between the client traffic and the ADM-10G Gigabit Ethernet interface enables such flow control.

11.15.12.1 Related Procedure for VCAT Circuit

The following is the list of procedures related to creating VCAT circuits:

- NTP-G245 Create an Automatically Routed VCAT Circuit, page 16-94
- NTP-G246 Create a Manually Routed VCAT Circuit, page 16-98

11.15.13 Intermediate Path Performance Monitoring

Intermediate path performance monitoring (IPPM) allows a node to monitor the constituent channel of an incoming transmission signal. You can enable IPPM for STS/VC-4s payload on OCn and Trunk ports of ADM-10G card. The IPPM is complaint with GR253/G.826.

Software Release 9.2 and higher enables the ADM-10G card to monitor the near-end and far-end PM data on individual STS/VC-4 payloads by enabling IPPM. After provisioning IPPM on the card, service providers can monitor large amounts of STS/VC-4 traffic through intermediate nodes, thus making troubleshooting and maintenance activities more efficient. IPPM occurs only on STS/VC-4 paths that have IPPM enabled, and TCAs are raised only for PM parameters on the selected IPPM paths.

For a CCAT circuit, you can enable IPPM only on the first STS/VC-4 of the concatenation group. For a VCAT circuit, you can enable IPPM independently on each member STS/VC-4 of the concatenation group.

11.15.13.1 Related Procedure for IPPM

To enable IPPM on the ADM-10G card, see the "NTP-G247 Enable or disable Path Performance Monitoring on Intermediate Nodes" section on page 16-100.

11.15.14 Pointer Justification Count Performance Monitoring

Pointers are used to compensate for frequency and phase variations. Pointer justification counts indicate timing errors on SONET networks. When a network is out of synchronization, jitter and wander occur on the transported signal. Excessive wander can cause terminating equipment to slip.

Slips cause different effects in service. Voice service has intermittent audible clicks. Compressed voice technology has short transmission errors or dropped calls. Fax machines lose scanned lines or experience dropped calls. Digital video transmission has distorted pictures or frozen frames. Encryption service loses the encryption key, causing data to be transmitted again.

Pointers provide a way to align the phase variations in STS and VC4 payloads. The STS payload pointer is located in the H1 and H2 bytes of the line overhead. Clocking differences are measured by the offset in bytes from the pointer to the first byte of the STS synchronous payload envelope (SPE) called the J1 byte. Clocking differences that exceed the normal range of 0 to 782 can cause data loss.

There are positive (PPJC) and negative (NPJC) pointer justification count parameters. PPJC is a count of path-detected (PPJC-PDET-P) or path-generated (PPJC-PGEN-P) positive pointer justifications. NPJC is a count of path-detected (NPJC-PDET-P) or path-generated (NPJC-PGEN-P) negative pointer justifications depending on the specific PM name. PJCDIFF is the absolute value of the difference between the total number of detected pointer justification counts and the total number of generated pointer justification counts. PJCS-PDET-P is a count of the one-second intervals containing one or more PPJC-PDET or NPJC-PDET. PJCS-PGEN-P is a count of the one-second intervals containing one or more PPJC-PGEN or NPJC-PGEN.

A consistent pointer justification count indicates clock synchronization problems between nodes. A difference between the counts means that the node transmitting the original pointer justification has timing variations with the node detecting and transmitting this count. Positive pointer adjustments occur when the frame rate of the SPE is too slow in relation to the rate of the STS-1.

You must enable PPJC and NPJC performance monitoring parameters for ADM-10Gcard. In CTC, the count fields for PPJC and NPJC PMs appear white and blank unless they are enabled on the card view Provisioning tab.

11.15.15 Performance Monitoring Parameter Definitions

This section describes the STS and VC-4 path performance monitoring parameters that ADM-10G card support.

Table 11-24 lists the STS near-end path performance monitoring parameters.

Table 11-24 STS Near-end Path Performance Monitoring Parameters

Parameter	Definition
CV-P	Near-End STS Path Coding Violations (CV-P) is a count of BIP errors detected at the STS path layer (that is, using the B3 byte). Up to eight BIP errors can be detected per frame; each error increments the current CV-P second register.
ES-P	Near-End STS Path Errored Seconds (ES-P) is a count of the seconds when at least one STS path BIP error was detected. An AIS Path (AIS-P) defect (or a lower-layer, traffic-related, near-end defect) or a Loss of Pointer Path (LOP-P) defect can also cause an ES-P.

Table 11-24 STS Near-end Path Performance Monitoring Parameters

Parameter	Definition
SES-P	Near-End STS Path Severely Errored Seconds (SES-P) is a count of the seconds when K (2400) or more STS path BIP errors were detected. An AIS-P defect (or a lower-layer, traffic-related, near-end defect) or an LOP-P defect can also cause an SES-P.
UAS-P	Near-End STS Path Unavailable Seconds (UAS-P) is a count of the seconds when the STS path was unavailable. An STS path becomes unavailable when ten consecutive seconds occur that qualify as SES-Ps, and continues to be unavailable until ten consecutive seconds occur that do not qualify as SES-Ps.
FC-P	Near-End STS Path Failure Counts (FC-P) is a count of the number of near-end STS path failure events. A failure event begins when an AIS-P failure, an LOP-P failure, a UNEQ-P failure, or a Section Trace Identifier Mismatch Path (TIM-P) failure is declared. A failure event also begins if the STS PTE that is monitoring the path supports Three-Bit (Enhanced) Remote Failure Indication Path Connectivity (ERFI-P-CONN) for that path. The failure event ends when these failures are cleared.
PPJC-PDET-P	Positive Pointer Justification Count, STS Path Detected (PPJC-PDET-P) is a count of the positive pointer justifications detected on a particular path in an incoming SONET signal.
PPJC-PGEN-P	Positive Pointer Justification Count, STS Path Generated (PPJC-PGEN-P) is a count of the positive pointer justifications generated for a particular path to reconcile the frequency of the SPE with the local clock.
NPJC-PDET-P	Negative Pointer Justification Count, STS Path Detected (NPJC-PDET-P) is a count of the negative pointer justifications detected on a particular path in an incoming SONET signal.
NPJC-PGEN-P	Negative Pointer Justification Count, STS Path Generated (NPJC-PGEN-P) is a count of the negative pointer justifications generated for a particular path to reconcile the frequency of the SPE with the local clock.
PJCDIFF-P	Pointer Justification Count Difference, STS Path (PJCDIFF-P) is the absolute value of the difference between the total number of detected pointer justification counts and the total number of generated pointer justification counts. That is, PJCDiff-P is equal to (PPJC-PGEN-P - NPJC-PGEN-P) - (PPJC-PDET-P - NPJC-PDET-P).
PJCS-PDET-P	Pointer Justification Count Seconds, STS Path Detect (NPJCS-PDET-P) is a count of the one-second intervals containing one or more PPJC-PDET or NPJC-PDET.
PJCS-PGEN-P	Pointer Justification Count Seconds, STS Path Generate (PJCS-PGEN-P) is a count of the one-second intervals containing one or more PPJC-PGEN or NPJC-PGEN.

Table 11-25 gives the VC-4 near-end path performance monitoring parameters definition that ADM-10G card support.

Table 11-25 VC-4 Near-end Path Performance Monitoring Parameters

Parameter	Definition
HP-EB	High-Order Path Errored Block (HP-EB) indicates that one or more bits are in error within a block.
HP-BBE	High-Order Path Background Block Error (HP-BBE) is an errored block not occurring as part of an SES.
HP-ES	High-Order Path Errored Second (HP-ES) is a one-second period with one or more errored blocks or at least one defect.
HP-SES	High-Order Path Severely Errored Seconds (HP-SES) is a one-second period containing 30 percent or more errored blocks or at least one defect. SES is a subset of ES.
HP-UAS	High-Order Path Unavailable Seconds (HP-UAS) is a count of the seconds when the VC path was unavailable. A high-order path becomes unavailable when ten consecutive seconds occur that qualify as HP-SESs, and it continues to be unavailable until ten consecutive seconds occur that do not qualify as HP-SESs.
HP-BBER	High-Order Path Background Block Error Ratio (HP-BBER) is the ratio of BBE to total blocks in available time during a fixed measurement interval. The count of total blocks excludes all blocks during SESs.
HP-ESR	High-Order Path Errored Second Ratio (HP-ESR) is the ratio of errored seconds to total seconds in available time during a fixed measurement interval.
HP-SESR	High-Order Path Severely Errored Second Ratio (HP-SESR) is the ratio of SES to total seconds in available time during a fixed measurement interval.
HP-PPJC-PDET	High-Order, Positive Pointer Justification Count, Path Detected (HP-PPJC-Pdet) is a count of the positive pointer justifications detected on a particular path on an incoming SDH signal.
HP-NPJC-PDET	High-Order, Negative Pointer Justification Count, Path Detected (HP-NPJC-Pdet) is a count of the negative pointer justifications detected on a particular path on an incoming SDH signal.
HP-PPJC-PGEN	High-Order, Positive Pointer Justification Count, Path Generated (HP-PPJC-Pgen) is a count of the positive pointer justifications generated for a particular path.
HP-NPJC-PGEN	High-Order, Negative Pointer Justification Count, Path Generated (HP-NPJC-Pgen) is a count of the negative pointer justifications generated for a particular path.
HP-PJCDIFF	High-Order Path Pointer Justification Count Difference (HP-PJCDiff) is the absolute value of the difference between the total number of detected pointer justification counts and the total number of generated pointer justification counts. That is, HP-PJCDiff is equal to (HP-PPJC-PGen - HP-NPJC-PGen) - (HP-PPJC-PDet - HP-NPJC-PDet).

Table 11-25 VC-4 Near-end Path Performance Monitoring Parameters

Parameter	Definition
HP-PJCS-PDET	High-Order Path Pointer Justification Count Seconds (HP-PJCS-PDet) is a count of the one-second intervals containing one or more HP-PPJC-PDet or HP-NPJC-PDet.
HP-PJCS-PGEN	High-Order Path Pointer Justification Count Seconds (HP-PJCS-PGen) is a count of the one-second intervals containing one or more HP-PPJC-PGen or HP-NPJC-PGen.

11.15.16 ADM-10G Functions

The functions of the ADM-10G card are:

- G.2 Automatic Laser Shutdown, page G-6
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-11 on page G-12

11.15.17 Related Procedures for ADM-10G Card

The following is the list of procedures and tasks related to the configuration of the ADM-10G card:

- NTP-G170 Provision the ADM-10G Card Peer Group, Ethernet Settings, Line Settings, PM Parameters, and Thresholds, page 11-237
- NTP-G200 Create, Delete, and Manage STS or VC Circuits for the ADM-10G Card, page 16-49
- NTP-G75 Monitor Transponder and Muxponder Performance
- NTP-G333 Add an ADM-10G card to an Existing Topology, page 11-261

11.16 OTU2_XP Card

The OTU2_XP card is a single-slot card with four ports with XFP-based multirate (OC-192/STM-64, 10GE, 10G FC, IB_5G) Xponder for the ONS 15454 ANSI and ETSI platforms. The OTU2_XP card supports multiple configurations.

Table 11-26 describes the different configurations supported by the OTU2_XP card and the ports that must be used for these configurations.

Table 11-26 OTU2_XP Card Configurations and Ports

Configuration	Port 1	Port 2	Port 3	Port 4
2 x 10G transponder	Client port 1	Client port 2	Trunk port 1	Trunk port 2
2 x 10G standard regenerator (with enhanced FEC (E-FEC) only on one port)	Trunk port 1	Trunk port 2	Trunk port 1	Trunk port 2

Table 11-26 OTU2_XP Card Configurations and Ports (continued)

Configuration	Port 1	Port 2	Port 3	Port 4
10 GE LAN Phy to WAN Phy	Client port	Client port in transponder or trunk port in regenerator configuration	Trunk port	Trunk port in transponder or regenerator configuration
1 x 10G E-FEC regenerator (with E-FEC on two ports)	Not used	Not used	Trunk port	Trunk port
1 x 10G splitter protected transponder	Client port	Not used	Trunk port (working)	Trunk port (protect)

All the four ports are ITU-T G.709 compliant and support 40 channels (wavelengths) at 100-GHz channel spacing in the C-band (that is, the 1530.33 nm to 1561.42 nm wavelength range).

The OTU2_XP card can be installed in Slots 1 through 6 or 12 through 17. The OTU2_XP card supports SONET SR1, IR2, and LR2 XFPs, 10GE BASE SR, SW, LR, LW, ER, EW, and ZR XFPs, and 10G FC MX-SN-I and SM-LL-L XFPs.

Caution Fan-tray assembly 15454E-CC-FTA (ETSI shelf)/15454-CC-FTA (ANSI shelf) must be installed in a shelf where the OTU2_XP card is installed.

11.16.1 Key Features

The OTU2_XP card has the following high-level features:

- 10G transponder, regenerator, and splitter protection capability on the ONS 15454 DWDM platform.
- Compatible with the ONS 15454 ANSI high-density shelf assembly, the ETSI ONS 15454 shelf assembly, and the ETSI ONS 15454 high-density shelf assembly. Compatible with TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards.
- Interoperable with TXP_MR_10E and TXP_MR_10E_C cards.
- Four port, multirate (OC-192/STM-64, 10G Ethernet WAN Phy, 10G Ethernet LAN Phy, 10G Fibre Channel, IB_5G) client interface. The client signals are mapped into an ITU-T G.709 OTU2 signal using standard ITU-T G.709 multiplexing.
- ITU-T G.709 framing with standard Reed-Soloman (RS) (255,237) FEC. Performance monitoring and ITU-T G.709 Optical Data Unit (ODU) synchronous mapping. Enhanced FEC (E-FEC) with ITU-T G.709 ODU with greater than 8 dB coding gain.
- The trunk rate remains the same irrespective of the FEC configuration. The error coding performance can be provisioned as follows:
  - FEC—Standard ITU-T G.709.
  - E-FEC—Standard ITU-T G.975.1 (subclause I.7)
- IEEE 802.3 frame format supported for 10 Gigabit Ethernet interfaces. The minimum frame size is 64 bytes. The maximum frame size is user-provisionable.

- Supports fixed/no fixed stuff mapping (insertion of stuffing bytes) for 10G Ethernet LAN Phy signals (only in transponder configuration).
- Supports 10G Ethernet LAN Phy to 10G Ethernet WAN Phy conversion on Ports 1 (client port) and 3 (trunk port).
- Supports 10G Ethernet LAN Phy to WAN Phy conversion using CTC and TL1. When enabled on the OTU2_XP card, the first Channel (Ports 1 and 3) supports LAN to WAN conversion. The second channel carries normal 10GE, 10G FC, and OC192/STM64 traffic.
- The LAN Phy to WAN Phy conversion functions in accordance to WAN Interface Sublayer (WIS) mechanism as defined by IEEE802.3ae (IEEE Std 802.3ae-2002, Amendment to CSMA/CD).
- Default configuration is transponder, with trunk ports configured as ITU-T G.709 standard FEC.
- In transponder or regenerator configuration, if one of the ports is configured the corresponding port is automatically created.
- In regenerator configuration, only Ports 3 and 4 can be configured as E-FEC. Ports 1 and 2 can be configured only with standard FEC.
- When port pair 1-3 or 2-4 is configured as regenerator (that is, card mode is standard regenerator), the default configuration on Ports 3 and 4 is automatically set to standard FEC.
- When Ports 3 and 4 are configured as regenerator (that is, card mode is E-FEC regenerator), the default configuration on both these ports is automatically set to E-FEC.
- In splitter protected transponder configuration, the trunk ports (Ports 3 and 4) are configured as ITU-T G.709 standard FECor E-FEC.
- Supports protection through Y-cable protection scheme.

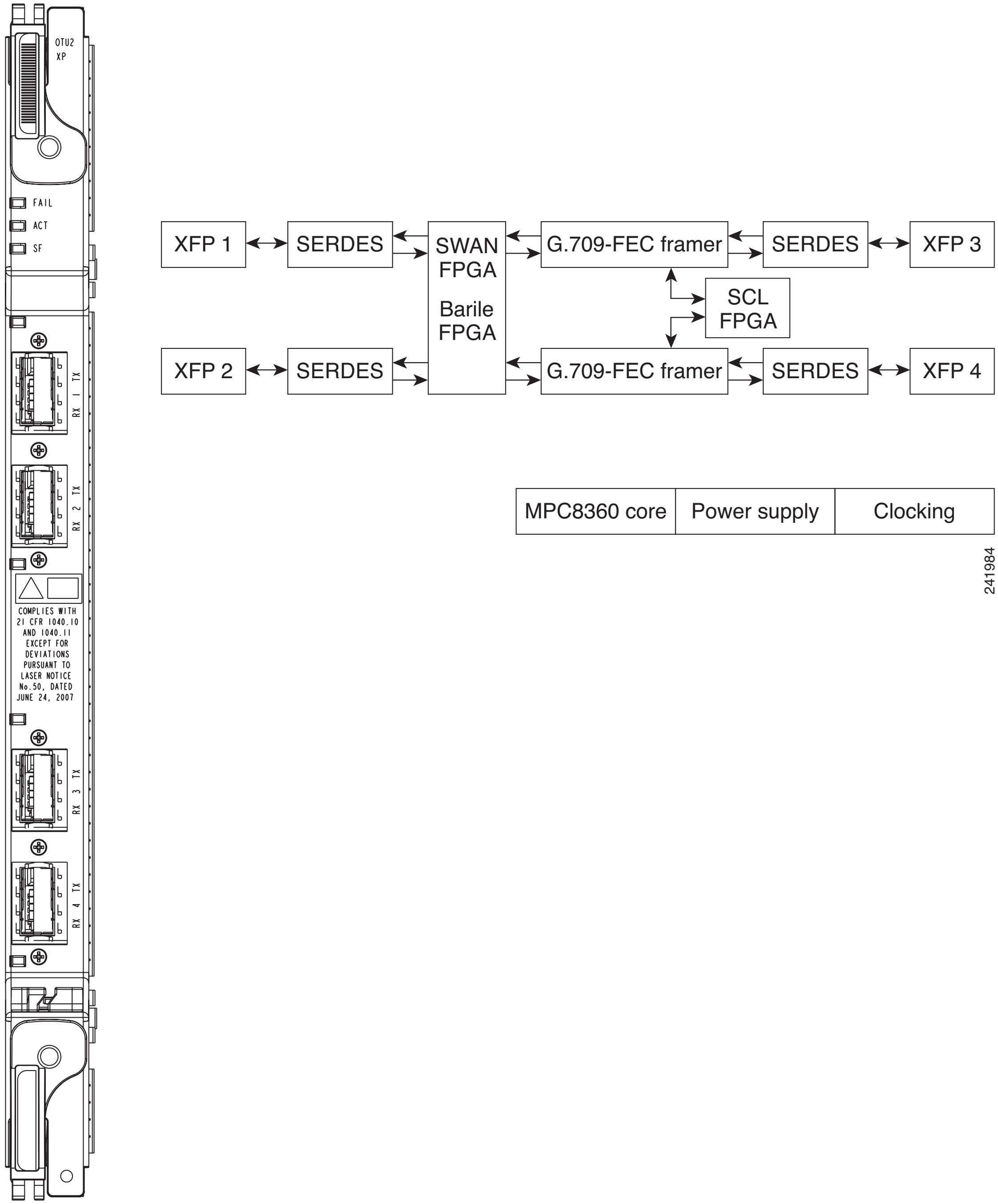
Note When enabled, the 10G Ethernet LAN Phy to WAN Phy conversion feature does not support Y-cable protection on the LAN to WAN interface (ports 1 and 3).

- Client ports support SONET SR1, IR2, and LR2 XFPs, 10GE BASE SR, SW, LR, LW, ER, EW, and ZR XFPs, and 10G FC MX-SN-I and SM-LL-L XFPs.
- Following are the OTU2 link rates that are supported on the OTU2_XP trunk port:
  - Standard G.709 (10.70923 Gbps) when the client is provisioned as “SONET” (including 10G Ethernet WAN PHY) (9.95328 Gbps).
  - G.709 overclocked to transport 10GE as defined by ITU-T G. Sup43 Clause 7.2 (11.0491 Gbps) when the client is provisioned as “10G Ethernet LAN Phy” (10.3125 Gbps) with “No Fixed Stuff” enabled.
  - G.709 overclocked to transport 10GE as defined by ITU-T G. Sup43 Clause 7.1 (11.0957 Gbps) when the client is provisioned as “10G Ethernet LAN Phy” (10.3125 Gbps) with “No Fixed Stuff” disabled.
  - G.709 proprietary overclocking mode to transport 10G FC (11.3168 Gbps) when the client is provisioned as “10G Fiber Channel” (10.518 Gbps).
  - Proprietary rate at the trunk when the client is provisioned as IB_5G.
- The MTU setting is used to display the ifInerrors and OverSizePkts counters on the receiving trunk and client port interfaces. Traffic of frame sizes up to 65535 bytes pass without any packet drops, from the client port to the trunk port and vice versa irrespective of the MTU setting.

11.16.2 Faceplate and Block Diagram

Figure 11-22 shows the OTU2_XP card faceplate and block diagram.

Figure 11-22 OTU2_XP Card Faceplate and Block Diagram



Note The Swan FPGA is automatically loaded when the LAN Phy to WAN Phy conversion feature is enabled on the OTU2_XP card. The Barile FPGA is automatically loaded when the LAN Phy to WAN Phy conversion feature is disabled on the OTU2_XP card.

11.16.3 OTU2_XP Card Interface

The OTU2_XP card is a multi-functional card that operates in different configurations, such as transponder, standard regenerator, E-FEC regenerator, and 10G Ethernet LAN Phy to WAN Phy conversion mode. The OTU2_XP card acts as a protected transponder, when the 10G Ethernet LAN Phy to WAN Phy is in splitter protected transponder configuration mode.

Depending on the configuration of the OTU2_XP card, the ports act as client or trunk ports (see Table 11-26). This following section describes the client and trunk rates supported on the OTU2_XP card for different card configurations:

11.16.3.1 Client Interface

In transponder and 10G Ethernet LAN Phy to WAN Phy card configurations, Ports 1 and 2 act as client ports and in splitter protected transponder configuration, Port 1 acts as a client port. For these card configurations, the client rates supported are:

- OC-192/STM-64
- 10G Ethernet WAN Phy
- 10G Ethernet LAN Phy
- 10G Fibre Channel
- IB_5G

11.16.3.2 Trunk Interface

In transponder, 10G Ethernet LAN Phy to WAN Phy, and splitter protected transponder card configurations, Ports 3 and 4 act as trunk ports. For these card configurations, the trunk rates supported are:

- OC-192/STM-64
- 10G Ethernet WAN Phy
- 10G Ethernet LAN Phy
- 10G Fibre Channel
- OTU2 with ITU-T G.709 for OC-192 client interface
- OTU2e with ITU-T G.709 for 10G Ethernet LAN Phy client interface
- Proprietary rate at the trunk when the client is provisioned as IB_5G.

In standard regenerator card configuration, all four ports act as trunk ports and in E-FEC regenerator configuration, Ports 3 and 4 act as the trunk ports. For these card configurations, the trunk rate supported is OTU2 G.709

Note The above mentioned OTU2 signal must be an OC-192/STM-64, 10G Ethernet WAN Phy, 10G Ethernet LAN Phy, or 10G Fibre Channel signal packaged into an OTU2 G.709 frame. Additionally, the standard regenerator and E-FEC regenerator configuration supports an OTU2 signal that is OTU2 has been generated by multiplexing four ODU1 signals.

11.16.4 Configuration Management

The OTU2_XP card supports the following configuration management parameters:

- Card Configuration—Provisionable card configuration: Transponder, Standard Regen, Enhanced FEC, or Mixed, or 10G Ethernet LAN Phy to WAN Phy.
- Port Mode—Provisionable port mode when the card configuration is set as Mixed. The port mode can be chosen as either Transponder or Standard Regen for each port pair (1-3 and 2-4). For card configurations other than Mixed, CTC automatically sets the port mode depending on the selected card configuration. For 10G Ethernet LAN Phy to WAN Phy mode, CTC automatically selects the port pair (1-3) as 10G Ethernet LAN Phy to WAN Phy. Port pair (2-4) in 10G Ethernet LAN Phy to WAN Phy mode is selected as Transponder or Standard Regen.
- Termination Mode—Provisionable termination mode when the card configuration is set as either Transponder or Mixed. The termination mode can be chosen as Transparent, Section, or Line. For Standard Regen and Enhanced FEC card configurations, CTC automatically sets the termination mode as Transparent. For 10G Ethernet LAN Phy to WAN Phy mode, CTC automatically selects the Termination Mode of port pair (1-3) as Line. You cannot provision the Termination Mode parameter.
- AIS/Squelch—Provisionable AIS/Squelch mode configuration when the card configuration is set as either Transponder, Mixed, or Standard Regen. The AIS/Squelch mode configuration can be chosen as AIS or Squelch. For Enhanced FEC card configuration, CTC automatically sets the AIS/Squelch mode configuration as AIS. For 10G Ethernet LAN Phy to WAN Phy mode, the CTC automatically selects the AIS/Squelch of port pair (1-3) as Squelch. You cannot provision the AIS/Squelch parameter.

Note When AIS/Squelch is enabled in Standard Regen configuration with port pairs (1-3) and (2-4), Squelch is supported on ports 1 and 2 and AIS on ports 3 and 4.

Note When you choose the 10G Ethernet LAN Phy to WAN Phy conversion, the Termination mode is automatically set to LINE. The AIS/Squelch is set to SQUELCH and ODU Transparency is set to Cisco Extended Use for Ports 1 and 3.

- Regen Line Name—User-assigned text string for regeneration line name.
- ODU Transparency—Provisionable ODU overhead byte configuration, either Transparent Standard Use or Cisco Extended Use. See the "11.16.7 ODU Transparency" section on page 11-104 for more detailed information. For 10G Ethernet LAN Phy to WAN Phy mode, CTC automatically selects the ODU Transparency as Cisco Extended Use. You cannot provision the ODU Transparency parameter.
- Port name—User-assigned text string.
- Admin State/Service State—Administrative and service states to manage and view port status.
- ALS Mode—Provisionable ALS function.

- Reach—Provisionable optical reach distance of the port.
- Wavelength—Provisionable wavelength of the port.
- AINS Soak—Provisionable automatic in-service soak period.

11.16.5 OTU2_XP Card Configuration Rules

The following rules apply to OTU2_XP card configurations:

- When you preprovision the card, port pairs 1-3 and 2-4 come up in the default Transponder configuration.
- The port pairs 1-3 and 2-4 can be configured in different modes only when the card configuration is Mixed. If the card configuration is Mixed, you must choose different modes on port pairs 1-3 and 2-4 (that is, one port pair in Transponder mode and the other port pair in Standard Regen mode).
- If the card is in Transponder configuration, you can change the configuration to Standard Regen or Enhanced FEC.
- If the card is in Standard Regen configuration and you have configured only one port pair, then configuring payload rates for the other port pair automatically changes the card configuration to Mixed, with the new port pair in Transponder mode.
- If the card is in Standard Regen configuration, you cannot directly change the configuration to Enhanced FEC. You have to change to Transponder configuration and then configure the card as Enhanced FEC.
- If the card is in Enhanced FEC configuration, Ports 1 and 2 are disabled. Hence, you cannot directly change the configuration to Standard Regen or Mixed. You must remove the Enhanced FEC group by moving the card to Transponder configuration, provision PPM on Ports 1 and 2, and then change the card configuration to Standard Regen or Mixed.
- If the card is in Standard Regen or Enhanced FEC configuration, you cannot change the payload rate of the port pairs. You have to change the configuration to Transponder, change the payload rate, and then move the card configuration back to Standard Regen or Enhanced FEC.
- If any of the affected ports are in IS (ANSI) or Unlocked-enabled (ETSI) state, you cannot change the card configuration.
- If IB_5G payload has to be provisioned, the NE Default should match the values listed in the Table 11-27. For more information on editing the NE Default values, see the "NTP-G135 Edit Network Element Defaults" task on page 24-23.

Table 11-27 OTU2_XP Card Configuration for IB_5G Payload Provisioning

Parameter	NE Default Name	Value
FEC	OTU2-XP.otn.otnLines.FEC	Standard
ITU-T G.709 OTN	OTU2-XP.otn.otnLines.G709OTN	Enable
Termination Mode	OTU2-XP.config.port.TerminationMode	Transparent
ODU Transparency	OTU2-XP.config.port.OduTransparency	Cisco Extended Use
AIS/Squelch	OTU2-XP.config.port.AisSquelchMode	Squelch

- If the card is changed to 10G Ethernet LAN Phy to WAN Phy, the first PPM port is deleted and replaced by a 10G Ethernet port; the third PPM port is deleted and automatically replaced with OC192/STM64 (SONET/SDH) port. The third PPM port is automatically deleted and the third PPM port is replaced with OC192/STM64 (SONET/SDH).

Table 11-28 provides a summary of transitions allowed for the OTU2_XP card configurations.

Table 11-28 Card Configuration Transition Summary

Card Configuration	Transition To				
	Transponder	**Standard Regen**	**Enhanced FEC**	**Mixed**	**10G Ethernet LAN Phy to WAN Phy**
Transponder	—	Yes	Yes	Yes	Yes
Standard Regen	Yes	—	No	Yes	Yes
Enhanced FEC	Yes	No	—	No	No
Mixed	Yes	Yes	No	—	Yes
10G Ethernet LAN Phy to WAN Phy	Yes	Yes	No	The 10G Ethernet LAN Phy to WAN Phy to Mixed is supported if the Port pair 1-3 is chosen as Transponder. The 10G Ethernet LAN Phy to WAN Phy to Mixed is not supported if the Port pair 1-3 is chosen as Standard Regen.	—

11.16.6 Security

The OTU2_XP card, when an XFP is plugged into it, implements the Cisco Standard Security Code Check Algorithm that keys on vendor ID and serial number.

If a PPM is plugged into a port on the card but fails the security code check because it is not a Cisco PPM, a NON-CISCO-PPM Not Reported (NR) condition occurs.

If a PPM with a non-qualified product ID is plugged into a port on this card, that is, the PPM passes the security code as a Cisco PPM but it has not been qualified for use on the OTU2_XP card, a UNQUAL-PPM NR condition occurs.

11.16.7 ODU Transparency

A key feature of the OTU2_XP card is the ability to configure the ODU overhead bytes (EXP bytes and RES bytes 1 and 2) using the ODU Transparency parameter. The two options available for this parameter are:

- Transparent Standard Use—ODU overhead bytes are transparently passed through the card. This option allows the OTU2_XP card to act transparently between two trunk ports (when the card is configured in Standard Regen or Enhanced FEC).
- Cisco Extended Use—ODU overhead bytes are terminated and regenerated on both ports of the regenerator group.

The ODU Transparency parameter is configurable only for Standard Regen and Enhanced FEC card configuration. For Transponder card configuration, this parameter defaults to Cisco Extended Use and cannot be changed.

Note The Forward Error Correction (FEC) Mismatch (FEC-MISM) alarm will not be raised on OTU2_XP card when you choose Transparent Standard Use.

11.16.8 OTU2_XP Functions

The functions of the OTU2_XP card are:

- G.2 Automatic Laser Shutdown, page G-6
- G.35.1 Y-Cable and Splitter Protection, page G-27
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-11 on page G-12

11.16.9 Related Procedures for OTU2_XP Card

The following is the list of procedures and tasks related to the configuration of the OTU2_XP card:

- NTP-G197 Provision the OTU2_XP Card Line Settings, PM Parameters, and Thresholds, page 11-427
- NTP-G33 Create a Y-Cable Protection Group, page 11-162
- NTP-G199 Create a Splitter Protection Group for the OTU2_XP Card, page 11-166
- NTP-G75 Monitor Transponder and Muxponder Performance

11.17 TXP_MR_10EX_C Card

The TXP_MR_10EX_C card is a multirate transponder for the ONS 15454 platform. The card is fully backward compatible with TXP_MR_10E_C cards (only when the error decorrelator is disabled in the CTC on the TXP_MR_10EX_C card). It processes one 10-Gbps signal (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side). The TXP_MR_10EX_C card is tunable over the 82 channels of C-band (82 channels spaced at 50 GHz on the ITU grid).

You can install TXP_MR_10EX_C card in Slots 1 to 6 and 12 to 17. The card can be provisioned in linear, BLSR/MS-SPRing, path protection/SNCP configurations or as a regenerator. The card can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the card is configured for transparent termination mode. The TXP_MR_10EX_C card features an MLSE-based Universal Transponder 1550-nm tunable laser and a separately orderable ONS-XC-10G-S1 1310-nm or ONS-XC-10G-L2 1550-nm laser XFP module for the client port.

Note The PRE FEC BER performance of the TXP_MR_10EX_C card may be significantly low when compared to the TXP_MR_10E card. However, this does not affect the Post FEC BER performance, but could possibly affect any specific monitoring application that relies on the PRE FEC BER value (for example, protection switching). In this case, the replacement of TXP_MR_10E card with the TXP_MR_10EX_C may not work properly.

Note When the ONS-XC-10G-L2 XFP is installed, the TXP_MR_10EX_C card must be installed in a high-speed slot (slot 6, 7, 12, or 13)

On its faceplate, the TXP_MR_10EX_C card contains two transmit and receive connector pairs, one for the trunk port and one for the client port. Each connector pair is labeled.

11.17.1 Key Features

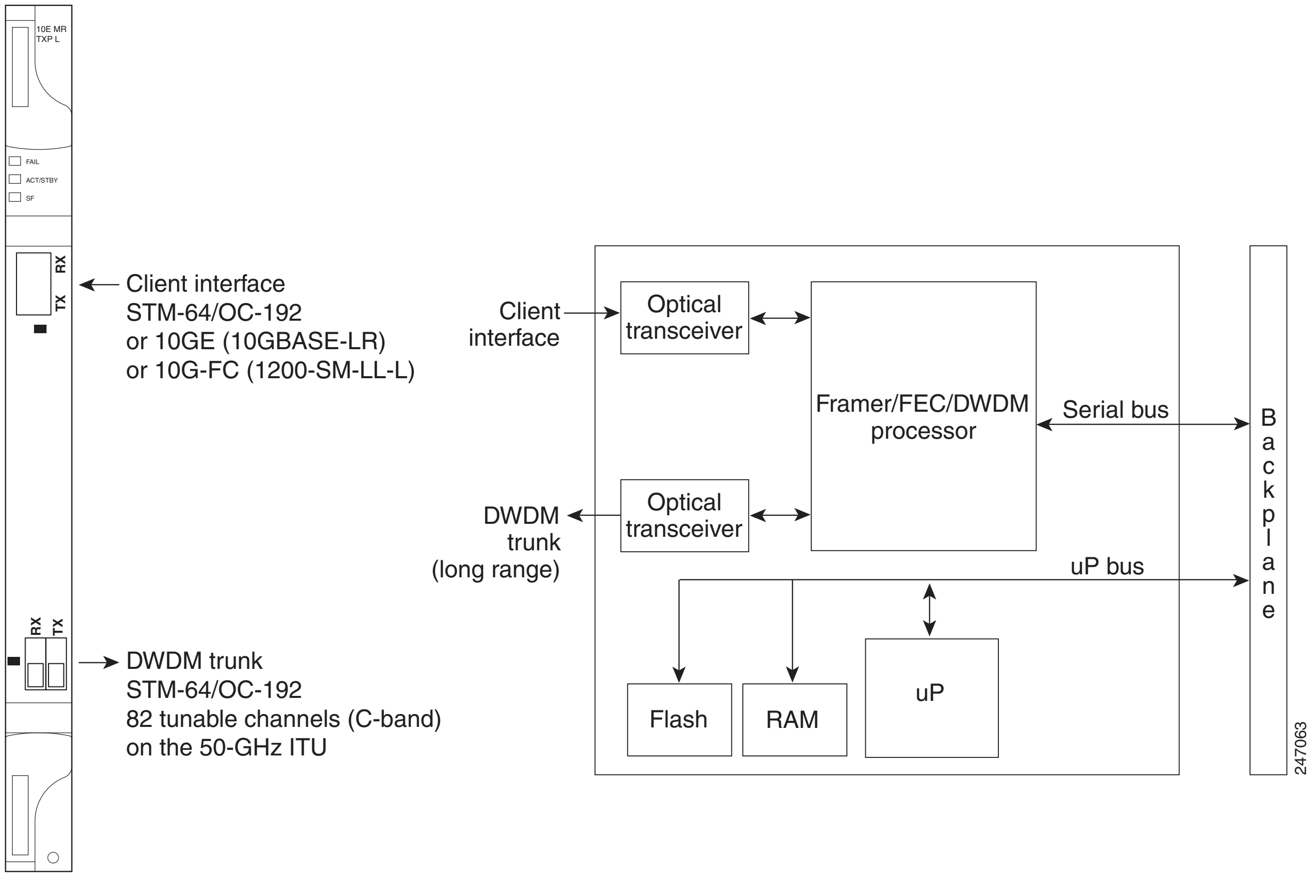
The key features of the TXP_MR_10EX_C card are:

- A multi-rate client interface (available through the ONS-XC-10G-S1 XFP, ordered separately):
  - OC-192 (SR1)
  - 10GE (10GBASE-LR)
  - 10G-FC (1200-SM-LL-L)
  - (ONS-XC-10G-S1 version 3 only) IB_5G
- An MLSE-based UT module tunable through 82 channels of C-band. The channels are spaced at 50 GHz on the ITU grid.
- OC-192 to ITU-T G.709 OTU2 provisionable synchronous and asynchronous mapping.
- Proprietary rate at the trunk when the client is provisioned as IB_5G.
- The MTU setting is used to display the OverSizePkts counters on the receiving trunk and client port interfaces. Traffic of frame sizes up to 65535 bytes pass without any packet drops, from the client port to the trunk port and vice versa irrespective of the MTU setting.

11.17.2 Faceplate and Block Diagram

Figure 11-23 shows the TXP_MR_10EX_C faceplate and block diagram.

Figure 11-23 TXP_MR_10EX_C Faceplate and Block Diagram



For information about safety labels for the card, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Caution You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10EX_C card in a loopback on the trunk port. Do not use direct fiber loopbacks with this card, because they can cause irreparable damage to the card.

11.17.3 TXP_MR_10EX_C Functions

The functions of the TXP_MR_10EX_C card are:

- G.5 Client Interface, page G-14
- G.7 DWDM Trunk Interface, page G-15
- G.8 Enhanced FEC (E-FEC) Feature, page G-16
- G.9 FEC and E-FEC Modes, page G-16
- G.10 Client-to-Trunk Mapping, page G-17
- G.2 Automatic Laser Shutdown, page G-6

- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-6 on page G-10.

11.17.4 Related Procedures for TXP_MR_10EX_C Card

The following is the list of procedures and tasks related to the configuration of the TXP_MR_10EX_C card:

- NTP-G96 Provision the 10G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds, page 11-191
- NTP-G75 Monitor Transponder and Muxponder Performance

11.18 MXP_2.5G_10EX_C card

The MXP_2.5G_10EX_C card is a DWDM muxponder for the ONS 15454 platform that supports transparent termination mode on the client side. The faceplate designation of the card is “4x2.5G 10EX MXP.” The card multiplexes four 2.5-Gbps client signals (4xOC48/STM-16 SFP) into a single 10-Gbps DWDM optical signal on the trunk side. The card provides wavelength transmission service for the four incoming 2.5-Gbps client interfaces. The MXP_2.5G_10EX_C muxponder passes all SONET/SDH overhead bytes transparently.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate PM.

The MXP_2.5G_10EX_C card works with OTN devices defined in ITU-T G.709. The card supports ODU1 to OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. See the “G.12 Multiplexing Function” section on page G-18.

The MXP_2.5G_10EX_C card is not compatible with the MXP_2.5G_10G card, which does not support transparent termination mode.

You can install the MXP_2.5G_10EX_C card in slots 1 to 6 and 12 to 17. You can provision a card in a linear configuration, a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. The card can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the card is configured for transparent termination mode.

The MXP_2.5G_10EX_C card features a tunable 1550-nm C-band laser on the trunk port. The laser is tunable across 82 wavelengths on the ITU grid with 50-GHz spacing between wavelengths. The card features four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The card uses dual LC connectors on the trunk side and SFP modules on the client side for optical cable termination. The SFP pluggable modules are SR or IR and support an LC fiber connector.

Note When you create a 4xOC-48 OCHCC circuit, you need to select the G.709 and Synchronous options. A 4xOC-48 OCHCC circuit is supported by G.709 and synchronous mode, which are necessary to provision the 4xOC-48 OCHCC circuit.

11.18.1 Key Features

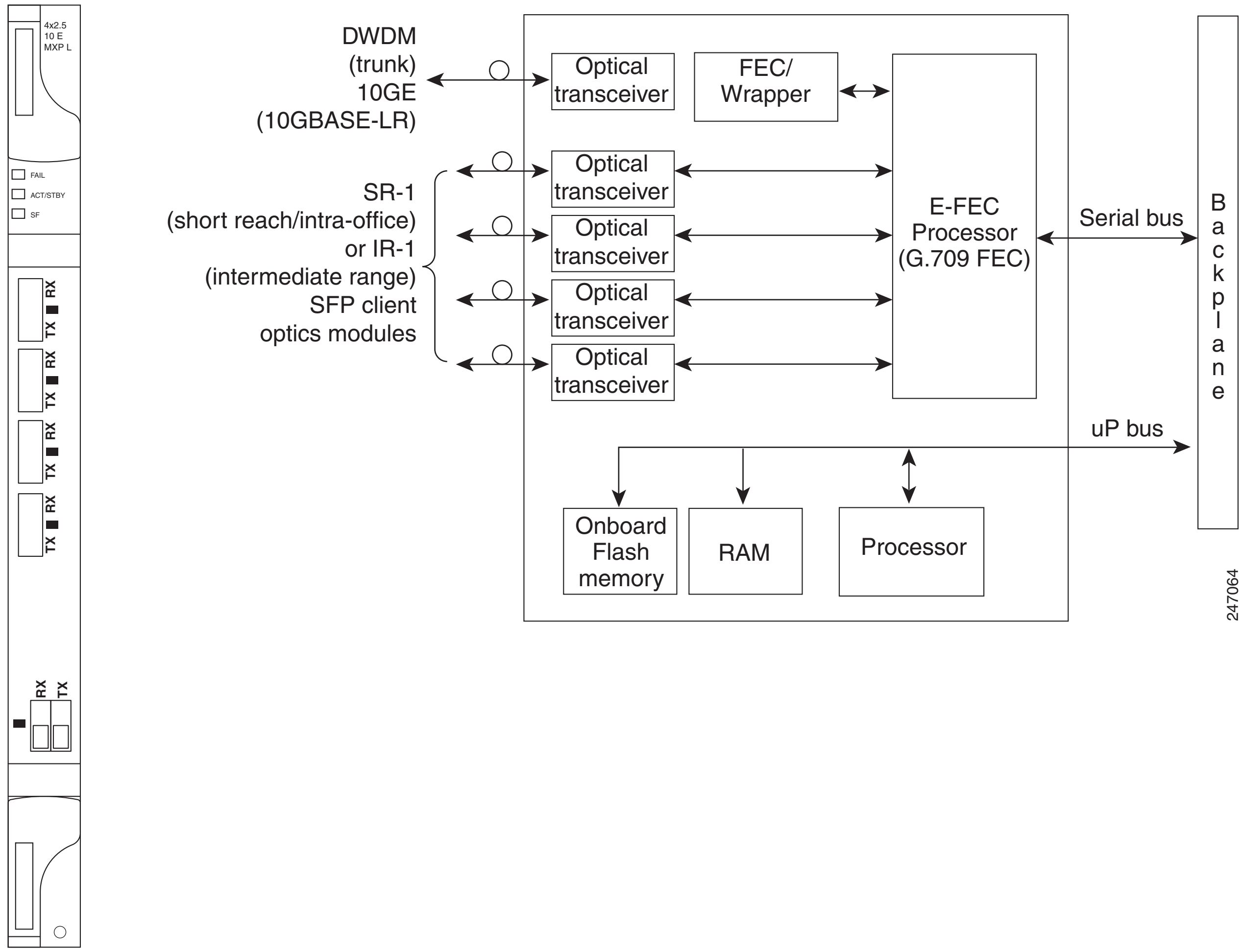
The MXP_2.5G_10EX_C card has the following high-level features:

- Four 2.5-Gbps client interfaces (OC-48/STM-16) and one 10-Gbps trunk. The four OC-48 signals are mapped into an ITU-T G.709 OTU2 signal using standard ITU-T G.709 multiplexing.
- Onboard E-FEC processor: The processor supports both standard RS (specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm.
- Pluggable client-interface optic modules: The MXP_2.5G_10EX_C card has modular interfaces. Two types of optic modules can be plugged into the card. These modules include an OC-48/STM-16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range of up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).
- High-level provisioning support: The card is initially provisioned using Cisco TransportPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- Link monitoring and management: The card uses standard OC-48 OH (overhead) bytes to monitor and manage incoming interfaces. The card passes the incoming SDH/SONET data stream and its overhead bytes transparently.
- Control of layered SONET/SDH transport overhead: The card is provisionable to terminate regenerator section overhead, which eliminates forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- Automatic timing source synchronization: The MXP_2.5G_10EX_C card normally synchronizes from the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE is not available, the card automatically synchronize to one of the input client-interface clocks.
- Configurable squelching policy: The card can be configured to squelch the client interface output if LOS occurs at the DWDM receiver or if a remote fault occurs. In the event of a remote fault, the card manages MS-AIS insertion.
- The card is tunable across the full C-band, thus eliminating the need to use different versions of each card to provide tunability across specific wavelengths in a band.

11.18.2 Faceplate and Block Diagram

Figure 11-24 shows the MXP_2.5G_10EX_C faceplate and block diagram.

Figure 11-24 MXP_2.5G_10EX_C Faceplate and Block Diagram



For information about safety labels for the card, see the "G.1.1 Class 1 Laser Product Cards" section on page G-1.

11.18.3 MXP_2.5G_10EX_C Functions

The functions of the MXP_2.5G_10EX_C card are:

- G.5 Client Interface, page G-14
- G.6 DWDM Interface, page G-15
- G.8 Enhanced FEC (E-FEC) Feature, page G-16
- G.9 FEC and E-FEC Modes, page G-16
- G.12 Multiplexing Function, page G-18
- G.11 Timing Synchronization, page G-17
- G.13 SONET/SDH Overhead Byte Processing, page G-19
- G.13 SONET/SDH Overhead Byte Processing, page G-19
- G.14 Client Interface Monitoring, page G-19

- G.2 Automatic Laser Shutdown, page G-6
- G.15 Jitter, page G-19
- G.16 Lamp Test, page G-19
- G.17 Onboard Traffic Generation, page G-19
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-6 on page G-10

11.18.3.1 Wavelength Identification

The card uses trunk lasers that are wavelocked, which allows the trunk transmitter to operate on the ITU grid effectively. The MXP_2.5G_10EX_C card implements the MLSE-based UT module. The MXP_2.5G_10EX_C card uses a C-band version of the UT2.

Table 11-29 describes the required trunk transmit laser wavelengths for the MXP_2.5G_10EX_C card. The laser is tunable over 82 wavelengths in the C-band at 50-GHz spacing on the ITU grid.

Table 11-29 MXP_2.5G_10EX_C Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134

Table 11-29 MXP_2.5G_10EX_C Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

11.18.4 Related Procedures for MXP_2.5G_10EX_C Card

The following is the list of procedures and tasks related to the configuration of the MXP_2.5G_10EX_C card:

- NTP-G97 Modify the 4x2.5G Muxponder Card Line Settings and PM Parameter Thresholds, page 11-262
- NTP-G75 Monitor Transponder and Muxponder Performance

11.19 MXP_MR_10DMEX_C Card

The MXP_MR_10DMEX_C card aggregates a mix of client SAN service-client inputs (GE, FICON, and Fibre Channel) into one 10-Gbps STM-64/OC-192 DWDM signal on the trunk side. It provides one long-reach STM-64/OC-192 port per card and is compliant with Telcordia GR-253-CORE and ITU-T G.957.

The card supports aggregation of the following signal types:

- 1-Gigabit Fibre Channel
- 2-Gigabit Fibre Channel

- 4-Gigabit Fibre Channel
- 1-Gigabit Ethernet
- 1-Gigabit ISC-Compatible (ISC-1)
- 2-Gigabit ISC-Peer (ISC-3)

Caution The card can be damaged by dropping it. Handle it carefully.

The MXP_MR_10DMEX_C muxponder passes all SONET/SDH overhead bytes transparently.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate PM. The MXP_MR_10DMEX_C card works with the OTN devices defined in ITU-T G.709. The card supports ODU1 to OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. See the "G.12 Multiplexing Function" section on page G-18.

Note You cannot disable ITU-T G.709 on the trunk side. If ITU-T G.709 is enabled, then FEC cannot be disabled.

Note Because the client payload cannot oversubscribe the trunk, a mix of client signals can be accepted, up to a maximum limit of 10 Gbps.

You can install the MXP_MR_10DMEX_C card in slots 1 to 6 and 12 to 17.

Note The MXP_MR_10DMEX_C card is not compatible with the MXP_2.5G_10G card, which does not support transparent termination mode.

The MXP_MR_10DMEX_C card features a tunable 1550-nm C-band laser on the trunk port. The laser is tunable across 82 wavelengths on the ITU grid with 50-GHz spacing between wavelengths. Each card features four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The card uses dual LC connectors on the trunk side and SFP modules on the client side for optical cable termination. The SFP pluggable modules are SR or IR and support an LC fiber connector.

Table 11-30 shows the input data rate for each client interface, and the encapsulation method. The current version of the GFP-T G.7041 supports transparent mapping of 8B/10B block-coded protocols, including Gigabit Ethernet, Fibre Channel, ISC, and FICON.

In addition to the GFP mapping, 1-Gbps traffic on Port 1 or 2 of the high-speed SERDES is mapped to an STS-24c channel. If two 1-Gbps client signals are present at Port 1 and Port 2 of the high-speed SERDES, the Port 1 signal is mapped into the first STS-24c channel and the Port 2 signal into the second STS-24c channel. The two channels are then mapped into an OC-48 trunk channel.

Table 11-30 MXP_MR_10DMEX_C Client Interface Data Rates and Encapsulation

Client Interface	Input Data Rate	GFP-T G.7041 Encapsulation
2G FC	2.125 Gbps	Yes
1G FC	1.06 Gbps	Yes

Table 11-30 MXP_MR_10DMEX_C Client Interface Data Rates and Encapsulation (continued)

Client Interface	Input Data Rate	GFP-T G.7041 Encapsulation
2G FICON/2G ISC-Compatible (ISC-1)/ 2G ISC-Peer (ISC-3)	2.125 Gbps	Yes
1G FICON/1G ISC-Compatible (ISC-1)/ 1G ISC-Peer (ISC-3)	1.06 Gbps	Yes
Gigabit Ethernet	1.25 Gbps	Yes

The MXP_MR_10DMEX_C card includes two FPGAs, and a group of four ports is mapped to each FPGA. Group 1 consists of Ports 1 through 4, and Group 2 consists of Ports 5 through 8. Table 11-31 shows some of the mix and match possibilities on the various client data rates for Ports 1 through 4, and Ports 5 through 8. An X indicates that the data rate is supported in that port.

Table 11-31 Supported Client Data Rates for Ports 1 through 4 and Ports 5 through 8

Port (Group 1)	Port (Group 2)	Gigabit Ethernet	1G FC	2G FC	4G FC
1	5	X	X	X	X
2	6	X	X	—	—
3	7	X	X	X	—
4	8	X	X	—	—

GFP-T PM is available through RMON and trunk PM is managed according to Telcordia GR-253-CORE and ITU G.783/826. Client PM is achieved through RMON for FC and GE.

A buffer-to-buffer credit management scheme provides FC flow control. With this feature enabled, a port indicates the number of frames that can be sent to it (its buffer credit), before the sender is required to stop transmitting and wait for the receipt of a "ready" indication. The MXP_MR_10DMEX_C card supports FC credit-based flow control with a buffer-to-buffer credit extension of up to 1600 km (994.1 miles) for 1G FC, up to 800 km (497.1 miles) for 2G FC, or up to 400 km (248.5 miles) for 4G FC. The feature can be enabled or disabled.

The MXP_MR_10DMEX_C card features a 1550-nm laser for the trunk/line port and a 1310-nm or 850-nm laser (depending on the SFP) for the client ports. The card contains eight 12.5-degree downward-tilt SFP modules for the client interfaces. For optical termination, each SFP uses two LC connectors, which are labeled TX and RX on the faceplate. The trunk port is a dual-LC connector with a 45-degree downward angle.

11.19.1 Key Features

The MXP_MR_10DMEX_C card has the following high-level features:

- Onboard E-FEC processor: The processor supports both standard RS (specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm.

- Pluggable client-interface optic modules: The MXP_MR_10DMEX_C card has modular interfaces. Two types of optics modules can be plugged into the card. These modules include an OC-48/STM-16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range of up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).
- Y-cable protection: The card supports Y-cable protection between the same card type only, on ports with the same port number and signal rate. See the "G.35.1.1 Y-Cable Protection" section on page G-27 for more detailed information.
- High-level provisioning support: The card is initially provisioned using Cisco TransportPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- ALS: This safety mechanism is used in the event of a fiber cut. For details regarding ALS provisioning for the MXP_MR_10DMEX_C card, see the "NTP-G162 Change the ALS Maintenance Settings" section on page 11-449.
- Link monitoring and management: The card uses standard OC-48 OH (overhead) bytes to monitor and manage incoming interfaces. The card passes the incoming SDH/SONET data stream and its OH (overhead) bytes transparently.
- Control of layered SONET/SDH transport overhead: The card is provisionable to terminate regenerator section overhead, which eliminates forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- Automatic timing source synchronization: The MXP_MR_10DMEX_C card normally synchronizes from the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE is not available, the card automatically synchronizes to one of the input client-interface clocks.

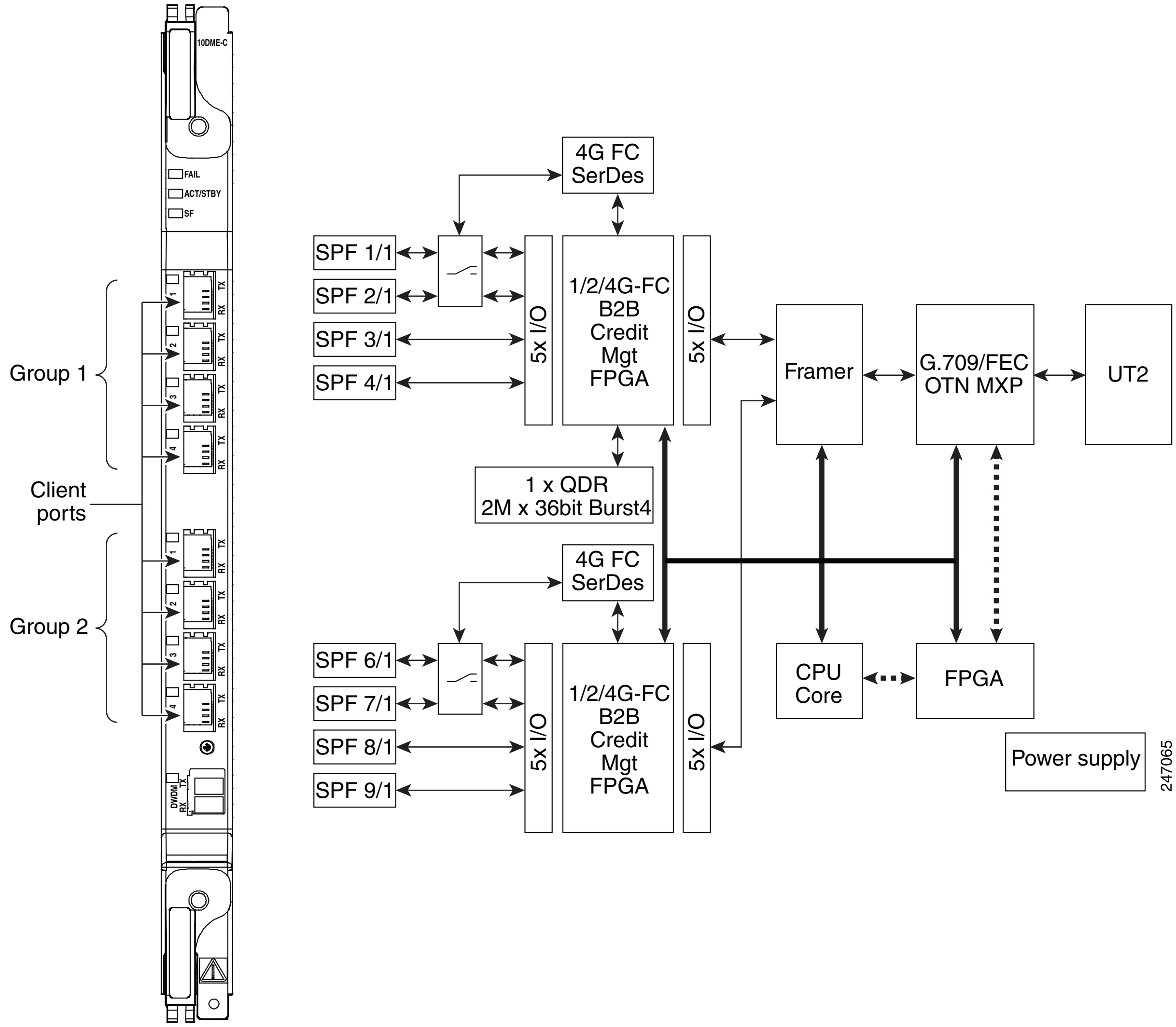
Note MXP_MR_10DMEX_C card cannot be used for line timing.

- Configurable squelching policy: The card can be configured to squelch the client-interface output if LOS occurs at the DWDM receiver or if a remote fault occurs. In the event of a remote fault, the card manages MS-AIS insertion.
- The card is tunable across the full C-band, thus eliminating the need to use different versions of each card to provide tunability across specific wavelengths in a band.
- You can provision a string (port name) for each fiber channel/FICON interface on the MXP_MR_10DMEX_C card, which allows the MDS Fabric Manager to create a link association between that SAN port and a SAN port on a Cisco MDS 9000 switch.

11.19.2 Faceplate and Block Diagram

Figure 11-25 shows the MXP_MR_10DMEX_C faceplate and block diagram.

Figure 11-25 MXP_MR_10DMEX_C Faceplate and Block Diagram



For information about safety labels for the card, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the card in a loopback on the trunk port. Do not use direct fiber loopbacks with the card, because they can cause irreparable damage to the MXP_MR_10DMEX_C card.

11.19.3 MXP_MR_10DMEX_C Functions

The functions of the MXP_MR_10DMEX_C card are:

- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-9 on page G-11

11.19.3.1 Wavelength Identification

The card uses trunk lasers that are wavelocked, which allows the trunk transmitter to operate on the ITU grid effectively. The MXP_MR_10DMEX_C card uses a C-band version of the MLSE-based UT module.

Table 11-32 describes the required trunk transmit laser wavelengths for the MXP_MR_10DMEX_C card. The laser is tunable over 82 wavelengths in the C-band at 50-GHz spacing on the ITU grid.

Table 11-32 MXP_MR_10DMEX_C Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537

Table 11-32 MXP_MR_10DMEX_C Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

11.19.4 Related Procedures for MXP_MR_10DMEX_C Card

The following is the list of procedures and tasks related to the configuration of the MXP_MR_10DMEX_C card:

- NTP-G148 Modify the 10G Data Muxponder Card Line Settings and PM Parameter Thresholds, page 11-301
- NTP-G75 Monitor Transponder and Muxponder Performance

11.20 AR_MXP and AR_XP Cards

The AR_MXP (Any-Rate Muxponder) and AR_XP (Any-Rate Xponder) cards are supported on ONS 15454, ONS 15454 M2, and ONS 15454 M6 platforms. The AR_MXP card supports a trunk bandwidth of up to 10 Gbps, and the AR_XP card supports a trunk bandwidth of up to 20 Gbps. The AR_MXP and AR_XP cards aggregate a mix of client SAN services (FC or FICON 1G/2G/4G/8G, ESCON and ISC3-STP 1G/2G), Ethernet (GE, FE), OCn (OC3/STM-1, OC12/STM-4, and OC48/STM-16), OTU (OTU1, OTU2e/1e), and Video (SD-SDI, HD-SDI, and 3G-SDI) into one 10 Gbps signal on the trunk side.

The cards support aggregation of the following signal types:

- SONET/SDH:
  - STM-1/OC-3
  - STM-4/OC-12
  - STM-16/OC-48

- OTN:
  - OTU-1
  - OTU-2 (OTU1E/OTU2E)
- Ethernet:
  - Fast Ethernet (FE)
  - Gigabit Ethernet (GE)
- SAN:
  - Enterprise Systems Connection (ESCON)
  - 1 Gigabit Fiber Channel or fiber connectivity (FICON)
  - 2 Gigabit Fiber Channel or FICON
  - 4 Gigabit Fiber Channel or FICON
  - 8 Gigabit Fiber Channel or FICON
  - 1G ISC3-STP
  - 2G ISC3-STP
- Video:
  - SD-SDI (270 Mbps)
  - HD-SDI (1.485 Gbps)
  - Third-generation SDI (3G-SDI) (2.970 Gbps)

The AR_MXP and AR_XP cards pass all SONET/SDH overhead bytes transparently.

Caution The AR_MXP and AR_XP cards can be damaged if dropped. Handle it safely.

Table 11-33 shows the input data rate for each client interface, and the encapsulation method. The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate PM. The AR_MXP and AR_XP cards work with the OTN devices defined in ITU-T G.709. The client can be OTU1 with standard G.975 FEC or disabled FEC. The cards provide standard 4 x OTU1 to OTU2 multiplexing. The OTU2 card is equipped with standard G.709 FEC, E-FEC I.4, E-FEC I.7 and disabled FEC. The cards support ODU1 to OTU1 or OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. For more details on multiplexing, see “G.12 Multiplexing Function” section on page G-18.

Table 11-33 AR_MXP and AR_XP Client Interface Data Rates and Encapsulation

Client Interface	Input Data Rate	GFP Encapsulation
OC3/ STM1	155.52 Mbps	—
OC12/STM4	622.08 Mbps	—
OC48/STM16	2.488 Gbps	—
FE	100 Mbps	GFP-F
GE	1.125 Gbps	GFP-F
1GFC	1.06 Gbps	GFP-T

Table 11-33 AR_MXP and AR_XP Client Interface Data Rates and Encapsulation

Client Interface	Input Data Rate	GFP Encapsulation
2GFC	2.125 Gbps	GFP-T
4GFC	4.25 Gbps	GFP-T
8GFC	8.5 Gbps	GFP-T
OTU1	2.66 Gbps	—
OTU2	10.7 Gbps	—
ESCON	200 Mbps	GFP-T
1G ISC3-STP	1.06 Gbps	GFP-T
2G ISC3-STP	2.125 Gbps	GFP-T
HD-SDI	1.485 Gbps	GFP-F
SD-SDI	270 Mbps	GFP-F
3G-SDI	2.970 Gbps	GFP-F

11.20.1 Key Features

The AR_MXP and AR_XP cards support the following key features:

- Multiple Operating Modes—The AR_MXP or AR_XP cards can be configured into multiple operating modes. The cards are equipped with pluggables for client and trunk options, and offer a large variety of configurations. For more information about multiple operating modes, see 11.20.3 Multiple Operating Modes, page 11-126.
- Operating Mode to Client Payload Mapping—Each operating mode supports a specific set of client payloads. Table 11-34 and Table 11-35 lists the supported payloads for each operating mode.

Table 11-34 AR_MXP and AR_XP Card Supported Client-Payload Mapping—SONET/SDH, Ethernet, OTU1, and FC

		SONET/SDH			Ethernet		OTU		FC		
Card Mode	Rate	OC3/ STM1	OC12/ STM4	OC48/ STM16	FE	GE	OTU1	OTU2e	FICON1G/ FC1G	FICON2G/ FC2G	FICON4G/ FC4G
TXP_MR	LOW	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes
	HIGH	No	No	No	No	No	No	Yes	No	No	No
TXPP_MR	LOW	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	HIGH	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
MXP_DME	HIGH	No	No	No	No	Yes	No	No	Yes	Yes	Yes
MXPP_DME	HIGH	No	No	No	No	Yes	No	No	Yes	Yes	Yes
MXP_MR	LOW	Yes	Yes	No	Yes	Yes	No	No	Yes	No	No
	HIGH	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
MXPP_MR	LOW	Yes	Yes	No	Yes	Yes	No	No	Yes	No	No
	HIGH	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
MXP-4x2.5-10G	HIGH	No	No	Yes	No	No	Yes	No	No	No	No

		SONET/SDH			Ethernet		OTU		FC			
Card Mode	**Rate**	**OC3/ STM1**	**OC12/ STM4**	**OC48/ STM16**	**FE**	**GE**	**OTU1**	**OTU2e**	**FICON1G/ FC1G**	**FICON2G/ FC2G**	**FICON4G/ FC4G**	**FI F**
MXPP-4x2.5-10G	HIGH	No	No	Yes	No	No	Yes	No	No	No	No	N
MXP-VD-10G	HIGH	No	No	No	No	No	No	No	No	No	No	N
REGEN	HIGH	No	No	No	No	No	No	Yes	No	No	No	N
	LOW	No	No	No	No	No	Yes	No	No	No	No	N

Table 11-35 AR_MXP and AR_XP Card Supported Client-Payload Mapping—ISC and Video

		ISC			Video		
Card Mode	**Rate**	**ISC-1**	**ISC3_STP_1G**	**ISC3_STP_2G**	**SD-SDI**	**HD-SDI**	**3G-SDI**
TXP_MR	LOW	No	Yes	Yes	No	No	No
	HIGH	No	No	No	No	No	No
TXPP_MR	LOW	N/A	N/A	N/A	N/A	N/A	N/A
	HIGH	N/A	N/A	N/A	N/A	N/A	N/A
MXP_DME	HIGH	No	No	No	No	No	No
MXPP_DME	HIGH	No	No	No	No	No	No
MXP_MR	LOW	No	No	No	No	No	No
	HIGH	No	No	No	Yes	Yes	No
MXPP_MR	LOW	No	No	No	No	No	No
	HIGH	No	No	No	Yes	Yes	No
MXP-4x2.5-10G	HIGH	No	No	No	No	No	No
MXPP-4x2.5-10G	HIGH	No	No	No	No	No	No
MXP-VD-10G	HIGH	No	No	No	No	No	Yes
REGEN	HIGH	No	No	No	No	No	No
	LOW	No	No	No	No	No	No

- Auto Sensing—The AR_MXP and AR_XP cards support auto sensing of client payloads. The line card analyzes the received client signal and configures the payload on the client port automatically without user intervention.

  Auto sensing feature is supported on the Gigabit Ethernet, OC-3/STM-1, OC-12/STM-4, and OC-48/STM-16 payloads. Following operating card modes support the autosensing feature:

  - TXP (low rate)
  - TXPP (low rate)
  - MXP_MR (low and high Rate)
  - MXPP_MR (low and high rate)

  CTC supports the configuration of all the provisioning parameters supported by the autosensed payload. However, creation and deletion of the circuits are the only configurations supported on the "AUTO" payload.

- Video Multiplexing—The AR_XP cards support the capability to multiplex SD-SDI, HD-SDI, and 3G-SDI signals over the OTU2 trunk interface allowing to maximize the wavelength bandwidth, maintain full transparency for uncompressed signals, and reduce latency. The video multiplexing of 3G-SDI signal is not supported on the AR_MXP card.
- Regenerator Mode—This mode regenerates the OTU2e or OTU1 signals with ODU transparent or CISCO Extended Use options. For OTU2e, FEC can be Disabled, Standard G.975, EFEC I.4 or EFEC I.7, and for OTU1, FEC can be Standard G.975 or Disabled.
- High Speed GCCs—The AR_MXP and AR_XP cards support the provisioning of GCC channel on OTN (OTU1/OTU2) enabled client and trunk ports. A maximum of five GCC channels on the Cisco ONS 15454 shelf and ten GCC channels on Cisco ONS 15454 M2 or Cisco ONS 15454 M6 shelf can be created. The high speed GCC enables you to create the GCC when both the NE and FE line cards are in Cisco ONS 15454 M2 or Cisco ONS 15454 M6 shelf. The legacy GCC on Cisco ONS 15454 shelf can be selected on one side and the Cisco ONS 15454, Cisco ONS 15454 M2 or Cisco ONS 15454 M6 shelf on the other side.
- Y-cable protection—Y-cable protection between the same card type is supported only on ports with the same port number and signal rate. For more detailed information, see "G.35.1.1 Y-Cable Protection" section on page G-27.
- Licensing—The AR_MXP and AR_XP cards offer you an unprecedented flexibility. The cards support a wide range of different applications and configurations. To help you take advantage of such flexibility to lower capital expenditures (CapEx) on your network, Cisco provides a licensing model for AR_MXP and AR_XP cards. For more information on licensing, see the Cisco ONS 15454 DWDM Licensing Configuration Guide.

11.20.2 Faceplate and Block Diagram

Figure 11-26 shows the AXP_MXP and AR_XP faceplates.

The AR_MXP and AR_XP cards have eight SFP and two XFP ports. The client and trunk ports are either SFP (2.5 G) or XFP (10 G) based ports.

The AR_MXP or AR_XP card can be tuned to any wavelength over the C-band by inserting the required DWDM SFP or XFP on client or trunk ports. For optical termination, each XFP/SFP uses two LC connectors, which are labeled TX and RX on the faceplate.

Figure 11-26 AR_MXP and AR_XP Faceplates

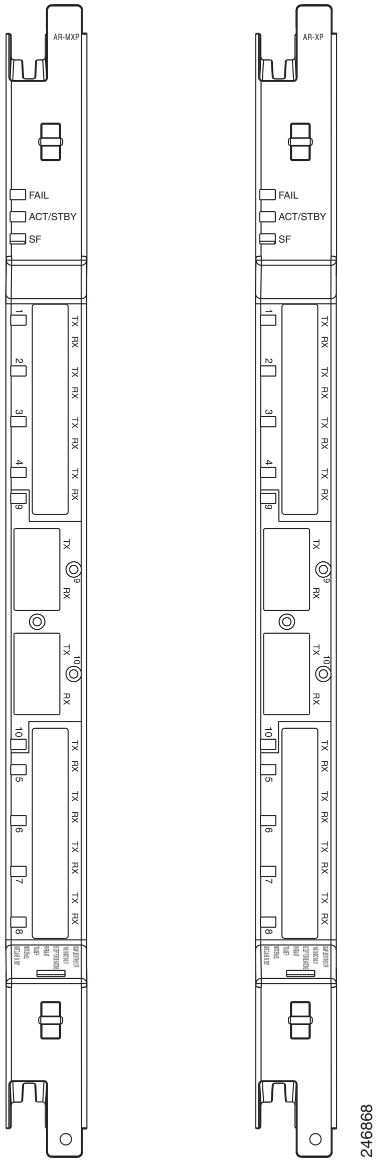
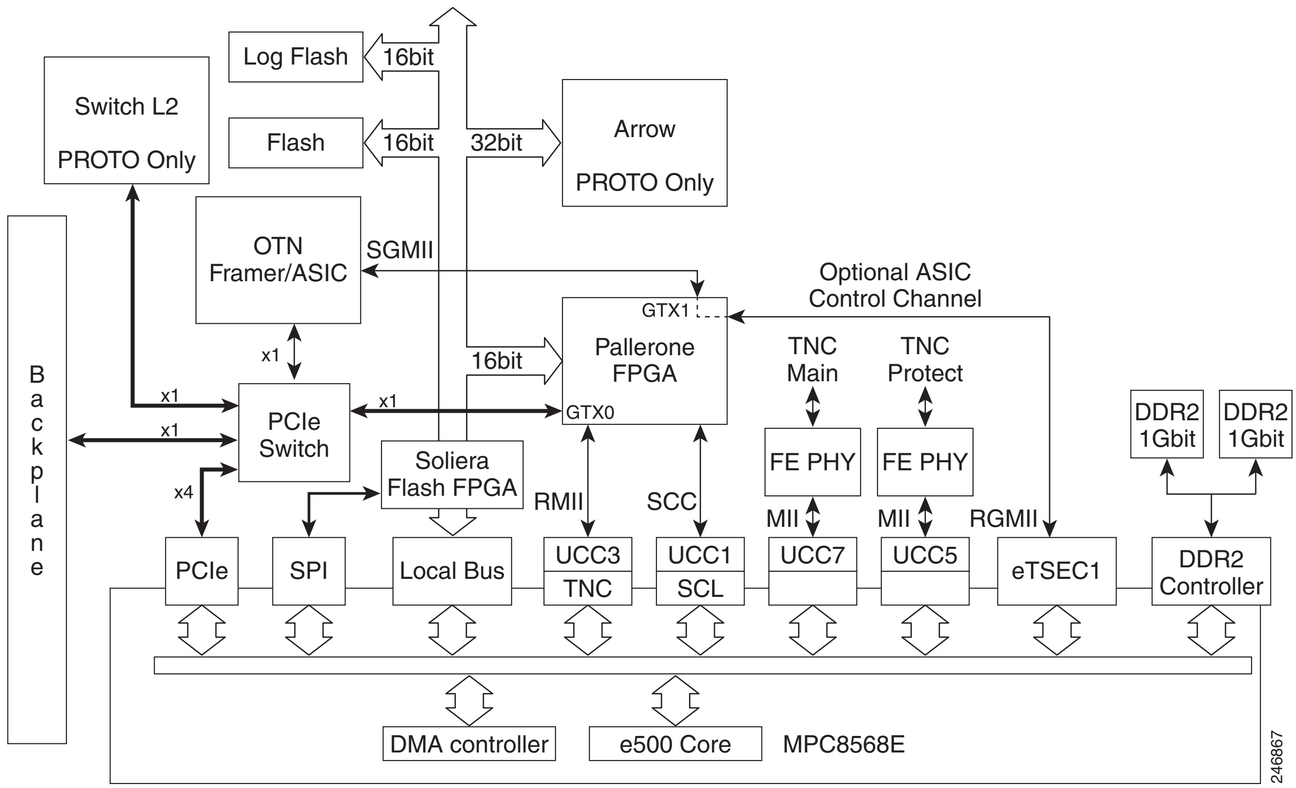


Figure 11-27 shows the AXP_MXP and AR_XP block diagram.

Figure 11-27 AR_MXP and AR_XP Block Diagram



For information on safety labels for the cards, see the "G.1.2 Class 1M Laser Product Cards" section on page G-4.

Caution A 15 to 20 dB fiber attenuator must be used when working with the cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the cards. Using direct fiber loopbacks causes irreparable damage to the DWDM/CWDM XFP/SFPs plugged in AXP_MXP or AR_XP card.

The AR_MXP and AR_XP cards can be installed in Slot 1 to Slot 6 and Slot 12 to Slot 17 in the Cisco ONS 15454 chassis, the Slot 2 to Slot 7 in the Cisco ONS 15454 M6 chassis, and Slot 2 and Slot 3 in the Cisco ONS 15454 M2 chassis. The AR_MXP and AR_XP cards do not interoperate with all the existing TXP or MXP cards. The AR_MXP card allows you to configure only one high rate XFP port. This can be a muxponder mode where N [N= 1 to 8] client ports goes out via 1 trunk XFP port or in a transponder mode where client and trunk are XFP ports. There is no limitation in the AR_XP card, where you can use both high rate trunk ports simultaneously.

The AR_XP card allows you to configure two high rate operational modes, where as you can configure only one high rate operational mode on the AR_MXP card.

11.20.3 Multiple Operating Modes

A single AR_MXP or AR_XP card can be configured into multiple operating modes. Criteria for selecting a particular operational mode are defined by the network level design. CTP helps you to choose the appropriate operational mode. Each operating mode is divided into two categories based on the trunk rate:

- Low rate (trunk rate < 5G)
- High rate (trunk rate > 5G)

When you configure the AR_MXP or AR_XP card in to multiple operational modes, make sure that the following tasks are completed:

- In order to make the ports operational and to correctly report alarms, OCHCC circuit must be created for the following operating modes:
  - Low-rate MXP_MR
  - High-rate MXP_MR
  - Low-rate MXPP_MR
  - High-rate MXPP_MR
- Same operational mode is configured at both ends and ensure the port numbers are same on both ends.
- The OCHCC circuit should be created between the same client port numbers at the near and far end.
- Ensure ODU and TS are matching on both ends.
- For auto sensing payloads created on auto ports, you should check the Auto Sensing checkbox in the provisioning pane.
- Check the Auto Sensing checkbox in the provisioning pane on the auto provisioned ports for the auto sensing payload.
- WSON circuits cannot be created for AR_MXP and AR_XP cards.
- PPMs must be provisioned on all ports before configuring the operational mode.
- The following conditions determine the maximum bandwidth at the client side when a 4GFC payload is configured in the TXP_MR or TXPP_MR mode:
  - The maximum client bandwidth should not exceed 28G when TXP_MR or TXPP_MR operating mode is configured on the AR_MXP or AR_XP card and other operating modes, like low-rate or high-rate TXP_MR,TXPP_MR, MXP_DME, MXPP_DME, MXP_MR, MXPP_MR, MXP-4X2.5G-10G, MXPP-4X2.5G-10G, and MXP-VDC-10G, are configured on the same card.
  - The maximum client bandwidth should not exceed 20G when a TXP_MR or TXPP_MR operating mode is configured on the AR_MXP or AR_XP card and if more than two or more combinations of Low-rate or high-rate TXP_MR,TXPP_MR, MXP_DME, MXPP_DME, MXP_MR, MXPP_MR, MXP-4X2.5G-10G, MXPP-4X2.5G-10G, and MXP-VDC-10G, operating modes are configured on the same card.
  - The utilized client bandwidth is 8G when the TXP_MR operating mode is configured with a 4GFC as payload.
  - The utilized client bandwidth is 12G when the TXPP_MR operating mode is configured with a 4GFC as payload.

- There is no restriction on the bandwidth if only TXP_MR or TXPP_MR operating mode with 4GFC payload is configured on the card. For example, four instances of TXP_MR mode with 4GFC payload on one AR_MPX or AR_XP card.
- The low-rate or high-rate REGEN operating mode does not add to the client side bandwidth. For example, four instances of TXP_MR mode with 4GFC and one instance of high-rate REGEN mode on same card.

  For all the other payloads and operating modes, the client bandwidth utilized is the client payload data rate.

The AR_MXP and AR_XP cards support the following operating modes:

- TXP_MR (Unprotected Transponder), page 11-127
- TXPP_MR (Protected Transponder), page 11-129
- MXP_DME (Unprotected Data Muxponder), page 11-129
- MXPP_DME (Protected Data Muxponder), page 11-130
- MXP_MR (Unprotected Multirate Muxponder), page 11-131
- MXPP_MR (Protected Multirate Muxponder), page 11-133
- MXP-4x2.5-10G (OC48/OTU1 Unprotected Muxponder), page 11-134
- MXPP-4x2.5-10G (OC48/OTU1 Protected Muxponder), page 11-135
- REGEN (OTU1/OTU2 Regenerator), page 11-135
- MXP-VD-10G (Video Muxponder), page 11-137

TXP_MR (Unprotected Transponder)

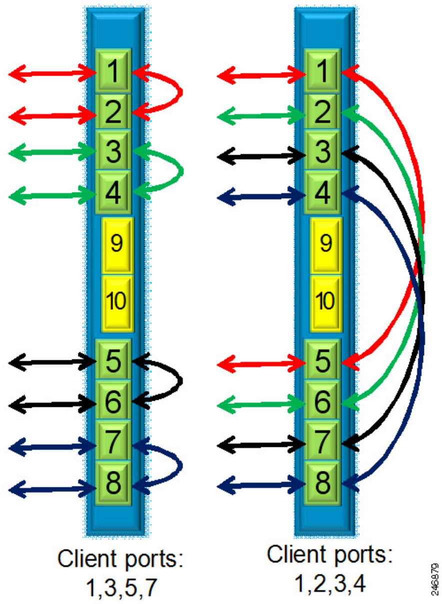
The AR_MXP or AR_XP card can be configured as a low-rate or a high-rate TXP_MR card mode.

Note OTN cannot be enabled for 4GFC trunk ports.

- Low Rate—A maximum of four TXP_MR configurations can be provisioned on a single AR_MXP or AR_XP card (Figure 11-28). The AR_MXP or AR_XP card can be configured as a low-rate TXP_MR card by adhering to the following provisioning rules:
  1. Two SFP ports must be grouped. The allowed port pairs are 1-2, 3-4, 5-6, 7-8, 1-5, 2-6, 3-7, and/or 4-8.
  2. Ports 2, 4, 5, 6, 8, or 7 can be configured as trunk ports.
  3. Ports 1, 2, 3, 4, 5 or 7 can be configured as client ports.

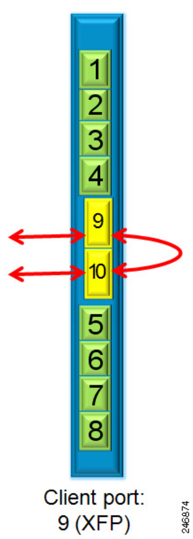
Note The trunk port is not created when the low-rate TXP_MR card operating mode is configured. It is created after the client payload is created.

Figure 11-28 Low-Rate TXP_MR Card Operating Mode Configuration



- High Rate—Only one TXP_MR configuration can be provisioned on a single AR_MXP or AR_XP card (Figure 11-29). The AR_MXP or AR_XP card can be configured as a high-rate TXP_MR card by adhering to the following provisioning rules:
  1. XFP ports 9 and 10 must be grouped.
  2. Port 10 must be configured as a trunk port.
  3. Port 9 must be configured as a client port.

Figure 11-29 High-Rate TXP_MR Card Operating Mode Configuration



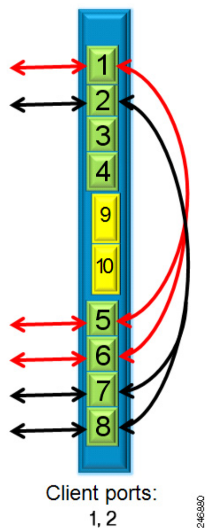
TXPP_MR (Protected Transponder)

The AR_MXP or AR_XP card can be configured as a low-rate TXPP_MR card mode. A maximum of two TXPP_MR configurations can be provisioned on a single AR_MXP or AR_XP card (Figure 11-30). The AR_MXP or AR_XP card can be configured as a low-rate TXPP_MR card by adhering to the following provisioning rules:

1. Three SFP ports must be grouped. The allowed port pairs are 1-5-6 or 2-7-8, or both.
2. Ports 5 and 6, and 7 and 8 must be configured as trunk ports, where 6 and 8 are the protect trunk ports for 5 and 6 respectively.
3. Ports 1 and 2 must be configured as client ports.

Splitter protection is automatically created between ports 5-6 and 7-8.

Figure 11-30 Low-Rate TXPP_MR Card Operating Mode Configuration



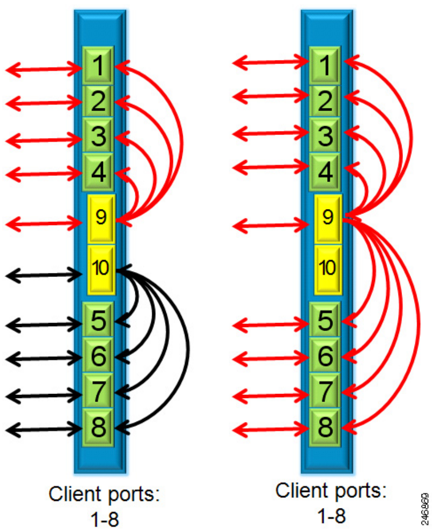
MXP_DME (Unprotected Data Muxponder)

The AR_XP card can be configured as a high-rate 4:1 or 8:1 MXP_DME card mode. The AR_MXP card can be configured as a high rate 8:1 MXP_DME card mode.

- 4:1 MXP_DME mode—A maximum of two MXP_DME configurations can be provisioned on a single AR_XP card (Figure 11-31). The AR_XP card can be configured as a high-rate 4:1 MXP_DME card by adhering to the following provisioning rules:
  1. Four SFP ports and one XFP port must be grouped. The allowed port pairs are 1-2-3-4-9 or 5-6-7-8-10, or both.
  2. Ports 9 and 10 must be configured as trunk ports.
  3. Ports 1, 2, 3, and 4, and 5, 6, 7, and 8 must be configured as client ports.

- 8:1 MXP_DME mode—Only one MXP_DME configuration can be provisioned on a single AR_MXP or AR_XP card (Figure 11-31). The AR_MXP or AR_XP can be configured card as a high-rate 8:1 MXP_DME card by adhering to the following provisioning rules:
  1. Eight SFP ports and one XFP port must be grouped. The allowed port pairs are 1-2-3-4-5-6-7-8-9.
  2. Port 9 must be configured as a trunk port.
  3. Ports 1 to 8 must be configured as client ports.

Figure 11-31 High-Rate MXP_DME Card Operating Mode Configuration



MXPP_DME (Protected Data Muxponder)

The AR_XP card can be configured as a high-rate 4:2 or 8:2 MXPP_DME card mode.

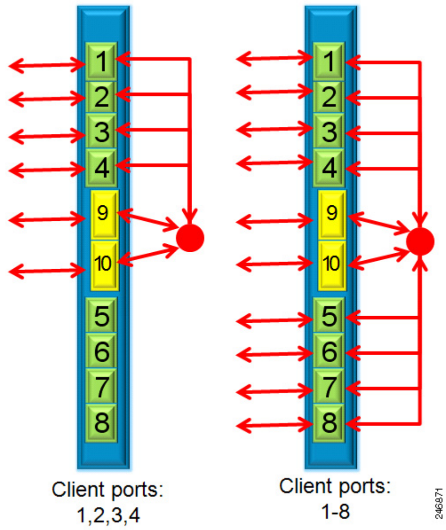
- 4:2 MXP_DME mode—Only one MXPP_DME configuration can be provisioned on a single AR_XP card (Figure 11-32). The AR_XP card can be configured as a high-rate 4:2 MXPP_DME card by adhering to the following provisioning rules:
  1. Four SFP ports and two XFP ports must be grouped. The allowed port pairs are 1-2-3-4-9-10 or 5-6-7-8-9-10.
  2. Ports 9 and 10 must be configured as trunk ports.
  3. Ports 1, 2, 3, and 4, or 5, 6, 7, and 8 must be configured as client ports.

Splitter protection is automatically created between ports 9 and 10. Port 10 will be the protected trunk port for port 9.

- 8:2 MXPP_DME mode—Only one MXPP_DME configuration can be provisioned on a single AR_XP card (Figure 11-32). The AR_XP card can be configured as a high-rate 8:2 MXPP_DME card by adhering to the following provisioning rules:
  1. Eight SFP ports and two XFP ports must be grouped. The allowed port pairs are 1-2-3-4-5-6-7-8-9-10.
  2. Ports 9 and 10 must be configured as trunk ports.
  3. Ports 1 to 8 must be configured as client ports.

Splitter protection is automatically created between ports 9 and 10. Port 10 will be the protected trunk port for port 9.

Figure 11-32 High-Rate MXPP_DME Card Operating Mode Configuration



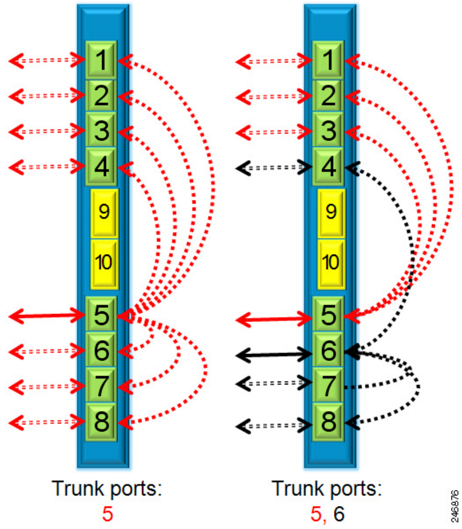
MXP_MR (Unprotected Multirate Muxponder)

The AR_MXP or AR_XP card can be configured as a low-rate or a high-rate MXP_MR card mode.

- Low Rate—A maximum of two MXP_MR configurations can be provisioned depending on the availability of client ports (Figure 11-33). The AR_MXP or AR_XP card can be configured as a low-rate MXP_MR card by adhering to the following provisioning rules:
  1. N:1 muxponder must be created, where N varies from client ports 2 to 7.
  2. Only ports 5, 6, 7, or 8 can be configured as trunk ports.
  3. Ports 1 to 8 can be configured as client ports, if they are not configured as trunk ports.

Any client port can be added or deleted, if the trunk bandwidth supports the new payload without impacting the traffic on the existing services. Minimum of two client ports should be part of the operational mode group.

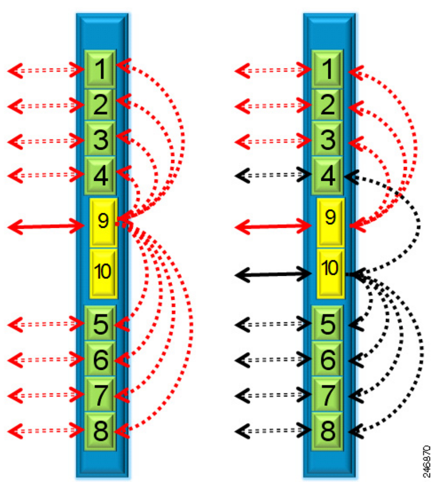
Figure 11-33 Low-Rate MXP_MR Card Operating Mode Configuration



- High Rate—A maximum of two MXP_MR configurations can be provisioned on an AR_XP card and only one such configuration can be provisioned on an AR_MXP card (Figure 11-34). The AR_MXP or AR_XP card can be configured as a high-rate MXP_MR card by adhering to the following provisioning rules:
  1. N:1 muxponder must be created, where N varies from client ports 2 to 8.
  2. Only ports 9 and 10 can be configured as trunk ports.
  3. Ports 1 to 8 can be configured as client ports.

Any client payload can be added or deleted, if the trunk bandwidth supports the new payload without impacting the traffic on the existing services.

Figure 11-34 High-Rate MXP_MR Card Operating Mode Configuration



MXPP_MR (Protected Multirate Muxponder)

The AR_MXP or AR_XP card can be configured as a low-rate or a high-rate MXPP_MR card mode.

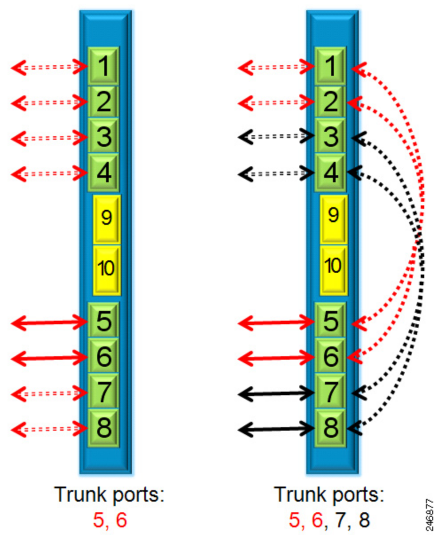
- Low Rate—A maximum of two MXPP_MR configurations can be provisioned depending on the availability of client ports (Figure 11-35). Any client payload can be added or deleted, if the trunk bandwidth supports the new payload without impacting the traffic on the existing services.

The AR_MXP or AR_XP card can be configured as a low-rate MXPP_MR card by adhering to the following provisioning rules:

1. N:2 muxponder must be created, where N varies from client ports 2 to 6.
2. Only ports 5 and 6 or 7 and 8, or both can be configured as trunk port.
3. Ports 1 to 8 can be configured as client ports, if ports are not configured as a trunk ports and are not part of another muxponder.

Splitter protection is automatically created between ports 5 and 6 or 7 and 8.

Figure 11-35 Low-Rate MXPP_MR Card Operating Mode Configuration



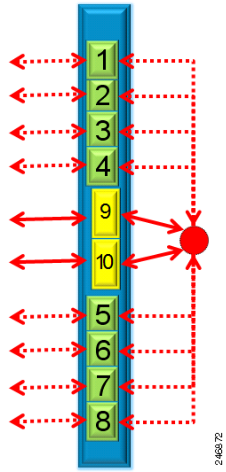
- High Rate—A maximum of one MXPP_MR configuration can be provisioned on an AR_XP card (Figure 11-36). Any client payload can be added or deleted, if the trunk bandwidth supports the new payload without impacting the traffic on the existing services.

The AR_XP card can be configured as a high-rate MXPP_MR card by adhering to the following provisioning rules:

1. N:2 muxponder must be created, where N varies from client ports 2 to 8.
2. Only ports 9 and 10 can be configured as trunk ports.
3. Ports 1 to 8 can be configured as client ports.

Splitter protection is automatically created between ports 9 and 10. Port 10 will be the protected trunk port for port 9.

Figure 11-36 High-Rate MXPP_MR Card Operating Mode Configuration



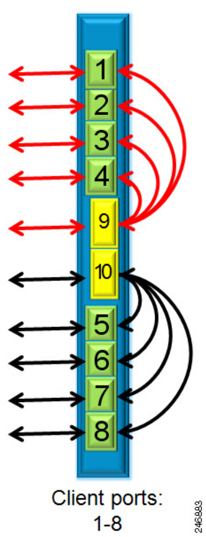
MXP-4x2.5-10G (OC48/OTU1 Unprotected Muxponder)

The AR_MXP or AR_XP card can be configured as a high-rate MXP-4x2.5-10G card mode. Only one MXP-4x2.5-10G configuration can be provisioned on an AR_MXP card and a maximum of two on an AR_XP card (Figure 11-37).

The AR_MXP or AR_XP card can be provisioned as MXP-4x2.5-10G card by adhering to the following provisioning rules:

1. The allowed port pairs are 1-2-3-4-9 or 5-6-7-8-10, or both.
2. Ports 9 and 10 can be configured as trunk ports.
3. Ports 1-2-3-4 or 5-6-7-8 can be configured as client ports.

Figure 11-37 High-Rate MXP-4x2.5-10G Card Operating Mode Configuration



MXPP-4x2.5-10G (OC48/OTU1 Protected Muxponder)

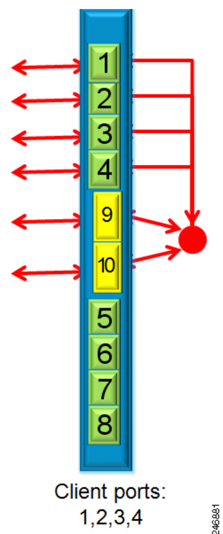
The AR_XP card can be configured as a high-rate MXPP-4x2.5-10G card mode. Only one MXPP-4x2.5-10G configuration can be provisioned on an AR_XP card (Figure 11-38).

The AR_XP card can be configured as MXPP-4x2.5-10G card by adhering to the following provisioning rules:

1. Four SFP ports and two XFP ports must be configured. The allowed port pair is 1-2-3-4-9-10 or 5-6-7-8-9-10, or both.
2. Only ports 9 and 10 can be configured as trunk ports.
3. Ports 1-2-3-4 or 5-6-7-8 can be configured as client ports.

Splitter protection is automatically created between ports 9 and 10. Port 10 will be the protected trunk port for port 9.

Figure 11-38 High-Rate MXPP-4x2.5-10G Card Operating Mode Configuration

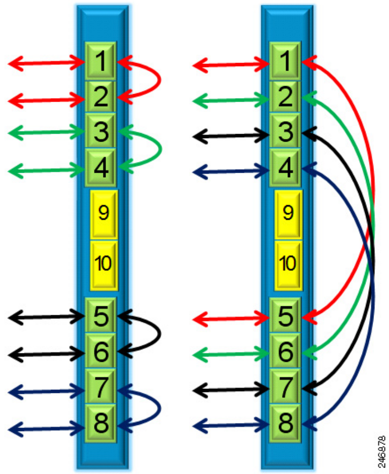


REGEN (OTU1/OTU2 Regenerator)

The AR_MXP or AR_XP card can be configured as a low-rate or high-rate REGEN card mode.

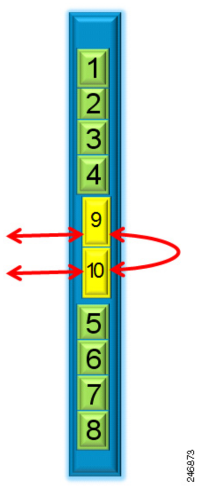
- Low Rate—A maximum of four REGEN configurations can be provisioned on a single AR_MXP or AR_XP card (Figure 11-39). The AR_MXP or AR_XP card can be configured as a low-rate REGEN card by adhering to the following provisioning rules:
  1. The allowed port pairs are 1-2, 3-4, 5-6, 7-8 or 1-5, 2-6, 3-7, 4-8.

Figure 11-39 Low-Rate REGEN Card Operating Mode Configuration



- High Rate—Only one REGEN configuration can be provisioned on an AR_MXP or AR_XP card (Figure 11-40). The AR_MXP or AR_XP card can be configured as a high rate REGEN card by adhering to the following provisioning rules:
  1. The allowed port pairs are 9-10.

Figure 11-40 High-Rate REGEN Card Operating Mode Configuration



The 10 GE over OTU2e/OTU1e signal with disabled FEC, standard FEC, I.4 or I.7 EFEC mode can be regenerated. The ODU transparency can either be CISCO Extended or Use or Transparent Standard Use.

Note Payload PMs are not supported in this operating mode.

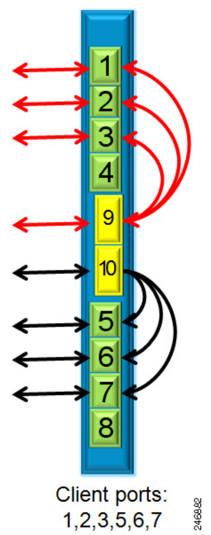
MXP-VD-10G (Video Muxponder)

The AR_XP card can be configured as a high-rate MXP-VD-10G card mode. A maximum of two MXP-VD-10G configurations can be provisioned on an AR_XP card (Figure 11-41).

The AR_XP card can be configured as MXP-VD-10G card by adhering to the following provisioning rules:

1. The allowed port pairs are 1-2-3-9 or 5-6-7-10.
2. Only ports 9 and 10 can be configured as trunk ports.
3. Ports 1-2-3 and 5-6-7 can be configured as client ports.

Figure 11-41 High-Rate MXP-VD-10G Card Operating Mode Configuration



11.20.4 Scenarios of Different Operational mode Configurations on an AR_MXP or AR_XP Card

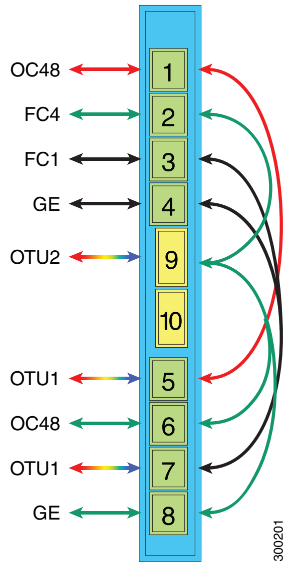
The following section provides a few sample scenarios of different operational modes that can be configured on an AR_MXP or AR_XP card:

Scenario 1

In this example (Figure 11-44), the following three operational modes are configured on the AR_MXP card:

- Low-rate TXP_MR (Cl=1;Tr=5)
- Low-rate MXP_MR (Cl=3,4;Tr=7)
- High-rate 3:1 MXP_MR (Cl=2,6,8;Tr=9)

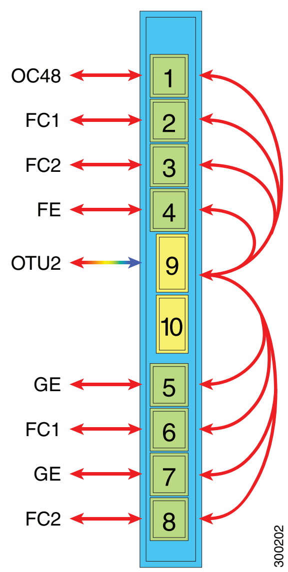
Figure 11-42 Scenario 1



Scenario 2

In this example (Figure 11-43), high-rate MXP_DME (8:1) operational mode is configured on the AR_MXP card.

Figure 11-43 Scenario 2

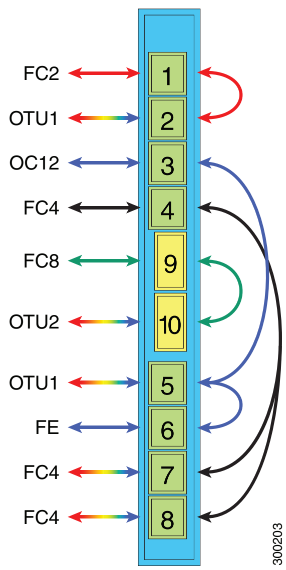


Scenario 3

In this example (Figure 11-44), the following four operational modes are configured on the AR_XP card:

- Low-rate TXP_MR (Cl=1;Tr=2)
- 8G FC TXP (Cl=9;Tr=10)
- Low-rate MR_MXP (Cl=4,7;TR=8)
- Low-rate MR_MXP (Cl=3,6;TR=5)

Figure 11-44 Scenario 3

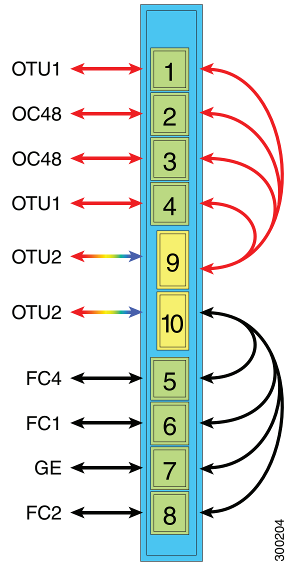


Scenario 4

In this example (Figure 11-45), the following two operational modes are configured on the AR_XP card:

- High-rate MXP-4x2.5-10G (Cl=1,2,3,4;Tr=9)
- High-rate 4:1 MXP_DME (Cl=5,6,7,8;Tr=10)

Figure 11-45 Scenario 4

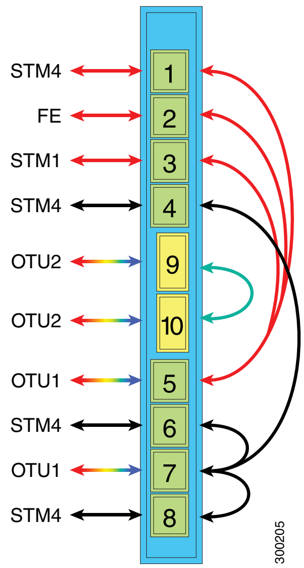


Scenario 5

In this example (Figure 11-46), the following three operational modes are configured on the AR_XP card:

- Low-rate MXP_MR (Cl=1,2,3;Tr=5)
- Low-rate MXP_MR (Cl=3,6,8;Tr=7)
- REGEN(Cl=9;Tr=10)

Figure 11-46 Scenario 5

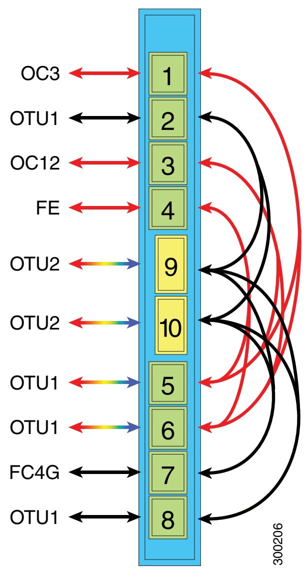


Scenario 6

In this example (Figure 11-47), the following two operational modes are configured on the AR_XP card:

- Low-rate MXPP_MR (Cl=1,3,4;Tr=5,6)
- High-rate MXPP_MR (Cl=2,7,8;Tr=9,10)

Figure 11-47 Scenario 6



11.20.5 AR_MXP and AR_XP Functions and Features

The AR_MXP and AR_XP cards have the following functions and features:

- Client Interface—G.5 Client Interface, page G-14
- DWDM Interface—G.6 DWDM Interface, page G-15
- DWDM Trunk Interface—G.7 DWDM Trunk Interface, page G-15
- Enhanced FEC (E-FEC) Feature—G.8 Enhanced FEC (E-FEC) Feature, page G-16
- Timing Synchronization—G.11 Timing Synchronization, page G-17
- Y-Cable Protection—G.35.1.1 Y-Cable Protection, page G-27
- Jitter Considerations—G.37 Jitter Considerations, page G-32
- Card level indicators—Table G-1 on page G-7
- Port level indicators—Table G-9 on page G-11

11.20.6 Related Procedures for AR_MXP and AR_XP Cards

The following is the list of procedures and tasks related to the configuration of the AR_MXP and AR_XP cards:

- "NTP-G321 Provision Multiple Operating Modes on AR_MXP or AR_XP Cards" section on page 11-455.
- "NTP-G322 Modify the AR_MXP or AR_XP Card Line Settings and PM Parameter Thresholds" section on page 11-455.
- NTP-G75 Monitor Transponder and Muxponder Performance.

11.21 MLSE UT

The maximum likelihood sequence estimation (MLSE) based universal transponder (UT) modules are added to the TXP_MR_10EX_C, MXP_2.5G_10EX_C, and MXP_MR_10DMEX_C cards to support the error decorrelator functionality to enhance system performance.

11.21.1 Error Decorrelator

The MLSE feature uses the error decorrelator functionality to reduce the chromatic dispersion (CD) and polarization mode dispersion (PMD), thereby extending the transmission range on the trunk interface. You can enable or disable the error decorrelator functionality using CTC or TL1. The dispersion compensation unit (DCU) is also used to reduce CD and PMD. The MLSE-based UT module helps to reduce CD and PMD without the use of a DCU.

11.22 SFP and XFP Modules

SFPs and 10-Gbps SFPs (XFPs) are integrated fiber optic transceivers that provide high-speed serial links from a port or slot to the network. For more information on SFPs/XFPs and for a list of SFPs/XFPs supported by the transponder and muxponder cards, see the Installing the GBIC, SFP, SFP+, and XFP Optical Modules in Cisco ONS Platforms.

In CTC, SFPs/XFPs are called pluggable port modules (PPMs). To provision SFPs/XFPs and change the line rate for multirate PPMs, see the "DLP-G277 Provision a Multirate PPM" section on page 11-152.

11.23 Procedures for Transponder and Muxponder Cards

The procedures described below explain how to provision transponder (TXP), muxponder (MXP), Xponder (GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE), and ADM-10G cards. The provisioning must be performed before you provision the dense wavelength division multiplexing (DWDM) network and create circuits.

11.23.1 Before You Begin

Before performing any of the following procedures, investigate all alarms and clear any trouble conditions. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* as necessary.

Caution Provisioning TXP and MXP cards can be service affecting. You should make all changes during a scheduled maintenance window.

This section lists the chapter procedures (NTPs). Turn to a procedure for applicable tasks (DLPs).

1. NTP-G128 Manage Pluggable Port Modules, page 11-144—Complete this procedure to provision a multirate pluggable port module (PPM), provision or change the optical line rate of a PPM, or delete a PPM. PPMs provide the fiber interface to the TXP, MXP, and ADM-10G cards. With the exception of the TXP_MR_10G card, all TXPs, MXPs, and ADM-10G cards accept PPMs.
2. NTP-G33 Create a Y-Cable Protection Group, page 11-162—As needed, complete this procedure for TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards that will be protected with Y-cable protection.
3. NTP-G199 Create a Splitter Protection Group for the OTU2_XP Card, page 11-166—As needed, complete this procedure to create a splitter protection group for an OTU2_XP card.
4. NTP-G198 Create 1+1 Protection for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards, page 11-168—As needed, complete this procedure to create 1+1 protection for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
5. NTP-G98 Provision the 2.5G Multirate Transponder Card Line Settings and PM Parameter Thresholds, page 11-171—As needed, complete this procedure to change the transmission settings for TXP_MR_2.5G and TXPP_MR_2.5G cards.
6. NTP-G96 Provision the 10G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds, page 11-191—As needed, complete this procedure to change the transmission settings for TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C cards.
7. NTP-G292 Provision the 40G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds, page 6-72—As needed, complete this procedure to change the transmission settings for 40E-TXP-C and 40ME-TXP-C cards.
8. NTP-G170 Provision the ADM-10G Card Peer Group, Ethernet Settings, Line Settings, PM Parameters, and Thresholds, page 11-237—As needed, complete this procedure to provision the transmission settings for ADM-10G cards.
9. NTP-G97 Modify the 4x2.5G Muxponder Card Line Settings and PM Parameter Thresholds, page 11-262—As needed, complete this procedure to change the transmission settings for MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards.
10. NTP-G99 Modify the 2.5G Data Muxponder Card Line Settings and PM Parameter Thresholds, page 11-283—As needed, complete this procedure to change the transmission settings for MXP_MR_2.5G and MXPP_MR_2.5G cards.
11. NTP-G148 Modify the 10G Data Muxponder Card Line Settings and PM Parameter Thresholds, page 11-301—As needed, complete this procedure to change the transmission settings for MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C cards.
12. NTP-G293 Modify the 40G Muxponder Card Line Settings and PM Parameter Thresholds, page 11-323—As needed, complete this procedure to change the transmission settings for 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.
13. NTP-G281 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Channel Group Settings, page 11-346—As needed, complete this procedure to change the channel group settings for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
14. NTP-G283 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card CFM Settings, page 11-357—As needed, complete this procedure to change the CFM settings for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

15. NTP-G285 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card EFM Settings, page 11-369—As needed, complete this procedure to change the EFM settings for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
16. NTP-G287 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card REP Settings, page 11-374—As needed, complete this procedure to change the REP settings for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
17. NTP-G165 Modify the GE_XP, 10GE_XP, GE_XPE, 10GE_XPE Cards Ethernet Parameters, Line Settings, and PM Thresholds, page 11-381—As needed, complete this procedure to change the transmission settings for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
18. NTP-G314 Add a GE_XP or 10GE_XP Card on a FAPS Ring, page 11-424—As needed, complete this procedure to add a GE_XP or 10GE_XP Card on a FAPS Ring.
19. NTP-G197 Provision the OTU2_XP Card Line Settings, PM Parameters, and Thresholds, page 11-427—As needed, complete this procedure to change the transmission settings for OTU2_XP cards.
20. NTP-G162 Change the ALS Maintenance Settings, page 11-449—As needed, complete this procedure to change the automatic laser shutdown settings for a TXP or MXP card.
21. NTP-G192 Force FPGA Update, page 11-451—As needed, complete this procedure to force an upgrade of the FPGA image on the MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C cards.
22. NTP-G196 Force FPGA Update When the Card is Part of a Protection Group, page 11-452—As needed, complete this procedure to force an upgrade of the FPGA image on the MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C cards when the card is part of a protection group.
23. NTP-G232 Enabling Error Decorrelator, page 11-453—As needed, complete this procedure to enable error decorrelator on a TXP_MR_10EX_C, MXP_2.5G_10EX_C, or MXP_MR_10DMEX_C card.

NTP-G128 Manage Pluggable Port Modules

Purpose	Complete this procedure to provision a multirate PPM, provision the optical line rate of a multirate PPM, or delete a single-rate or multirate PPM.
Tools/Equipment	None
Prerequisite Procedures	DLP-G63 Install an SFP or XFP, page 14-72
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note If a single-rate PPM is installed, the PPM screen will autoprovision and no further steps are necessary.

Note When you autoprovision a PPM, initial alarm and TCA defaults are supplied by Cisco Transport Controller (CTC) depending on your port and rate selections and the type of PPM. These default values can be changed after you install the PPM.

Note The hardware device that plugs into a TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable I/O devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Step 1 Complete the DLP-G46 Log into CTC" task to log into an ONS 15454 on the network. If you are already logged in, continue with Step 2.

Step 2 Click the **Alarms** tab:

a. Verify that the alarm filter is not turned on. See the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no unexplained conditions appear. If unexplained conditions appear, resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

Step 3 If you are provisioning a MXP_MR_2.5G or MXPP_MR_2.5G card, complete the "DLP-G235 Change the 2.5G Data Muxponder Card Mode" task on page 11-146. If not, continue with Step 4

Step 4 If you are provisioning a MXP_MR_10DME_C, MXP_MR_10DME_L, or MXP_MR_10DMEX_C card, complete the "DLP-G332 Change the 10G Data Muxponder Port Mode" task on page 11-147. If not, continue with Step 5.

Step 5 If you are provisioning a GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card, complete the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149. If not, continue with Step 6.

Step 6 If you are provisioning a OTU2_XP card, complete the "DLP-G452 Change the OTU2_XP Card Mode" task on page 11-151. If not, continue with Step 7.

Step 7 If you are provisioning a PPM on an ADM-10G card, complete the "DLP-G411 Provision an ADM-10G PPM and Port" task on page 11-150. If not, continue with Step 9.

Step 8 If you are provisioning a PPM on an AR_MXP or AR_XP card, complete the "NTP-G321 Provision Multiple Operating Modes on AR_MXP or AR_XP Cards" task on page 11-455. If not, continue with Step 9.

Step 9 Complete the "DLP-G277 Provision a Multirate PPM" task on page 11-152 for TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP ports with multirate PPMs. If you already preprovisioned the multirate PPM (DLP-G273 Preprovision an SFP or XFP Slot, page 14-73), skip this step and continue with Step 10.

Step 10 If you are provisioning an IBM ETR_CLO (External Time Reference – Control Link Oscillator) or InterSystem Coupling Link (ISC) service on the PPM, complete "DLP-G274 Verify Topologies for ETR_CLO and ISC Services" task on page 11-153. Otherwise, continue with Step 11.

Step 11 Complete the "DLP-G278 Provision the Optical Line Rate" task on page 11-155 to assign a line rate to a TXP, MXP, AR_MXP, AR_XP, or OTU2_XP port after the PPM is provisioned. (This task is not performed for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.)

Step 12 If you need to delete a PPM at any point in this procedure, complete the "DLP-G280 Delete a PPM" task on page 11-161.

Stop. You have completed this procedure.

DLP-G235 Change the 2.5G Data Muxponder Card Mode

Purpose	This task changes the card mode for MXP_MR_2.5G and MXPP_MR_2.5G muxponder cards. The card mode determines which PPMs can be provisioned for the card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the card settings.

Step 2 Click the **Provisioning > Line > SONET** (ANSI) or **SDH** (ETSI) tabs.

Step 3 Locate the Trunk port table row and verify that the Service State column value is OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI). If the service state is correct, continue with Step 6. If not, complete the following steps:

a. Click the **Admin State** table cell and choose **OOS,DSBLD** (ANSI) or **Locked,Maintenance** (ETSI).

b. Click **Apply**, then **Yes**.

Step 4 Click the **Provisioning > Line > Client** tabs.

Step 5 Locate the Trunk port table row and verify that the Service State column value is OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI). If the service state is correct, continue with Step 6. If not, complete the following steps:

a. Click the **Admin State** table cell and choose **OOS,DSBLD** (ANSI) or **Locked,Maintenance** (ETSI).

b. Click **Apply**, then **Yes**.

Step 6 Click the **Provisioning > Card** tabs.

Step 7 Change the Card Mode as needed:

- FC-GE—Choose this option if you will provision any of the following PPM port rates: FC1G (Ports 1-1 and 2-1 only), FC2G (Port 1-1 only), FICON1G (Ports 1-1 and 2-1 only), FICON2G (Port 1-1 only), and ONE_GE (Ports 1-1 through 8-1).
- Mixed—Choose this option if you will provision any of the following PPM port rates: FC1G and ONE_GE (Port 1–1 only), ESCON (Ports 5–1 through 8-1 only)
- ESCON—Choose this option if you will provision the ESCON PPM on Ports 1-1 through 8-1.

Note The Provisioning > Card tab also has the display-only Tunable Wavelengths field. This field shows the supported wavelengths of the trunk port after the card is installed in the format:
first wavelength-last wavelength-frequency spacing-number of supported wavelengths.
For example, 1529.55nm-1561.83nm-50gHz-82.

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G332 Change the 10G Data Muxponder Port Mode

Purpose	This task changes the port mode for the MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C muxponder cards. The port mode determines which PPMs can be provisioned on the ports.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C cards have two port mode groups, one for Ports 1 through 4, and the second for Ports 5 through 8. To change the port mode, all ports within the selected port group must be in OOS (out-of-service) service state. Ports in the second port group do not need to be in OOS service state if you are not changing the port mode for the second port group. Before you change the port mode, you must also ensure that any PPM port rate provisioned for the selected port group is deleted (see the "DLP-G280 Delete a PPM" task on page 11-161).

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C, MXP_MR_10DME_L, or MXP_MR_10DMEX_C card where you want to change the port mode.

Step 2 Click the **Provisioning > Card** tabs.

Step 3 Change the port mode as described in Table 11-36.

Note The PPM port rates are provisioned in the "DLP-G277 Provision a Multirate PPM" task on page 11-152.

Table 11-36 10G Data Muxponder Card Port Modes

Parameter	Description	Options
Port 1-4 Mode	Sets the mode of operation for Ports 1-1 through 4-1.	Chose one of the following: • FC-GE_ISC—Choose this option if you will provision any of the following PPM port rates: FC1G (Ports 1-1 through 4-1), FC2G (Ports 1-1 and 3-1 only), FICON1G (Ports 1-1 through 4-1), FICON2G (Ports 1-1 and 3-1 only), ONE_GE (Ports 1-1 through 4-1), ISC3 COMPAT (Ports 1-1 through 4-1), ISC3 PEER 1G (Ports 1-1 through 4-1), and ISC3 PEER 2G (Ports 1-1 and 3-1 only). • FC4G—Choose this option if you will provision an FC4G or FICON4G PPM (Port 1-1 only).
Port 5-8 Mode	Sets the mode of operation for Ports 5-1 through 8-1.	Chose one of the following: • FC-GE_ISC—choose this option if you will provision any of the following PPM port rates: FC1G (Ports 5-1 through 8-1), FC2G (Ports 5-1 and 7-1 only), FICON1G (Ports 5-1 through 8-1), FICON2G (Ports 5-1 and 7-1 only), ONE_GE (Ports 5-1 through 8-1), ISC3 COMPAT (Ports 5-1 through 8-1), ISC3 PEER 1G (Ports 5-1 through 8-1), and ISC3 PEER 2G (Ports 5-1 and 7-1 only). • FC4G—choose this option if you will provision an FC4G or FICON4G PPM port rate (Port 5-1 only).

Note The Provisioning > Cards tab also has a display-only Tunable Wavelengths field which shows the wavelengths supported by the card. If a MXP_MR_10DME_C card is installed, the 32 C-band wavelengths appear. If the MXP_MR_10DME_L card is installed, the 32 L-band wavelengths appear. If the MXP_MR_10DMEX_C card is installed, the 82 C-band wavelengths appear.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

Note Loopbacks on MXP-MR-10DME are not applicable when Fiber Channel switches are present.

Note If the Fiber Channel switch version is not present then the Distance Extension settings are not supported.

DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode

Purpose	This task changes the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card mode. 10GE_XP and 10GE_XPE cards can be provisioned as a Layer 2 Ethernet switch or a 10G Ethernet TXP. GE_XP and GE_XPE cards can be provisioned as a Layer 2 Ethernet switch, 10G Ethernet MXP, or 20G Ethernet MXP.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the card mode.

Step 2 In card view, click **Provisioning > Ether Ports > Ports**.

Step 3 Verify that any provisioned client or trunk ports have an **OOS-MA,DSBLD** (ANSI) or **Locked-enabled,disabled** (ETSI) service state in the Service State column**.** If so, continue with Step 4. If not, complete the following substeps.

a. For the first port that is not out of service, in the Admin State column, choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI).

b. Repeat Step **a** for each port that is not out of service.

c. Click **Apply**.

Step 4 Click the **Provisioning > Card** tabs.

Step 5 Choose one of the card modes shown in Table 11-37.

:

Table 11-37 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Modes

Mode	Cards	Description
L2 over DWDM	GE_XP 10GE_XP GE_XPE 10GE_XPE	Provisions the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE as a Layer 2 switch.
10GE TXP	10GE_XP 10GE_XPE	Provisions the 10GE_XP or 10GE_XPE as a 10 Gigabit Ethernet transponder. Traffic received on the 10GE client Port 1-1 is sent to 10 Gigabit Ethernet trunk Port 3-1, and traffic received on 10 Gigabit Ethernet client Port 2-1 is sent to 10 Gigabit Ethernet trunk Port 4-1.

Table 11-37 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Modes

Mode	Cards	Description
10GE MXP	GE_XP GE_XPE	Provisions the GE_XP or GE_XPE as a 10 Gigabit Ethernet muxponder. Traffic received on Gigabit Ethernet client Ports 1-1 through 10-1 is multiplexed and sent to 10 Gigabit Ethernet trunk Port 21-1, and traffic received on Gigabit Ethernet client Ports 11-1 through 20-1 is multiplexed and sent to 10 Gigabit Ethernet trunk Port 22-1.
20GE MXP	GE_XP GE_XPE	Provisions the GE_XP or GE_XPE as a 20 Gigabit Ethernet muxponder. Traffic received on Gigabit Ethernet client Ports 1-1 through 20-1 is multiplexed and sent to 10 Gigabit Ethernet trunk Port 21-1. Trunk port 22-1 is not used.

The GE-XP and GE-XPE cards operating in 10GE MXP mode and configured for 100% traffic flow, do not drop frames when up to nine ports are in use. However, when all the ten ports are in use, some frames are dropped. When the tenth port is to be used, configure the Committed Info Rate (CIR) at 55% on any one of the ports. For more information about configuring the CIR, see the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.

Step 6 Click **Apply**, then click **Yes** in the confirmation dialog box.

Step 7 Return to your originating procedure (NTP).

DLP-G411 Provision an ADM-10G PPM and Port

Purpose	This task provisions a fixed-rate PPM and port on an ADM-10G PPM card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to provision PPM settings.

Step 2 Click the **Provisioning > Pluggable Port Modules** tabs.

Step 3 In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.

Step 4 In the Create PPM dialog box, complete the following:

- PPM—Choose the SFP you want to install from the drop-down list.
- PPM Type—Choose the number of ports supported by your SFP from the drop-down list. If only one port is supported, **PPM (1 port)** is the only option.

Step 5 Click **OK**. The newly created PPM appears in the Pluggable Port Modules area. The row in the Pluggable Port Modules area turns white and the Actual Equipment Type column lists the equipment name.

Step 6 In the Pluggable Ports area, click **Create**. The Create Ports dialog box appears.

Step 7 In the Create Ports dialog box, complete the following:

- Port—Choose the port you want to configure from the drop-down list.
- Port Type—Choose the port type, such as OC-3, OC-12, OC-48, or ONE-GE from the drop-down list.
  - Ports 1 - 8 can only be OC-3, OC-12, or ONE_GE
  - Ports 9 - 12 can on be OC-3 or OC-12
  - Ports 13 - 16 can only be OC-3, OC-12, or OC-48

Step 8 Click **OK**. The newly created port appears in the Pluggable Ports area. The port type you provisioned is listed in the Rate column.

Step 9 If you want to provision a PPM or another port, repeat Steps 4 through 8.

Step 10 Return to your originating procedure (NTP).

DLP-G452 Change the OTU2_XP Card Mode

Purpose	This task changes the OTU2_XP card mode. The card mode determines which PPMs can be provisioned for the card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Changing the card configuration to 10G Ethernet LAN Phy to WAN Phy automatically replaces the current port configurations (Ports 1 and 3) to 10G Ethernet and OC192. This resets and reboots the OTU2_XP card.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the card mode.

Step 2 In card view, click the **Provisioning > Line > Ports** tab.

Step 3 Verify that all provisioned client or trunk ports have an OOS-MA, DSBLD (ANSI) or Locked-enabled, disabled (ETSI) service state in the Service State column. If so, continue with Step 4. If not, complete the following substeps.

a. For the first port that is not out of service, in the Admin State column, choose **OOS, DSBLD** (ANSI) or **Locked, disabled** (ETSI).

b. Repeat Step **a** for each port that is not out of service.

c. Click **Apply**.

Step 4 Click the **Provisioning > Card** tab.

Step 5 Change the Card Configuration as needed:

- **Transponder**—Choose this option to provision the OTU2_XP card as a transponder. Port pairs 1-3 and 2-4 are both configured as transponders. This is the default card configuration.

- **Standard Regen**—Choose this option to provision the OTU2_XP card as a standard regenerator (with E-FEC only on one port). Port pairs 1-3 and 2-4 are both configured as regenerators.
- **Enhanced FEC**—Choose this option to provision the OTU2_XP card as an E-FEC regenerator (with E-FEC on two ports). Port pair 3-4 is configured as enhanced regenerator. Ports 1 and 2 are not used.
- **Mixed**—Choose this option to provision the OTU2_XP card as a transponder and a standard regenerator (mixed configuration). One of the port pair (1-3 or 2-4) is configured as a transponder and the other port pair as a standard regenerator.
- **10G Ethernet LAN Phy to WAN Phy—**Choose this option to provision the OTU2_XP card to enable the 10G Ethernet LAN Phy to WAN Phy conversion. Port pair 1-3 supports LAN Phy to WAN Phy conversion. Port pair 2-4 can be configured either as a transponder or a standard regenerator.

Note If you revert to the previous release (release earlier than 9.10), be sure to disable the 10G Ethernet LAN Phy to WAN Phy conversion feature. If you do not disable the 10G Ethernet LAN Phy to WAN Phy feature, an error message stating that the user needs to disable 10G Ethernet LAN Phy to WAN Phy feature before reverting to the previous release is displayed.

Note Table 11-176 on page 11-440 lists the Ethernet variables supported on Ports 1 and 3 of the OTU2_XP card that has the 10G Ethernet LAN Phy to WAN Phy enabled. When the card is in the 10G Ethernet LAN Phy to WAN Phy mode, no 10G FC RMONS are supported on Ports 2 and 4.

For more information on OTU2_XP card configuration rules, see the "11.16.5 OTU2_XP Card Configuration Rules" section on page 11-103.

Step 6 Click **Apply**. Then click **Yes** in the confirmation dialog box.

Step 7 Return to your originating procedure (NTP).

DLP-G277 Provision a Multirate PPM

Purpose	This task provisions a multirate PPM on a TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note If the PPM was preprovisioned using the "DLP-G273 Preprovision an SFP or XFP Slot" task on page 14-73 this task is unnecessary, unless the PPM has an Out-of-Service and Autonomous Management, Unassigned (OOS-AUMA,UAS) (ANSI) or unlocked-disabled, or unassigned (ETSI) service state.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card where you want to provision PPM settings.

Step 2 Click the **Provisioning > Pluggable Port Modules** tabs.

Step 3 In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.

Step 4 In the Create PPM dialog box, complete the following:

- PPM—Choose the PPM slot number where the SFP is installed from the drop-down list.
- PPM Type—Choose the number of ports supported by your SFP from the drop-down list. If only one port is supported, **PPM (1 port)** is the only option.

Step 5 Click **OK**. The newly created port appears in the Pluggable Port Modules area. The row in the Pluggable Port Modules area turns white and the Actual Equipment Type column lists the equipment name.

Step 6 If you want to provision a PPM on another port, repeat Steps 3 through 5. If not, continue with Step 7.

Step 7 Return to your originating procedure (NTP).

DLP-G274 Verify Topologies for ETR_CLO and ISC Services

Purpose	This task verifies that the DWDM network topology can support the IBM ETR_CLO and ISC services.
Tools/Equipment	Cisco TransportPlanner site plan
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

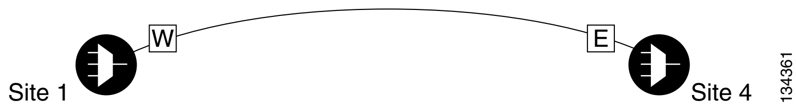
Step 1 Display your site plan in Cisco TransportPlanner.

Step 2 Verify that the topology where you plan to run the ETR_CLO or ISC service can support the service. The following topologies support ETR_CLO or ISC:

- Single span—Two terminal sites with no intermediate sites in between and one of the following sets of cards installed:
  - 32MUX-O and 32DMX-O cards
  - 32WSS and 32DMX cards
  - 32WSS and 32-DMX-O cards
  - 40-MUX-C and 40-DMX-C/40-DMX-CE cards
  - 40-WSS-C/40-WSS-CE and 40-DMX-C/40-DMX-CE cards

  Figure 11-48 shows a single-span topology as displayed in Cisco TransportPlanner.

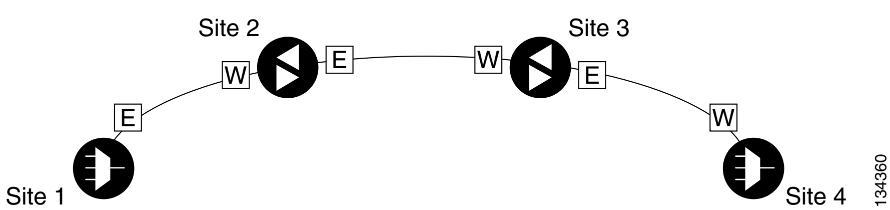
Figure 11-48 Single-Span Topology



- Point-to-Point—Two terminal sites with one of the following sets of cards installed:
  - 32MUX-O and 32DMX-O cards
  - 32WSS and 32DMX cards
  - 32WSS and 32-DMX-O cards
  - 40-MUX-C and 40-DMX-C/40-DMX-CE cards
  - 40-WSS-C/40-WSS-CE and 40-DMX-C/40-DMX-CE cards

  Line amplifiers can be installed between the terminal sites, but intermediate (traffic terminating) sites cannot be installed. Figure 11-49 shows a point-to-point topology as shown in Cisco TransportPlanner.

Figure 11-49 Point-to-Point Topology



- Two hubs—Two hub nodes in a ring with one of the following sets of cards installed:
  - 32MUX-O and 32DMX-O cards
  - 32WSS and 32DMX cards
  - 32WSS and 32-DMX-O cards
  - 40-MUX-C and 40-DMX-C/40-DMX-CE cards
  - 40-WSS-C/40-WSS-CE and 40-DMX-C/40-DMX-CE cards

  Line amplifiers can be installed between the hubs. Figure 11-50 shows two hub nodes with no line amplifier nodes installed. Figure 11-51 shows two hub nodes with line amplifier nodes installed.

Figure 11-50 Hubs with No Line Amplifiers

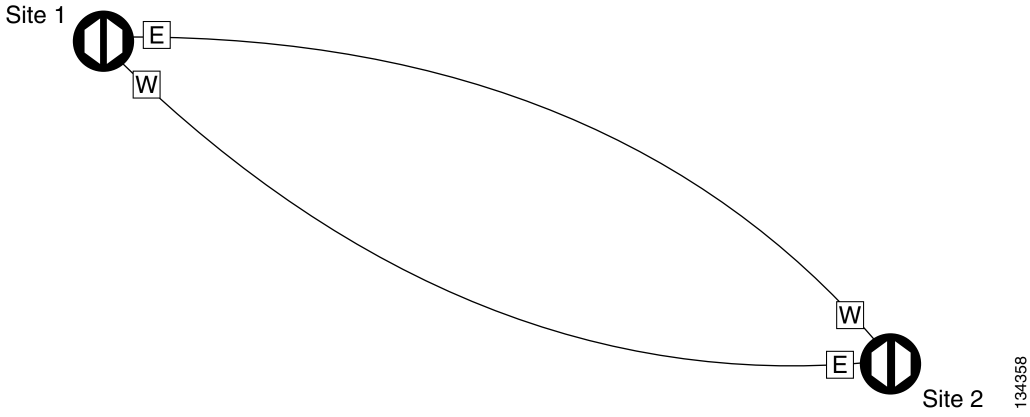
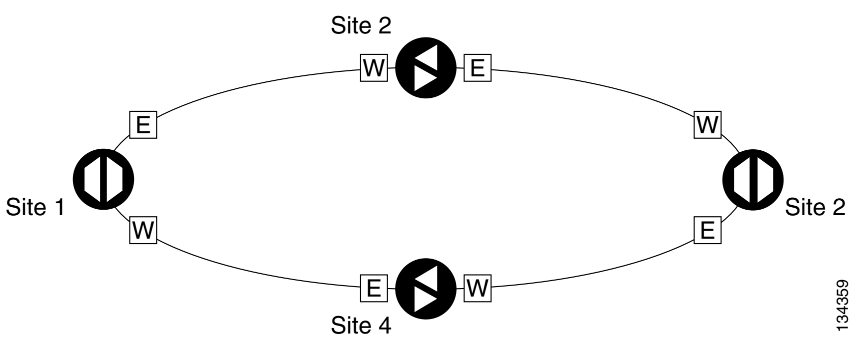


Figure 11-51 Hubs with Line Amplifiers



Step 3 Return to your originating procedure (NTP).

DLP-G278 Provision the Optical Line Rate

Purpose	This task provisions the line rate for TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G277 Provision a Multirate PPM, page 11-152 DLP-G274 Verify Topologies for ETR_CLO and ISC Services, page 11-153, if you are provisioning an ETR_CLO service.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The optical line rate for cards with single-rate PPMs is provisioned automatically when you complete the "DLP-G277 Provision a Multirate PPM" task on page 11-152 if the trunk port is out of service. If the optical line rate was provisioned automatically, you do not need to complete this task for the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_2.5G_10EX_C, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card. If the trunk port was in-service when you provisioned the PPM, complete this task to provision the optical line rate manually for those cards.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card where you want to provision PPM ports. If the data rate that you are provisioning is DV-6000, HDTV, ESCON, SDI/D1 Video, ISC1, ISC3 (for TXP_MR_2.5G and TXPP_MR_2.5G cards), or ETR_CLO, complete the following steps. Otherwise, continue with Step 4.

a. Click the **Provisioning > OTN > OTN Lines** tabs.

b. In the ITU-T G.709 OTN field for the respective PPM, choose **Disable**.

c. In the FEC field for the respective PPM, choose **Disable**.

d. Click **Apply**.

Step 2 For the TXP_MR-10G card, click the **Provisioning > Data Rate Selection** tabs. For all other cards, go to Step 4.

Step 3 In the Data Rate Selection area, click **Create** and choose the type of port from the drop-down list. The supported port types are SONET (including 10G Ethernet WAN Phy) and 10G Ethernet LAN Phy.

Step 4 Click the **Provisioning > Pluggable Port Modules** tabs.

Step 5 In the Pluggable Ports area, click **Create**. The Create Port dialog box appears.

Step 6 In the Create Port dialog box, complete the following:

- Port—Choose the port and port number from the drop-down list. The first number indicates the PPM in the Pluggable Port Modules area, and the second number indicates the port number on the PPM. For example, the first PPM with one port appears as 1-1 and the second PPM with one port appears as 2-1. The PPM number can be 1 to 4, but the port number is always 1.
- Port Type—Choose the type of port from the drop-down list. The port type list displays the supported port rates on your PPM. See Table 11-38 on page 11-157 for definitions of the supported rates on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, or AR_XP card.

Step 7 Click **OK**. The row in the Pluggable Ports area turns white if the physical SFP is installed and light blue if the SFP is not installed.
If the optical parameter values differ from the NE Default settings, change the port state to In-Service (for ANSI) or Unlocked (for ETSI) to synchronize the values with the NE Default settings.

Step 8 Repeat Step 5 through Step 7 to configure the rest of the port rates as needed.

Table 11-38 PPM Port Types

Card	Port Type
TXP_MR_2.5G TXPP_MR_2.5G	• OC-3/STM1—155 Mbps • OC-12/STM4—622 Mbps • OC-48/STM16—2.48 Gbps • ONE_GE—One Gigabit Ethernet 1.125 Gbps • ESCON—Enterprise System Connection 200 Mbps (IBM signal) • DV6000—Proprietary signal from video vendor • SDI_D1_VIDEO—Serial Digital Interface and Digital Video signal type 1 • HDTV—High Definition Television • PASS-THRU—Not specified • FC1G—Fibre Channel 1.06 Gbps • FC2G—Fibre Channel 2.125 Gbps • FICON1G—Fiber connectivity1.06 Gbps (IBM signal) • FICON2G—Fiber connectivity 2.125 Gbps (IBM signal) • ETR_CLO—External Time Reference–Control Link Oscillator • ISC compat—InterSystem Coupling Link 1 (ISC1) • ISC peer—InterSystem Coupling Link 3 (ISC3) • DVB-ASI — Proprietary signal from video vendor. Digital Video Broadcast - Asynchronous Serial Interface • ISC1— InterSystem Channel 1 Gbps (IBM signal)
MXP_2.5G_10G MXP_2.5G_10E MXP_2.5G_10E_C MXP_2.5G_10E_L MXP_2.5G_10EX_C	• OC-48/STM16—2.48 Gbps[1]
TXP_MR_10G[2]	• SONET (OC-192)/SDH (STM-64) including 10G Ethernet WAN Phy • 10G Ethernet LAN Phy
TXP_MR_10E TXP_MR_10E_C TXP_MR_10E_L TXP_MR_10EX_C	• SONET (OC-192)/SDH (STM-64) including 10G Ethernet WAN Phy—10 Gbps • 10G Ethernet LAN Phy—10 Gbps Ethernet • 10G Fibre Channel—10 Gbps Fibre Channel • (TXP_MR_10EX_C only) IB_5G

Table 11-38 PPM Port Types (continued)

Card	Port Type
40E-TXP-C 40ME-TXP-C	• SONET (OC-768)/SDH (STM-256) • 40G Ethernet LAN Phy • OTU3
MXP_MR_2.5G MXPP_MR_2.5G	If the card mode is FC_GE: • FC1G ISL—Fibre Channel 1.06 Gbps (Ports 1-1 and 2-1) • FC2G ISL—Fibre Channel 2.125 Gbps (Port 1-1 only) • FICON1G ISL—Fiber connectivity 1.06 Gbps (IBM signal) (Ports 1-1 and 2-1) • FICON2G ISL—Fiber connectivity 2.125 Gbps (IBM signal) (Port 1-1 only) • ONE_GE—One Gigabit Ethernet 1.125 Gbps (Ports 1-1 and 2-1 only) If the card mode is Mixed: • FC1G ISL—Fibre Channel 1.06 Gbps (Port 1-1 only) • FICON1G ISL—Fiber connectivity 1.06 Gbps (IBM signal) (Port1-1 only) • ONE_GE—One Gigabit Ethernet 1.125 Gbps (Port 1-1 only) • ESCON—Enterprise System Connection 200 Mbps (IBM signal) (Ports 5-1 through 8-1) If the card mode is ESCON: • ESCON—Enterprise System Connection 200 Mbps (IBM signal) (Ports 1-1 through 8-1)

Table 11-38 PPM Port Types (continued)

Card	Port Type
MXP_MR_10DME_C MXP_MR_10DME_L MXP_MR_10DMEX_C	If the port mode is FC_GE_ISC: • FC1G—Fibre Channel 1.06 Gbps (Ports 1-1 through 8-1) • FC2G—Fibre Channel 2.125 Gbps (Ports 1-1, 3-1, 5-1, and 7-1 only; ports are not available if the port that follows—2-1, 4-1, 6-1, or 8-1—has a PPM provisioned.) • FICON1G—Fiber connectivity 1.06 Gbps (IBM signal) FICON2G—Fiber connectivity 2.125 Gbps (IBM signal) (Ports 1-1, 3-1, 5-1, and 7-1 only; ports are not available if the port that follows—2-1, 4-1, 6-1, or 8-1—has a PPM provisioned.) • ONE_GE—One Gigabit Ethernet 1.125 Gbps (Ports 1-1 through 8-1) • ISC COMPAT (Ports 1-1 through 8-1) • ISC3 PEER 1G (Ports 1-1 through 8-1) • ISC3 PEER 2G (Ports 1-1, 3-1, 5-1, and 7-1 only; ports are not available if the port that follows—2-1, 4-1, 6-1, or 8-1—has a PPM provisioned.) If the port mode is FC4G: • FC4G—Fibre Channel 4.25 Gbps (Ports 1-1 or 5-1 only; ports are not available if any of the three ports that follow has a PPM provisioned.) • FICON4G—Fiber connectivity 4.25 Gbps (IBM signal) (Ports 1-1 or 5-1 only; ports are not available if any of the three ports that follow has a PPM provisioned.)
40G-MXP-C 40E-MXP-C 40ME-MXP-C	• SONET (OC-192)/SDH (STM-64) • FC8G • FC10G • TEN_GE • OTU2
GE_XP 10GE_XP GE_XPE 10GE_XPE	• GE_XP and GE_XPE client ports[1] • 10GE_XP and 10GE_XPE client and trunk ports; GE_XP and GE_XPE trunk ports[1]

Table 11-38 PPM Port Types (continued)

Card	Port Type
OTU2_XP	• SONET (including 10G Ethernet WAN Phy)—10 Gbps • 10G Ethernet LAN Phy—10 Gbps Ethernet • 10G Fiber Channel—10 Gbps Fibre Channel • IB_5G—InfiniBand 5 Gbps **Note** If you have an OTU2 signal in which the OPU2 has been generated by multiplexing four ODU1 signals, choose SONET as the port rate. This allows the OTU2 signal to be transported transparently in standard or E-FEC regenerator configuration.
AR_MXP AR_XP	• OC-3/STM1—155 Mbps • OC-12/STM4—622 Mbps • OC-48/STM16—2.48 Gbps • Gigabit Ethernet—1.125 Gbps • Fast Ethernet—100 Mbps • ESCON-Enterprise System Connection 200 Mbps (IBM signal) • FC1G—Fibre Channel 1.06 Gbps • FC2G—Fibre Channel 2.125 Gbps • FC4G—Fibre Channel 4.25 Gbps • FC8G—Fibre Channel 8.5 Gbps • FICON1G—Fiber connectivity1.06 Gbps (IBM signal) • FICON2G—Fiber connectivity 2.125 Gbps (IBM signal) • FICON4G—Fiber connectivity 4.25 (IBM signal) • FICON8G—Fiber connectivity 8.5 Gbps (IBM signal) • SD-SDI—270 Mbps • HD-SDI—1.485 Gbps • Third-generation SDI (3G-SDI)—2.970 Gbps • OTU2E —11.09 Gbps • OTU1—2.66 Gbps

1. Automatically provisioned when the PPM is created if the trunk port is out of service.
2. Provisioned on the Data Rate Selection tab.

Step 9 Return to your originating procedure (NTP).

DLP-G280 Delete a PPM

Purpose	This task deletes PPM provisioning for SFPs or XFPs installed on TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G63 Install an SFP or XFP, page 14-72 or • DLP-G273 Preprovision an SFP or XFP Slot, page 14-73 • DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Before deleting a PPM, delete the PPM from the provisioning pane.

Note This task does not apply to the TXP_MR_10G card. To change the TXP_MR_10G data rate, complete the "DLP-G365 Provision the TXP_MR_10G Data Rate" task on page 11-192.

Note You cannot delete a PPM if the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card is part of a regenerator group. For OTU2_XP card, you cannot delete a PPM if the card configuration is in Standard Regen or Enhanced FEC mode.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card where you want to delete PPM settings.

Step 2 Verify that the PPM port Service State is **OOS,DSBLD**. If the PPM port is **OOS,DSBLD**, go to Step 3. If it is not OOS,DSBLD, follow the tasks in NTP-G128 Manage Pluggable Port Modules, page 11-144, to change the Service State of the PPM port to **OOS,DSBLD**.

Step 3 Click the **Provisioning > Pluggable Port Modules** tabs.

Step 4 To delete a PPM and the associated ports:

a. In the Pluggable Port Modules area, click the PPM that you want to delete. The highlight changes to dark blue.

b. Click **Delete**. The Delete PPM dialog box appears.

c. Click **Yes**. The PPM provisioning is removed from the Pluggable Port Modules area and the Pluggable Ports area.

Note You cannot delete a PPM until its port is in the OOS,DSBLD state. You cannot delete a client port if the client is in the In Service and Normal (IS-NR) (ANSI) or Unlocked-enabled (ETSI) service state, is in a protection group, has a generic communications channel (GCC) or data communications channel (DCC), is a timing source, has circuits or overhead circuits, or transports Link Management Protocol channels or links. You can delete a client port (except the last port) if the trunk port is in service and the client port is in the OOS,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) service state. You can delete the last client port only if the trunk port is in a OOS,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) service state for all cards except the MXP_MR_2.5G, MXPP_MR_2.5G, MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C cards. For more information about port states, see the Administrative and Service States document.

Step 5 Verify that the PPM provisioning is deleted:

- In the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card view, CTC shows an empty port after the PPM is deleted.
- If the SFP or XFP is physically present when you delete the PPM provisioning, CTC transitions to the deleted state, the ports (if any) are deleted, and the PPM is represented as a gray graphic in CTC. The SFP or XFP can be provisioned again in CTC, or the equipment can be removed. If the equipment is removed, the graphic disappears.

Step 6 If you need to remove the PPM hardware (the SFP or XFP), complete the "DLP-G64 Remove an SFP or XFP" task on page 14-74.

Step 7 Return to your originating procedure (NTP).

NTP-G33 Create a Y-Cable Protection Group

Purpose	This procedure creates a Y-cable protection group between the client ports of two TXP, MXP, AR_XP, AR_MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards. For additional information about Y-cable protection, see "G.35.1.1 Y-Cable Protection" section on page G-27.
Tools/Equipment	• Installed TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card. • Cisco TransportPlanner Traffic Matrix
Prerequisite Procedures	In the *Cisco ONS 15454 Hardware Installation Guide*: • NTP-G15 Install the Common Control Cards • NTP-G14 Install DWDM Equipment • DLP-G46 Log into CTC • NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Y-cable protection is available for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards when they are provisioned in 10GE MXP, 20GE MXP, or 10GE TXP mode. Y-cable protection cannot be provisioned for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards when they are provisioned in L2-over-DWDM mode. Y-cable protection is available for the OTU2_XP card when it is provisioned in the TXP card mode.

Note If you are provisioning Y-cable protection for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, the Ethernet mode must be set to 1000 and 10000 Mbps respectively. To provision the Ethernet mode, see the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.

Note There is a traffic hit of up to a couple hundred milliseconds on the MXP_MR_2.5G and MXP_MR_10DME cards in Y-cable configuration when a fiber cut or SFP failure occurs on one of the client ports.

Note The OTU2-XP and 40E-MXP-C card cannot implement Y-cable protection for the client ports in 10 GE LAN PHY mode. Hence, a pair of OTU2_XP cards is used at each end in pass-through mode (Transponder mode with G.709 disabled) to implement Y-cable protection. The 40E-MXP-CE card can implement Y-cable protection without the OTU2-XP card for the client ports in LAN PHY GFP mode. However, the 40E-MXP-CE card cannot implement Y-cable protection without the OTU2-XP card for the client ports in LAN PHY WIS mode.

Note For SONET or SDH payloads, Loss of Pointer Path (LOP-P) alarms can occur on a split signal if the ports are not in a Y-cable protection group.

Step 1 View the Cisco TransportPlanner Traffic Matrix (see the Table 14-1 on page 14-4) for your site. Verify the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards that need Y-cable protection groups. (Cards requiring Y-cable protection are indicated with "Y-Cable" in the Traffic Matrix table Protection Type column. For more information, see to the *Cisco TransportPlanner DWDM Operations Guide*.)

Step 2 Verify that the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards are installed according to the requirements specified in Table 14-7 on page 14-109. Table 11-39 lists the protection types available in the ONS 15454 for DWDM client cards.

Table 11-39 Protection Types

Protection Type	Cards	Description and Installation Requirements
Y-cable	MXP_2.5_10G MXP_2.5_10E MXP_2.5_10E_C MXP_2.5_10E_L TXP_MR_10EX_C TXP_MR_10G TXP_MR_10E TXP_MR_10E_C TXP_MR_10E_L TXP_MR_2.5G 40E-TXP-C 40ME-TXP-C MXP_MR_2.5G MXP_MR_10DME_C MXP_MR_10DME_L MXP_MR_10DMEX_C 40G-MXP-C 40E-MXP-C 40ME-MXP-C GE_XP[1] 10GE_XP[2] GE_XPE 10GE_XPE OTU2_XP AR_MXP AR_XP	Pairs a working transponder or muxponder card or port with a protect transponder or muxponder card or port. The protect port must be on a different card than the working port and it must be the same card type as the working port. The working and protect port numbers must be the same, that is, Port 1 can only protect Port 1, Port 2 can only protect Port 2, and so on. **Note** The working and protect card must be in the same shelf for a multishelf node.

Table 11-39 Protection Types

Protection Type	Cards	Description and Installation Requirements
Splitter	TXPP_MR_2.5G MXPP_MR_2.5G AR_MXP AR_XP	A splitter protection group is automatically created when a TXPP_MR_2.5G, MXPP_MR_2.5G, AR_MXP, or AR_XP card is installed. You can edit the splitter protection group name.
	OTU2_XP	A splitter protection group is configurable for the OTU2_XP card. You can create a splitter protection group on ports 3 and 4 of the OTU2_XP card using the "NTP-G199 Create a Splitter Protection Group for the OTU2_XP Card" procedure on page 11-166.
1+1	GE_XP 10GE_XP GE_XPE 10GE_XPE	In the Layer 2 (L2) card mode 1+1 protection is provided to protect the card against client port and card failure.

1. When provisioned in 10GE MXP or 20GE MXP card mode.
2. When provisioned in 10GE TXP card mode.

Step 3 Verify that pluggable ports are provisioned for the same payload and payload rate on the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards where you want to create the Y-cable protection group:

a. Display the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card in card view.

b. Click the **Provisioning > Pluggable Port Module** tab.

c. Verify that a pluggable port is provisioned in the Pluggable Port Module area, and the payload type and rate is provisioned for it in the Pluggable Ports area. If they are not the same, for example, if the pluggable port and rate are not the same, you must either delete the provisioned rate and create a new rate to match using the "DLP-G273 Preprovision an SFP or XFP Slot" task on page 14-73 or replace the pluggable port (SFP or XFP) using the "DLP-G64 Remove an SFP or XFP" task on page 14-74.

Step 4 In node view (single-shelf mode) or shelf view (multishelf mode), click the **Provisioning** > **Protection** tabs.

Step 5 In the Protection Groups area, click **Create**.

Step 6 In the Create Protection Group dialog box, enter the following:

- Name—Type a name for the protection group. The name can have up to 32 alphanumeric (a-z, A-Z, 0-9) characters. Special characters are permitted. For TL1 compatibility, do not use question mark (?), backslash (\), or double quote (") characters.
- Type—Choose **Y Cable** from the drop-down list.
- Protect Port—From the drop-down list, choose the port that will be the standby or protection port to the active port. The list displays the available transponder or muxponder ports. If transponder or muxponder cards are not installed, no ports appear in the drop-down list.

After you choose the protect port, a list of available working ports appear in the Available Ports list. If no cards are available, no ports appear. If this occurs, you can not complete this task until you install the physical cards or preprovision the ONS 15454 slots using the "DLP-G353 Preprovision a Slot" task on page 14-53.

Step 7 From the Available Ports list, select the port that will be protected by the port you selected in Protect Ports. Click the top arrow button to move the port to the Working Ports list.

Step 8 Complete the remaining fields:

- Revertive—Check this check box if you want traffic to revert to the working port after failure conditions remain corrected for the amount of time entered in the Reversion Time field.
- Reversion time—If Revertive is checked, select a reversion time from the drop-down list. The range is 0.5 to 12.0 minutes. The default is 5.0 minutes. Reversion time is the amount of time that will elapse before the traffic reverts to the working card. The reversion timer starts after conditions causing the switch are cleared.

Note The bidirectional switching option is available for Y-cable protection groups only in the following cases:

- On the MXP_MR_10DME card when ISC3_PEER_1G/ISC3_PEER_2G is the client payload.
- On the MXP_MR_10DME and MXP_MR_2.5G cards when Fibre Channel is the client payload. In this case bidirectional switching is:
  - Automatically enabled when Distance Extension is enabled.
  - Automatically disabled when Distance Extension is disabled.

The bidirectional switching option is available for all SONET and SDH 1+1 protection groups.

Step 9 Click **OK**.

Step 10 Repeat this procedure for every Y-cable protection group indicated in the Cisco TransportPlanner Traffic Matrix.

Stop. You have completed this procedure.

NTP-G199 Create a Splitter Protection Group for the OTU2_XP Card

Purpose	This procedure creates a splitter protection group between the trunk ports of an OTU2_XP card. For additional information about splitter protection, see the "G.35.1.2 Splitter Protection" section on page G-30.
Tools/Equipment	Installed OTU2_XP card Cisco TransportPlanner Traffic Matrix

Prerequisite Procedures	In the *Cisco ONS 15454 Hardware Installation Guide*: • NTP-G15 Install the Common Control Cards • NTP-G14 Install DWDM Equipment DLP-G46 Log into CTC NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note A splitter protection group is automatically created when a TXPP_MR_2.5G, MXPP_MR_2.5G, or PSM card is installed. You can edit the splitter protection group name for these cards. The splitter protection group is deleted when you delete the TXPP_MR_2.5G, MXPP_MR_2.5G, or PSM card.

Note Splitter protection is available for the OTU2_XP card when it is provisioned in Transponder configuration only. In a splitter-protected Transponder configuration, Port 1 is the client port, Port 3 is the working trunk port, and Port 4 is the standby trunk port.

Note For SONET or SDH payloads, Loss of Pointer Path (LOP-P) alarms can occur on a split signal if the ports are not in a splitter protection group.

Step 1 View the Cisco TransportPlanner Traffic Matrix (see the Table 14-1 on page 14-4) for your site. Verify which OTU2_XP card needs a splitter protection group. (Cards requiring splitter protection are indicated with "Splitter" in the Traffic Matrix table Protection Type column. Refer to the *Cisco TransportPlanner DWDM Operations Guide* for more information.)

Step 2 Verify that the OTU2_XP card is installed according to the requirements specified in Table 14-7 on page 14-109.

Step 3 Verify that the pluggable port (SFP or XFP) slot is provisioned for the same payload rate as the pluggable port on the OTU2_XP card where you will create the splitter protection group:

  a. Display the OTU2_XP card in card view.

  b. Click the **Provisioning > Pluggable Port Module** tabs.

  c. Verify that a pluggable port (SFP or XFP) slot is provisioned in the Pluggable Port Module area, and that the payload rate of the pluggable port (SFP or XFP) slot is same as the payload rate of the pluggable port on the OTU2_XP card provisioned in the Pluggable Ports area. If they are not the same, you must either delete the provisioned rate and create a new rate to match using the "DLP-G273 Preprovision an SFP or XFP Slot" task on page 14-73 or replace the pluggable port (SFP or XFP) using the "DLP-G64 Remove an SFP or XFP" task on page 14-74.

Step 4 In node view (single-shelf mode) or shelf view (multishelf view), click the **Provisioning** > **Protection** tabs.

Step 5 In the Protection Groups area, click **Create**.

Step 6 In the Create Protection Group dialog box, enter the following:

- Name—Type a name for the protection group. The name can have up to 32 alphanumeric (a-z, A-Z, 0-9) characters. Special characters are permitted. For TL1 compatibility, do not use question mark (?), backslash (\), or double quote (") characters.
- Type—Choose **Splitter** from the drop-down list.
- Protect Card—From the drop-down list, choose the port that will be the standby or protection port to the active port. The list displays the available OTU2_XP ports. If transponder or muxponder cards are not installed or if the trunk ports of the card are part of a regenerator group, no ports appear in the drop-down list.

After you choose the protect port, a list of available working ports appear in the Available Cards list. If no cards are available, no ports appear. If this occurs, you cannot complete this task until you install the physical cards or preprovision the ONS 15454 slots using the "DLP-G353 Preprovision a Slot" task on page 14-53.

Step 7 From the Available Cards list, select the port that will be protected by the port you selected in Protect Cards. Click the top arrow button to move the port to the Working Cards list.

Step 8 Complete the remaining fields:

- Revertive—Check this check box if you want traffic to revert to the working port after failure conditions remain corrected for the amount of time entered in the Reversion Time field.
- Reversion time—If Revertive is checked, select a reversion time from the drop-down list. The range is 0.5 to 12.0 minutes. The default is 5.0 minutes. Reversion time is the amount of time that will elapse before the traffic reverts to the working card. The reversion timer starts after conditions causing the switch are cleared.

Note The Bidirectional Switching option is not applicable for splitter protection groups.

Step 9 Click **OK**.

Step 10 Repeat this procedure for every splitter protection group indicated in the Cisco TransportPlanner Traffic Matrix.

Stop. You have completed this procedure.

NTP-G198 Create 1+1 Protection for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards

Purpose	This procedure creates a 1+1 protection group to protect against client port and card failure of GE_XP, 10GE_XP, GE_XPE, 10GE_XPE cards. For additional information about 1+1 protection, see the "G.35.2 1+1 Protection" section on page G-30.
Tools/Equipment	None
Prerequisite Procedures	In the *Cisco ONS 15454 Hardware Installation Guide*: • NTP-G15 Install the Common Control Cards • NTP-G14 Install DWDM Equipment NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3

Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to protect the card against client port and card failure. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed according to the requirements specified in Table 14-7 on page 14-109.

Step 3 Complete the NTP-G242 Create an Internal Patchcord Manually, page 14-114 by selecting the Trunk to Trunk (L2) option, at the trunk port where you want to create 1+1 protection.

Step 4 Complete the "NTP-G461 Create a 1+1 Protection Group for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards" task on page 11-169 to create a protection group.

Step 5 Configure the standby port behavior, by setting the Protection Action to **None** or **Squelch**. For detailed information on how to configure the standby port behavior, see the, "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.

Note Do not enable squelch in a 1 + 1 protection group, if the 100FX, 100LX SFP, and ONS-SE-ZE-EL SFP is used in the protection group and is connected to the peer via the parallel cable (not Y-cable)

Note When you configure L2 1 + 1 protection on 10GE_XP and 10GE_XPE cards, set the Protection Action to **None** on the client ports. Setting the Protection Action as **Squelch** results in unexpected switching behavior.

Step 6 Configure the standby and active port speed, by setting the mode parameter to Auto or 1000 or any other values. For detailed information on how to configure the standby port behavior, see the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.

Stop. You have completed this procedure.

NTP-G461 Create a 1+1 Protection Group for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards

Purpose	This procedure creates a 1+1 protection group for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE slots where internal patchcords were created.
Tools/Equipment	None
Prerequisite Procedures	DLP-G344 Verify Provisionable and Internal Patchcords, page 16-61
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **Protection** tabs.

Step 2 In the Protection Groups area, click **Create**.

Step 3 In the Create Protection Group dialog box, enter the following:

- Name—Type a name for the protection group. The name can have up to 32 alphanumeric (a-z, A-Z, 0-9) characters. Special characters are permitted. For TL1 compatibility, do not use question mark (?), backslash (\), or double quote (") characters.
- Type—Choose **L2 1+1 (port)** from the drop-down list.
- Protect Port—From the drop-down list, choose the port that will be the standby or protection port for the active port. The list displays the available transponder or muxponder ports. If transponder or muxponder cards are not installed, no ports appear in the drop-down list.

After you choose the protect port, a list of available working ports appear in the Available Ports list. If no cards are available, no ports appear. If this occurs, you cannot complete this task until you install the physical cards or preprovision the ONS 15454 slots using the "DLP-G353 Preprovision a Slot" task on page 14-53.

Step 4 From the Available Ports list, select the port that will be protected by the port you selected in the Protected Port drop-down list. Click the top arrow button to move the port to the Working Ports list.

Step 5 Complete the remaining fields:

- Revertive—Check this check box if you want traffic to revert to the working port after failure conditions remain corrected for the amount of time entered in the Reversion Time field.
- Reversion time—If Revertive is checked, select a reversion time from the drop-down list. The range is 0.5 to 12.0 minutes. The default is 5.0 minutes. Reversion time is the amount of time that will elapse before the traffic reverts to the working card. The reversion timer starts after conditions causing the switch are cleared.

The bidirectional switching option is available for SONET and SDH 1+1 protection groups.

Step 6 Click **OK**.

Step 7 Repeat this procedure for every 1+1 protection group indicated in the Cisco TransportPlanner Traffic Matrix.

Step 8 Return to your originating procedure (NTP).

NTP-G98 Provision the 2.5G Multirate Transponder Card Line Settings and PM Parameter Thresholds

Purpose	This procedure changes the line and threshold settings for TXP_MR_2.5G and TXPP_MR_2.5G transponder cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 DLP-G63 Install an SFP or XFP, page 14-72 DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary) DLP-G278 Provision the Optical Line Rate, page 11-155 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the transponder card settings. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 Perform any of the following tasks as needed:

- DLP-G229 Change the 2.5G Multirate Transponder Card Settings, page 11-172
- DLP-G230 Change the 2.5G Multirate Transponder Line Settings, page 11-173
- DLP-G231 Change the 2.5G Multirate Transponder Line Section Trace Settings, page 11-176
- DLP-G232 Change the 2.5G Multirate Transponder SONET or SDH Line Threshold Settings, page 11-178
- DLP-G320 Change the 2.5G Multirate Transponder Line RMON Thresholds for 1G Ethernet or 1G FC/FICON Payloads, page 11-181
- DLP-G305 Provision the 2.5G Multirate Transponder Trunk Port Alarm and TCA Thresholds, page 11-182
- DLP-G306 Provision the 2.5G Multirate Transponder Client Port Alarm and TCA Thresholds, page 11-184
- DLP-G234 Change the 2.5G Multirate Transponder OTN Settings, page 11-188
- DLP-G367 Change the 2.5G Multirate Transponder Trunk Wavelength Settings, page 11-177

Stop. You have completed this procedure.

DLP-G229 Change the 2.5G Multirate Transponder Card Settings

Purpose	This task changes the card settings for TXP_MR_2.5G and TXPP_MR_2.5G transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the card settings.

Step 2 Click the **Provisioning > Card** tabs.

Step 3 Modify any of the settings described in Table 11-40.

Note The Card subtab Framing Type and Tunable Wavelengths fields are display-only. Framing Type shows the card framing type, either SONET or SDH, depending on whether the card is installed in an ANSI or ETSI chassis. The Tunable Wavelengths field shows the tunable wavelengths for the physical TXP_MR_2.5G or TXPP_MR_2.5G that is installed.

Table 11-40 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Settings

Parameter	Description	Options
Termination Mode	Sets the mode of operation (option only supported for SONET/SDH payloads).	• Transparent • Section (ANSI) or Regeneration Section (ETSI) • Line (ANSI) or Multiplex Section (ETSI)
Regeneration Peer Slot	Sets the slot containing another TXP_MR_2.5G or TXPP_MR_2.5G card to create a regeneration peer group. A regeneration peer group facilitates the management of two TXP_MR_2.5G or TXPP_MR_2.5G cards that are needed to perform a complete signal regeneration. The regeneration peer group synchronizes provisioning of the two cards. Payload type and ITU-T G.709 optical transport network (OTN) changes made on one TXP_MR_2.5G or TXPP_MR_2.5G card are reflected on the peer TXP_MR_2.5G or TXPP_MR_2.5G card. **Note** Y-cable protection groups cannot be created on TXP_MR_2.5G or TXPP_MR_2.5G cards that are in a regeneration peer group.	• None • 1 • 2 • 3 • 4 • 5 • 6 • 12 • 13 • 14 • 15 • 16 • 17
Regeneration Group Name	Sets the regeneration peer group name.	User defined

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G230 Change the 2.5G Multirate Transponder Line Settings

Purpose	This task changes the line settings for the client port of the TXP_MR_2.5G and TXPP_MR_2.5G transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > SONET** tabs.

Step 3 Modify any of the settings described in Table 11-41.

Note The 2.5G multirate transponder trunk settings are provisioned in the "DLP-G305 Provision the 2.5G Multirate Transponder Trunk Port Alarm and TCA Thresholds" task on page 11-182.

Table 11-41 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	• 1 • 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G card only)
Port Name	The user can assign a logical name for each of the ports shown by filling in this field.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI)
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)
SF BER	(OC-N and STM-N payloads only) Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5
SD BER	(OC-N and STM-N payloads only) Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9

Table 11-41 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Line Settings (continued)

Parameter	Description	Options
ALS Mode	Sets the automatic laser shutdown (ALS) function.	• Disabled (default) • Auto Restart • Manual Restart • Manual Restart for Test
Reach	Displays the optical reach distance of the client port.	Options: ANSI/ETSI • Autoprovision/Autoprovision (default) • SR • SR 1/I-1—Short reach up to 2-km distance • IR 1/S1—Intermediate reach, up to 15-km distance • IR 2/S2—Intermediate reach up to 40-km distance • LR 1/L1—long reach, up to 40-km distance • LR 2/L2—long reach, up to 80-km distance • LR 3/L3—long reach, up to 80-km distance
Wavelength	Displays the wavelength of the client port.	• First Tunable Wavelength • Further wavelengths: 1310 nm through 1560.61 nm, 100-GHz ITU spacing; coarse wavelength division multiplexing (CWDM) spacing Note: supported wavelengths are marked by asterisks (**)
AINS Soak	(OC-N and STM-N payloads only) Sets the automatic in-service soak period.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments
Type	(OC-N and STM-N payloads only) The optical transport type.	• SONET • SDH

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G231 Change the 2.5G Multirate Transponder Line Section Trace Settings

Purpose	This task changes the section trace settings for TXP_MR_2.5G and TXPP_MR_2.5G transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This task only applies to SONET services.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs.

Step 3 Modify any of the settings described in Table 11-42.

Table 11-42 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Section Trace Settings

Parameter	Description	Options
Port	(Display only) Port number.	• 1 • 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G only)
Received Trace Mode	Sets the trace mode.	• Off/None • Manual
Disable AIS/RDI on TIM-S	If an TIM on Section overhead alarm arises because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size

Table 11-42 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Section Trace Settings (continued)

Parameter	Description	Options
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this display updated automatically.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G367 Change the 2.5G Multirate Transponder Trunk Wavelength Settings

Purpose	This task changes the trunk wavelength settings for the TXP_MR_2.5G and TXPP_MR_2.5G cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the trunk wavelength settings.

Step 2 Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

Step 3 Modify any of the settings as described in Table 11-43.

Table 11-43 TXP_MR_2.5G and TXPP_MR_2.5G Card Wavelength Trunk Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	• 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G only)
Wavelength	The wavelength provisioned for the trunk.	• First Tunable Wavelength • Further wavelengths in 100-GHz ITU-T, C-band spacing. If the card is installed, the wavelengths it carries are identified with two asterisks. Other wavelengths have a dark grey background. If the card is not installed, all wavelengths appear with a dark grey background.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G232 Change the 2.5G Multirate Transponder SONET or SDH Line Threshold Settings

Purpose	This task changes the line threshold settings for TXP_MR_2.5G and TXPP_MR_2.5G transponder cards carrying OC-3/STM-1, OC-12/STM-4, and OC-48/STM-16 payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds** tabs.

Note You must modify Near End and Far End independently; 15 Min and 1 Day independently; and Line and Section independently. To do so, choose the appropriate radio button and click **Refresh**.

Step 3 Modify any of the settings in Table 11-44.

> **Note** Some parameters and options in Table 11-44 do not apply to all TXP_MR_2.5G or TXPP_MR_2.5G cards. If a parameter or option does not apply, that parameter or option does not appear in CTC.

Table 11-44 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Line Thresholds Settings for OC-3/STM-1, OC-12/STM-4, and OC-48/STM-16 Payloads

Parameter	Description	Options - ANSI	Options - ETSI
Port	(Display only) Port number	• 1 • 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G only)	• 1 • 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G only)
EB	Path Errored Block indicates that one or more bits are in error within a block	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Table 11-44 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Line Thresholds Settings for OC-3/STM-1, OC-12/STM-4, and OC-48/STM-16 Payloads (continued)

Parameter	Description	Options - ANSI	Options - ETSI
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
SEFS	(Near End Section or Regeneration Section only) Severely errored framing seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.	—
UAS	Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
BBE	Background block errors	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G320 Change the 2.5G Multirate Transponder Line RMON Thresholds for 1G Ethernet or 1G FC/FICON Payloads

Purpose	This task changes the line remote monitoring (RMON) threshold settings for TXP_MR_2.5G and TXPP_MR_2.5G transponder cards carrying the 1G Ethernet or 1G FC/FICON payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In card view, display the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose the applicable port.

Step 5 From the Variable drop-down list, choose an Ethernet variable. See Table 11-45 for a list of available Ethernet variables.

Table 11-45 TXP_MR_2.5G and TXPP_MR_2.5G Card 1G Ethernet and 1G FC/FICON Thresholds

Variable	Description
ifInErrors	Number of inbound packets that contained errors preventing them from being delivered to a higher-layer protocol.
rxTotalPkts	Total number of received packets.
8b10bStatsEncodingDispErrors	Number of IETF 8b10b disparity violations on the Fibre Channel line side.
8b10bIdleOrderedSets	Number of received packets containing idle ordered sets.
8b10bNonIdleOrderedSets	Number of received packets containing non-idle ordered sets.
8b10bDataOrderedSets	Number of received packets containing data ordered sets.

Step 6 From the Alarm Type drop-down list, indicate whether the event will be triggered by the rising threshold, the falling threshold, or both the rising and falling thresholds.

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Enter the appropriate number of seconds for the Sample Period.

Step 9 Enter the appropriate number of occurrences for the Rising Threshold.

For a rising type of alarm, the measured value must move from below the falling threshold to above the rising threshold. For example, if a network is running below a rising threshold of 1000 collisions every 15 seconds and a problem causes 1001 collisions in 15 seconds, the excess occurrences trigger an alarm.

Step 10 Enter the appropriate number of occurrences in the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the counterpart to a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded (otherwise, a single network problem might cause a rising threshold to be exceeded multiple times and cause a flood of events).

Step 11 Click **OK**.

Step 12 Return to your originating procedure (NTP).

DLP-G305 Provision the 2.5G Multirate Transponder Trunk Port Alarm and TCA Thresholds

Purpose	This task changes the TXP_MR_2.5G and TXPP_MR_2.5G trunk port alarm and threshold crossing alert (TCA) thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note In this task, trunk port refers to Port 2 for TXP_MR_2.5G cards, and to Ports 2 and 3 for TXPP_MR_2.5G cards.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Pluggable Port Modules** tab. Under Pluggable Ports, record the Rate that is provisioned.

Step 3 Look up the rate in Table 11-46 and note whether it is 2R or 3R.

Table 11-46 2R and 3R Mode and ITU-T G.709 Compliance by Client Interface

Client Interface	Input Bit Rate	3R vs. 2R	ITU-T G.709
OC-48/STM-16	2.488 Gbps	3R	On or Off
DV-6000	2.38 Gbps	2R	—
2 Gigabit Fibre Channel (2G-FC)/fiber connectivity (FICON)	2.125 Gbps	3R[1]	On or Off
High-Definition Television (HDTV)	1.48 Gbps	2R	—
Gigabit Ethernet (GE)	1.25 Gbps	3R	On or Off
1 Gigabit Fibre Channel (1G-FC)/FICON	1.06 Gbps	3R	On or Off
OC-12/STM-4	622 Mbps	3R	On or Off
OC-3/STM-1	155 Mbps	3R	On or Off
Enterprise System Connection (ESCON)	200 Mbps	2R	—
SDI/D1 video	270 Mbps	2R	—
ISC-1 Compact	1.06 Gbps	3R	Off
ISC-3	1.06 or 2.125 Gbps	2R	—
ETR_CLO	16 Mbps	2R	—

1. No monitoring

Step 4 Click the **Provisioning > Optics Thresholds** tabs.

Step 5 Under **Types**, verify that the TCA radio button is checked. If not, check it and click **Refresh**.

Step 6 Referring to Table 11-47, verify the trunk port TCA thresholds for RX Power High and RX Power Low depending on whether the rate is 2R or 3R. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Note Do not modify the Laser Bias parameters.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-47 TXP_MR_2.5G and TXPP_MR_2.5G Trunk Port TCA Thresholds

Signal	TCA RX Power Low	TCA RX Power High
3R	–23 dBm	–9 dBm
2R	–24 dBm	–9 dBm

Step 7 Click **Apply**.

Step 8 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 9 Verify the trunk port Alarm thresholds for RX Power High is –7 dBm, and for RX Power Low is –26 dBm. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Step 10 Click **Apply**.

Step 11 Return to your originating procedure (NTP).

DLP-G306 Provision the 2.5G Multirate Transponder Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the TXP_MR_2.5G and TXPP_MR_2.5G cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G278 Provision the Optical Line Rate, page 11-155
	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs. The TCA thresholds are shown by default.

Step 3 Referring to Table 11-48, verify the Port 1 (client) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface at the other end. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Note Do not modify the Laser Bias parameters.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the “11.22 SFP and XFP Modules” section on page 11-142.

Table 11-48 TXP_MR_2.5G and TXPP_MR_2.5G Card Client Interface TCA Thresholds

Port Type (by CTC)	Pluggable Port Module (SFP)	TCA RX Power Low	TCA RX Power High	TCA TX Power Low	TCA TX Power High
OC-3	15454-SFP3-1-IR	–23	–8	–21	–2
STM-1	15454E-SFP-L.1.1	–24	–10	–21	–2
OC-12	15454-SFP12-4-IR	–28	–7	–21	–2
STM-4	15454E-SFP-L.4.1	–28	–8	–21	–2
OC-48	ONS-SE-2G-S1	–18	–3	–16	3
	15454-SFP-OC48-IR	–18	0	–11	6
STM-16	ONS-SE-2G-S1 15454E-SFP-L.16.1	–18	–3	–16	3
ONE_GE	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–17	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
ESCON	15454-SFP-200 15454E-SFP-200 ONS-SE-200-MM	–21	–14	–35	–8
DV6000	15454-SFP-OC48-IR	–18	0	–11	6
	15454E-SFP-L.16.1	–18	–3	–16	3
SDI_D1_ VIDEO	15454-SFP12-4-IR	–28	–7	–21	–2
	15454E-SFP-L.4.1	–28	–8	–21	–2
HDTV	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
PASS-THRU	2R MODE (not specified)	—	—	—	—
FC1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–17	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
FC2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–15	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3

Table 11-48 TXP_MR_2.5G and TXPP_MR_2.5G Card Client Interface TCA Thresholds (continued)

Port Type (by CTC)	Pluggable Port Module (SFP)	TCA RX Power Low	TCA RX Power High	TCA TX Power Low	TCA TX Power High
FICON1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–17	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
FICON2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–15	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
ETR_CLO	15454-SFP-200 15454E-SFP-200 ONS-SE-200-MM	–17	0	–16	3
ISC compat	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
ISC peer	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3

Step 4 Click **Apply**.

Step 5 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 6 Referring to Table 11-49, verify the Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Table 11-49 TXP_MR_2.5G and TXPP_MR_2.5G Card Client Interface Alarm Thresholds

Port Type (by CTC)	Pluggable Port Module (SFP)	Alarm RX Power Low	Alarm RX Power High	Alarm TX Power Low	Alarm TX Power High
OC-3	15454-SFP3-1-IR	–26	–5	–17	–6
STM-1	15454E-SFP-L.1.1	–27	–7	–17	–6
OC-12	15454-SFP12-4-IR	–31	–4	–17	–6
STM-4	15454E-SFP-L.4.1	–31	–5	–17	–6
OC-48	ONS-SE-2G-S1	–21	0	–12	–1
	15454-SFP-OC48-IR	–21	3	–7	2
STM-16	ONS-SE-2G-S1 15454E-SFP-L.16.1	–21	0	–12	–1

Table 11-49 TXP_MR_2.5G and TXPP_MR_2.5G Card Client Interface Alarm Thresholds (continued)

Port Type (by CTC)	Pluggable Port Module (SFP)	Alarm RX Power Low	Alarm RX Power High	Alarm TX Power Low	Alarm TX Power High
ONE_GE	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–12	–2
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–12	–1
ESCON	15454-SFP-200 15454E-SFP-200 ONS-SE-200-MM	–24	–11	–31	–12
DV6000	15454-SFP-OC48-IR	–21	3	–7	2
	15454E-SFP-L.16.1	–21	0	–12	–5
SDI_D1_ VIDEO	15454-SFP12-4-IR	–31	–4	–17	–6
	15454E-SFP-L.4.1	–31	–5	–17	–6
HDTV	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–12	–1
PASS-THRU	2R MODE (not specified)	—	—	—	—
FC1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–12	–2
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–12	–1
FC2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–18	3	–12	–2
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–12	–1
FICON1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–12	–2
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–12	–1
FICON2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–18	3	–12	–2
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–12	–1

Table 11-49 TXP_MR_2.5G and TXPP_MR_2.5G Card Client Interface Alarm Thresholds (continued)

Port Type (by CTC)	Pluggable Port Module (SFP)	Alarm RX Power Low	Alarm RX Power High	Alarm TX Power Low	Alarm TX Power High
ETR_CLO	15454-SFP-200 15454E-SFP-200 ONS-SE-200-MM	–20	3	–12	–2
ISC compat	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–12	–1
ISC peer	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–12	–1

Step 7 Click **Apply**.

Step 8 Return to your originating procedure (NTP).

DLP-G234 Change the 2.5G Multirate Transponder OTN Settings

Purpose	This task changes the OTN settings for TXP_MR_2.5G and TXPP_MR_2.5G transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_2.5G or TXPP_MR_2.5G card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then choose one of the following subtabs: **OTN Lines**, **G.709 Thresholds**, **FEC Thresholds**, or **Trail Trace Identifier**.

Step 3 Modify any of the settings described in Tables 11-50 through 11-53.

Note You must modify Near End and Far End; 15 Min and 1 Day; and SM and PM settings independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-50 describes the values on the Provisioning > OTN > OTN Lines tab.

Table 11-50 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card OTN Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	• 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G)
G.709 OTN	Sets the OTN lines according to ITU-T G.709.	• Enable • Disable
FEC	Sets the OTN lines to forward error correction (FEC).	• Enable • Disable
SF BER	(Display only) The signal fail bit error rate.	• 1E-5
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9

Table 11-51 describes the values on the Provisioning > OTN > G.709 Thresholds tab.

Table 11-51 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card ITU-T G.709 Threshold Settings

Parameter	Description	Options
Port[1]	(Display only) Port number.	• 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G)
ES	Errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
SES	Severely errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
UAS	Unavailable seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
BBE	Background block errors	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
FC	Failure counter	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.

1. Latency for a 1G-FC payload without ITU-T G.709 is 4 microseconds, and with ITU-T G.709 is 40 microseconds. Latency for a 2G-FC payload without ITU-T G.709 is 2 microseconds, and with ITU-T G.709 is 20 microseconds. Consider these values when planning a FC network that is sensitive to latency.

Table 11-52 describes the values on the Provisioning > OTN > FEC Threshold tab.

Table 11-52 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card FEC Threshold Settings

Parameter	Description	Options
Port	(Display only) Port number.	• 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G)
Bit Errors Corrected	Sets the value for bit errors corrected.	Numeric. Can be set for 15-minute or one-day intervals.
Uncorrectable Words	Sets the value for uncorrectable words.	Numeric. Can be set for 15-minute or one-day intervals.

Table 11-53 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-53 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Trail Trace Identifier Settings

Parameter	Description	Options
Port	(Display only) Port number.	• 2 (Trunk) • 3 (Trunk) (TXPP_MR_2.5G)
Level	Sets the level.	• Section • Path
Received Trace Mode	Sets the trace mode.	• Off/None • Manual
Disable FDI on TIM	If an TIM on Section overhead alarm arises because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size

Table 11-53 TXP_MR_2.5G and TXPP_MR_2.5G Transponder Card Trail Trace Identifier Settings (continued)

Parameter	Description	Options
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 minutes.	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

NTP-G96 Provision the 10G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds

Purpose	This procedure changes the line and threshold settings for 10G multirate transponder cards including the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 DLP-G63 Install an SFP or XFP, page 14-72 DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary) DLP-G278 Provision the Optical Line Rate, page 11-155 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The TXP_MR_10G card does not support PPMs.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the transponder card settings. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 If you are provisioning a TXP_MR_10G card, complete the "DLP-G365 Provision the TXP_MR_10G Data Rate" task on page 11-192, and if you are provisioning a TXP_MR_10E or TXP_MR_10EX_C card, complete the "DLP-G712 Provision the TXP_MR_10E or TXP_MR_10EX_C Data Rate" task on page 11-193. If not, continue with Step 4.

Step 4 Perform any of the following tasks as needed:

- DLP-G216 Change the 10G Multirate Transponder Card Settings, page 11-193
- DLP-G217 Change the 10G Multirate Transponder Line Settings, page 11-195
- DLP-G218 Change the 10G Multirate Transponder Line Section Trace Settings, page 11-200
- DLP-G219 Change the 10G Multirate Transponder Line Thresholds for SONET or SDH Payloads Including 10G Ethernet WAN Phy, page 11-202
- DLP-G319 Change the 10G Multirate Transponder Line RMON Thresholds for 10G Ethernet LAN Phy Payloads, page 11-205
- DLP-G301 Provision the 10G Multirate Transponder Trunk Port Alarm and TCA Thresholds, page 11-209
- DLP-G302 Provision the 10G Multirate Transponder Client Port Alarm and TCA Thresholds, page 11-210
- DLP-G221 Change the 10G Multirate Transponder OTN Settings, page 11-212
- DLP-G368 Change the 10G Multirate Transponder Trunk Wavelength Settings, page 11-201

Stop. You have completed this procedure.

DLP-G365 Provision the TXP_MR_10G Data Rate

Purpose	This task changes the TXP_MR_10G card data rate.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G card where you want to change the card data rate settings.

Step 2 Click the **Provisioning > Data Rate Selection** tabs.

Step 3 Click **Create**.

Step 4 In the Create Port dialog box, choose one of the following data rates:

- SONET (ANSI) or SDH (ETSI) (including 10G Ethernet WAN Phy)
- 10G Ethernet LAN Phy

Step 5 Click **Ok**.

Step 6 Return to your originating procedure.

DLP-G712 Provision the TXP_MR_10E or TXP_MR_10EX_C Data Rate

Purpose	This task changes the TXP_MR_10E or TXP_MR_10EX_C card data rate.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10E or TXP_MR_10EX_C card where you want to change the card data rate settings.

Step 2 Click the **Provisioning > Pluggable Port Modules** tabs.

Step 3 In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.

Step 4 In the Create PPM dialog box, complete the following:

- PPM—Choose the SFP you want to install from the drop-down list.
- PPM Type—Choose the number of ports supported by your SFP from the drop-down list. If only one port is supported, **PPM (1 port)** is the only option.

Step 5 Click **OK**. The newly created PPM appears in the Pluggable Port Modules area. The row in the Pluggable

Step 6 Port Modules area turns white and the Actual Equipment Type column lists the equipment name.

Step 7 In the Pluggable Ports area, click **Create**. The Create Ports dialog box appears.

Step 8 In the Create Port dialog box, choose one of the following data rates:

- SONET (ANSI) or SDH (ETSI) (including 10G Ethernet WAN Phy)
- 10G Ethernet LAN Phy
- 10G FIBER Channel
- (TXP-MR-10EX_C card only) IB_5G

Step 9 Click **Ok**.

Step 10 Return to your originating procedure.

DLP-G216 Change the 10G Multirate Transponder Card Settings

Purpose	This task changes the card settings for the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, or TXP_MR_10E_L card where you want to change the card settings.

Step 2 Click the **Provisioning > Card** tabs.

Step 3 Modify any of the settings described in Table 11-54.

Table 11-54 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card Settings

Parameter	Description	ONS 15454 Options	ONS 15454 SDH Options
Termination Mode	Sets the mode of operation. (This option is only available for SONET/SDH payloads).	• Transparent • Section (TXP_MR_10E only) • Line	• Transparent • Regeneration Section (TXP_MR_10E only) • Multiplex Section
AIS/Squelch Configuration	(TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C only) Sets the transparent termination mode configuration.	• Squelch • AIS	• Squelch • AIS
Regeneration Peer Slot	Sets the slot containing another TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card to create a regeneration peer group. A regeneration peer group facilitates the management of two TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C cards that are needed to perform a complete signal regeneration. The regeneration peer group synchronizes provisioning of the two cards. Payload type and ITU-T G.709 optical transport network (OTN) changes made on one TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card are reflected on the peer TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card. **Note** Y-cable protection groups cannot be created on TXP cards that are in a regeneration peer group.	• None • 1 • 2 • 3 • 4 • 5 • 6 • 12 • 13 • 14 • 15 • 16 • 17	• None • 1 • 2 • 3 • 4 • 5 • 6 • 12 • 13 • 14 • 15 • 16 • 17

Table 11-54 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card Settings

Parameter	Description	ONS 15454 Options	ONS 15454 SDH Options
Regeneration Group Name	(Display only) The regeneration peer group name.	—	—
Tunable Wavelengths	(Display only) Shows the supported wavelengths of the trunk port after the card is installed. For the TXP_MR_10E_C, or TXP_MR_10E_L cards, the first and last supported wavelength, frequency spacing, and number of supported wavelengths are shown in the format: *first wavelength-last wavelength-frequency spacing-number of supported wavelengths*. For example, the TXP_MR_10E_C card would show: `1529.55nm-1561.83nm-50gHz-82`. The TXP_MR_10E show the four wavelengths supported by the card that is installed. The TXP_MR_10G show the two wavelengths supported by the card that is installed.	—	—

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G217 Change the 10G Multirate Transponder Line Settings

Purpose	This task changes the line settings for TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > SONET/SDH/Ethernet** tabs. SONET is the option for ANSI shelves when 10G Ethernet WAN phy is the Pluggable Port Rate, SDH is the option for ETSI shelves when 10G Ethernet WAN phy is the Pluggable Port Rate, and Ethernet is the option for ANSI or ETSI shelves when 10GE LAN Phy is the Pluggable Port Rate.

Step 3 Modify any of the settings described in Table 11-55.

Note In Table 11-55, some parameter tabs do not always apply to all 10G multirate transponder cards. If a tab does not apply, it will not appear in CTC.

Table 11-55 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Line Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the port number.	• 1 (OC192) (10G Ethernet WAN Phy) (if TXP_MR_10G) • 1 (TEN_GE) (if Ethernet LAN is provisioned on the TXP_MR_10G card) • 1-1 (OC192) (10G Ethernet WAN Phy on the TXP_MR_10E card) • 1-1 (TEN_GE) (if Ethernet LAN is provisioned on the TXP_MR_10E card) • 1-1 (FC10G) (if 10G fiber channel is provisioned on the TXP_MR_10E card) • 2 (Trunk) • (TXP_MR_10EX_C only) IB_5G	• 1 (STM-64) (10G Ethernet WAN Phy) (if TXP_MR_10G) • 1 (TEN_GE) (if Ethernet LAN is provisioned on the TXP_MR_10G card) • 1-1 (STM-64) (10G Ethernet WAN Phy on the TXP_MR_10E card) • 1-1 (TEN_GE) (if Ethernet LAN is provisioned on the TXP_MR_10E card) • 1-1 (FC10G) (if 10G fiber channel is provisioned on the TXP_MR_10E card) • 2 (Trunk) • (TXP_MR_10EX_C only) IB_5G
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state. For more information about administrative states, see the Administrative and Service States.	• IS • IS,AINS • OOS,DSBLD • OOS,MT	• Unlocked • Unlocked,automaticInService • Locked,disabled • Locked,maintenance

Table 11-55 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Line Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States.	• IS-NR • OOS-AU,AINS • OOS-MA,DSBLD • OOS-MA,MT	• Unlocked-enabled • Unlocked-disabled, automaticInService • Locked-enabled,disabled • Locked-enabled,maintenance
SF BER	(SONET [ANSI] or SDH [ETSI] including 10G Ethernet WAN Phy only) Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5	• 1E-3 • 1E-4 • 1E-5
SD BER	(SONET [ANSI] or SDH [ETSI] including 10G Ethernet WAN Phy only) Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
Type	(SONET [ANSI] or SDH [ETSI] including 10G Ethernet WAN Phy only) The optical transport type.	• SONET • SDH	• SONET • SDH

Table 11-55 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Line Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled, or it can be set for one of three mode options.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.
AINS Soak	(SONET [ANSI] or SDH [ETSI] including 10G Ethernet WAN Phy only) Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments
ProvidesSync	(TXP_MR_10E, OC192 only) Sets the ProvidesSync card parameter. If checked, the card is provisioned as a network element (NE) timing reference.	Checked or unchecked	Checked or unchecked

Table 11-55 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Line Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
SyncMsgIn	(TXP_MR_10E, OC192 only) Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked	Checked or unchecked
Max Size	(TXP_MR_10E, TXP_MR_10G LAN Phy only) Sets the maximum Ethernet packet size.	• 1548 bytes • Jumbo (64 to 9,216 bytes)	• 1548 bytes • Jumbo (64 to 9,216 bytes)
Incoming MAC Address	(TXP_MR_10E, TXP_MR_10G LAN Phy only) Sets the incoming MAC address.	Value of MAC address. Six bytes in hexadecimal format.	Value of MAC address. Six bytes in hexadecimal format.
Wavelength	Displays the wavelength of the client port.	• First Tunable Wavelength • Further wavelengths: 1310 nm through 1560.61 nm, 100-GHz ITU spacing; coarse wavelength division multiplexing (CWDM) spacing Note: supported wavelengths are marked by asterisks (**)	• First Tunable Wavelength • Further wavelengths: 1310 nm through 1560.61 nm, 100-GHz ITU spacing; coarse wavelength division multiplexing (CWDM) spacing Note: supported wavelengths are marked by asterisks (**)
Reach	Displays the optical reach distance of the client port.	The Reach options depend on the traffic type that has been selected.	The Reach options depend on the traffic type that has been selected.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G218 Change the 10G Multirate Transponder Line Section Trace Settings

Purpose	This task changes the line section trace settings for the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The Section Trace tab is available for the 10G Multirate Transponder cards only if no PPMs are provisioned, or the OC192 PPM is provisioned. The tab is not available if a 10G Ethernet LAN Phy or 10G Fibre Channel PPM is provisioned.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card where you want to change the section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs.

Step 3 Modify any of the settings described in Table 11-56.

Table 11-56 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Section Trace Settings

Parameter	Description	ONS 15454 Options	Options — ONS 15454 SDH
Port	Sets the port number.	• 1-1 (OC192) • 2—Trunk	• 1-1 (STM64) • 2—Trunk
Received Trace Mode	Sets the trace mode.	• Off/None • Manual	• Off/None • Manual
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte	• 1 byte • 16 byte
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size	String of trace string size
Disable AIS/RDI on TIM-S	If an TIM on Section overhead alarm arises because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)

Table 11-56 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Section Trace Settings

Parameter	Description	ONS 15454 Options	Options — ONS 15454 SDH
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked/unchecked (default)	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G368 Change the 10G Multirate Transponder Trunk Wavelength Settings

Purpose	This task changes the trunk wavelength settings for the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Before modifying the wavelength settings, change the port state to OOS,DSBLD (for ANSI) or Locked,disabled (for ETSI) and delete the circuit and patchcord provisioning present on the port. Payload or communication channel provisioning can be retained.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C card where you want to change the trunk wavelength settings.

Step 2 Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

Step 3 Modify any of the settings as described in Table 11-57.

Table 11-57 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C Card Wavelength Trunk Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	Port 2 (Trunk)
Band	Indicates the wavelength band that can be provisioned. If the physical TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C is installed, this field is display-only.	• C—The C-band wavelengths are available in the Wavelength field. • L—The L-band wavelengths are available in the Wavelength field.
Even/Odd	Sets the wavelengths available for provisioning for TXP_MR_10E_C, and TXP_MR_10E_L cards. (This field does not apply to TXP_MR_10G or TXP_MR_10E cards.)	• Even—Displays even C-band or L-band wavelengths in the Wavelength field. • Odd—Displays odd C-band or L-band wavelengths in the Wavelength field.
Wavelength	The wavelength provisioned for the trunk.	• First Tunable Wavelength • Further wavelengths in 100-GHz ITU-T C-band or L-band spacing, depending on the card that is installed. For TXP_MR_10G and TXP_MR_10E cards, the wavelengths carried by the card are identified with two asterisks. If the card is not installed, all wavelengths appear with a dark grey background.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G219 Change the 10G Multirate Transponder Line Thresholds for SONET or SDH Payloads Including 10G Ethernet WAN Phy

Purpose	This task changes the line threshold settings for TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C transponder cards carrying SONET or SDH payloads, including the physical 10G Ethernet WAN Phy payload.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds > SONET Thresholds** (ANSI) or **SDH Thresholds** (ETSI) tabs.

Step 3 Modify any of the settings described in Table 11-58.

Note Parameters shown in Table 11-58 do not apply to all 10G multirate transponder cards. If the parameter or option does not apply, it is not shown in CTC.

Table 11-58 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card Line Threshold Settings

Parameter	Description	Options - ANSI	Options - ETSI
Port	(Display only) Port number	• 1-1 (OC192) • 2 (Trunk)	• 1-1 (STM64) • 2 (Trunk)
EB	Path Errored Block indicates that one or more bits are in error within a block	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Table 11-58 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card Line Threshold Settings (continued)

Parameter	Description	Options - ANSI	Options - ETSI
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
SEFS	(Near End Section or Regeneration Section only) Severely errored framing seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
OFS	(Near End Section or Regeneration Section only) Out of frame seconds	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.
BBE	Background block errors	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Table 11-58 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card Line Threshold Settings (continued)

Parameter	Description	Options - ANSI	Options - ETSI
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
UAS	(Line or Multiplex Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G319 Change the 10G Multirate Transponder Line RMON Thresholds for 10G Ethernet LAN Phy Payloads

Purpose	This task changes the line threshold settings for TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C transponder cards carrying the physical 10G Ethernet LAN payload.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Display the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card where you want to change the line threshold settings in card view.

Step 2 Click the **Provisioning > Line Thresholds > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose the applicable port.

Step 5 From the Variable drop-down list, choose an Ethernet variable. See Table 11-59 for a list of available Ethernet variables.

Table 11-59 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card GE LAN Phy Variables

Variable	Description
ifInOctets	Total number of octets received on the interface, including framing characters.
rxTotalPkts	Total number of received packets.
ifInMulticastPkts	Number of multicast frames received error free.
ifInBroadcastPkts	Number of packets, delivered by a sublayer to an higher sublayer, that were addressed to a broadcast address at this sublayer.
ifInErrors	Number of inbound packets that contained errors preventing them from being delivered to a higher-layer protocol.
ifInErrorBytePkts (TXP_MR_10G only)	Number of receive error bytes.
ifInFramingErrorPkts (TXP_MR_10G only)	Number of receive framing error counters.
ifInJunkInterPkts (TXP_MR_10G only)	Number of receive interpacket junk counters.
ifOutOctets (TXP_MR_10G only)	Total number of octets transmitted out of the interface, including framing characters.
txTotalPkts (TXP_MR_10G only)	Total number of transmit packets.
ifOutMulticastPkts (TXP_MR_10G only)	Number of multicast frames transmitted error free.
ifOutBroadcastPkts (TXP_MR_10G only)	Total number of packets that higher-level protocols requested be transmitted, and that were addressed to a broadcast address at this sublayer, including those that were discarded or not sent.
dot3StatsFCSErrors	Number of frames with frame check errors, that is, there is an integral number of octets, but an incorrect Frame Check Sequence (FCS).
dot3StatsFrameTooLong (TXP_MR_10G only)	Number of received frames that were larger than the maximum size permitted.
etherStatsUndersizePkts	Total number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.

Table 11-59 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card GE LAN Phy Variables (continued)

etherStatsFragments	Total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Note that it is entirely normal for etherStatsFragments to increment. This is because it counts both runts (which are normal occurrences due to collisions) and noise hits.
etherStatsPkts64Octets	Total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts65to127Octets	Total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts128to255Octets	The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts256to511Octets	Total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts512to1023Octets	Total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts1024to1518Octets	Total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsBroadcastPkts	Total number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.
etherStatsMulticastPkts	Total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
etherStatsOversizePkts	The total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
etherStatsJabbers	Total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a nonintegral number of octets (Alignment Error).
etherStatsOctets	Total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).

Table 11-59 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card GE LAN Phy Variables (continued)

etherStatsCRCAlignErrors (TXP_MR_10G only)	Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
rxPauseFrames (TXP_MR_10G only)	Number of received IETF 802.x pause frames.
rxControlFrames	Number of MAC control frames passed by the MAC sublayer to the MAC control sublayer.
rxUnknownOpcodeFrames (TXP_MR_10G only)	Number of MAC control frames received that contain an opcode that is not supported by the device.

Step 6 From the Alarm Type drop-down list, indicate whether the event will be triggered by the rising threshold, the falling threshold, or both the rising and falling thresholds.

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Type in an appropriate number of seconds for the Sample Period.

Step 9 Type in the appropriate number of occurrences for the Rising Threshold.

For a rising type of alarm, the measured value must move from below the falling threshold to above the rising threshold. For example, if a network is running below a rising threshold of 1000 collisions every 15 seconds and a problem causes 1001 collisions in 15 seconds, the excess occurrences trigger an alarm.

Step 10 Enter the appropriate number of occurrences in the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the counterpart to a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded (otherwise, a single network problem might cause a rising threshold to be exceeded multiple times and cause a flood of events).

Step 11 Click **OK**.

Note To view all RMON thresholds, click **Show All RMON thresholds**.

Step 12 Return to your originating procedure (NTP).

DLP-G301 Provision the 10G Multirate Transponder Trunk Port Alarm and TCA Thresholds

Purpose	This task provisions the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C trunk port alarm and threshold cross alert (TCA) thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Step 3 Under Types, verify that the TCA radio button is checked. If not, check it, then click **Refresh**.

Step 4 Referring to Table 11-60, verify the trunk port (Port 2) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting the existing value, and entering the new value. Hit **Enter**, then click **Apply**.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Table 11-60 10G Multirate Transponder Trunk Port TCA Thresholds

Card	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
TXP_MR_10G	–8 dBm	–18 dBm	7 dBm	–1 dBm
TXP_MR_10E TXP_MR_10E_C TXP_MR_10E_L TXP_MR_10EX_C	–9 dBm	–18 dBm	9 dBm	0 dBm

Step 5 Click **Apply**.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Referring to Table 11-61, verify the trunk port (Port 2) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting the existing value, and entering the new value. Hit **Enter**, then click **Apply**.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-61 10G Multirate Transponder Trunk Port Alarm Thresholds

Card	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
TXP_MR_10G	–8 dBm	–20 dBm	4 dBm	2 dBm
TXP_MR_10E TXP_MR_10E_C TXP_MR_10E_L TXP_MR_10EX_C	–8 dBm	–20 dBm	7 dBm	3 dBm

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G302 Provision the 10G Multirate Transponder Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G278 Provision the Optical Line Rate, page 11-155 DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs. The TCA thresholds are shown by default.

Step 3 Under Types, verify that the TCA radio button is checked. If not, check it, then click **Refresh**.

Step 4 Referring to Table 11-62, verify the Port 1 (Client) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface at the other end. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting the existing value, and entering the new value. Hit Enter, then click **Apply**.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Table 11-62 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card Client Interface TCA Thresholds

Pluggable Port Rate	Pluggable Port Module (XFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
SONET (or SDH)	TXP_MR_10E uses ONS-XC-10G-S1 TXP_MR_10G (XFP not present)	–1	–11	–1	–6
10G Ethernet LAN Phy	TXP_MR_10E uses ONS-XC-10G-S1 TXP_MR_10G (XFP not present)	0.5	–14.4	–1	–6
10G Fibre Channel	TXP_MR_10E uses ONS-XC-10G-S1	0.5	–14.4	–1	–6
IB_5G[1]	TXP_MR_10EX_C uses ONS-XC-10G-S1 Version 3	1.0	–14.0	5.0	12.0

1. Only the TXP_MR_10EX_C card supports IB_5G.

Step 5 Click **Apply**.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Referring to Table 11-63, provision the Port 1 (Client) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-63 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card Client Interface Alarm Thresholds

Pluggable Port Rate	Pluggable Port Module (XFP)	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
SONET (or SDH)	TXP_MR_10E uses ONS-XC-10G-S1 TXP_MR_10G (XFP not present)	3	–16	1	–8
10G Ethernet LAN Phy	TXP_MR_10E uses ONS-XC-10G-S1 TXP_MR_10G (XFP not present)	3	–16	1	–8
10G Fibre Channel	TXP_MR_10E uses ONS-XC-10G-S1	3	–16	1	–8
IB_5G[1]	TXP_MR_10EX_C uses ONS-XC-10G-S1 Version 3	3.0	–16	1.0	–8

1. Only the TXP_MR_10EX_C card supports IB_5G.

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G221 Change the 10G Multirate Transponder OTN Settings

Purpose	This task changes the line OTN settings for the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then click one of the following subtabs: **OTN Lines**, **G.709 Thresholds**, **FEC Thresholds**, or **Trail Trace Identifier**.

Step 3 Modify any of the settings described in Tables 11-64 through 11-67.

Note You must modify Near End and Far End independently, 15 Min and 1 Day independently, and SM and PM independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-64 describes the values on the Provisioning > OTN > OTN Lines tab.

Table 11-64 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card OTN Lines Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	2
G.709 OTN	Sets the OTN lines according to ITU-T G.709. Check the box to enable. For TXP-MR-10EX_C cards, the G.709 OTN should be enabled.	• Enable • Disable
FEC	Sets the OTN lines FEC mode. FEC mode can be Disabled, Enabled, or, for the TXP_MR_10E, Enhanced FEC mode can be enabled to provide greater range and lower bit error rate. For TXP_MR_10E cards, Standard is the same as enabling FEC. For TXP-MR-10EX_C cards, the FEC should be enabled.	• Enable—(TXP_MR_10G only) FEC is on. • Disable—FEC is off. • Standard—(TXP_MR_10E only) Standard FEC is on. • Enhanced—(TXP_MR_10E only) Enhanced FEC is on.
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
SF BER	(Display only) Indicates the signal fail bit error rate.	• 1E-5
Asynch/Synch Mapping	(TXP_MR_10E only) Sets how the ODUk (client payload) is mapped to the optical channel (OTUk).	• Asynch mapping • Synch mapping

Table 11-65 describes the values on the Provisioning > OTN > G.709 Thresholds tab.

Table 11-65 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card ITU-T G.709 Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	2
ES	Severely errored seconds. Two types of thresholds can be asserted. Selecting the SM (OTUk) radio button selects FEC, overhead management, and PM using OTUk. Selecting the PM radio button selects path PM using ODUk.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. **Note** SM (OTUk) is the ITU-T G.709 optical channel transport unit order of k overhead frame used for management and performance monitoring. PM (ODUk) is the ITU-T G.709 optical channel data unit order of k overhead frame unit used for path performance monitoring.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
UAS	Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Table 11-65 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card ITU-T G.709 Threshold Settings (continued)

Parameter	Description	Options
BBE	Background block errors	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
FC	Failure counter	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Table 11-66 describes the values on the Provisioning > OTN > FEC Thresholds tab.

Table 11-66 TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C Card FEC Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	2
Bit Errors Corrected	Displays the number of bit errors corrected during the selected time period.	Numeric display. Can be set for 15-minute or one-day intervals.
Uncorrectable Words	Displays the number of uncorrectable words in the selected time period.	Numeric display. Can be set for 15-minute or one-day intervals.

Table 11-67 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-67 10G Multirate Transponder Trail Trace Identifier Settings

Parameter	Description	Options
Port	Sets the port number.	• 1 • 2
Level	Sets the level.	• Section • Path
Received Trace Mode	Sets the trace mode.	• Off/None • Manual

Table 11-67 10G Multirate Transponder Trail Trace Identifier Settings (continued)

Parameter	Description	Options
Disable FDI on TTIM	If a Trace Identifier Mismatch on Section overhead alarm arises because of a J0 overhead string mismatch, no Forward Defect Indication (FDI) signal is sent to the downstream nodes if this box is checked.	• Checked (FDI on TTIM is disabled) • Unchecked (FDI on TTIM is not disabled)
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size; trail trace identifier is 64 bytes in length.
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 minutes.	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

NTP-G292 Provision the 40G Multirate Transponder Card Line Settings, PM Parameters, and Thresholds

Purpose	This procedure changes the line settings, PM parameters, and threshold settings for 40G multirate transponder cards (40E-TXP-C, 40ME-TXP-C).
Tools/Equipment	None
Prerequisite Procedures	• NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 • DLP-G63 Install an SFP or XFP, page 14-72 • DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary) • DLP-G278 Provision the Optical Line Rate, page 11-155 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The 40E-TXP-C and 40ME-TXP-C cards does not support PPMs.

Note The maximum ambient operating temperature for 40E-TXP-C, and 40ME-TXP-C cards is 50^0 Celsius.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the transponder card settings. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 If you are provisioning a 40E-TXP-C or 40ME-TXP-C card, complete the "DLP-G656 Provision the 40E-TXP-C and 40ME-TXP-C Data Rate" task on page 11-218. If not, continue with Step 4.

Step 4 Perform any of the following tasks as needed:

- DLP-G657 Change the 40G Multirate Transponder Card Settings, page 11-218
- DLP-G658 Change the 40G Multirate Transponder Line Settings, page 11-219
- DLP-G659 Change the 40G Multirate Transponder SONET, SDH, or Ethernet Line Settings, page 11-221
- DLP-G660 Change the 40G Multirate Transponder Line Section Trace Settings, page 11-225
- DLP-G661 Change the 40G Multirate Transponder Line Thresholds for SONET or SDH Payloads Including 40G Ethernet WAN Phy, page 11-228
- DLP-G663 Provision the 40G Multirate Transponder Trunk Port Alarm and TCA Thresholds, page 11-230
- DLP-G664 Provision the 40G Multirate Transponder Client Port Alarm and TCA Thresholds, page 11-231
- DLP-G665 Change the 40G Multirate Transponder OTN Settings, page 11-232

Stop. You have completed this procedure.

DLP-G656 Provision the 40E-TXP-C and 40ME-TXP-C Data Rate

Purpose	This task changes the 40E-TXP-C and 40ME-TXP-C card data rate.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the card data rate settings.

Step 2 Click the **Provisioning > Data Rate Selection** tabs.

Step 3 Click **Create**.

Step 4 In the Create Port dialog box, choose one of the following data rates:

- SONET (ANSI) OC-768 or SDH (ETSI) STM-256
- 40G Ethernet LAN Phy (only when overclock mode is ON)
- OTU3

Step 5 Click **Ok**.

Step 6 Return to your originating procedure.

DLP-G657 Change the 40G Multirate Transponder Card Settings

Purpose	This task changes the card settings of the 40E-TXP-C and 40ME-TXP-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the card settings.

Step 2 Click the **Provisioning > Card** tabs.

Step 3 Modify any of the settings described in Table 11-68.

Table 11-68 40E-TXP-C and 40ME-TXP-C Card Settings

Parameter	Description	ONS 15454(ANSI) Options	ONS 15454 SDH(ETSI) Options
Regeneration Peer Slot	Sets the slot containing another 40E-TXP-C or 40ME-TXP-C card to create a regeneration peer group. A regeneration peer group facilitates the management of two 40E-TXP-C or 40ME-TXP-C cards that are needed to perform a complete signal regeneration. The regeneration peer group synchronizes provisioning of the two cards. Payload type and ITU-T G.709 optical transport network (OTN) changes made on one 40E-TXP-C or 40ME-TXP-C card is reflected on the peer 40E-TXP-C or 40ME-TXP-C card. **Note** Y-cable protection groups cannot be created on TXP cards that are in a regeneration peer group.	• None • 1 • 2 • 3 • 4 • 5 • 12 • 13 • 14 • 15 • 16	• None • 1 • 2 • 3 • 4 • 5 • 12 • 13 • 14 • 15 • 16
Regeneration Group Name	(Display only) The regeneration peer group name.	—	—
Trunk Wavelengths	(Display only) Shows the supported wavelengths of the trunk port after the card is installed. The 40E-TXP-C, or 40ME-TXP-C that is installed shows the C-band wavelengths that it supports.	—	—

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G658 Change the 40G Multirate Transponder Line Settings

Purpose	This task changes the line settings of the 40E-TXP-C and 40ME-TXP-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > Ports** tabs.

Step 3 Modify any of the settings for the Client tab as described in Table 11-69.

Table 11-69 Line Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number.	1 and 2
Port Name	Assigns a logical name for each of the ports shown by filling in this field.	User-defined. The port name can be up to 32 alphanumeric or special characters, or both. The port name is blank by default. For information about assigning a port name, see the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about service states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI) • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI)
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)
ALS Mode	(Client port only) Sets the ALS function mode.	• Disabled (default)—ALS is off; the laser is not automatically shut down when traffic outage or loss of signal (LOS) occurs. • Auto Restart: (OC-768/STM-256/OTU-3 only) ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart—ALS is on; the laser automatically shuts down when traffic outage or LOS occurs. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test—Manually restarts the laser for testing.
Reach	(Display only) Displays the optical reach distance of the port.	• Autoprovision—(trunk port only) The system automatically provisions the reach. • VSR—(client port only) The system provisions very short reach (VSR) for the port.
Wavelength	Provisions the wavelength for the port.	• First Tunable Wavelength • Further wavelengths: Further wavelengths in 100-GHz ITU-T C-band spacing. The wavelengths carried by the card are identified with two asterisks. If the card is not installed, all wavelengths appear with a dark grey background.

Table 11-69 Line Settings (continued)of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	Options
Squelch	(Display only) Applicable only to client port 1. When the termination mode is set to transparent, squelch is enabled. For section/line termination mode, AIS is enabled. For trunk port, squelch is disabled.	• Squelch • AIS • Disable **Note** Both Squelch and AIS options are supported when the selected Termination Mode is Transparent. If the Termination Mode selected is Section or Line, then only AIS is supported. This is applicable for OC-192/STM-64 and OC-768/STM-256. For OTN payloads, both Squelch and AIS options are supported.
Overclock	Enables or disables overclock mode on trunk port.	• OFF (default) • ON
Rx Wavelength	Provisions the wavelength of the trunk port.	• First Tunable Wavelength • Further wavelengths: Further wavelengths in 100-GHz ITU-T C-band spacing. The wavelengths carried by the card are identified with two asterisks. If the card is not installed, all wavelengths appear with a dark grey background.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G659 Change the 40G Multirate Transponder SONET, SDH, or Ethernet Line Settings

Purpose	This task changes the SONET, SDH, or Ethernet line settings for 40E-TXP-C and 40ME-TXP-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the SONET, SDH, or Ethernet line settings.

Step 2 Click the **Provisioning > Line > SONET/SDH/Ethernet** tabs.

Step 3 Modify any of the settings described in Table 11-70.

Note In Table 11-70, some parameter tabs do not always apply to all 40G multirate transponder cards. If a tab does not apply, it will not appear in CTC.

Table 11-70 SONET, SDH Line Settings of the 40E-TXP-C and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the port number.	• 1 (OC-768) • 1 (40G Ethernet LAN Phy) • 1 (OTU3)	• 1 (STM-256) • 1 (40G Ethernet LAN Phy) • 1 (OTU3)
SF BER	(SONET [ANSI] or SDH [ETSI] only) Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5	• 1E-3 • 1E-4 • 1E-5
SD BER	(SONET [ANSI] or SDH [ETSI] only) Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
ProvidesSync	(OC-768/STM-256 only) Sets the ProvidesSync card parameter. If checked, the card is provisioned as a network element (NE) timing reference.	Checked or unchecked	Checked or unchecked
SyncMsgIn	(OC-768/STM-256 only) Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked	Checked or unchecked
Admin SSM In	Overrides the synchronization status message (SSM) and the synchronization traceability unknown (STU) value. If the node does not receive an SSM signal, it defaults to STU.	• PRS—Primary Reference Source (Stratum 1) • STU—Sync traceability unknown • ST2—Stratum 2 • ST3—Stratum 3 • SMC—SONET minimum clock • ST4—Stratum 4 • DUS—Do not use for timing synchronization • RES—Reserved; quality level set by user	• G811—Primary reference clock • STU—Sync traceability unknown • G812T—Transit node clock traceable • G812L—Local node clock traceable • SETS—Synchronous equipment • DUS—Do not use for timing synchronization

Table 11-70 SONET, SDH Line Settings of the 40E-TXP-C and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Send DoNotUse	(OC-768/STM-256 only) Sets the Send DoNotUse card state. When checked, sends a do not use (DUS) message on the S1 byte.	Checked or unchecked	Checked or unchecked
Type	(SONET [ANSI] or SDH [ETSI] only) Indicates the optical transport type.	• SONET • SDH	• SONET • SDH
Termination Mode	(OC-768/STM-256 only) Sets the mode of operation. **Note** This option is only available for SONET/SDH payloads.	• Transparent • Section • Line	• Transparent • Regeneration Section (RS) • Multiplex Section (MS)

Table 11-71 Ethernet Line Settings of the 40E-TXP-C and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the port number.	• 1-1 to 1-16 (OC3/OC12/OC48/GE) • 17-1 (Trunk/Interlink) • 18-1 (Trunk/Interlink) • 19-1 (Trunk) **Note** Port 17 and Port 18 are trunk ports that support OC192 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).	• 1-1 to 1-16 (STM1/STM4/STM16/GE) • 17-1 (Trunk/Interlink) • 18-1 (Trunk/Interlink) • 19-1 (Trunk) **Note** Port 17 and Port 18 are trunk ports that support STM64 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.

Table 11-71 Ethernet Line Settings of the 40E-TXP-C and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Admin State	Sets the port service state. For more information about administrative states, see the Administrative and Service States document.	• IS • IS,AINS • OOS,DSBLD • OOS,MT	• Unlocked • Unlocked,automaticInService • Locked,disabled • Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR • OOS-AU,AINS • OOS-MA,DSBLD • OOS-MA,MT	• Unlocked-enabled • Unlocked-disabled, automaticInService • Locked-enabled,disabled • Locked-enabled,maintenance
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled, or it can be set for one of three mode options.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments **Note** The AINS service state is not supported on interlink ports.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments **Note** The AINS service state is not supported on interlink ports.
Reach	Displays the optical reach distance of the client port.	The Reach options depend on the traffic type that has been selected.	The Reach options depend on the traffic type that has been selected.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G660 Change the 40G Multirate Transponder Line Section Trace Settings

Purpose	This task changes the line section trace settings of the 40E-TXP-C, and 40ME-TXP-C transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the line section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs.

Step 3 Modify any of the settings described in Table 11-72.

Table 11-72 Section Trace Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	Sets the port number.	• 1 (OC-768) • 2 (OC-768)	• 1 (STM-256) • 2 (STM-256)
Received Trace Mode	Sets the trace mode.	• Off/None • Manual	• Off/None • Manual
Disable AIS/RDI on TIM-S	If a TIM on Section overhead alarm is raised because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte	• 1 byte • 16 byte

Table 11-72 Section Trace Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Transmit String Type, click **Hex Mode** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex Mode).The supported range for 1 bit Hex TX trace is 20 to 7E. If TX trace is provisioned outside this range, client transmits 00.	String of trace string size	String of trace string size
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Expected String Type, click **Hex Mode** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex Mode).	String of trace string size	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size	String of trace string size
Auto-refresh	Refreshes the display automatically every 5 seconds, if checked.	Checked or unchecked (default)	Checked or unchecked (default)

Step 4 Click **Apply**.

Step 5 Click **Default** to restore default values.

Step 6 Return to your originating procedure (NTP).

DLP-G692 Change the 40G Multirate Transponder OTU Settings

Purpose	This task changes the OTU settings of the 40E-TXP-C, and 40ME-TXP-C transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C or 40ME-TXP-C card where you want to change the OTU settings.

Step 2 Click the **Provisioning > Line > OTU** tabs.

Step 3 Modify any of the settings described in Table 11-73.

Table 11-73 OTU Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the port number that is applicable only for OC-192/STM-64 payloads.	• 1-1 • 2-1 • 3-1 • 4-1	• 1-1 • 2-1 • 3-1 • 4-1
SyncMsgIn	(Display only) (OC-768/STM-256 only) Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked	Checked or unchecked
Admin SSM	Overrides the synchronization status message (SSM) and the synchronization traceability unknown (STU) value. If the node does not receive an SSM signal, it defaults to STU.	• PRS—Primary Reference Source (Stratum 1) • STU—Sync traceability unknown • ST2—Stratum 2 • ST3—Stratum 3 • SMC—SONET minimum clock • ST4—Stratum 4 • DUS—Do not use for timing synchronization • RES—Reserved; quality level set by user	• G811—Primary reference clock • STU—Sync traceability unknown • G812T—Transit node clock traceable • G812L—Local node clock traceable • SETS—Synchronous equipment • DUS—Do not use for timing synchronization
ProvidesSync	(Display only) (OC-768/STM-256 only) Sets the ProvidesSync card parameter. If checked, the card is provisioned as a network element (NE) timing reference.	Checked or unchecked	Checked or unchecked

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G661 Change the 40G Multirate Transponder Line Thresholds for SONET or SDH Payloads Including 40G Ethernet WAN Phy

Purpose	This task changes the line threshold settings of 40E-TXP-C and 40ME-TXP-C transponder cards carrying SONET or SDH payloads, including the physical 40G Ethernet WAN Phy payload.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds > SONET Thresholds** (ANSI) or **SDH Thresholds** (ETSI) tabs.

Step 3 Modify any of the settings described in Table 11-74.

Table 11-74 Line Threshold Settings for the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Port number	• 1 (OC-768) • 2 (OC-768)	• 1 (STM-256) • 2 (STM-256)
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Table 11-74 Line Threshold Settings for the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.	—
UAS	(Line or Multiplex Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G663 Provision the 40G Multirate Transponder Trunk Port Alarm and TCA Thresholds

Purpose	This task provisions the 40E-TXP-C, and 40ME-TXP-C trunk port alarm and threshold cross alert (TCA) thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Step 3 Under Types area, verify that the TCA radio button is selected. If not, click it, then click **Refresh**.

Step 4 Referring to Table 11-75, verify the trunk port (Port 2) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting the existing value, and entering the new value. Press **Enter**, then click **Apply**.

Step 5 Under Intervals area, select 15 Min or 1 Day, then click **Refresh**.

Note Do not modify the Laser Bias parameters.

Table 11-75 Trunk Port TCA Thresholds of the 40E-TXP-C, and 40ME-TXP-C Cards

Card	TCA RX Power High (dbm)	TCA RX Power Low (dbm)	TCA TX Power High (dbm)	TCA TX Power Low (dbm)
40E-TXP-C 40ME-TXP-C	–9.0	–22.0	9.0	0.0

Step 6 Click **Apply**.

Step 7 Under Types area, click the **Alarm** radio button and click **Refresh**.

Step 8 Referring to Table 11-75, verify the trunk port (Port 2) alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting the existing value, and entering the new value. Press **Enter**, then click **Apply**.

Step 9 Under Intervals area, select 15 Min or 1 Day, then click **Refresh**.

Table 11-76 Trunk Port Alarm Thresholds of the 40E-TXP-C, and 40ME-TXP-C Cards

Card	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
40E-TXP-C 40ME-TXP-C	–9.0	–22.0	9.0	0.0

Step 10 Click **Apply**.

Step 11 Click **Default** to restore default values.

Step 12 Return to your originating procedure (NTP).

DLP-G664 Provision the 40G Multirate Transponder Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the 40E-TXP-C, and 40ME-TXP-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G278 Provision the Optical Line Rate, page 11-155 DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs. The TCA thresholds are shown by default.

Step 3 Under Types area, verify that the TCA radio button is selected. If not, click it, then click **Refresh**.

Step 4 Referring to Table 11-77, verify the client port (Port 1) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface at the other end. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting the existing value, and entering the new value. Press Enter, then click **Apply**.

Step 5 Under Intervals area, select 15 Min or 1 Day, then click **Refresh**.

Note Do not modify the Laser Bias parameters.

Table 11-77 Client Interface TCA Thresholds of the 40E-TXP-C, and 40ME-TXP-C Cards

Pluggable Port Rate	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
40G Ethernet LAN Phy	3.0	–6.0	6.0	–3.0
OC-768/STM-256	3.0	–6.0	6.0	–3.0
OTU3	3.0	–6.0	6.0	–3.0

Step 6 Click **Apply**.

Step 7 Under Types area, click the **Alarm** radio button and click **Refresh**.

Step 8 Referring to Table 11-78, provision the client port (Port 1) alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned.

Step 9 Under Intervals area, select 15 Min or 1 Day, then click **Refresh**.

Table 11-78 Card Client Interface Alarm Thresholds of the 40E-TXP-C, and 40ME-TXP-C Cards

Pluggable Port Rate	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
40G Ethernet LAN Phy	5.0	–8.0	4.0	–1.0
OC-768/STM-256	5.0	–8.0	4.0	–1.0
OTU3	5.0	–8.0	4.0	–1.0

Step 10 Click **Apply**.

Step 11 Return to your originating procedure (NTP).

DLP-G665 Change the 40G Multirate Transponder OTN Settings

Purpose	This task changes the line OTN settings of the 40E-TXP-C, and 40ME-TXP-C transponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40E-TXP-C card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then click one of the following subtabs: **OTN Lines**, **ITU-T G.709 Thresholds**, **FEC Thresholds**, or **Trail Trace Identifier**.

Step 3 Modify any of the settings described in Tables 11-79 through 11-82.

> **Note** You must modify Near End and Far End, 15 Min and 1 Day, and SM and PM independently. To do so, select the appropriate radio button and click **Refresh**.

Table 11-79 describes the values on the Provisioning > OTN > OTN Lines tab.

Table 11-79 OTN Line Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	• 1 (only when data rate is set to OTU3) • 2
ITU-T G.709 OTN	(Display only) Displays the OTN lines according to ITU-T G.709.	• Enable • Disable
FEC	Sets the OTN line FEC mode. FEC mode can be Standard or Enhanced. Standard is the same as enabling FEC. Enhanced FEC mode can be enabled to provide greater range and lower bit error rate.	• Standard Standard FEC is on. • Enhanced Enhanced FEC is on.
SF BER	(Display only) Sets the signal fail bit error rate.	• 1E-5
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9

Table 11-80 describes the values on the Provisioning > OTN > G.709 Thresholds tab.

Table 11-80 ITU-T G.709 Threshold Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	2
ES	Severely errored seconds. Two types of thresholds can be asserted. Selecting the SM (OTUk) radio button selects FEC, overhead management, and PM using OTUk. Selecting the PM radio button selects path PM using ODUk.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values. **Note** SM (OTUk) is the ITU-T G.709 optical channel transport unit order of k overhead frame used for management and performance monitoring. PM (ODUk) is the ITU-T G.709 optical channel data unit order of k overhead frame unit used for path performance monitoring.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.
UAS	Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.

Table 11-80 ITU-T G.709 Threshold Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	Options
BBE	Background block errors	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.
FC	Failure counter	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.

Table 11-81 describes the values on the Provisioning > OTN > FEC Thresholds tab.

Table 11-81 FEC Threshold Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	2
Bit Errors Corrected	Displays the number of bit errors corrected during the selected time period.	Numeric display. Can be set for 15-minute or one-day intervals. Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.
Uncorrectable Words	Displays the number of uncorrectable words in the selected time period.	Numeric display. Can be set for 15-minute or one-day intervals. Choose an option in each category and click **Refresh**. Click **Reset to Default** to restore default values.

Table 11-82 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-82 Trail Trace Identifier Settings of the 40E-TXP-C, and 40ME-TXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	Sets the port number.	• 1 (OTU3) • 2 (Trunk)	• 1 (OTU3) • 2 (Trunk)
Received Trace Mode	Sets the trace mode.	• Off/None • Manual	• Off/None • Manual
Disable AIS/RDI on TIM-S	If a TIM on Section overhead alarm is raised because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte	• 1 byte • 16 byte
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Transmit String Type, click **Hex Mode** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex Mode).	String of trace string size	String of trace string size
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Transmit String Type, click **Hex Mode** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex Mode).	String of trace string size	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size	String of trace string size
Auto-refresh	Refreshes the display automatically every 5 seconds, if checked.	Checked or unchecked (default)	Checked or unchecked (default)

Step 4 Click **Apply**.

Step 5 Click **Default** to restore default settings.

Step 6 Return to your originating procedure (NTP).

NTP-G170 Provision the ADM-10G Card Peer Group, Ethernet Settings, Line Settings, PM Parameters, and Thresholds

Purpose	This procedure creates an ADM-10G peer group and changes line settings, PM parameters, and threshold settings for ADM-10G cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 DLP-G63 Install an SFP or XFP, page 14-72 DLP-G411 Provision an ADM-10G PPM and Port, page 11-150 (if necessary) DLP-G278 Provision the Optical Line Rate, page 11-155 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the ADM-10G card settings. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 To provision a peer group, complete the "DLP-G403 Create the ADM-10G Peer Group" task on page 11-238.

Step 4 To provision Ethernet settings, complete the "DLP-G469 Provision the ADM-10G Card Ethernet Settings" task on page 11-239.

Step 5 To change line settings, complete the following tasks as needed:

- DLP-G397 Change the ADM-10G Line Settings, page 11-240
- DLP-G398 Change the ADM-10G Line Section Trace Settings, page 11-245
- DLP-G399 Change the ADM-10G Line Thresholds for SONET and SDH Payloads, page 11-247
- DLP-G412 Change the ADM-10G Line RMON Thresholds for the 1G Ethernet Payload, page 11-251

Step 6 To change thresholds, complete the following tasks as needed:

- DLP-G400 Provision the ADM-10G Interlink or Trunk Port Alarm and TCA Thresholds, page 11-254
- DLP-G401 Provision the ADM-10G Client Port Alarm and TCA Thresholds, page 11-255
- DLP-G402 Change the ADM-10G OTN Settings, page 11-256

Stop. You have completed this procedure.

DLP-G403 Create the ADM-10G Peer Group

Purpose	This task creates peer group protection for two ADM-10G cards within the same node, located on the same shelf.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69, for two ADM-10G cards (located on the same shelf) for which a peer group is desired. DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note You cannot perform this task on a single ADM-10G card; it is only available if a second ADM-10G card can be accessed through the interlink ports (Port 17 and Port 18).

Note Due to a hardware limitation, you cannot provision the SDCC/LDCC on Port 17.

Note Perform this task on only one of the two peer cards.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the card settings.

Step 2 Click the **Provisioning > Card** tabs.

Step 3 In the **ADM Group Peer** drop-down list, choose the slot number (for example, 14) where the companion ADM-10G card is located.

Step 4 In the **ADM Peer Group** field, enter a group name.

Step 5 Click **Apply**.

Note The Card Parameters Tunable Wavelengths area is read-only and does not contain any wavelengths until circuits are separately provisioned for the card.

Step 6 Return to your originating procedure (NTP).

DLP-G469 Provision the ADM-10G Card Ethernet Settings

Purpose	This task changes the Ethernet settings for the ADM-10G card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the Ethernet settings. The card view appears.

Step 2 Click the **Provisioning > Line > Ethernet** tabs.

Step 3 Modify any of the settings for the Ethernet tab as described in Table 11-83. The parameters that appear depend on the card mode.

Table 11-83 ADM-10G Card Ethernet Settings

Parameter	Description	Options
Port	(Display only) The Port number (*n-n*) and rate.	—
MTU	The maximum size of the Ethernet frames accepted by the port.	Jumbo. Default: 64 to 9216 Numeric: 1548
Mode	Sets the Ethernet mode.	1000 Mbps
Framing	Sets the framing type.	• GFP-F • HDLC
CRC Encap	Sets the CRC encap values for the framing type.	CRC encap value for GFP-F: • None (default) • 32-Bit CRC encap value for HDLC: • 16-Bit • 32-Bit (default)
AINS Soak	Automatic in-service soak time. The duration of time that must pass with an uninterrupted signal before the traffic/termination transitions to the IS-NR (ANSI) or unlocked-enabled (ETSI) service state.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G397 Change the ADM-10G Line Settings

Purpose	This task changes the line settings for ADM-10G cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > Ports tabs**.

Step 3 Modify any of the settings described in Table 11-84 as needed.

Note In Table 11-84, some parameter tabs do not always apply to all ADM-10G cards. If a tab does not apply, it will not appear in CTC.

Table 11-84 ADM-10G Line Port Tab Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the port number.	• 1-1 to 1-16 (OC3/OC12/OC48/GE) • 17-1 (Trunk/Interlink) • 18-1 (Trunk/Interlink) • 19-1 (Trunk) **Note** Port 17 and Port 18 are trunk ports that support OC192 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).	• 1-1 to 1-16 (STM1/STM4/STM16/GE) • 17-1 (Trunk/Interlink) • 18-1 (Trunk/Interlink) • 19-1 (Trunk) **Note** Port 17 and Port 18 are trunk ports that support STM64 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state. For more information about administrative states, see the Administrative and Service States document.	• IS • IS,AINS • OOS,DSBLD • OOS,MT	• Unlocked • Unlocked,automaticInService • Locked,disabled • Locked,maintenance

Table 11-84 ADM-10G Line Port Tab Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR • OOS-AU,AINS • OOS-MA,DSBLD • OOS-MA,MT	• Unlocked-enabled • Unlocked-disabled, automaticInService • Locked-enabled,disabled • Locked-enabled,maintenance
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled, or it can be set for one of three mode options.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: (Not applicable for Gigabit Ethernet client interfaces) ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: (Not applicable for Gigabit Ethernet client interfaces) ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.

Table 11-84 ADM-10G Line Port Tab Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments **Note** The AINS service state is not supported on interlink ports.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments **Note** The AINS service state is not supported on interlink ports.
Reach	Displays the optical reach distance of the client port.	The Reach options depend on the traffic type that has been selected.	The Reach options depend on the traffic type that has been selected.
Wavelength	Tunable wavelength.	Shows the supported wavelengths of the trunk port after the card is installed in the format: *first wavelength-last wavelength-frequency spacing-number of supported wavelengths*. For example, 1529.55nm-1561.83nm-50gHz-8 are supported wavelengths.	Shows the supported wavelengths of the trunk port after the card is installed in the format: *first wavelength-last wavelength-frequency spacing-number of supported wavelengths*. For example, 1529.55nm-1561.83nm-50gHz-8 are supported wavelengths.

Step 4 Click **Apply**.

Step 5 Click the **Provisioning > Line > SONET or SDH** tabs.

Step 6 Modify any of the settings described in Table 11-85 as needed.

Table 11-85 ADM-10G Line SONET or SDH Tab Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the client and trunk port number.	• 1-1 to 1-16 (OC3/OC12/OC48/GE) • 17-1 (OC192) • 18-1 (OC192/Interlink) • 19-1 (OC192) **Note** Port 17 and Port 18 are trunk ports that support OC192 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).	• 1-1 to 1-16 (STM1/STM4/STM16/GE) • 17-1(STM64) • 18-1 (STM64/Interlink) • 19-1 (STM64) **Note** Port 17 and Port 18 are trunk ports that support STM64 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).
ProvidesSync	When checked, the card is provisioned as an NE timing reference.	Checked or unchecked	Checked or unchecked
SyncMsgIn	Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked	Checked or unchecked
SF BER	Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5	• 1E-3 • 1E-4 • 1E-5
Send DoNotUse	When checked, sends a DUS message on the S1 byte.	Checked or unchecked	Checked or unchecked
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9

Table 11-85 ADM-10G Line SONET or SDH Tab Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Type	(Display only) Type of node.	• SONET • SDH	• SDH
Admin SSM In	Overrides the synchronization status message (SSM) synchronization traceability unknown (STU) value. If the node does not receive an SSM signal, it defaults to STU.	• PRS—Primary Reference Source (Stratum 1) • ST2—Stratum 2 • TNC—Transit node clock • ST3E—Stratum 3E • ST3—Stratum 3 • SMC—SONET minimum clock • ST4—Stratum 4 • DUS—Do not use for timing synchronization • RES—Reserved; quality level set by user	• G811—Primary reference clock • STU—Sync traceability unknown • G812T—Transit node clock traceable • G812L—Local node clock traceable • SETS—Synchronous equipment • DUS—Do not use for timing synchronization

Step 7 Return to your originating procedure (NTP).

DLP-G398 Change the ADM-10G Line Section Trace Settings

Purpose	This task changes the line section trace settings for the ADM-10G cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The **Section Trace** tab is available for ports configured as OC-N (Ports 1 through 16, Ports 17 and 18 [only in a single-card configuration] and Port 19). Section trace is not available on interlink ports.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the section trace settings. The card view appears.

Step 2 Click the **Provisioning > Line > Section Trace** tabs.

Step 3 Modify any of the settings described in Table 11-86.

Table 11-86 ADM-10G Section Trace Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	Sets the port number.	• 1-1 to 1-16 (OC3/OC12/OC48/GE) • 17-1 (OC 192) • 18-1 (OC192) • 19-1 (OC192) **Note** Port 17 and Port 18 are trunk ports that support OC192 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).	• 1-1 to 1-16 (STM1/STM4/STM16/GE) • 17-1 (STM64) • 18-1 (STM64) • 19-1 (STM64) **Note** Port 17 and Port 18 are trunk ports that support STM64 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).
Received Trace Mode	Sets the trace mode.	• Off/None • Manual	• Off/None • Manual
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte • 64 byte	• 1 byte • 16 byte • 64 byte
Current	Current Transmit String displays the current transmit string; New Transmit String sets a new transmit string. Current String Type allows you to choose between ASCII or Hexadecimal format. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size	String of trace string size

Table 11-86 ADM-10G Section Trace Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Received	(Display only) Current Received String displays the current received string. You can click **Refresh** to manually refresh this display, or check the **Auto-refresh every 5 sec** check box to keep this panel updated.	String of trace string size	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked/unchecked (default)	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G399 Change the ADM-10G Line Thresholds for SONET and SDH Payloads

Purpose	This task changes the line threshold settings for ADM-10G cards carrying SONET payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the line threshold settings. The card view appears.

Step 2 Click the **Provisioning > Line Thresholds > SONET or SDH Thresholds** tabs.

Step 3 Modify any of the settings described in Table 11-87.

Table 11-87 ADM-10G Card Line Threshold Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Port number	• 1-1 to 1-16 (OC3/OC12/OC48/GE) • 17-1 (OC 192) • 18-1 (OC192) • 19-1 (OC192) **Note** Port 17 and Port 18 are trunk ports that support OC192 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).	• 1-1 to 1-16 (STM1/STM4/STM16/GE) • 17-1 (STM 64) • 18-1 (STM64) • 19-1 (STM64) **Note** Port 17 and Port 18 are trunk ports that support STM64 payload in a single-card configuration. These ports are interlink ports in a double-card configuration (ADM-10G peer group).
EB	Path Errored Block indicates that one or more bits are in error within a block	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—

Table 11-87 ADM-10G Card Line Threshold Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.
BBE	Background block errors	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
FC	(Line Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—

Table 11-87 ADM-10G Card Line Threshold Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
PSC	Protection Switching Count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day Choose an option in each category and click **Refresh**.	—
PSD	Protection Switching Duration	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day Choose an option in each category and click **Refresh**.	—
UAS	(Line Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G412 Change the ADM-10G Line RMON Thresholds for the 1G Ethernet Payload

Purpose	This task changes the line RMON threshold settings for an ADM-10G card carrying the 1G Ethernet payload.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G411 Provision an ADM-10G PPM and Port, page 11-150
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This task can only be performed if the ADM-10G card has at least one PPM port provisioned for Gigabit Ethernet.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the line RMON thresholds. The card view appears.

Step 2 Click the **Provisioning > Line Thresholds > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose the applicable port.

Step 5 From the Variable drop-down list, choose the applicable Ethernet variable. See Table 11-88 for a list of available Ethernet variables.

Table 11-88 ADM-10G Gigabit Ethernet Thresholds

Variable	Description
ifInOctets	Total number of octets received on the interface, including framing characters.
ifInErrors	Number of inbound packets that contained errors preventing them from being deliverable to a higher-layer protocol.
ifOutOctets	Total number of octets transmitted out of the interface, including framing characters.
ifInMulticastPkts	Number of multicast frames received error-free.
ifInBroadcastPkts	Number of packets, delivered by a sublayer to a higher layer or sublayer, that were addressed to a broadcast address at this sublayer.
ifInErrorBytePkts	Number of receive error bytes.
dot3StatsFCSErrors	Number of frames with frame check errors; that is, there is an integral number of octets, but there is also an incorrect frame check sequence (FCS).
dot3StatsFrameTooLong	Number of received frames that were larger than the permitted maximum size.

Table 11-88 ADM-10G Gigabit Ethernet Thresholds (continued)

dot3ControlInUnknownOpcodes	A count of MAC control frames received on this interface that contain an opcode not supported by this device.
dot3InPauseFrames	A count of MAC control frames received on this interface with an opcode indicating the PAUSE operation.
dot3OutPauseFrames	A count of MAC control frames transmitted on this interface with an opcode indicating the PAUSE operation.
etherStatsUndersizePkts	Total number of packets received that were well-formed and less than 64 octets long (excluding framing bits and including FCS octets).
etherStatsFragments	Total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS error) or a bad FCS with a non-integral number of octets (alignment error). **Note** It is normal for etherStatsFragments to increment. This is because it counts both runts (which are normal occurrences due to collisions) and noise hits.
etherStatsPkts64Octets	Total number of packets (including bad packets) transmitted and received by the interface that were 64 octets in length (excluding framing bits and including FCS octets).
etherStatsPkts65to127Octets	Total number of packets (including bad packets) transmitted and received by the interface that were between 65 and 127 octets in length, inclusive.
etherStatsPkts128to255Octets	The total number of packets (including bad packets) transmitted and received by the interface that were between 128 and 255 octets in length, inclusive, excluding framing bits and including FCS octets.
etherStatsPkts256to511Octets	Total number of packets (including bad packets) transmitted and received by the interface that were between 256 and 511 octets in length, inclusive.
etherStatsPkts512to1023Octets	Total number of packets (including bad packets) transmitted and received by the interface that were between 512 and 1023 octets in length, inclusive, excluding framing bits and including FCS octets.
etherStatsPkts1024to1518Octets	Total number of packets (including bad packets) transmitted and received by the interface that were between 1024 and 1518 octets in length, inclusive, excluding framing bits and including FCS octets.
etherStatsBroadcastPkts	Total number of good packets transmitted and received by the interface that were directed to the broadcast address. **Note** Multicast packets are not included.

Table 11-88 ADM-10G Gigabit Ethernet Thresholds (continued)

etherStatsMulticastPkts	Total number of good packets transmitted and received by the interface that were directed to a multicast address. **Note** This number does not include packets directed to the broadcast address.
etherStatsOversizePkts	Total number of packets transmitted and received by the interface that were well-formed and longer than 1518 octets, excluding framing bits and including FCS octets.
etherStatsJabbers	Total number of packets received that were longer than 1518 octets (excluding framing bits and including FCS octets), and had a bad FCS with an integral number of octets (FCS error) or a bad FCS with a non-integral number of octets (alignment error).
rxTotalPkts	Total number of received packets.
txTotalPkts	Total number of transmit packets.

Step 6 From the Alarm Type drop-down list, indicate whether the event will be triggered by the rising threshold, the falling threshold, or both the rising and falling thresholds.

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Type an appropriate number of seconds for the Sample Period.

Step 9 Type the appropriate number of occurrences for the Rising Threshold.

For a rising type of alarm, the measured value must move from below the falling threshold to above the rising threshold. For example, if a network is running below a rising threshold of 1000 collisions every 15 seconds and a problem causes 1001 collisions in 15 seconds, the excess occurrences trigger an alarm.

Step 10 Enter the appropriate number of occurrences in the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the counterpart to a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded (otherwise, a single network problem might cause a rising threshold to be exceeded multiple times and cause a flood of events).

Step 11 Click **OK**.

Step 12 Return to your originating procedure (NTP).

DLP-G400 Provision the ADM-10G Interlink or Trunk Port Alarm and TCA Thresholds

Purpose	This task provisions the ADM-10G interlink or trunk port alarm and threshold crossing alert (TCA) thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the interlink or trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Step 3 Under Types, verify that the TCA radio button is checked. If not, check it, then click **Refresh**.

Step 4 Referring to Table 11-89, verify the interlink or trunk port TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and pressing **Enter**.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Table 11-89 ADM-10G Interlink and Trunk Port TCA Thresholds

Port	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
17-1 and 18-1 (Trunk/Interlink) **Note** Port 17 and Port 18 are trunk ports in single-card configuration and an interlink port in double-card configuration (ADM-10G peer group).	–7.0 dBm	–27.0 dBm	6.0 dBm	–4.0 dBm
19-1 (Trunk)	–7.0 dBm	–27.0 dBm	6.0 dBm	–4.0 dBm

Step 5 Click **Apply**.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Referring to Table 11-90, verify the interlink or trunk port alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and pressing **Enter**.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-90 ADM-10G Interlink and Trunk Port Alarm Thresholds

Port	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
17-1 (Trunk/Interlink) **Note** Port 17 is a trunk port in single-card configuration and an interlink port in double-card configuration (ADM-10G peer group).	1.0 dBm	–13.0 dBm	1.0 dBm	–8.0 dBm
18-1 (Trunk/Interlink) **Note** Port 18 is a trunk port in single-card configuration and an interlink port in double-card configuration (ADM-10G peer group).	–5.0 dBm	–30.0 dBm	5.0 dBm	–3.0 dBm
19-1 (Trunk)	–5.0 dBm	–30.0 dBm	5.0 dBm	–3.0 dBm

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G401 Provision the ADM-10G Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the ADM-10G card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G278 Provision the Optical Line Rate, page 11-155 DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Step 3 Under Types, verify that the **TCA** radio button is checked. If not, check it, then click **Refresh**.

Step 4 Referring to Table 11-48 on page 11-185 and Table 11-49 on page 11-186, verify the Port 1 to 16 (Client) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and pressing **Enter**.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Step 5 Click **Apply**.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Referring to Table 11-48 and Table 11-49 on page 11-186, verify the interlink ports 17-1 and 18-1 for RX Power High, RX Power Low, TX Power High, and TX Power Low settings. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and pressing **Enter**.

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G402 Change the ADM-10G OTN Settings

Purpose	This task changes the line OTN settings for the ADM-10G cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the ADM-10G card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then click one of the following subtabs: **OTN Lines**, **ITU-T G.709 Thresholds**, **FEC Thresholds**, or **Trail Trace Identifier**.

Step 3 Modify any of the settings described in Tables 11-91 through 11-94.

Note You must modify Near End and Far End independently; 15 Min and 1 Day independently; and SM and PM independently. To do so, choose the appropriate radio buttons and click **Refresh**.

Table 11-91 describes the values on the Provisioning > OTN > OTN Lines tab.

Table 11-91 ADM-10G Card OTN Lines Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	• 18-1 (Trunk/Interlink) • 19-1 (Trunk) **Note** Port 18 is a trunk port in single-card configuration and an interlink port in double-card configuration (ADM-10G peer group).
ITU-TG.709 OTN	Sets the OTN lines according to ITU-T G.709.	• Enable • Disable
FEC	Sets the OTN lines FEC mode. FEC mode can be Disabled, Enabled, or, for the TXP_MR_10E, Enhanced FEC mode can be enabled to provide greater range and lower bit error rate. For TXP_MR_10E cards, Standard is the same as enabling FEC.	• Disable—FEC is off. • Standard—Standard FEC is on. • Enhanced—Enhanced FEC is on.
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
SF BER	(Display only) Indicates the signal fail bit error rate.	• 1E-5
Synch Mapping	Sets how the ODUk (client payload) is mapped to the optical channel (OTUk).	Synch mapping

Table 11-92 describes the values on the Provisioning > OTN > ITU-T G.709 Thresholds tab.

Table 11-92 ADM-10G Card ITU-T G.709 Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	• 18-1 (Trunk/Interlink) • 19-1 (Trunk) **Note** Port 18 is a trunk port in single-card configuration and an interlink port in double-card configuration (ADM-10G peer group).
ES	Errored seconds. Selecting the SM (OTUk) radio button selects FEC, overhead management, and PM using OTUk. Selecting the PM radio button selects path PM using ODUk.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. **Note** SM (OTUk) is the ITU-T G.709 optical channel transport unit order of k overhead frame used for management and performance monitoring. PM (ODUk) is the ITU-T G.709 optical channel data unit order of k overhead frame unit used for path performance monitoring.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
UAS	Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Table 11-92 ADM-10G Card ITU-T G.709 Threshold Settings (continued)

Parameter	Description	Options
BBE	Background block errors	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
FC	Failure counter	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Table 11-93 describes the values on the Provisioning > OTN > FEC Thresholds tab.

Table 11-93 ADM-10G Card FEC Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	• 18-1 (Trunk/Interlink) • 19-1 (Trunk) **Note** Port 18 is a trunk port in single-card configuration and an interlink port in double-card configuration (ADM-10G peer group).
Bit Errors Corrected	Displays the number of bit errors corrected during the selected time period.	Numeric display. Can be set for 15-minute or 1 day intervals.
Uncorrectable Words	Displays the number of uncorrectable words in the selected time period.	Numeric display. Can be set for 15-minute or 1 day intervals.

Table 11-94 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-94 ADM-10GTrail Trace Identifier Settings

Parameter	Description	Options
Port	Sets the port number.	• 18-1 (Trunk/Interlink) • 19-1 (Trunk) **Note** Port 18 is a trunk port in single-card configuration and an interlink port in double-card configuration (ADM-10G peer group).
Level	Sets the level.	• Section • Path
Received Trace Mode	Sets the trace mode.	• Off/None • Manual
Disable FDI on TTIM	If a Trace Identifier Mismatch on Section/Path overhead alarm arises because of a J0/J1 overhead string mismatch, no Forward Defect Indication (FDI) signal is sent to the downstream nodes if this box is checked.	• Checked (FDI on TTIM is disabled) • Unchecked (FDI on TTIM is not disabled)
Transmit	Current Transmit String displays the current transmit string; New sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Transmit String Type, click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size; trail trace identifier is 64 bytes in length.
Expected	Current Expected String displays the current expected string; New sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Expected String Type, click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Current Received String displays the current received string. You can click **Refresh** to manually refresh this display, or check the **Auto-refresh every 5 sec** check box to keep this panel updated.	String of trace string size
Auto-refresh (every 5 sec)	If checked, automatically refreshes the display every 5 seconds.	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

NTP-G333 Add an ADM-10G card to an Existing Topology

Purpose	This procedure adds an ADM-10G card to an existing topology. Perform the steps in this procedure when OCHNC and DCC are present in the network. In case of OCH trails, delete all the circuits in Step 3 that traverses the port before deleting the OCH-trail.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC. • Complete the turn up procedures in Turn Up a Node, page 14-1 for the node to be added. • An updated Cisco Transport Planner network plan recalculated with the new node.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 If path protected circuits exist between Node A and Node B, complete the DLP-A197 Initiate a Path Protection Force Switch task. This task applies a force switch on the path between Node A and Node B.

Step 2 Complete the NTP-G129 Add a DWDM Node task to add Node C.

Step 3 Complete the DLP-G106 Delete Optical Channel Network Connections, page 16-46 task to delete OCHNC circuit between Node A and Node B.

Step 4 Complete the NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40, task to create OCHNC circuit between Node A-->Node C and Node C-->Node B for wavelength connectivity.

Note The ports on the card in Node C must be tuned to the same wavelength as Node A and Node B.

Step 5 Create DCC terminations on Node C. See the DLP-A377 Provision Section DCC Terminations task.

Alternatively, if additional bandwidth is needed for CTC management, complete the DLP-A378 Provision Line DCC Terminations task.

Step 6 Ensure that the DCCs are functional between Node A-->Node C and Node C-->Node B. See the DLP-G76 Provision DCC/GCC Terminations, page 16-82 task.

Step 7 Complete the NTP-G200 Create, Delete, and Manage STS or VC Circuits for the ADM-10G Card, page 16-49 to create pass-through STS or VC circuits in Node C.

Step 8 Complete the NTP-A301 Merge Circuits task for each circuit created.

Step 9 If path protected circuits exist between Node A and Node B, complete the DLP-A198 Clear a Path Protection Force Switch task. This task clears a force switch on the path between Node A and Node B.

Step 10 **Stop. You have completed this procedure.**

NTP-G97 Modify the 4x2.5G Muxponder Card Line Settings and PM Parameter Thresholds

Purpose	This procedure changes the line and threshold settings for the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69. DLP-G63 Install an SFP or XFP, page 14-72 DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary) DLP-G278 Provision the Optical Line Rate, page 11-155 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the muxponder card settings. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 Perform any of the following tasks as needed:

- DLP-G222 Change the 4x2.5G Muxponder Card Settings, page 11-263
- DLP-G223 Change the 4x2.5G Muxponder Line Settings, page 11-265
- DLP-G224 Change the 4x2.5G Muxponder Section Trace Settings, page 11-267
- DLP-G225 Change the 4x2.5G Muxponder Trunk Settings, page 11-269
- DLP-G226 Change the 4x2.5G Muxponder SONET/SDH Line Thresholds Settings, page 11-272
- DLP-G303 Provision the 4x2.5G Muxponder Trunk Port Alarm and TCA Thresholds, page 11-274
- DLP-G304 Provision the 4x2.5G Muxponder Client Port Alarm and TCA Thresholds, page 11-276
- DLP-G228 Change the 4x2.5G Muxponder Line OTN Settings, page 11-278
- DLP-G369 Change the 4x2.5G Muxponder Trunk Wavelength Settings, page 11-270

Step 4 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G222 Change the 4x2.5G Muxponder Card Settings

Purpose	This task changes the card settings for the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C muxponder cards, including payload type, termination mode, and wavelength.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card where you want to change the card settings.

Step 2 Click the **Provisioning > Card** tabs.

Step 3 Modify any of the settings described in Table 11-95.

Note Parameters shown in Table 11-95 do not apply to all 4x2.5G muxponder cards. If the parameter or option does not apply, it is not shown in CTC.

Table 11-95 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Settings

Parameter	Description	Options
Termination Mode	Sets the mode of operation. Options that do not apply to a card do not display. The MXP_2.5G_10G card is based on SONET/SDH multiplexing. The transparent mode terminates and rebuilds the B1 byte (as well as other bytes) of the incoming OC-48/STM-16 signal. The B2 byte is not touched. The MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards are fully transparent in transparent mode based on the OTN/ITU-T G.709 multiplexing scheme. It does not terminate the B1 byte or other bytes. It encapsulates OC-48/STM-16 bytes into ODU1 first, then multiplexes them into an OTU2.	For ANSI platforms: • Transparent • Section (MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C only) • Line (MXP_2.5G_10G only) For ETSI platforms: • Transparent • Multiplex Section (MXP_2.5G_10G, only) • Regeneration Section (MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C only)
AIS/Squelch	(MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C only) Sets the transparent termination mode configuration.	• Ais • Squelch
Tunable Wavelengths	(Display only) Shows the supported wavelengths of the trunk port after the card is installed. For the MXP_2.5G_10E_C, or MXP_2.5G_10E_L cards, the first and last supported wavelength, frequency spacing, and number of supported wavelengths are shown in the format: *first wavelength-last wavelength-frequency spacing-number of supported wavelengths*. For example, the MXP_2.5G_10E_C card would show: 1529.55nm-1561.83nm-50gHz-82. The MXP_2.5G_10G and MXP_2.5G_10E show the four wavelengths supported by the card that is installed.	—

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G223 Change the 4x2.5G Muxponder Line Settings

Purpose	This task changes the line settings for the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > SONET** (ANSI) or **SDH** (ETSI) tabs.

Note The SONET tab appears only if you have created a PPM for a given port.

Step 3 Modify any of the settings described in Table 11-96.

Note You must modify Near End and Far End independently; 15 Min and 1 Day independently; and Line and Section independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-96 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Line Settings

Parameter	Description	Options
Port	(Display only) Port number. Ports 1 to 4 are client ports (OC-48/STM-16). Port 5 is the DWDM trunk (OC-192/STM-64) that provides wavelength services. Client ports will not appear of the pluggable port module is not provisioned for it.	• 1 • 2 • 3 • 4 • 5 (Trunk) (MXP_2.5G_10G only)
Port Name	Provides the ability to assign the specified port a logical name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI)

Table 11-96 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Line Settings (continued)

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)
SF BER	Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled or can be set for one of three mode options.	• Disable (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments
Type	Sets the optical transport type.	• SONET • SDH
SyncMsgIn	Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source. (This parameter does not appear for the MXP_2.5G_10E trunk port.)	Checked or unchecked

Table 11-96 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Line Settings (continued)

Parameter	Description	Options
ProvidesSync	Sets the ProvidesSync card parameter. If checked, the card is provisioned as an NE timing reference. (This parameter does not appear for the MXP_2.5G_10E trunk port.)	Checked or unchecked
Reach	Displays the optical reach distance of the client port.	Options: ANSI/ETSI • Autoprovision/Autoprovision (default) • SR • SR 1/I-1—Short reach up to 2-km distance • IR 1/S1—Intermediate reach, up to 15-km distance • IR 2/S2—Intermediate reach up to 40-km distance • LR 1/L1—long reach, up to 40-km distance • LR 2/L2—long reach, up to 80-km distance • LR 3/L3—long reach, up to 80-km distance
Wavelength	Displays the wavelength of the client port.	• First Tunable Wavelength • Further wavelengths: 850 nm through 1560.61 nm 100-GHz ITU spacing CWDM spacing

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G224 Change the 4x2.5G Muxponder Section Trace Settings

Purpose	This task changes the section trace settings for the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The Section Trace tab appears only if you have created a PPM for the card.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card where you want to change the section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs.

Step 3 Modify any of the settings described in Table 11-97.

Table 11-97 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Section Trace Settings

Parameter	Description	Options
Port	Sets the port number.	• 1 • 2 • 3 • 4 • 5 (Trunk; MXP_2.5G_10G only)
Received Trace Mode	Sets the trace mode.	• Off/None • Manual
Disable AIS/RDI on TIM-S	If an TIM on Section overhead alarm arises because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size. Select either radio button.	• 1 byte • 16 byte
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 minutes.	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G225 Change the 4x2.5G Muxponder Trunk Settings

Purpose	This task provisions the trunk settings for the MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This task does not apply to the MXP_2.5G_10G card.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card where you want to change the trunk settings.

Step 2 Click the **Provisioning > Line > Trunk** tabs.

Step 3 Modify any of the settings described in Table 11-98.

Table 11-98 MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Trunk Settings

Parameter	Description	Options
Port	(Display only) Displays the port number. Port 5 is the DWDM trunk (OC-192/STM-64) that provides wavelength services.	5 (Trunk)
Port Name	Provides the ability to assign the specified port a logical name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI)

Table 11-98 MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Trunk Settings

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled or can be set for one of three mode options.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.
AINS Soak	(OC-N and STM-N payloads only) Sets the automatic in-service soak period.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G369 Change the 4x2.5G Muxponder Trunk Wavelength Settings

Purpose	This task changes the trunk wavelength settings for the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C card where you want to change the trunk wavelength settings.

Step 2 Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

Step 3 Modify any of the settings described in Table 11-99.

Table 11-99 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C Card Wavelength Trunk Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	5 (Trunk)
Band	(Display only) Indicates the wavelength band available from the card that is installed. If the card is preprovisioned, the field can be provisioned to the band of the card that will be installed.	• C—The C-band wavelengths are available in the Wavelength field. • L—The L-band wavelengths are available in the Wavelength field.
Even/Odd	Sets the wavelengths available for provisioning for MXP_2.5G_10E_C and MXP_2.5G_10E_L cards. (This field does not apply to MXP_2.5G_10G or MXP_2.5G_10E cards.)	• Even—Displays even C-band or L-band wavelengths in the Wavelength field. • Odd—Displays odd C-band or L-band wavelengths in the Wavelength field.
Wavelength	The wavelength provisioned for the trunk.	• First Tunable Wavelength • Further wavelengths in 100-GHz ITU-T C-band or L-band spacing, depending on the card that is installed. For MXP_2.5G_10G and MXP_2.5G_10E cards, the wavelengths carried by the card are identified with two asterisks. If the card is not installed, all wavelengths appear with a dark grey background.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G226 Change the 4x2.5G Muxponder SONET/SDH Line Thresholds Settings

Purpose	This task changes the SONET (ANSI) or SDH (ETSI) line threshold settings for the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds** tabs.

Step 3 Modify any of the settings described in Table 11-100.

Note In Table 11-100, some parameter tabs or selections do not always apply to all 4x2.5G muxponder cards. If the tabs or selections do not apply, they do not appear in CTC.

Table 11-100 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Line Threshold Settings

Parameter	Description	Options - ONS 15454	Options - ONS 15454 SDH
Port	(Display only) Port number	• 1 • 2 • 3 • 4 • 5 (MXP_2.5G_10G only)	• 1 • 2 • 3 • 4 • 5 (MXP_2.5G_10G only)
EB	Path Errored Block indicates that one or more bits are in error within a block	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Table 11-100 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Line Threshold Settings (continued)

Parameter	Description	Options - ONS 15454	Options - ONS 15454 SDH
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
SEFS	(Near End Section or Regeneration Section only) Severely errored framing seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—

Table 11-100 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Line Threshold Settings (continued)

Parameter	Description	Options - ONS 15454	Options - ONS 15454 SDH
BBE	Background block errors	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
UAS	(Line or Multiplex Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G303 Provision the 4x2.5G Muxponder Trunk Port Alarm and TCA Thresholds

Purpose	This task changes the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C trunk port alarm and TCA thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed

Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Step 3 Select **TCA** (if not already selected), a **15 Min** or **1 Day** PM interval radio button and then click **Refresh**.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Step 4 Referring to Table 11-101, verify the trunk port (Port 5) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Note Do not modify the Laser Bias parameters.

Table 11-101 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Trunk Port TCA Thresholds

Card	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
MXP_2.5G_10G	–8 dBm	–18 dBm	7 dBm	–1 dBm
MXP_2.5G_10E	–9 dBm	–18 dBm	9 dBm	0 dBm
MXP_2.5G_10E_C	–9 dBm	–18 dBm	9 dBm	0 dBm
MXP_2.5G_10E_L	–9 dBm	–18 dBm	9 dBm	0 dBm
MXP_2.5G_10EX_C	–9 dBm	–18 dBm	9 dBm	0 dBm

Step 5 Click **Apply**.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Referring to Table 11-102, verify the trunk port (Port 5) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Note Do not modify the Laser Bias parameters.

Table 11-102 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Trunk Port Alarm Thresholds

Card	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
MXP_2.5G_10G	–8 dBm	–20 dBm	4 dBm	2 dBm
MXP_2.5G_10E	–8 dBm	–20 dBm	7 dBm	3 dBm
MXP_2.5G_10E_C	–8 dBm	–20 dBm	7 dBm	3 dBm
MXP_2.5G_10E_L	–8 dBm	–20 dBm	7 dBm	3 dBm
MXP_2.5G_10EX_C	–8 dBm	–20 dBm	7 dBm	3 dBm

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G304 Provision the 4x2.5G Muxponder Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G278 Provision the Optical Line Rate, page 11-155 DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs. The TCA thresholds are shown by default.

Step 3 Referring to Table 11-103, verify the client Port *N* (where *N* = 1 through 4) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface at the other end. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Table 11-103 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Client Interfaces TCA Thresholds

Port Type (by CTC)	Pluggable Port Module (SFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
OC-48	ONS-SE-2G-S1	–3	–18	3	–16
	15454-SFP-OC48-IR	0	–18	6	–11
STM-16	ONS-SE-2G-S1	–3	–18	3	–16
	15454E-SFP-L.16.1	0	–18	6	–11

Step 4 Repeat Step 3 to provision each additional client port.

Step 5 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 6 Referring to Table 11-104, verify the client Port *N* (where *N* = 1 through 4) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Note Do not modify the Laser Bias parameters.

Table 11-104 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, or MXP_2.5G_10E_L Card Client Interfaces Alarm Thresholds

Port Type (by CTC)	Pluggable Port Module (SFP)	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
OC-48	ONS-SE-2G-S1	0	–21	0	–13
	15454-SFP-OC48-IR	3	–21	3	–8
STM-16	ONS-SE-2G-S1	0	–21	0	–13
	15454E-SFP-L.16.1	3	–21	3	–8

Step 7 Click **Apply**.

Step 8 Repeat Steps 6 and 7 to provision each additional client port.

Step 9 Return to your originating procedure (NTP).

DLP-G228 Change the 4x2.5G Muxponder Line OTN Settings

Purpose	This task changes the line OTN settings for MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card where you want to change the line OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then choose one of the following subtabs: **OTN Lines**, **OTN G.709 Thresholds**, **FEC Thresholds**, or **Trail Trace Identifier**.

Step 3 Modify any of the settings described in Tables 11-105 through 11-108.

Note You must modify Near End and Far End independently, 15 Min and 1 Day independently, and SM and PM independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-105 describes the values on the Provisioning > OTN > OTN Lines tab.

Note In Table 11-105, some parameter tabs or values do not always apply to all MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, or MXP_2.5G_10E_L cards. If the tabs or values do not apply, they do not appear in CTC.

Table 11-105 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Line OTN Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	5 (Trunk)
G.709 OTN	Sets the OTN lines according to ITU-T G.709.	• Enable • Disable

Table 11-105 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Card Line OTN Settings (continued)

Parameter	Description	Options
FEC	Sets the OTN line FEC mode. FEC mode can be Disabled or Enabled. With the MXP_2.5G_10E card, Enhanced FEC (E-FEC) mode can be enabled to provide greater range and lower bit error rate. E-FEC applies only to the MXP_2.5G_10E card.	• Enable—(MXP_2.5G_10G only) FEC is on. • Disable—FEC is off. • Standard—(MXP_2.5G_10E only) FEC is on. • Enhanced—(MXP_2.5G_10E only) Enhanced FEC is on.
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
SF BER	(Display only) Sets the signal fail bit error rate.	• 1E-5
Asynch/Synch Mapping	(MXP_2.5G_10E only) The MXP_2.5G_10E can perform standard ODU multiplexing according to ITU-T G.709. The card uses this to aggregate the four OC-48 client signals.	• ODU Multiplex

Table 11-106 describes the values on the Provisioning > OTN > OTN G.709 Thresholds tab.

Table 11-106 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C ITU-T G.709 Threshold Settings

Parameter	Description	Options
Port	(Display only) Port number	5 (Trunk)
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. **Note** SM (OTUk) is the ITU-T G.709 optical channel transport unit order of k overhead frame used for management and performance monitoring. PM (ODUk) is the ITU-T G.709 optical channel data unit order of k overhead frame unit used for path performance monitoring.
SES	Severely errored seconds. Two types of thresholds can be asserted. Selecting the SM (OTUk) radio button selects FEC, overhead management, and PM using OTUk. Selecting the PM radio button selects path PM using ODUk.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
UAS	Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Table 11-106 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C ITU-T G.709 Threshold Settings (continued)

Parameter	Description	Options
BBE	Background block errors	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
FC	Failure counter	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Table 11-107 describes the values on the Provisioning > OTN > FEC Thresholds tab.

Table 11-107 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C FEC Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	5 (Trunk)
Bit Errors Corrected	Displays the number of bit errors corrected during the interval selected. The interval can be set for 15 minutes or one day.	Numeric
Uncorrectable Words	Displays the number of uncorrectable words during the interval selected. The interval can be set for 15 minutes or one day.	Numeric

Table 11-108 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-108 MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C Trail Trace Identifier Settings

Parameter	Description	Options
Port	Sets the port number. The trail trace identifier is applicable only to the trunk interface, which handles ITU-T G.709 frames.	5 (Trunk)
Level	Sets the level.	• Section • Path
Received Trace Mode	Sets the trace mode.	• Off/None • Manual
Disable FDI on TTIM	If a Trace Identifier Mismatch on Section overhead alarm arises because of a J0 overhead string mismatch, no Forward Defect Indication (FDI) signal is sent to the downstream nodes if this box is checked.	• Checked (FDI on TTIM is disabled) • Unchecked (FDI on TTIM is not disabled)
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size; trail trace identifier is 64 bytes in length.
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 minutes.	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

NTP-G99 Modify the 2.5G Data Muxponder Card Line Settings and PM Parameter Thresholds

Purpose	This procedure changes the line and threshold settings for the MXP_MR_2.5G and MXPP_MR_2.5G muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 DLP-G63 Install an SFP or XFP, page 14-72 DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary) DLP-G278 Provision the Optical Line Rate, page 11-155 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the muxponder card settings. If you are already logged in, proceed to Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 Perform any of the following tasks as needed:

- DLP-G236 Change the 2.5G Data Muxponder Client Line Settings, page 11-284
- DLP-G237 Change the 2.5G Data Muxponder Distance Extension Settings, page 11-286
- DLP-G238 Change the 2.5G Data Muxponder SONET (OC-48)/SDH (STM-16) Settings, page 11-288
- DLP-G239 Change the 2.5G Data Muxponder Section Trace Settings, page 11-290
- DLP-G240 Change the 2.5G Data Muxponder SONET or SDH Line Thresholds, page 11-293
- DLP-G321 Change the 2.5G Data Muxponder Line Thresholds for 1G Ethernet or 1G FC/FICON Payloads, page 11-295
- DLP-G307 Provision the 2.5G Data Muxponder Trunk Port Alarm and TCA Thresholds, page 11-297
- DLP-G308 Provision the 2.5G Data Muxponder Client Port Alarm and TCA Thresholds, page 11-298
- DLP-G370 Change the 2.5G Data Muxponder Trunk Wavelength Settings, page 11-292

Note To use the Alarm Profiles tab, including creating alarm profiles and suppressing alarms, see the Alarm and TCA Monitoring and Management document.

Stop. You have completed this procedure.

DLP-G236 Change the 2.5G Data Muxponder Client Line Settings

Purpose	This task changes the client line settings for MXP_MR_2.5G and MXPP_MR_2.5G muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > Client** tabs. Tabs and parameter selections vary according to PPM provisioning.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Step 3 Modify any of the settings for the Client tab as described in Table 11-109.

Table 11-109 MXP_MR_2.5G or MXPP_MR_2.5G Card Client Settings

Parameter	Description	Options
Port	(Display only) Port number.	• 1 • 2
Port Name	The user can assign a logical name for each of the ports shown by filling in this field.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16. **Note** You can provision a string (port name) for each fiber channel/FICON interface on the MXP_MR_2.5G and MXPP_MR_2.5G cards, which allows the MDS Fabric Manager to create a link association between that SAN port and a SAN port on a Cisco MDS 9000 switch.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI)

Table 11-109 MXP_MR_2.5G or MXPP_MR_2.5G Card Client Settings (continued)

Parameter	Description	Options
Service State	Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)
ALS Mode	Sets the ALS function.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: (MXP_MR_2.5G only) ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.

Table 11-109 MXP_MR_2.5G or MXPP_MR_2.5G Card Client Settings (continued)

Parameter	Description	Options
Reach	Displays the optical reach distance of the client port.	The reach distances that appear in the drop-down list depend on the card: • Autoprovision—The system to automatically provision the reach from the pluggable port module (PPM) reach value on the hardware. • SX—Short laser wavelength on multimode fiber optic cable for a maximum length of 550 meters. The operating wavelength range is 770-860 nm. • LX—Long wavelength for a long haul fiber optic cable for a maximum length of 10 km. The operating wavelength range is 1270-1355 nm. • CX—Two pairs of 150-ohm shielded twisted pair cable for a maximum length of 25 meters. • T—Four pairs of Category 5 Unshielded Twisted Pair cable for a maximum length of 100 meters. • DX—Single mode up to 40 km. The operating wavelength range is 1430-1580 nm. • HX—Single mode up to 40 km. The operating wavelength range is 1280-1335 nm. • ZX—Extended wavelength single-mode optical fiber for up to 100 km. The operating wavelength range is 1500-1580 nm. • VX—Single mode up to 100 km. The operating wavelength range is 1500-1580 nm.
Wavelength	Displays the wavelength of the client port.	• First Tunable Wavelength • Further wavelengths:850 nm through 1560.61 nm; 100-GHz ITU spacing; CWDM spacing

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G237 Change the 2.5G Data Muxponder Distance Extension Settings

Purpose	This task changes the distance extension settings for MXP_MR_2.5G and MXPP_MR_2.5G muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Distance extension settings can be changed only if the facilities are out of service (OOS,DSBLD).

Note The distance extension parameters only apply to client ports (Ports 1 to 8) and not to the trunk ports (Port 9 for MXP_MR_2.5G card or Ports 9 and 10 for the MXPP_MR_2.5G card).

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the distance extension settings.

Step 2 Click the **Provisioning > Line** > *Client* tabs. A client port must be provisioned for the tab to be present.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Step 3 Locate the Client port table row and verify that the Service State column value is OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI). If yes, continue with Step 4. If not, complete the following substeps:

a. Click the **Admin State** table cell and choose **OOS,DSBLD** (ANSI) or **Locked,Maintenance** (ETSI).

b. Click **Apply**, then **Yes**.

Step 4 Click the **Provisioning > Line > Distance Extension** tabs. Tabs and parameter selections vary according to PPM provisioning.

Step 5 Modify any of the settings for the Distance Extension tab as described in Table 11-110.

Table 11-110 MXP_MR_2.5G or MXPP_MR_2.5G Card Line Distance Extension Settings

Parameter	Description	Options
Port	(Display only) Port number	• 1 • 2
Enable Distance Extension	Allows end-to-end distances of up to 1600 km for FC1G and up to 800 km for FC2G. If Distance Extension is enabled, set the connected Fibre Channel switches to Interop or Open Fabric mode, depending on the Fibre Channel switch. By default, the MXP_MR_2.5G and MXPP_MR_2.5G card will interoperate with the Cisco Multilayer Director Switch (MDS) storage products.	Checked or unchecked
Auto Detect Credits	Allows automatic detection of buffer credits for Fibre Channel flow control.	Checked or unchecked

Table 11-110 MXP_MR_2.5G or MXPP_MR_2.5G Card Line Distance Extension Settings (continued)

Parameter	Description	Options
Credits Available	(Display only) Displays the number of buffer credits available.	Numeric (range depends on the client equipment attached to the card)
Autoadjust GFP Buffer Threshold	Allows the threshold of the generic framing procedure (GFP) buffer between two MXP_MR_2.5G or two MXPP_MR_2.5G cards to be automatically adjusted.	Checked or unchecked
GFP Buffers Available	Displays the number of GFP buffers available between two MXP_MR_2.5G or two MXPP_MR_2.5G cards.	Numeric

Step 6 Click **Apply**.

Step 7 Return to your originating procedure (NTP).

DLP-G238 Change the 2.5G Data Muxponder SONET (OC-48)/SDH (STM-16) Settings

Purpose	This task changes the SONET (OC-48) or SDH (STM-16) settings for MXP_MR_2.5G and MXPP_MR_2.5G muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note SONET (OC-48)/SDH (STM-16) settings apply only to the trunk ports (Port 9 for the MXP_MR_2.5G card and Ports 9 and 10 for the MXPP_MR_2.5G card.)

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the OC-48/STM-64 settings.

Step 2 Click the **Provisioning > Line > SONET** (ANSI) or **SDH** (ETSI). Tabs and parameter selections vary according to PPM provisioning.

Step 3 Modify any of the settings for the SONET or SDH tab as described in Table 11-111.

Table 11-111 MXP_MR_2.5G or MXPP_MR_2.5G Card Line SONET or SDH Settings

Parameter	Description	Options
Port	(Display only) Port number.	9 (trunk for MXP_MR_2.5G) or 9 and 10 (trunks for MXPP_MR_2.5G)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI)
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)
SF BER[1]	Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5
SD BER[1]	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled or can be set for one of three mode options.	• Disable (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.

Table 11-111 MXP_MR_2.5G or MXPP_MR_2.5G Card Line SONET or SDH Settings (continued)

Parameter	Description	Options
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments
Type	The optical transport type.	• SONET (ANSI) • SDH (ETSI)
SyncMsgIn	Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked
Send DoNotUse	Sets the Send DoNotUse card state. When checked, sends a DUS message on the S1 byte.	Checked or unchecked
ProvidesSync	Sets the ProvidesSync card parameter. If checked, the card is provisioned as an NE timing reference.	Checked or unchecked

1. SF BER and SD BER thresholds apply only to trunk ports (Port 9 for MXP_MR_2.5G and Ports 9 and 10 for MXPP_MR_2.5G).

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G239 Change the 2.5G Data Muxponder Section Trace Settings

Purpose	This task changes the section trace settings for MXP_MR_2.5G and MXPP_MR_2.5G muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs. Tabs and parameter selections vary according to PPM provisioning.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Step 3 Modify any of the settings in the Section Trace tab as described in Table 11-112.

Table 11-112 MXP_MR_2.5G or MXPP_MR_2.5G Card Line Section Trace Settings

Parameter	Description	Options
Port	(Display only) Port number.	• 9 (trunk port for MXP_MR_2.5G) • 9 and 10 (trunk ports for MXPP_MR_2.5G)
Received Trace Mode	Sets the received trace mode.	• Off/None • Manual
Disable AIS/RDI on TIM-S	If an TIM on Section overhead alarm arises because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G370 Change the 2.5G Data Muxponder Trunk Wavelength Settings

Purpose	This task changes the trunk wavelength settings for the MXP_MR_2.5G and MXPP_MR_2.5G.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the trunk wavelength settings.

Step 2 Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

Step 3 Modify any of the settings as described in Table 11-113.

Table 11-113 MXP_MR_2.5G or MXPP_MR_2.5G Card Wavelength Trunk Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	9 (Trunk) 10 (Trunk) (MXPP_MR_2.5G only)
Band	(Display only) Indicates the wavelength band that can be provisioned.	C—Only the C band is available
Even/Odd	Sets the wavelengths available for provisioning. This field does not apply to MXP_MR_2.5G or MXPP_MR_2.5G cards	—
Wavelength	The wavelength provisioned for the trunk.	• First Tunable Wavelength • Further wavelengths in 100-GHz ITU-T, C-band spacing. If the card is installed, the wavelengths it carries are identified with two asterisks. Other wavelengths have a dark grey background. If the card is not installed, all wavelengths appear with a dark grey background.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G240 Change the 2.5G Data Muxponder SONET or SDH Line Thresholds

Purpose	This task changes the SONET or SDH line threshold settings for MXP_MR_2.5G and MXPP_MR_2.5G muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds > SONET Thresholds** (ANSI) or **SDH Thresholds** (ETSI) tabs.

Step 3 Modify any of the settings as shown in Table 11-114.

Note You must modify Near End and Far End independently, 15 Min and 1 Day independently, and Line and Section independently. To do so, choose the appropriate radio button and click **Refresh**.

Note In Table 11-114, some parameters or options do not apply to all MXP_MR_2.5G or MXPP_MR_2.5G cards. If the parameters or options do not apply, they do not appear in CTC.

Table 11-114 MXP_MR_2.5G or MXPP_MR_2.5G Card Line Threshold Settings

Field	Description	ONS 15454 Options	ONS 15454 SDH Options
Port	(Display only) Port number	• 9 (MXP_MR_2.5G) • 9 and 10 (MXPP_MR_2.5G)	• 9 (MXP_MR_2.5G) • 9 and 10 (MXPP_MR_2.5G)
EB	Path Errored Block indicates that one or more bits are in error within a block	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—

Table 11-114 MXP_MR_2.5G or MXPP_MR_2.5G Card Line Threshold Settings (continued)

Field	Description	ONS 15454 Options	ONS 15454 SDH Options
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
BBE	Background block errors	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
SEFS	(Section or Regeneration Section only) Severely errored framing seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Section only Choose an option in each category and click **Refresh**.	—
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Section only Choose an option in each category and click **Refresh**.	—
UAS	(Line or Multiplex Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Section only Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Regeneration Section (only) Choose an option in each category and click **Refresh**.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G321 Change the 2.5G Data Muxponder Line Thresholds for 1G Ethernet or 1G FC/FICON Payloads

Purpose	This task changes the line threshold settings for MXP_MR_10G and MXPP_MR_2.5G transponder cards carrying the 1G Ethernet or 1G FC/FICON payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Display the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the line threshold settings in card view.

Step 2 Click the **Provisioning > Line Thresholds > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose the applicable port.

Step 5 From the Variable drop-down list, choose an Ethernet variable. See Table 11-115 for a list of available Ethernet variables.

Table 11-115 MXP_MR_2.5G and MXPP_MR 2.5G Card 1G Ethernet or 1G, 2G FC/FICON Variables

Variable	Description
ifInOctets	Number of bytes received since the last counter reset.
rxTotalPkts	Total number of receive packets.
ifInDiscards	Number of inbound packets that were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol.
ifInErrors	Total number of receive errors.
ifOutOctets	The total number of octets transmitted out of the interface, including framing characters.
txTotalPkts	Total number of transmitted packets.
ifOutDiscards	Number of outbound packets that were chosen to be discarded even though no errors had been detected to prevent their being transmitted.

Table 11-115 MXP_MR_2.5G and MXPP_MR 2.5G Card 1G Ethernet or 1G, 2G FC/FICON Variables (continued)

mediaIndStatsRxFramesTruncated	Total number of frames received that are less than 5 bytes. This value is a part of high-level data link control (HDLC) and GFP port statistics.
mediaIndStatsRxFramesTooLong	Number of received frames that exceed the maximum transmission unit (MTU). This value is part of HDLC and GFP port statistics.
mediaIndStatsRxFramesBadCRC	Number of receive data frames with payload cyclic redundancy check (CRC) errors when HDLC framing is used.
mediaIndStatsTxFramesBadCRC	Number of transmitted data frames with payload CRC errors when HDLC framing is used.
8b10bInvalidOrderedSets	Number of 8b10b disparity violations on the Fibre Channel line side.
8b10bStatsEncodingDispErrors	Number of 8b10b disparity violations on the Fibre Channel line side.

Step 6 From the Alarm Type drop-down list, indicate whether the event will be triggered by the rising threshold, the falling threshold, or both the rising and falling thresholds.

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Type in an appropriate number of seconds for the Sample Period.

Step 9 Type in the appropriate number of occurrences for the Rising Threshold.

For a rising type of alarm, the measured value must move from below the falling threshold to above the rising threshold. For example, if a network is running below a rising threshold of 1000 collisions every 15 seconds and a problem causes 1001 collisions in 15 seconds, the excess occurrences trigger an alarm.

Step 10 Enter the appropriate number of occurrences in the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the counterpart to a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded (otherwise, a single network problem might cause a rising threshold to be exceeded multiple times and cause a flood of events).

Step 11 Click **OK**.

Step 12 Return to your originating procedure (NTP).

DLP-G307 Provision the 2.5G Data Muxponder Trunk Port Alarm and TCA Thresholds

Purpose	This task changes the MXP_MR_2.5G and MXPP_MR_2.5G trunk port alarm and TCA thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Throughout this task, trunk port refers to Port 9 (MXP_MR_2.5G and MXPP_MR_2.5G) and Port 10 (MXPP_MR_2.5G only).

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Step 3 Verify the trunk port TCA thresholds for RX Power High is –9 dBm and for RX Power Low is –23 dBm. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Step 4 Under Types, click the **Alarm** radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Step 5 Verify the trunk port Alarm thresholds for RX Power High is –7 dBm and for RX Power Low is –26 dBm. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Step 6 Click **Apply**.

Step 7 Return to your originating procedure (NTP).

DLP-G308 Provision the 2.5G Data Muxponder Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the MXP_MR_2.5G and MXPP_MR_2.5G cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G278 Provision the Optical Line Rate, page 11-155 DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_2.5G or MXPP_MR_2.5G card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs. The TCA thresholds are shown by default.

Step 3 Referring to Table 11-116, verify the client port (Ports 1 through 8) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface at the other end. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Note Do not modify the Laser Bias parameters.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Table 11-116 MXP_MR_2.5G and MXPP_MR_2.5G Card Client Interface TCA Thresholds

Port Type (by CTC)	Pluggable Port Module (XFP)	TCA RX Power Low	TCA RX Power High	TCA TX Power Low	TCA TX Power High
FC1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–17	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
FC2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–15	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
FICON1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–17	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
FICON2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–17	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
ONE_GE	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–17	0	–16	3
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–20	–3	–16	3
ESCON	ONS-SE-200-MM	–21	–14	–32	–11

Step 4 Click **Apply**.

Step 5 Repeat Steps 3 and 4 to provision each additional client port.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Referring to Table 11-117, verify the client port (Ports 1 through 8) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Table 11-117 MXP_MR_2.5G and MXPP_MR_2.5G Card Client Interface Alarm Thresholds

Port Type (by CTC)	Pluggable Port Module (XFP)	Alarm RX Power Low	Alarm RX Power High	Alarm TX Power Low	Alarm TX Power High
FC1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
FC2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–18	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
FICON1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
FICON2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
ONE_GE	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
ESCON	ONS-SE-200-MM	–24	–11	–35	–8

Step 8 Click **Apply**.

Step 9 Repeat Steps 7 and 8 to provision each additional client port. When you have finished provisioning client ports, continue with Step 10.

Step 10 Return to your originating procedure (NTP).

NTP-G148 Modify the 10G Data Muxponder Card Line Settings and PM Parameter Thresholds

Purpose	This procedure changes the line and threshold settings for the MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 DLP-G63 Install an SFP or XFP, page 14-72 DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary) DLP-G278 Provision the Optical Line Rate, page 11-155 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the muxponder card settings. If you are already logged in, proceed to Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 Perform any of the following tasks as needed:

- DLP-G333 Change the 10G Data Muxponder Client Line Settings, page 11-302
- DLP-G334 Change the 10G Data Muxponder Distance Extension Settings, page 11-304
- DLP-G340 Change the 10G Data Muxponder Trunk Wavelength Settings, page 11-306
- DLP-G335 Change the 10G Data Muxponder SONET (OC-192)/SDH (STM-64) Settings, page 11-307
- DLP-G336 Change the 10G Data Muxponder Section Trace Settings, page 11-309
- DLP-G341 Change the 10G Data Muxponder SONET or SDH Line Thresholds, page 11-310
- DLP-G337 Change the 10G Data Muxponder Line RMON Thresholds for Ethernet, 1G FC/FICON, or ISC/ISC3 Payloads, page 11-312
- DLP-G338 Provision the 10G Data Muxponder Trunk Port Alarm and TCA Thresholds, page 11-315
- DLP-G339 Provision the 10G Data Muxponder Client Port Alarm and TCA Thresholds, page 11-317
- DLP-G366 Change the 10G Data Muxponder OTN Settings, page 11-320

Note To use the Alarm Profiles tab, including creating alarm profiles and suppressing alarms, see the Alarm and TCA Monitoring and Management document.

Stop. You have completed this procedure.

DLP-G333 Change the 10G Data Muxponder Client Line Settings

Purpose	This task changes the line settings for the MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C, MXP_MR_10DME_L, or MXP_MR_10DMEX_C card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > Client** tabs. Tabs and parameter selections vary according to PPM provisioning.

Step 3 Modify any of the settings for the Client tab as described in Table 11-118.

Table 11-118 MXP_MR_10DME_C, MXP_MR_10DME_L, or MXP_MR_10DMEX_C Card Line Client Settings

Parameter	Description	Options
Port	(Display only) Port number.	1 through 8
Port Name	The user can assign a logical name for each of the ports shown by filling in this field.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16. **Note** You can provision a string (port name) for each fiber channel/FICON interface on the MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C cards, which allows the MDS Fabric Manager to create a link association between that SAN port and a SAN port on a Cisco MDS 9000 switch.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI)
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)

Table 11-118 MXP_MR_10DME_C, MXP_MR_10DME_L, or MXP_MR_10DMEX_C Card Line Client Settings (continued)

Parameter	Description	Options
ALS Mode	Sets the ALS function mode.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.
Reach	Sets the optical reach distance of the client port.	The reach distances that appear in the drop-down list depend on the card: • Autoprovision—The system to automatically provision the reach from the pluggable port module (PPM) reach value on the hardware. • SX—Short laser wavelength on multimode fiber optic cable for a maximum length of 550 meters. The operating wavelength range is 770-860 nm.) • LX—Long wavelength for a long haul fiber optic cable for a maximum length of 10 km. The operating wavelength range is 1270-1355 nm.) • CX—Two pairs of 150-ohm shielded twisted pair cable for a maximum length of 25 meters.) • T—Four pairs of Category 5 Unshielded Twisted Pair cable for a maximum length of 100 meters.) • DX—Single mode up to 40 km. The operating wavelength range is 1430-1580 nm.) • HX—Single mode up to 40 km. The operating wavelength range is 1280-1335 nm.) • ZX—Extended wavelength single-mode optical fiber for up to 100 km. The operating wavelength range is 1500-1580 nm.) • VX—Single mode up to 100 km. The operating wavelength range is 1500-1580 nm.)
Wavelength	Displays the wavelength of the client port.	• First Tunable Wavelength • Further wavelengths: 850 nm through 1560.61 nm 100-GHz ITU spacing CWDM spacing
Squelch	Shuts down the far-end laser in response to certain defects. (Squelch does not apply to ISC COMPACT payloads.)	• Squelch • Disable

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G334 Change the 10G Data Muxponder Distance Extension Settings

Purpose	This task changes the distance extension settings for the MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C muxponder card ports provisioned for Fibre Channel or FICON payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The distance extension parameters only apply to client ports (Ports 1 to 8) and not to the trunk port (Port 9).

Note The client port must be in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) state in order to change the distance extension settings. If a Y-cable is provisioned on the client port, both the working and protect client ports must be in OOS,DSBLD (ANSI) or Locked,disabled (ETSI) state before you change the distance extension settings.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C, MXP_MR_10DME_L, or MXP_MR_10DMEX_C card where you want to change the distance extension settings.

Step 2 Click the **Provisioning > Line > Distance Extension** tabs.

Step 3 Modify any of the settings as described in Table 11-119.

Table 11-119 MXP_MR_10DME_C, MXP_MR_10DME_L, or MXP_MR_10DMEX_C Card Line Distance Extension Settings

Parameter	Description	Options
Port	(Display only) Port number. Up to eight ports might appear based on the number of pluggable port modules that are provisioned.	—

Table 11-119 MXP_MR_10DME_C, MXP_MR_10DME_L, or MXP_MR_10DMEX_C Card Line Distance Extension Settings (continued)

Parameter	Description	Options
Enable Distance Extension	Allows end-to-end distances of up to 1600 km for FC1G and up to 800 km for FC2G. If Distance Extension is enabled, set the connected Fibre Channel switches to Interop or Open Fabric mode, depending on the Fibre Channel switch. By default, the MXP_MR_10DME_C and MXP_MR_10DME_L card will interoperate with the Cisco MDS storage products.	Checked or unchecked
Fast Switch	If unchecked, the end-to-end fiber channel link is reinitialized every time a Y-cable protection switch occurs. If checked, reinitialization of the link is avoided when a Y-cable protection switch occurs, thus reducing the traffic hit considerably. This feature is supported for FC1G, FC2G, FC4G, FICON1G, FICON2G, and FICON4G trunk failures as well as user-initiated Y-cable protection switch such as, Manual, Force, or Lockout. It is recommended that you do not enable the Fast Switch option as the link may not come up after a Y-cable protection switch in certain cases. **Note** This option can be used only if you have unchecked Enable Distance Extension option.	Checked or unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G340 Change the 10G Data Muxponder Trunk Wavelength Settings

Purpose	This task changes the trunk wavelength settings for the MXP_MR_10DME_C and MXP_MR_10DME_L.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C or MXP_MR_10DME_L card where you want to change the trunk wavelength settings.

Step 2 Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

Step 3 Modify any of the settings for the Wavelength Trunk Settings tab as described in Table 11-120.

Table 11-120 MXP_MR_10DME_C or MXP_MR_10DME_L Card Wavelength Trunk Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	Port 9 (Trunk)
Band	Indicates the wavelength band that can be provisioned. The field is display-only when a physical MXP_MR_10DME_C or MXP_MR_10DME_L is installed. If the card is provisioned in CTC only, you can provision the band for the card that will be installed.	• C—The C-band wavelengths are available in the Wavelength field. • L—The L-band wavelengths are available in the Wavelength field.
Even/Odd	Sets the wavelengths available for provisioning.	• Even—Displays even C-band or L-band wavelengths in the Wavelength field. • Odd—Displays odd C-band or L-band wavelengths in the Wavelength field.
Wavelength	The wavelength provisioned for the trunk.	• First Tunable Wavelength • Further wavelengths in 100-GHz ITU spacing

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G335 Change the 10G Data Muxponder SONET (OC-192)/SDH (STM-64) Settings

Purpose	This task changes the OC-192 (ANSI)/STM-64 (ETSI) settings for the MXP_MR_10DME_C and MXP_MR_10DME_L muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C or MXP_MR_10DME_L card where you want to change the SONET (OC-192)/SDH (STM-64) settings.

Step 2 Click the **Provisioning > Line > SONET** (ANSI) or **SDH** (ETSI). Tabs and parameter selections vary according to PPM provisioning.

Step 3 Modify any of the settings as described in Table 11-121.

Table 11-121 MXP_MR_10DME_C or MXP_MR_10DME_L Card Line SONET or SDH Settings

Parameter	Description	Options
Port	(Display only) Port number.	9 (Trunk)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI)
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)
SF BER[1]	Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5

Table 11-121 MXP_MR_10DME_C or MXP_MR_10DME_L Card Line SONET or SDH Settings (continued)

Parameter	Description	Options
SD BER[1]	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
Type	The optical transport type.	• SONET (ANSI) • SDH (ETSI)
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled or can be set for one of three mode options.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments
ProvidesSync	Sets the ProvidesSync card parameter. If checked, the card is provisioned as a NE timing reference.	Checked or unchecked
SyncMsgIn	Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked
Send DoNotUse	Sets the Send DoNotUse card state. When checked, sends a DUS (do not use) message on the S1 byte.	Checked or unchecked

1. SF BER and SD BER thresholds apply only to trunk ports (Port 9 for MXP_MR_2.5G and Ports 9 and 10 for MXPP_MR_2.5G).

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G336 Change the 10G Data Muxponder Section Trace Settings

Purpose	This task changes the section trace settings for the MXP_MR_10DME_C and MXP_MR_10DME_L muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C or MXP_MR_10DME_L card where you want to change the section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs. Tabs and parameter selections vary according to PPM provisioning.

Step 3 Modify any of the settings in the Section Trace tab as described in Table 11-122.

Table 11-122 MXP_MR_10DME_C or MXP_MR_10DME_L Card Line Section Trace Settings

Parameter	Description	Options
Port	(Display only) Port number.	• 9 (trunk only)
Received Trace Mode	Sets the received trace mode.	• Off/None • Manual
Disable AIS/RDI on TIM-S	If a TIM on section overhead alarm arises because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or select the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G341 Change the 10G Data Muxponder SONET or SDH Line Thresholds

Purpose	This task changes the SONET or SDH line threshold settings for the MXP_MR_10DME_C and MXP_MR_10DME_L muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C or MXP_MR_10DME_L card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds > SONET Thresholds** (ANSI) or **SDH Thresholds** (ETSI) tabs.

Step 3 Modify any of the settings as shown in Table 11-123.

Note You must modify Near End and Far End independently; 15 Min and 1 Day independently; and Line and Section independently. To do so, choose the appropriate radio button and click **Refresh**.

Note In Table 11-123, some parameters and options do not apply to all MXP_MR_10DME cards. If the parameter or options do not apply, they do not appear in CTC.

Table 11-123 MXP_MR_10DME_C or MXP_MR_10DME_LCard Line Threshold Settings

Parameter	Description	Options - ONS 15454	Options - ONS 15454 SDH
Port	(Display only) Port number	• 9 (Trunk)	• 9 (Trunk)
EB	Path Errored Block indicates that one or more bits are in error within a block	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Table 11-123 MXP_MR_10DME_C or MXP_MR_10DME_LCard Line Threshold Settings (continued)

Parameter	Description	Options - ONS 15454	Options - ONS 15454 SDH
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
SEFS	(Near End Section or Regeneration Section only) Severely errored framing seconds	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
BBE	Background block errors	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Table 11-123 MXP_MR_10DME_C or MXP_MR_10DME_LCard Line Threshold Settings (continued)

Parameter	Description	Options - ONS 15454	Options - ONS 15454 SDH
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
UAS	(Line or Multiplex Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G337 Change the 10G Data Muxponder Line RMON Thresholds for Ethernet, 1G FC/FICON, or ISC/ISC3 Payloads

Purpose	This task changes the line threshold settings for MXP_MR_10DME_C and MXP_MR_10DME_L cards carrying Ethernet, FC/FICON, or ISC/ISC3 payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), display the MXP_MR_10DME_C or MXP_MR_10DME_L card where you want to change the line threshold settings in card view.

Step 2 Click the **Provisioning > Line Thresholds > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose the applicable port, either the payload port, for example "1-1 (ONE_GE)", or the equivalent ITU-T G.7041 GFP (Generic Frame Procedure) port.

Step 5 From the Variable drop-down list, choose an Ethernet, FC, FICON, or ISC variable. See Table 11-124 for a list of available Ethernet variables, Table 11-125 for a list of FC and FICON variables, Table 11-126 for a list of ISC and ISC3 variables, and Table 11-127 for a list of GFP variables.

Table 11-124 MXP_MR_10DME_C or MXP_MR_10DME_L Ethernet Variables

Variable	Description
ifInOctets	Number of bytes received since the last counter reset.
rxTotalPkts	Total number of receive packets.
ifInErrors	Total number of receive errors.
ifOutOctets	The total number of octets transmitted out of the interface, including framing characters.
txTotalPkts	Total number of transmitted packets.
mediaIndStatsRxFramesTruncated	Total number of frames received that are less than 5 bytes. This value is a part of HDLC and GFP port statistics.
mediaIndStatsRxFramesTooLong	Number of received frames that exceed the MTU[1]. This value is part of HDLC and GFP port statistics.
mediaIndStatsRxFramesBadCRC	Number of receive data frames with payload CRC errors when HDLC framing is used.
mediaIndStatsTxFramesBadCRC	Number of transmitted data frames with payload CRC errors when HDLC framing is used.
8b10bInvalidOrderedSetsDispErrorsSum	Number of code violations/running disparity errors in the 8b/10b encoded characters received.

1. Frames larger than the MTU, including Jumbo frames, pass through. The MTU, however, is not specified by the user.

Table 11-125 MXP_MR_10DME_C or MXP_MR_10DME_L FC/FICON Variables

Variable	Description
ifInOctets	Number of bytes received since the last counter reset.
rxTotalPkts	Total number of receive packets.
ifInErrors	Total number of receive errors.
ifOutOctets	The total number of octets transmitted out of the interface, including framing characters.
txTotalPkts	Total number of transmitted packets.
ifOutOversizePkts	Total number of oversized packets output from the interface.
mediaIndStatsRxFramesTruncated	Total number of frames received that are less than 5 bytes. This value is a part of HDLC and GFP port statistics.
mediaIndStatsRxFramesTooLong	Number of received frames that exceed the MTU. This value is part of HDLC and GFP port statistics.

Table 11-125 MXP_MR_10DME_C or MXP_MR_10DME_L FC/FICON Variables (continued)

Variable	Description
mediaIndStatsRxFramesBadCRC	Number of receive data frames with payload CRC errors when HDLC framing is used.
mediaIndStatsTxFramesBadCRC	Number of transmitted data frames with payload CRC errors when HDLC framing is used.
fcStatsZeroTxCredits	This is a count that increments when the FC/FICON Tx credits go from a non-zero value to zero.
fcStatsRxRecvrReady	Number of received RDY (Receive Ready) order set.
fcStatsTxRecvrReady	Number of transmitted RDY (Receive Ready) order set.
8b10bInvalidOrderedSetsDispErrorsSum	Number of Code Violations/Running Disparity errors in the 8b/10b encoded characters received.

Table 11-126 MXP_MR_10DME_C or MXP_MR_10DME_L ISC and ISC3Variables

Variable	Description
ifInOctets	Number of bytes received since the last counter reset.
rxTotalPkts	Total number of receive packets.
ifOutOctets	The total number of octets transmitted out of the interface, including framing characters.
txTotalPkts	Total number of transmitted packets.
8b10bInvalidOrderedSetsDispErrorsSum	Number of Code Violations/Running Disparity errors in the 8b/10b encoded characters received.

Table 11-127 MXP_MR_10DME_C or MXP_MR_10DME_L GFP RMON Variables

Variable	Description
gfpStatsRxSBitErrors	Received generic framing protocol (GFP) frames with single bit errors in the core header (these errors are correctable).
gfpStatsRxTypeInvalid	Received GFP frames with invalid type (these are discarded). For example, receiving GFP frames that contain Ethernet data when we expect Fibre Channel data.
gfpStatsRxSblkCRCErrors	Total number of superblock CRC errors with the receive transparent GFP frame. A transparent GFP frame has multiple superblocks which each contain Fibre Channel data.
gfpStatsCSFRaised	Number of Rx client management frames with Client Signal Fail indication.

Table 11-127 MXP_MR_10DME_C or MXP_MR_10DME_L GFP RMON Variables (continued)

gfpStatsLFDRaised	The number of Core HEC CRC Multiple Bit Errors. **Note** This count is only for cHEC multiple bit error when in frame. It is a count of when the state machine goes out of frame.

Step 6 From the Alarm Type drop-down list, indicate whether the event will be triggered by the rising threshold, the falling threshold, or both the rising and falling thresholds.

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Type in an appropriate number of seconds for the Sample Period.

Step 9 Type in the appropriate number of occurrences for the Rising Threshold.

For a rising type of alarm, the measured value must move from below the falling threshold to above the rising threshold. For example, if a network is running below a rising threshold of 1000 collisions every 15 seconds and a problem causes 1001 collisions in 15 seconds, the excess occurrences trigger an alarm.

Step 10 Enter the appropriate number of occurrences in the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the counterpart to a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded (otherwise, a single network problem might cause a rising threshold to be exceeded multiple times and cause a flood of events).

Step 11 Click **OK**.

Note To view all RMON thresholds, click **Show All RMON thresholds**.

Step 12 Return to your originating procedure (NTP).

DLP-G338 Provision the 10G Data Muxponder Trunk Port Alarm and TCA Thresholds

Purpose	This task changes the MXP_MR_10DME_C and MXP_MR_10DME_L trunk port alarm and TCA thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed

Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C or MXP_MR_10DME_L card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Step 3 If TCA is not selected, click **TCA** and then click Refresh. If it is selected, continue with Step 4.

Step 4 Verify the trunk port (Port 9) TCA thresholds are set at the values shown as follows. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and press **Enter**.

- RX Power High: –9 dBm
- RX Power Low: –18 dBm
- TX Power High: 9 dBm
- TX Power Low: 0 dBm

Step 5 Under Types, click the **Alarm** radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Step 6 Verify the trunk port (Port 9) Alarm thresholds are set at the values shown as follows. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and press **Enter**.

- RX Power High: –8 dBm
- RX Power Low: –20 dBm
- TX Power High: 7 dBm
- TX Power Low: 3 dBm

Step 7 Click **Apply**.

Step 8 Return to your originating procedure (NTP).

DLP-G339 Provision the 10G Data Muxponder Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the MXP_MR_10DME_C and MXP_MR_10DME_L cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G278 Provision the Optical Line Rate, page 11-155 DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C and MXP_MR_10DME_L card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs. The TCA thresholds are shown by default.

Step 3 Referring to Table 11-128, verify the client ports (Ports 1 through 8) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface at the other end. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Note Do not modify the Laser Bias parameters.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Table 11-128 MXP_MR_10DME_C and MXP_MR_10DME_L Card Client Interfaces TCA Thresholds

PPM Port Rate	Pluggable Port Module (XFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
FC1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	0	–17	3	–16
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–3	–20	3	–16
FC2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	0	–15	3	–16
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–3	–20	3	–16
FICON1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	0	–17	3	–16
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–3	–20	3	–16
FICON2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	0	–17	3	–16
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–3	–20	3	–16
ISC3 PEER 1G ISC3 PEER 2G	ONS-SE-G2F-SX	0	–17	3	–16
	ONS-SE-G2F-LX	0	–20	3	–16
FC4G	ONS-SE-4G-MM	0	–12	4	–15
	ONS-SE-4G-SM	–1	–15	4	–15
FICON4G	ONS-SE-4G-MM	0	–12	4	–15
	ONS-SE-4G-SM	–1	–15	4	–15

Step 4 Click **Apply**.

Step 5 Repeat Steps 3 and 4 to provision each additional client port.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Referring to Table 11-129, verify the client port (Ports 1 through 8) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Table 11-129 MXP_MR_10DME_C and MXP_MR_10DME_L Card Client Interface Alarm Thresholds

PPM Port Rate	Pluggable Port Module (XFP)	Alarm RX Power Low	Alarm RX Power High	Alarm TX Power Low	Alarm TX Power High
FC1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
FC2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–18	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
FICON1G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
FICON2G	15454-SFP-GEFC-SX 15454E-SFP-GEFC-S ONS-SE-G2F-SX	–20	3	–13	–1
	15454-SFP-GE+-LX 15454E-SFP-GE+-LX ONS-SE-G2F-LX	–23	0	–13	0
ISC3 PEER 1G ISC3 PEER 2G	ONS-SE-G2F-SX	–20	3	–13	–1
	ONS-SE-G2F-LX	–23	0	–13	0
FC4G	ONS-SE-4G-MM	–15	3	–11	–1
	ONS-SE-4G-SM	–18	2	–11	0
FICON4G	ONS-SE-4G-MM	–15	3	–11	–1
	ONS-SE-4G-SM	–18	2	–11	0

Step 8 Click **Apply**.

Step 9 Repeat Steps 7 and 8 to provision each additional client port.

Step 10 Return to your originating procedure (NTP).

DLP-G366 Change the 10G Data Muxponder OTN Settings

Purpose	This task changes the OTN settings for the MXP_MR_10DME_C and MXP_MR_10DME_L cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the MXP_MR_10DME_C and MXP_MR_10DME_L card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then choose one of the following subtabs: **OTN Lines**, **G.709 Thresholds**, **FEC Thresholds**, or **Trail Trace Identifier**.

Step 3 Modify any of the settings described in Tables 11-130 through 11-133.

Note You must modify Near End and Far End; 15 Min and 1 Day; and SM and PM independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-130 describes the values on the Provisioning > OTN > OTN Lines tab.

Table 11-130 MXP_MR_10DME_C and MXP_MR_10DME_L Card OTN Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	9 (Trunk)
G.709 OTN	Sets the OTN lines according to ITU-T G.709.	• Enable • Disable
FEC	Sets the OTN lines to forward error correction (FEC).	• Standard • Enhanced
SF BER	(Display only) Sets the signal fail bit error rate.	• 1E-5
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
Asynch/Synch Mapping	Sets how the ODUk (client payload) is mapped to the optical channel (OTUk).	• Asynch mapping • Synch mapping

Table 11-131 describes the values on the Provisioning > OTN > G.709 Thresholds tab.

Table 11-131 MXP_MR_10DME_C and MXP_MR_10DME_L Card ITU-T G.709 Threshold Settings

Parameter	Description	Options
Port[1]	(Display only) Port number.	9 (Trunk)
ES	Errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
SES	Severely errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
UAS	Unavailable seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
BBE	Background block errors	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
FC	Failure counter	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.

1. Latency for a 1G-FC payload without ITU-T G.709 is 4 microseconds, and with ITU-T G.709 is 40 microseconds. Latency for a 2G-FC payload without ITU-T G.709 is 2 microseconds, and with ITU-T G.709 is 20 microseconds. Consider these values when planning a FC network that is sensitive to latency.

Table 11-132 describes the values on the Provisioning > OTN > FEC Threshold tab.

Table 11-132 MXP_MR_10DME_C and MXP_MR_10DME_L Card FEC Threshold Settings

Parameter	Description	Options
Port	(Display only) Port number.	2
Bit Errors Corrected	Sets the value for bit errors corrected.	Numeric. Can be set for 15-minute or one-day intervals.
Uncorrectable Words	Sets the value for uncorrectable words.	Numeric. Can be set for 15-minute or one-day intervals.

Table 11-133 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-133 MXP_MR_10DME_C and MXP_MR_10DME_L Card Trail Trace Identifier Settings

Parameter	Description	Options
Port	(Display only) Port number.	2
Level	Sets the level.	• Section • Path
Received Trace Mode	Sets the trace mode.	• Off/None • Manual

Table 11-133 MXP_MR_10DME_C and MXP_MR_10DME_L Card Trail Trace Identifier Settings (continued)

Parameter	Description	Options
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Disable FDI on TTIM	If a Trace Identifier Mismatch on Section overhead alarm arises because of a J0 overhead string mismatch, no Forward Defect Indication (FDI) signal is sent to the downstream nodes if this box is checked.	• Checked (FDI on TTIM is disabled) • Unchecked (FDI on TTIM is not disabled)
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

NTP-G293 Modify the 40G Muxponder Card Line Settings and PM Parameter Thresholds

Purpose	This procedure changes the line and parameter threshold settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	• NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 • DLP-G63 Install an SFP or XFP, page 14-72 • DLP-G277 Provision a Multirate PPM, page 11-152 (Optional) • DLP-G278 Provision the Optical Line Rate, page 11-155 (Optional)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the muxponder card settings. If you are already logged in, proceed to Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to save the existing settings before modifying.

Step 3 Perform any of the following tasks as needed:

- DLP-G662 Change the 40G Multirate Muxponder Card Settings, page 11-324
- DLP-G666 Change the 40G Muxponder Line Settings, page 11-325
- DLP-G667 Change the 40G Muxponder SONET (OC-192)/SDH (STM-64) Settings, page 11-327
- DLP-G668 Change the 40G Muxponder Section Trace Settings, page 11-329
- DLP-G669 Change the 40G Muxponder SONET or SDH Line Thresholds, page 11-332
- DLP-G670 Change the 40G Muxponder Line RMON Thresholds for Ethernet, 8G FC, or 10G FC Payloads, page 11-334
- DLP-G671 Provision the 40G Muxponder Trunk Port Alarm and TCA Thresholds, page 11-338
- DLP-G672 Provision the 40G Muxponder Client Port Alarm and TCA Thresholds, page 11-339
- DLP-G673 Change the 40G Muxponder OTN Settings, page 11-343

Note To use the Alarm Profiles tab, including creating alarm profiles and suppressing alarms, see the Alarm and TCA Monitoring and Management document.

Stop. You have completed this procedure.

DLP-G662 Change the 40G Multirate Muxponder Card Settings

Purpose	This task changes the card settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C, or 40E-MXP-C card where you want to change the card settings.

Step 2 Click the **Provisioning > Card** tabs.

Step 3 Modify either of the settings described in Table 11-134.

Table 11-134 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Card Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Card Mode	Sets the card mode.	• Muxponder • Unidirectional Regen Set the mode to Unidirectional Regen under the following conditions: – Trunk port is in OOS,DSBLD state. – Pluggable port modules of the card must not be configured for payload. – Regeneration peer slot must be set to None.	• Muxponder • Unidirectional Regen Set the mode to Unidirectional Regen under the following conditions: – Trunk port is in locked,disabled state. – Pluggable port modules of the card must not be configured for payload. – Regeneration peer slot must be set to None.
Trunk Wavelengths	(Display only) Shows supported wavelengths of the trunk port after the card is installed. The 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C card that is installed shows the C-band wavelengths that it supports.	—	—

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G666 Change the 40G Muxponder Line Settings

Purpose	This task changes the line settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C or 40E-MXP-C card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > Ports** tabs. Tabs and parameters vary according to the PPM provisioning.

Step 3 Modify any of the settings as described in Table 11-135.

Table 11-135 Line Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number.	• 1 through 4 (client) • 5 (trunk)
Port Name	Assigns a logical name for each of the port.	User-defined. This can be up to 32 alphanumeric or special characters, or both. The port name is blank by default. For information about assigning a port name, see the "DLP-G104 Assign a Name to a Port" task on page 16-16. **Note** You can assign a port name for each fiber channel/FICON interface on the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C card, enabling the MDS Fabric Manager to associate the SAN port and a SAN port on the Cisco MDS 9000 switch.
Admin State	Sets the port service state unless network conditions prevent the change. For more information, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI) • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI)
Service State	(Display only) Shows the general condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)

Table 11-135 Line Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
ALS Mode	(Client ports only) Activates the ALS mode.	• Disabled (default)—ALS is off; the laser is not automatically shut down when traffic outage or loss of signal (LOS) occurs. • Auto Restart—(OC-192/STM-64 only) ALS is on; the laser automatically shuts down during LOS. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart—ALS is on; the laser automatically shuts down when traffic outage or LOS occurs. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test—Manually restarts the laser for testing.
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to the change settings.	• Duration of valid input signal, in hh.mm format, after which the card status changes to in service (IS) automatically • 0 to 48 hours, 15-minute increments
Reach	Sets the optical reach distance of the client port.	• Autoprovision—The system automatically provisions the reach from the pluggable port module (PPM) reach value on the hardware. • EW • LW • SW • LRM • ER • LR • SR • ZR • IR 2 • LR 2 • DWDM • CWDM40km
Wavelength	Provisions the port wavelength.	• First Tunable Wavelength • Further wavelengths: Further wavelengths in the 100-GHz ITU-T C-band spacing. The card wavelengths are marked by asterisks. If the card is not installed, all wavelengths appear with a dark grey background.

Table 11-135 Line Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Squelch	Shuts down the far-end laser in response to certain defects.	• Squelch **Note** Squelch does not apply to ISC COMPACT payloads. • Disable **Note** Both Squelch and AIS options are supported when the selected Termination Mode is Transparent. If the Termination Mode selected is Section or Line, then only AIS is supported. This is applicable for OC-192/STM-64 and OC-768/STM-256. For OTN payloads, both Squelch and AIS options are supported.
Overclock	(Trunk port only) Enables or disables overclock mode on the trunk port.	• OFF (default) • ON
Rx Wavelength	(Trunk port only) Provisions the trunk port wavelength.	• First Tunable Wavelength • Further wavelengths: Further wavelengths in the 100-GHz ITU-T C-band spacing. The card wavelengths are marked by asterisks. If the card is not installed, all wavelengths appear with a dark grey background.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G667 Change the 40G Muxponder SONET (OC-192)/SDH (STM-64) Settings

Purpose	This task changes the SONET OC-192 or SDH STM-64 settings for the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C, or 40E-MXP-C card where you want to change the SONET (OC-192) or SDH (STM-64) settings.

Step 2 Click the **Provisioning > Line > SONET** (ANSI) or **SDH** (ETSI). Tabs and parameters vary according to the PPM provisioning.

Step 3 Modify any of the settings described in Table 11-136.

Table 11-136 Line SONET or SDH Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number.	5 (Trunk)
Port Name	Assigns a logical name assigned to a port. This field is blank by default.	User-defined. This can be up to 32 alphanumeric or special characters, or both. The port name is blank by default. For information about assigning a port name, see the "DLP-G104 Assign a Name to a Port" task on page 16-16.
SF BER	Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
ProvidesSync	(Display only) Displays the ProvidesSync card parameter state.	Checked or unchecked
SyncMsgIn	Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked
Send DoNotUse	Sets the Send DoNotUse card state. When checked, sends a DUS (do not use) message on the S1 byte.	Checked or unchecked
Type	Indicates the optical transport type.	• SONET (ANSI) • SDH (ETSI)
Termination Mode	(Display-only for Standard Regeneration and Enhanced FEC card configurations) Sets the mode of operation.	• Transparent • Section (ANSI) or Regeneration Section (RS) (ETSI) • Line (ANSI) or Multiplex Section (MS) (ETSI)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G668 Change the 40G Muxponder Section Trace Settings

Purpose	This task changes the section trace settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C, or 40E-MXP-C card where you want to change the section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs. Tabs and parameter selections vary according to the PPM provisioning.

Step 3 Modify any of the settings described in Table 11-137.

Table 11-137 Line Section Trace Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number that is applicable only for OC-192/STM-64 payloads.	• 1-1 • 2-1 • 3-1 • 4-1
Received Trace Mode	Sets the trace mode.	• Off/None • Manual
Disable AIS/RDI on TIM-S	Disables the alarm indication signal.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte
Transmit	Displays and sets the current transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Transmit String Type, click **Hex Mode** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex Mode). The supported range for 1 bit Hex TX trace is 20 to 7E. If TX trace is provisioned outside this range, client transmits 00.	Transmit string size

Table 11-137 Line Section Trace Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Expected	Displays and sets the current expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Expected String Type, click **Hex Mode** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex Mode). The supported range for 1 bit Hex TX trace is 20 to 7E. If TX trace is provisioned outside this range, client transmits 00.	Expected string size
Received	(Display only) Displays the current received string. Click **Refresh** to manually refresh this display, or check the **Auto-refresh** every 5 sec check box to keep this panel updated.	Received string size
Auto-refresh	Automatically refreshes the display every 5 seconds.	• Checked • Unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G691 Change the 40G Muxponder OTU Settings

Purpose	This task changes the OTU settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C, or 40E-MXP-C card where you want to change the OTU settings.

Step 2 Click the **Provisioning > Line > OTU** tabs. Tabs and parameter selections vary according to the PPM provisioning.

Step 3 Modify any of the settings described in Table 11-138.

Table 11-138 OTU Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the port number that is applicable only for OC-192/STM-64 payloads.	• 1-1 • 2-1 • 3-1 • 4-1	• 1-1 • 2-1 • 3-1 • 4-1
SyncMsgIn	(Display only) (OC-768/STM-256 only) Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked	Checked or unchecked
Admin SSM	Overrides the synchronization status message (SSM) and the synchronization traceability unknown (STU) value. If the node does not receive an SSM signal, it defaults to STU.	• PRS—Primary Reference Source (Stratum 1) • STU—Sync traceability unknown • ST2—Stratum 2 • ST3—Stratum 3 • SMC—SONET minimum clock • ST4—Stratum 4 • DUS—Do not use for timing synchronization • RES—Reserved; quality level set by user	• G811—Primary reference clock • STU—Sync traceability unknown • G812T—Transit node clock traceable • G812L—Local node clock traceable • SETS—Synchronous equipment • DUS—Do not use for timing synchronization
ProvidesSync	(Display only) (OC-768/STM-256 only) Sets the ProvidesSync card parameter. If checked, the card is provisioned as a network element (NE) timing reference.	Checked or unchecked	Checked or unchecked

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G669 Change the 40G Muxponder SONET or SDH Line Thresholds

Purpose	This task changes the SONET or SDH line threshold settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C muxponder cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C, or 40E-MXP-C card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds > SONET Thresholds** (ANSI) or **SDH Thresholds** (ETSI) tabs.

Step 3 Modify any of the settings shown in Table 11-139.

Note In Table 11-139, some parameters and options do not apply to all 40-G-MXP-C cards. If the parameter or options do not apply, they do not appear in CTC.

Table 11-139 Line Threshold Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Port number. Applicable for only OC-192/STM-64 payloads.	• 1-1 • 2-1 • 3-1 • 4-1	• 1-1 • 2-1 • 3-1 • 4-1
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option individually in each category and click **Refresh**.	—

Table 11-139 Line Threshold Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option individually in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option individually in each category and click **Refresh**.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option individually in each category and click **Refresh**. Click **Reset to Default** to restore default values.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option individually in each category and click **Refresh**. Click **Reset to Default** to restore default values.
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option individually in each category and click **Refresh**. Click **Reset to Default** to restore default values.	—
UAS	(Line or Multiplex Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option individually in each category and click **Refresh**. Click **Reset to Default** to restore default values.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option individually in each category and click **Refresh**. Click **Reset to Default** to restore default values.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G670 Change the 40G Muxponder Line RMON Thresholds for Ethernet, 8G FC, or 10G FC Payloads

Purpose	This task changes the line threshold settings of 40G-MXP-C, or 40E-MXP-C card carrying Ethernet, 8G FC, or 10G FC payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), display the 40G-MXP-C, or 40E-MXP-C card where you want to change the line threshold settings in the card view.

Step 2 Click the **Provisioning > Line Thresholds > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose the payload port— for example "1-1 (TEN_GE)", or the equivalent ITU-T G.7041 GFP (Generic Frame Procedure) port.

Step 5 From the Variable drop-down list, choose an Ethernet or FC variable. See Table 11-140 for a list of available Ethernet variables, Table 11-141 for a list of FC, and Table 11-141 for a list of GFP variables.

Table 11-140 Ethernet Variables of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Variable	Description
ifInOctets	Number of bytes received since the last counter reset.
rxTotalPkts	Total number of received packets.
ifInUcastPkts	Number of packets, delivered by this sub-layer to a higher sub-layer, which were not addressed to a multicast or broadcast address at this sub-layer.
inInMulticastPkts	Number of packets, delivered by this sub-layer to a higher sub-layer, which were addressed to a multicast address at this sub-layer. For a MAC layer protocol, this includes both Group and Functional addresses.
ifInBroadcastPkts	Number of packets, delivered by this sub-layer to a higher sub-layer, which were addressed to a broadcast address at this sub-layer.
ifInErrors	Total number of received errors.
ifOutOctets	Total number of octets transmitted out of the interface, including framing characters.

Table 11-140 Ethernet Variables of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Variable	Description
txTotalPkts	Total number of transmitted packets.
dot3StatsFCSErrors	Count of frames received on a particular interface that are an integral number of octets in length but do not pass the Frame Check Sequence (FCS) check.
dot3StatsFrameTooLong	Count of frames received on a particular interface that exceed the maximum permitted frame size.
dot3StatsInPauseFrames	Count of frames received on this interface with an opcode indicating the PAUSE operation.
dot3StatsOutPauseFrames	Count of MAC control frames transmitted on this interface with an opcode indicating the PAUSE operation.
etherStatsUndersizePkts	Total number of packets transmitted and received by the interface that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
etherStatsFragments	Total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets.
etherStatsPkts	Total number of packets (including bad packets, broadcast packets, and multicast packets) transmitted and received by the interface.
etherStatsPkts64Octets	Total number of packets (including bad packets) transmitted and received by the interface that were 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts65to127Octets	Total number of packets (including error packets) transmitted and received by the interface that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts128to255Octets	Total number of packets (including error packets) transmitted and received by the interface that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts256to511Octets	Total number of packets (including error packets) transmitted and received by the interface that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts512to1023Octets	Total number of packets (including error packets) transmitted and received by the interface that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).

Table 11-140 Ethernet Variables of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Variable	Description
etherStatsPkts1024to1518Octets	Total number of packets (including error packets) transmitted and received by the interface that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsBroadcastPkts	Total number of good packets transmitted and received by the interface that were directed to the broadcast address.
etherStatsMulticastPkts	Total number of good packets transmitted and received by the interface that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
etherStatsOversizePkts	Total number of packets transmitted and received by the interface that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
etherStatsJabbers	Total number of packets transmitted and received by the interface that were longer than 1518 octets (excluding framing bits, but including FCS octets), and were not an integral number of octets in length or had a bad FCS.
etherStatsOctets	Total number of octets of data (including those in bad packets) transmitted and received by the interface on the network (excluding framing bits but including FCS octets).

Table 11-141 FC Variables of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Variable	Description
ifInOctets	Number of bytes received since the last counter reset.
rxTotalPkts	Total number of received packets.
ifInErrors	Total number of received errors.
ifOutOctets	Total number of octets transmitted out of the interface, including framing characters.
txTotalPkts	Total number of transmitted packets.
ifOutErrors	Number of outbound packets or transmission units that could not be transmitted because of errors.
mediaIndStatsRxFramesTruncated	Total number of frames received that are less than 5 bytes. This value is a part of HDLC and GFP port statistics.
mediaIndStatsRxFramesTooLong	Number of received frames that exceed the MTU. This value is part of HDLC and GFP port statistics.
mediaIndStatsRxFramesBadCRC	Number of receive data frames with payload CRC errors when HDLC framing is used.
mediaIndStatsTxFramesBadCRC	Number of transmitted data frames with payload CRC errors when HDLC framing is used.

Table 11-141 FC Variables of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Variable	Description
mediaIndStatsTxFramesTooLong	Total number of transmitted data frames that are less than 5 bytes. This value is a part of HDLC and GFP port statistics.
mediaIndStatsTxFramesTruncated	Number of transmitted data frames that exceed the MTU. This value is part of HDLC and GFP port statistics.

Table 11-142 GFP RMON Variables of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Variable	Description
gfpStatsRxFrame	Total number of received data frames.
gfpStatsTxFrame	Total number of transmitted data frames.
gfpStatsRxSblkCRCErrors	Total number of superblock CRC errors with the receive transparent GFP frame. A transparent GFP frame has multiple superblocks where each contains Fibre Channel data.
gfpStatsRxOctets	Total number of GFP data octets received.
gfpStatsTxOctets	Total number of GFP data octets transmitted.
gfpStatsRxSBitErrors	Received GFP frames with single bit errors in the core header (these errors can be corrected).
gfpStatsRxMBitErrors	Received GFP frames with multiple bit errors in the core header (these errors cannot be corrected).
gfpStatsRxTypeInvalid	Received GFP frames with invalid type (these are discarded). For example, receiving GFP frames that contain Ethernet data when we expect Fibre Channel data.
gfpStatsLFDRaised	Count of core HEC CRC multiple bit errors. **Note** This count is only of eHec multiple bit errors when in frame. This can be looked at as a count of when the state machine goes out of frame.
gfpRxCmfFrame	—
gfpTxCmfFrame	—

Step 6 From the Alarm Type drop-down list, choose an alarm type. The alarm type indicates whether or not an event is triggered by the type of threshold.

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Enter the number of Sample Period occurrences.

Step 9 Enter the number of Rising Threshold occurrences.

To trigger the alarm, the measured value of a threshold must always move from below the falling threshold to above the rising threshold. For example, if a network moves from below a rising threshold of 1000 collisions every 15 seconds to 1001 collisions.

Step 10 Enter the appropriate number of occurrences for the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the exact opposite of a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded.

Step 11 Click **OK**.

Step 12 Return to your originating procedure (NTP).

DLP-G671 Provision the 40G Muxponder Trunk Port Alarm and TCA Thresholds

Purpose	This task changes the trunk port alarm and TCA thresholds of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C, or 40E-MXP-C card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Note You must modify 15 Min and 1 Day independently. To do so, select the appropriate radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Step 3 If TCA is not selected, click **TCA** and then click Refresh. If it is selected, continue with Step 4.

Step 4 Verify the trunk port (Port 5) TCA thresholds are set at the values shown as follows:

- Laser Bias High (%): 95.0
- RX Power High (dBm): –9.0
- RX Power Low (dBm): –22.0
- TX Power High (dBm): 9.0

- TX Power Low (dBm): 0.0

  Provision new thresholds as needed by replacing the old values with new ones.

Step 5 Under Types area, click the **Alarm** radio button and click **Refresh**.

> **Note** Do not modify the Laser Bias parameters.

Step 6 Verify the trunk port (Port 5) alarm thresholds are set at the values shown as follows:

- Laser Bias High (%): 98.0
- RX Power High (dBm): –8.0
- RX Power Low (dBm): –24.0
- TX Power High (dBm): 7.0
- TX Power Low (dBm): 3.0

  Provision new thresholds as needed replacing the old values with new ones.

Step 7 Click **Apply**.

Step 8 Return to your originating procedure (NTP).

DLP-G672 Provision the 40G Muxponder Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC • DLP-G278 Provision the Optical Line Rate, page 11-155
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C, or 40E-MXP-C card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Step 3 If TCA is not selected, click **TCA** and then click Refresh. If it is selected, continue with Step 4.

Step 4 Referring to Table 11-143, verify the client ports (Ports 1 through 4) TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface at the other end. Provision new thresholds as needed by replacing the old values with new ones.

> **Note** Do not modify the Laser Bias parameters.

Note You must modify 15 Min and 1 Day independently. To do so, select the appropriate radio button and click **Refresh**.

Table 11-143 Client Interfaces TCA Thresholds of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

PPM Port Rate	Pluggable Port Module[1] (XFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
FC8G	ONS-XC-8G-FC-SM	–9	–22	9.0	0.0
FC10G	ONS-XC-10G-1470 through ONS-XC-10G-1610 ONS-XC-10G-C ONS-XC-10G-S1	–9	–22	9.0	0.0
	ONS-XC-10G-I2	2.0	–15.8	8.0	–7.0
	ONS-XC-10G-L2	1.0	–14.0	5.0	–12.0
	ONS-XC-10G-SR-MM	0.0	0.0	6.0	–6.0
10GE	ONS-XC-10G-30.3 through ONS-XC-10G-61.4 ONS-XC-10G-C ONS-XC-10G-SR-M ONS-XC-10G-S1	–9	–22	9.0	0.0
	ONS-XC-10G-I2	2.0	–15.8	8.0	–7.0
	ONS-XC-10G-L2	–7.0	–24.0	6.5	–2.5

Table 11-143 Client Interfaces TCA Thresholds of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

PPM Port Rate	Pluggable Port Module[1] (XFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
OC-192	ONS-XC-10G-30.3 through ONS-XC-10G-61.4 ONS-XC-10G-C ONS-XC-10G-1470 through ONS-XC-10G-1610 ONS-XC-10G-I2 ONS-XC-10G-SR-MM	–9	–22	9.0	0.0
	ONS-XC-10G-L2	–9.0	–26.0	8.0	–8.0
	ONS-XC-10G-S1	–1.0	–11.0	5.0	–12.0
OTU2	ONS-XC-10G-30.3 through ONS-XC-10G-61.4 ONS-XC-10G-C ONS-XC-10G-1470 through ONS-XC-10G-1610 ONS-XC-10G-I2 ONS-XC-10G-L2 ONS-XC-10G-SR-MM ONS-XC-10G-S1	–9	–22	9.0	0.0

1. In CTC, SFPs, and XFPs are called pluggable port modules (PPMs). For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Step 5 Click **Apply**.

Step 6 Repeat Steps 3 and 4 to provision the additional client ports.

Step 7 Under Types area, click the **Alarm** radio button and click **Refresh**.

Step 8 Referring to Table 11-144, verify the client port (Ports 1 through 8) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned. Provision new thresholds as needed replacing the old values with new ones.

Table 11-144 Client Interface Alarm Thresholds of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

PPM Port Rate	Pluggable Port Module[1] (XFP)	Alarm RX Power Low	Alarm RX Power High	Alarm TX Power Low	Alarm TX Power High
FC8G	ONS-XC-8G-FC-SM ONS-XC-10G-S1	–9	–22	9.0	0.0
FC10G	ONS-XC-10G-30.3 through ONS-XC-10G-61.4 ONS-XC-10G-C ONS-XC-10G-1470 through ONS-XC-10G-1610 ONS-XC-10G-S1	–9	–22	9.0	0.0
	ONS-XC-10G-I2	4.5	–18.3	4.5	–3.5
	ONS-XC-10G-L2	–4.5	–26.5	6.5	–2.5
	ONS-XC-10G-SR-MM	2.0	–2.0	2.0	–2.0
10GE	ONS-XC-10G-30.3 through ONS-XC-10G-61.4 ONS-XC-10G-C ONS-XC-10G-S1 ONS-XC-10G-SR-MM	–9	–22	9.0	0.0
	ONS-XC-10G-I2	4.5	–18.3	4.5	–3.5
	ONS-XC-10G-L2	–4.5	–26.5	6.5	–2.5
OC-192	ONS-XC-10G-30.3 through ONS-XC-10G-61.4 ONS-XC-10G-C ONS-XC-10G-1470 through ONS-XC-10G-1610 ONS-XC-10G-I2 ONS-XC-8G-FC-SM ONS-XC-10G-SR-MM	–9	–22	9.0	0.0
	ONS-XC-10G-L2	–7.0	–28.0	4.0	–4.0
	ONS-XC-10G-S1	–1.0	–13.0	1.0	–8.0
OTU2	ONS-XC-10G-30.3 through ONS-XC-10G-61.4 ONS-XC-10G-C ONS-XC-10G-1470 through ONS-XC-10G-1610 ONS-XC-10G-S1 ONS-XC-10G-I2 ONS-XC-10G-L2 ONS-XC-8G-FC-SM ONS-XC-10G-SR-MM	–9	–22	9.0	0.0

1. In CTC, SFPs and XFPs are called pluggable port modules (PPMs). For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Step 9 Click **Apply**.

Step 10 Repeat Steps 7 and 8 to provision additional client ports.

Step 11 Return to your originating procedure (NTP).

DLP-G673 Change the 40G Muxponder OTN Settings

Purpose	This task changes the OTN settings for the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the 40G-MXP-C, or 40E-MXP-C card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then choose one of the following subtabs: **OTN Lines**, **ITU-T G.709 Thresholds**, **FEC Thresholds**, or **Trail Trace Identifier**.

Step 3 Modify any of the settings described in Tables 11-145 through 11-148.

Note You must modify Near End and Far End, 15 Min and 1 Day, and SM and PM independently. To do so, select the appropriate radio button and click **Refresh**.

Table 11-145 describes the values on the Provisioning > OTN > OTN Lines tab.

Table 11-145 OTN Line Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number. Applicable for trunk ports and ports with OTU2 payload.	• 1-1 • 2-1 • 3-1 • 4-1 • 5 (Trunk)
ITU-T G.709 Thresholds	Sets the OTN lines according to ITU-T G.709.	• Enable • Disable
FEC	Sets the OTN lines to forward error correction (FEC).	• Standard • Enhanced

Table 11-145 OTN Line Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
SF BER	(Display only) Sets the signal fail bit error rate.	• 1E-5
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9

Table 11-146 describes the values on the Provisioning > OTN > G.709 Thresholds tab.

Table 11-146 ITU-T G.709 Threshold Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number. Applicable for trunk ports and ports with OTU2 payload.	• 1-1 • 2-1 • 3-1 • 4-1 • 5 (Trunk)
ES	Errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select the radio button individually and click **Refresh**. Click **Reset to Default** to restore default values.
SES	Severely errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select the radio button individually and click **Refresh**.
UAS	Unavailable seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select the radio button individually and click **Refresh**.
BBE	Background block errors	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select the radio button individually and click **Refresh**.
FC	Failure counter	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select radio button individually and click **Refresh**.

Table 11-147 describes the values on the Provisioning > OTN > FEC Threshold tab.

Table 11-147 FEC Threshold Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number. Applicable for trunk ports and ports with OTU2 payload.	• 1-1 • 2-1 • 3-1 • 4-1 • 5 (Trunk)
Bit Errors Corrected	Sets the value for bit errors corrected.	Numeric. Can be set for 15-minute or one-day intervals.
Uncorrectable Words	Sets the value for uncorrectable words.	Numeric. Can be set for 15-minute or one-day intervals.

Table 11-148 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-148 Trail Trace Identifier Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Port	(Display only) Displays the port number. Applicable for trunk ports and ports with OTU2 payload.	• 1-1 • 2-1 • 3-1 • 4-1 • 5 (Trunk)
Received Trace Mode	Sets the trace mode.	• Off/None • Manual
Disable AIS/RDI on TIM-S	Disables alarm indication signal.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte
Transmit	Displays and sets the current transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Transmit String Type, click **Hex Mode** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex Mode).	Transmit string size

Table 11-148 Trail Trace Identifier Settings of the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C Cards

Parameter	Description	Options
Expected	Displays and sets the current expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. In Expected String Type, click **Hex Mode** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex Mode).	Expected string size
Received	(Display only) Displays the current received string. Click **Refresh** to manually refresh this display, or check the **Auto-refresh every 5 sec** check box to keep this panel updated.	Received string size
Auto-refresh	Refreshes the display automatically every 5 seconds.	• Checked • Unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

NTP-G281 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Channel Group Settings

Purpose	This procedure changes the channel group settings for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	• NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 • "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149 • DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the channel group settings. If you are already logged in, continue with Step 2.

Step 2 Perform any of the following tasks as needed:

- DLP-G611 Create a Channel Group Using CTC, page 11-347
- DLP-G612 Modify the Parameters of the Channel Group Using CTC, page 11-348
- DLP-G613 Add or Remove Ports to or from an Existing Channel Group Using CTC, page 11-352
- DLP-G614 Delete a Channel Group Using CTC, page 11-353
- DLP-G615 Retrieve Information on Channel Group, REP, CFM, and EFM Using CTC, page 11-354
- DLP-G616 View Channel Group PM Parameters for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using CTC, page 11-355
- DLP-G617 View Channel Group Utilization PM Parameters for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using CTC, page 11-356
- DLP-G618 View Channel Group History PM Parameters for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using CTC, page 11-356
- DLP-G619 Create a Channel Group on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI
- DLP-G620 Add Ports to a Channel Group on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI

Step 3 **Stop. You have completed this procedure.**

DLP-G611 Create a Channel Group Using CTC

Purpose	This task creates a channel group on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note You can create up to 11 channel groups on the GE_XP and GE_XPE cards and up to 2 channel groups on the 10GE_XP and 10GE_XPE cards. You can create a channel group with ports only when the ports do not have any UNI QinQ settings or NNI SVLAN settings. Otherwise, the channel group will be created with empty ports.

For information about interaction of LACP with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to create a channel group. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed according to the requirements specified in Table 14-7 on page 14-109.

Step 3 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 4 In card view, click the **Provisioning > Channel Groups** tabs.

Step 5 Click **Create**. The Channel Group Creation dialog box appears.

Step 6 Enter the name of the channel group in the Name field.

Step 7 From the Stand Alone list, choose the ports that will belong to this channel group and click the right arrow button to move the selected ports to the Bundled list.

Step 8 From the LACP Mode drop-down list, choose the LACP mode as needed:

- On—Default mode. In this mode, the ports will not exchange LACP packets with the partner ports.
- Active—In this mode, the ports will send LACP packets at regular intervals to the partner ports.
- Passive—In this mode, the ports will not send LACP packets until the partner ports send LACP packets. After receiving the LACP packets from the partner ports, the ports will send LACP packets.

Step 9 From the LACP Hashing drop-down list, select the LACP hashing algorithm that the protocol uses to perform the load balancing task between the bundled ports.

The following hashing algorithms are supported:

- Ucast SA VLAN Incoming Port
- Ucast DA VLAN Incoming Port
- Ucast SA DA VLAN Incoming port
- Ucast Src IP TCP UDP
- Ucast Dst IP TCP UDP
- Ucast Src Dst IP TCP UDP

Step 10 Click **Create**.

A new row is added in the LACP table and all the other parameters in the channel group are set to default values. The default values of these parameters are taken from the first port that is attached to the channel group.

Step 11 Return to your originating procedure (NTP).

DLP-G612 Modify the Parameters of the Channel Group Using CTC

Purpose	This task modifies the parameters of the channel group.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Ports cannot be added or removed using this procedure. For adding or removing the ports, see the "DLP-G613 Add or Remove Ports to or from an Existing Channel Group Using CTC" task on page 11-352.

Step 1 Complete the "DLP-G46 Log into CTC" task the node where you want to modify the parameters of the channel group. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to modify the parameters of the channel group.

Step 3 In card view, click the **Provisioning > Channel Groups** tabs.

Step 4 Choose a channel group from the existing channel groups.

Step 5 Modify the channel group settings as described in Table 11-149.

Table 11-149 Channel Group Settings

Parameter	Description	Options
Channel Group	(Display only) ID and name of the channel group.	N.A.
Name	Sets the name of the channel group.	—
Ports	(Display only) Port number (*n-n*) and rate (GE or TEN_GE of the channel group).	N.A.
LACP Mode	Sets the LACP mode. The channel group must be in OOS-DSBLD admin state.	• On • Active • Passive
Hashing	Sets the LACP hashing algorithm. The channel group must be in OOS-DSBLD admin state.	• Ucast SA VLAN Incoming Port • Ucast DA VLAN Incoming Port • Ucast SA DA VLAN Incoming port • Ucast Src IP TCP UDP • Ucast Dst IP TCP UDP • Ucast Src Dst IP TCP UDP
Admin State	Sets the administrative state on the channel group.	• IS • OOS, DSBLD
Service State	(Display only) Sets the service state that indicates the operational state of the channel group.	• IS-NR • OOS-MA, DSBLD

Table 11-149 Channel Group Settings

Parameter	Description	Options
MTU	Sets the maximum transfer unit (MTU), which sets the maximum number of bytes per frame accepted on the port. The member ports must be in OOS-DSBLD admin state. The default MTU value in the channel group is taken from the default settings in the node.	Numeric. Default: 9700 Range: 64 to 9700
Mode	Sets the provisional port mode. If the port mode is Auto, the Expected Speed field determines which ports can belong to the bundle. The member ports must be in OOS-DSBLD admin state.	• Auto • 1000 Mbps
Expected Speed	Sets the expected speed of ports of the channel group. The channel group must be in OOS-DSBLD admin state.	• 10 Mbps • 100 Mbps • 1000 Mbps
Duplex	(Display only) Expected duplex capability of ports of the channel group.	• Full
Committed Info Rate	Sets the guaranteed information rate as per the service provider service-level agreement. The channel group must be in OOS-DSBLD admin state.	Numeric. Default: 100 Range: 0 to 100%
Committed Burst Size	Sets the maximum number of bits transferred per second. The channel group must be in OOS-DSBLD admin state.	• 4k (default) • 8k • 16k • 32k • 64k • 128k • 256k • 512k • 1M • 2M • 4M • 8M • 16M

Table 11-149 Channel Group Settings

Parameter	Description	Options
Excess Burst Size	Sets the maximum number of bits credited for later transfer if the committed burst rate cannot be transmitted. The channel group must be in OOS-DSBLD admin state.	• 4k (default) • 8k • 16k • 32k • 64k • 128k • 256k • 512k • 1M • 2M • 4M • 8M • 16M
NIM	Sets the network interface mode (NIM) for the channel group. The member ports must be in OOS-DSBLD admin state. The channel group NIM is set to UNI or NNI based on the mode of the first port that is added to the channel group.	• UNI Mode (Default)—provisions the port as a User-Network Interface (UNI). This is the interface that faces the subscriber. • NNI Mode—provisions the port as a Network-to-Network Interface (NNI). This is the interface that faces the service provider network.
Ingress CoS	Provisions the IEEE 802.1p ingress class of service (CoS). Ingress CoS is used to set the priority of the Ethernet frame in the service provider network. The member ports must be in OOS-DSBLD admin state.	• 0 • 1 • 2 • 3 • 4 • 5 • 6 • 7 • Trust • CVLAN • DSCP

Table 11-149 Channel Group Settings

Parameter	Description	Options
Inner Ethertype (Hex)	Defines the inner Ethertype field. The Ethertype field indicates which protocol is being transported in an Ethernet frame. The member ports must be in OOS-DSBLD admin state to modify the Inner Ethertype value to a non-default value.	Numeric. Default: 8100 (IEEE Std 802.1Q customer VLAN tag type) Range: 0x600 to 0xffff.
Outer Ethertype (Hex)	Defines the outer Ethertype field. The Ethertype field identifies which protocol is being transported in an Ethernet frame. The member ports must be in OOS-DSBLD admin state.	Numeric. Default: 8100 (IEEE standard 802.1Q service provider VLAN tag type) Range: 0x600 to 0xffff
MAC Learning	Enables or disables MAC learning for the port on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards. MAC learning is used by Layer 2 switches to learn the MAC addresses of network nodes so that the Layer 2 switches send traffic to the right location. In GE_XPE or 10GE_XPE cards, enable MAC address learning per SVLAN.	• Checked—MAC learning is enabled for this port. • Unchecked—(Default) MAC learning is disabled for this port.

Note When you set the Committed Info Rate above 40% on 10GE_XP and 10GE_XPE cards, the Committed Burst Size and Excess Burst Size must be set to at least 32K. The Committed Burst Size and Excess Burst Size can be increased based on the packet size and Committed Info Rate value.

Step 6 Click **Apply**.

Step 7 Return to your originating procedure (NTP).

DLP-G613 Add or Remove Ports to or from an Existing Channel Group Using CTC

Purpose	This task adds or removes ports to or from an existing channel group.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Before You Begin

- You can assign up to eight ports to a channel group on GE_XP and GE_XPE cards and up to three ports on the 10GE_XP and 10GE_XPE cards.
- You can assign the ports to a channel group only if the ports are in OOS-DSBLD admin state. The ports must not have any UNI QinQ rule or NNI SVLAN configuration.
- If the channel group is configured in UNI mode, only the UNI ports can be added to the channel group. If the channel group is configured in NNI mode, only the NNI ports can be added to the channel group.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want add ports to an existing channel group. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to add ports to an existing channel group.

Step 3 In card view, click the **Provisioning > Channel Groups** tabs.

Step 4 Choose a channel group from the existing channel groups.

Step 5 Click **Add/Remove Ports**. The Add/Remove Ports dialog box appears.

Step 6 To add ports to an existing channel group, complete the following:

From the Stand Alone list, choose the required ports and click the right arrow button to move the selected ports to the Bundled list.

Step 7 To remove ports from an existing channel group, complete the following:

From the Bundled list, choose the required ports and click the left arrow button to move the selected ports to the Stand Alone list.

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G614 Delete a Channel Group Using CTC

Purpose	This task deletes a channel group.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to delete the channel group. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XP card where you want to delete the channel group.

Step 3 In card view, click the **Provisioning > Channel Groups** tabs.

Step 4 Choose a channel group that you want to delete.

Step 5 Click **Delete**.

Step 6 Return to your originating procedure (NTP).

DLP-G615 Retrieve Information on Channel Group, REP, CFM, and EFM Using CTC

Purpose	This task enables you to view and retrieve information on the channel group, Resilient Ethernet Protocol (REP), Connectivity Fault Management (CFM), and Ethernet in the First Mile (EFM) on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to view and retrieve information on the channel group, REP, CFM, and EFM. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Maintenance > Show Commands** tabs.

Step 4 From the Command drop-down list, choose a command.

The following commands are supported:

- ETH LACP—Displays detailed LACP information from the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
- REP TOPO—Displays the topology information for a specific REP segment.
- REP TOPO ARCHIVE—Displays the previous topology information for a specific REP segment.
- REP INTERFACE—Displays information on the REP interface status and configuration. You can retrieve detailed information for each segment by selecting Detailed from the Level drop-down list and providing the segment ID.
- OAM DISCOVERY—Displays discovery information for all the EFM interfaces or for a specific EFM interface.
- OAM SUMMARY—Displays the active EFM sessions on a device.
- OAM STATISTICS—Displays detailed information about the EFM packets.

- OAM STATUS—Displays information about the EFM configurations for all the EFM interfaces or for a specific interface.

For more information, see the Pseudo Command Line Interface Reference document.

Step 5 From the Level drop-down list, choose **Normal** or **Detailed**.

Step 6 Click **Show**. Depending on the command, the appropriate output appears in the text area.

Step 7 Return to your originating procedure (NTP).

DLP-G616 View Channel Group PM Parameters for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using CTC

Purpose	This task enables you to view current statistical performance monitoring (PM) counts on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards and channel groups to detect possible performance problems.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to view the channel group PM counts on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

Step 2 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to view the channel group statistics. The card view appears.

Step 3 Click the **Performance** > **Channel Groups** > **Statistics** tabs.

Step 4 Click **Refresh**. Performance monitoring statistics for each channel group on the card appear in the Statistics tab.

View the PM parameter names in the Param column. The current PM parameter values appear in the Port # (CHGRP) column. For PM parameter definitions, see the Monitor Performance document.

Note To refresh, reset, or clear PM counts, see the "NTP-G73 Change the PM Display" procedure.

Return to your originating procedure (NTP).

DLP-G617 View Channel Group Utilization PM Parameters for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using CTC

Purpose	This task enables you to view line utilization PM counts on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards and channel groups to detect possible performance problems.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to view the channel group utilization PM parameters on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

Step 2 In node view, double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to view the channel group utilization. The card view appears.

Step 3 Click the **Performance** > **Channel Groups > Utilization** tabs.

Step 4 Click **Refresh**. The utilization percentages for each channel group on the card appear in the Utilization tab.

View the Port # column to find the channel group you want to monitor.

The transmit (Tx) and receive (Rx) bandwidth utilization values, for the previous time intervals, appear in the Prev-*n* columns. For PM parameter definitions, see the Monitor Performance document.

Note To refresh, reset, or clear PM counts, see the "NTP-G73 Change the PM Display" procedure.

Return to your originating procedure (NTP).

DLP-G618 View Channel Group History PM Parameters for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using CTC

Purpose	This task enables you to view historical PM counts at selected time intervals on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards and channel groups to detect possible performance problems.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to view the channel group history PM parameters on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

Step 2 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card where you want to view the channel group history PM data. The card view appears.

Step 3 Click the **Performance** > **Channel Groups > History** tabs.

Step 4 From the **Port** field, choose a channel group.

Step 5 Click **Refresh**. Performance monitoring statistics for each channel group on the card appear in the History tab.

View the PM parameter names that appear in the Param column. The PM parameter values appear in the Prev-*n* columns. For PM parameter definitions, see the Monitor Performance document.

Note To refresh, reset, or clear PM counts, see the "NTP-G73 Change the PM Display" procedure.

Return to your originating procedure (NTP).

NTP-G283 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card CFM Settings

Purpose	This procedure changes the CFM settings for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	• NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 • "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149 • DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the CFM settings. If you are already logged in, continue with Step 2.

Step 2 Perform any of the following tasks as needed:

- DLP-G621 Enable or Disable CFM on the Card Using CTC, page 11-358
- DLP-G622 Enable or Disable CFM for Each Port Using CTC, page 11-359
- DLP-G623 Create a Maintenance Domain Profile Using CTC, page 11-360
- DLP-G624 Delete a Maintenance Domain Profile Using CTC, page 11-361

Step 3 **Stop. You have completed this procedure.**

DLP-G621 Enable or Disable CFM on the Card Using CTC

Purpose	This task allows you to enable or disable CFM on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note CFM is disabled on the card by default. CFM must be enabled at both card and port levels for the CFM service to work.

For information about interaction of CFM with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable or disable CFM on the card. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > Security** tab.

Step 4 Uncheck the **MAC security** check box to disable MAC security.

Step 5 In card view, click the **Provisioning > CFM > Configuration > Global Settings** tabs.

Step 6 Check the **Enable CFM** check box that is present at the bottom of the screen.

Step 7 Choose the value for CC Timer field. The value can be 1 second, 10 seconds, or 1 minute.

Note Continuity Check (CC) messages are periodically exchanged between maintenance end points (MEPs). The CC Timer field is used to set the time frequency for transmission of CC messages.

Step 8 Click **Apply** to enable CFM on the card.

Note Uncheck the **Enable CFM** check box to disable CFM on the card.

Step 9 Return to your originating procedure (NTP).

DLP-G622 Enable or Disable CFM for Each Port Using CTC

Purpose	This task allows you to enable or disable CFM for each port on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note CFM must be enabled at both card and port levels for the CFM service to work. However, CFM is enabled on all the ports by default.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable or disable CFM for each port. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > Global Settings** tabs.

Step 4 If you want to enable CFM on a specific port, check the **Enable CFM** check box against that port.

Step 5 Choose the value for CC Timer field. The value can be 1 second, 10 seconds, or 1 minute.

Note Continuity Check (CC) messages are periodically exchanged between MEPs. The CC Timer field is used to set the time frequency for transmission of CC messages.

Step 6 Click **Apply** to enable CFM on the port.

Note Uncheck the **Enable CFM** check box against the port to disable CFM on the port.

Step 7 Return to your originating procedure (NTP).

DLP-G623 Create a Maintenance Domain Profile Using CTC

Purpose	This task allows you to create a maintenance domain profile on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Before You Begin

- You can create up to eight maintenance domain profiles on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
- The maximum number of characters for the maintenance domain profile and the maintenance association profile must not exceed 43 characters.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to create a maintenance domain profile. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > Domain Profiles** tabs or in node/network view, click the **Provisioning > CFM Profiles > Domain Profiles** tabs.

Note Use the network view to store the domain profile on multiple nodes.

Step 4 Click **Add row(s)**.

Step 5 Enter the name of the domain in the Domain Name field.

Step 6 Enter the level of the domain profile in the Level field. The range of the domain profile level is from 0 to 7.

Step 7 Click **Store**.

Step 8 Choose the card slot where you want to store this domain profile and click **OK**.

Step 9 Return to your originating procedure (NTP).

DLP-G624 Delete a Maintenance Domain Profile Using CTC

Purpose	This task allows you to delete a maintenance domain profile on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to delete a maintenance domain profile. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > Domain Profiles** tabs or in node/network view, click the **Provisioning > CFM Profiles > Domain Profiles** tabs.

Step 4 Select the domain profiles that you want to delete.

Step 5 Check the **on Node** check box.

Step 6 Click **Delete Sel. row(s)**. The **CFM Profile Deleting** dialog box appears.

Step 7 Choose the card slot where you want to delete this profile and click **OK**. The **Deleting Profile** dialog box appears.

Step 8 In the **Deleting Profile** dialog box, click **Yes**.

Step 9 Return to your originating procedure (NTP).

DLP-G625 Create a Maintenance Association Profile Using CTC

Purpose	This task allows you to create a maintenance association profile on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note You can create up to 1500 maintenance association profiles on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to create a maintenance association profile. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > MA Profiles** tabs or in node/network view, click the **Provisioning > CFM Profiles > MA Profiles** tabs.

Note Use the network view to store the maintenance association profile on multiple nodes.

Step 4 Click **Add row(s)**.

Step 5 Enter the name of the maintenance association in the Maintenance Profile Name field.

Step 6 Enter the VLAN ID in the VLAN ID field. The range of the VLAN ID is from 1 to 4093.

Step 7 Check the **CC Enable** check box to receive Continuity Check messages.

Step 8 Click **Store**.

Step 9 Choose the card slot where you want to store this maintenance association profile and click **OK**.

Step 10 Return to your originating procedure (NTP).

DLP-G626 Modify a Maintenance Association Profile Using CTC

Purpose	This task allows you to modify a maintenance association profile on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note Ensure that the maintenance association profile you want to modify is not associated with a maintenance domain profile.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to modify a maintenance association profile. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > MA Profiles** tabs or in node/network view, click the **Provisioning > CFM Profiles > MA Profiles** tabs.

Step 4 Select the maintenance association profiles that you want to modify.

Step 5 Click **Modify Selected Profile(s)**. The **Modify MA Profile** dialog box appears.

Step 6 Modify the values as required and click **OK**.

Step 7 Return to your originating procedure (NTP).

DLP-G627 Delete a Maintenance Association Profile Using CTC

Purpose	This task allows you to delete a maintenance association profile on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note Ensure that the maintenance association profile you want to delete is not associated with a maintenance domain profile.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to delete a maintenance association profile. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > MA Profiles** tabs or in node/network view, click the **Provisioning > CFM Profiles > MA Profiles** tabs.

Step 4 Select the maintenance association profiles that you want to delete.

Step 5 Check the **on Node** check box.

Step 6 Click **Delete Sel. row(s)**. The **CFM Profile Deleting** dialog box appears.

Step 7 Choose the card slot where you want to delete this profile and click **OK**. The **Deleting Profile** dialog box appears.

Step 8 In the **Deleting Profile** dialog box, click **Yes**.

Step 9 Return to your originating procedure (NTP).

DLP-G628 Map a Maintenance Association Profile to a Maintenance Domain Profile Using CTC

Purpose	This task allows you to map a maintenance association profile to a maintenance domain profile on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note Ensure that you have already created maintenance domain profiles and maintenance association profiles.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to map a maintenance association profile to a maintenance domain profile. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > MA-Domain Mapping** tabs.

Step 4 From the main drop-down list, choose a maintenance domain profile.

Step 5 Click **Link MA Profiles**. The **Link MA Profiles** dialog box appears.

Step 6 From the Available Profiles list, choose the required MA profiles and click the right arrow button to move the MA profiles to the Linked Profiles list and click **OK**.

Note The maintenance association profiles that are mapped with a specific maintenance domain profile must have a unique SVLAN ID.

Step 7 Return to your originating procedure (NTP).

DLP-G629 Create a MEP Using CTC

Purpose	This task allows you to create a Maintenance End Point (MEP) for a given VLAN range on a specific maintenance domain.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note You can create up to 255 MEPs and MIPs on the GE_XP and 10GE_XP cards. You can create up to 500 MEPs and MIPs on the GE_XPE and 10GE_XPE cards.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to create a MEP. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > MEP** tabs.

Step 4 Click **Create**. The **Create MEP** dialog box appears.

Step 5 From the Port drop-down list, choose a port where you want to create the MEP.

Note CFM must be enabled on the port to create a MEP. The port must not belong to a channel group.

Step 6 From the Domain drop-down list, choose a maintenance domain.

Step 7 Enter the SVLAN ID in the Vlan Id field.

Note The specified VLAN must be configured on the selected port. The specified VLAN must also appear in the MA-Domain Mapping table.

Step 8 Enter the MP ID (identifier of the maintenance end point) in the MPID field and click **OK**. The range of the MP ID is from 1 to 8191.

The MP ID must not be the same between the maintenance end points.

Step 9 Return to your originating procedure (NTP).

DLP-G630 Delete a MEP Using CTC

Purpose	This task allows you to delete a MEP on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to delete a MEP. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > MEP** tabs.

Step 4 Select the MEPs that you want to delete.

Step 5 Click **Delete**.

Step 6 Return to your originating procedure (NTP).

DLP-G631 Create a MIP Using CTC

Purpose	This task allows you to create a Maintenance Intermediate Point (MIP) for a given VLAN range with a specific maintenance level.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note You can create up to 255 MEPs and MIPs on the GE_XP and 10GE_XP cards. You can create up to 500 MEPs and MIPs on the GE_XPE and 10GE_XPE cards.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to create a MIP. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > MIP** tabs.

Step 4 Click **Create**. The **Create MIP** dialog box appears.

Step 5 From the Port drop-down list, choose a port where you want to create the MIP.

> **Note** The port must not belong to a channel group.

Step 6 From the Level drop-down list, choose a maintenance level. The range of the maintenance level is from 0 to 7.

Step 7 Enter the SVLAN range in the Vlan range field. The range of the SVLAN is from 1 to 4093.

> **Note** The specified SVLAN must be configured on the selected port.

Step 8 Click **OK**.

Step 9 Return to your originating procedure (NTP).

DLP-G632 Delete a MIP Using CTC

Purpose	This task allows you to delete a MIP on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to delete a MIP. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Configuration > MIP** tabs.

Step 4 Select the MIPs that you want to delete.

Step 5 Click **Delete**.

Step 6 Return to your originating procedure (NTP).

DLP-G633 Ping MEP Using CTC

Purpose	This task allows you to display the output of the ping command on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to ping MEP. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Ping** tabs.

Step 4 Enter the MP ID value in the MPID field. The range of the MP ID is from 1 to 8191.

Note Remote MP ID user cannot ping local MP ID.

Step 5 (Optional) Enter the MAC address of the remote maintenance point in the Mac Addr field. The format of MAC address is abcd.abcd.abcd.

Step 6 Enter the SVLAN ID in the VLAN ID field. The range of the SVLAN ID is from 1 to 4093.

Step 7 Enter the domain name in the Domain Name field.

Step 8 Enter the size of the ping packet in the DataGram Size field. The default value is 100.

Step 9 Enter the number of ping packets in the No of Requests field. The default value is 5.

Step 10 Click **Ping**. The output of the ping command appears in the Ping Response area.

Step 11 Return to your originating procedure (NTP).

DLP-G634 Traceroute MEP Using CTC

Purpose	This task allows you to display the output of the traceroute command on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to view the output of the **traceroute** command. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > CFM > Traceroute** tabs.

Step 4 Enter the remote MP ID value in the MPID field. The range of the MP ID is from 1 to 8191.

Step 5 (Optional) Enter the MAC address of the remote maintenance point in the Mac Addr field. The format of MAC address is abcd.abcd.abcd.

Step 6 Enter the SVLAN ID in the VLAN ID field. The range of the SVLAN ID is from 1 to 4093.

Step 7 Enter the domain name in the Domain Name field.

Step 8 Click **TraceRoute Response**.

The output of the **traceroute** command appears in the TraceRoute Response area.

- Verify the RlyHit message is shown in the traceroute display and LTM reaches a maintenance point whose MAC address matches the target MAC address.
- Verify the RlyFDB message is shown in the traceroute display when the next hop address is found in the forwarding database.
- Verify the RlyMPDB message is shown in the traceroute display when the next hop address is found in the CCDN.

Step 9 Return to your originating procedure (NTP).

NTP-G285 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card EFM Settings

Purpose	This procedure changes the EFM settings of the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	• NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 • "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149 • DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the EFM settings. If you are already logged in, continue with Step 2.

Step 2 Perform any of the following tasks as needed:

- DLP-G639 Enable or Disable EFM for Each Port Using CTC, page 11-370
- DLP-G640 Configure EFM Parameters Using CTC, page 11-371
- DLP-G641 Configure EFM Link Monitoring Parameters Using CTC, page 11-372
- DLP-G642 Enable Remote Loopback for Each Port Using CTC, page 11-374
- DLP-G615 Retrieve Information on Channel Group, REP, CFM, and EFM Using CTC, page 11-354
- DLP-G643 Enable EFM on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI
- DLP-G644 Configure the EFM Mode on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI

Stop. You have completed this procedure.

DLP-G639 Enable or Disable EFM for Each Port Using CTC

Purpose	This task allows you to enable or disable EFM for each port on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Before You Begin

- You can enable EFM on both UNI and NNI ports.
- You cannot enable or disable EFM for ports that belong to a channel group.
- For information about interaction of EFM with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable or disable EFM for each port. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > EFM > Configuration** tabs. The EFM details appear for each port.

Step 4 From the EFM State drop-down list, choose **Enabled**.

Step 5 Click **Apply** to enable EFM for that port.

Note From the EFM State drop-down list, choose **Disabled** to disable EFM for that port.

Step 6 Return to your originating procedure (NTP).

DLP-G640 Configure EFM Parameters Using CTC

Purpose	This task allows you to configure EFM parameters on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to configure EFM parameters. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > EFM > Configuration** tabs.

Step 4 Modify the EFM parameter settings as described in Table 11-150.

Table 11-150 EFM Parameter Settings

Parameter	Description	Options
Port	(Display only) Port number (*n-n*) and rate (GE or TEN_GE).	—
EFM State	Sets the state of the EFM protocol for each port.	• Enabled • Disabled
Mode	Sets the operating mode of the port. If the mode is Active, the port sends OAM Protocol Data Units (OAMPDUs) at regular intervals to the partner ports. If the mode is Passive, the port will not send OAMPDUs until the partner ports send OAMPDUs.	• Active • Passive

Table 11-150 EFM Parameter Settings

Parameter	Description	Options
Link Fault	Sets the Remote Failure Indication (RFI) action. If the link is down on a port, the link fault RFI is sent to the partner port through OAMPDU. An alarm indicating the remote failure indication link fault (RFI-LF) is raised. The alarm is cleared after you clear the link fault condition. You can specify the following actions for link fault RFI: • Error Block—The interface is placed in the error-block state and the RFI-LF alarm is raised. • None—Only the RFI-LF alarm is raised. **Note** Dying Gasp and critical events are not supported.	• Error Block • None
Session Timer	Sets the duration up to when the EFM session is retained with the partner port without receiving OAMPDUs.	Default: 5 seconds Range: 2 to 30 seconds

Step 5 Click **Apply** to save the changes.

Step 6 Return to your originating procedure (NTP).

DLP-G641 Configure EFM Link Monitoring Parameters Using CTC

Purpose	This task allows you to configure EFM link monitoring parameters for each port on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to configure EFM link monitoring parameters. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > EFM > Link Monitoring** tabs.

Step 4 Modify the EFM link monitoring parameter settings as described in Table 11-151.

Table 11-151 EFM Link Monitoring Parameter Settings

Parameter	Description	Options
Port	(Display only) Port number (*n-n*) and rate (GE or TEN_GE).	—
EF Max	Sets the threshold value for the maximum number of errored frames to detect during a specific period.	Range: 1 to 65535
EF Min	Sets the threshold value for the minimum number of errored frames to detect during a specific period.	Range: 0 to 65535
EF Action	Specifies that when the parameter value exceeds the maximum threshold value, the applicable action is None. When the parameter value falls below the minimum threshold value, a threshold crossing alert (transient condition) is generated.	• None • Squelch
EF Window	Period in which the errored frame parameters are monitored.	Range: 10 to 600
EFP Max	Sets the threshold value for the maximum number of errored frames within the last *n* frames.	Range: 1 to 65535
EFP Min	Sets the threshold value for the minimum number of errored frames within the last *n* frames.	Range: 0 to 65535
EFP Action	Specifies that when the parameter value exceeds the maximum threshold value, the applicable action is None. When the parameter value falls below the minimum threshold value, a threshold crossing alert (transient condition) is generated.	• None • Squelch
EFP Window	Period in which the EFP parameters are monitored.	Range: 1 to 65535
EFSS Max	Sets the threshold value for the maximum number of errored seconds within the last *m* seconds.	Range: 1 to 900
EFSS Min	Sets the threshold value for the minimum number of errored seconds within the last *m* seconds.	Range: 0 to 900
EFSS Action	Specifies that when the parameter value exceeds the maximum threshold value, the applicable action is None. When the parameter value falls below the minimum threshold value, a threshold crossing alert (transient condition) is generated.	• None • Squelch
EFSS Window	Specifies the period when the EFSS parameters are monitored.	Range: 100 to 9000

Step 5 Click **Apply** to save the changes.

Step 6 Return to your originating procedure (NTP).

DLP-G642 Enable Remote Loopback for Each Port Using CTC

Purpose	This task allows you to enable remote loopback for each port on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable the remote loopback for each port. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > EFM > Loopback** tabs.

The remote loopback type details appear for each port.

Step 4 From the Remote Loopback Type drop-down list, choose **Remote Loopback**.

Step 5 Click **Apply** to save the changes.

Step 6 Return to your originating procedure (NTP).

NTP-G287 Manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card REP Settings

Purpose	This procedure changes the REP settings for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	• NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 • "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149 • DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the REP settings. If you are already logged in, continue with Step 2.

Step 2 Perform any of the following tasks as needed:

- DLP-G713 Provision Administrative VLAN for Ports in a REP Segment Using CTC, page 11-375
- DLP-G645 Create a Segment Using CTC, page 11-376
- DLP-G646 Edit a Segment Using CTC, page 11-379
- DLP-G647 Activate VLAN Load Balancing Using CTC, page 11-379
- DLP-G648 Deactivate VLAN Load Balancing Using CTC, page 11-380
- DLP-G615 Retrieve Information on Channel Group, REP, CFM, and EFM Using CTC, page 11-354
- DLP-G649 Create a Segment on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI
- DLP-G650 Configure STCN on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI
- DLP-G651 Configure Preemption Delay on the Primary Edge Port Using PCLI
- DLP-G652 Configure VLAN Load Balancing on the Primary Edge Port Using PCLI

Stop. You have completed this procedure.

DLP-G713 Provision Administrative VLAN for Ports in a REP Segment Using CTC

Purpose	This task allows you to provision administrative VLAN for NNI and UNI ports in a REP segment on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note One administrative CVLAN and one administrative SVLAN can be provisioned for each card. The REP segments using NNI ports send Hardware Flood Layer (HFL) messages using the administrative SVLAN. The REP segments using UNI ports send HFL messages using the administrative CVLAN. The two VLANs need not be the same.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to provision administrative VLAN. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning** > **REP** > **Admin VLAN Configuration** tabs.

Step 4 To provision administrative VLAN for NNI ports in a REP segment, perform the following steps:

a. From the SVLAN drop-down list, choose a SVLAN. The following table describes the REP convergence time for SVLANs.

Table 11-152 REP Convergence Time for SVLANs

SVLAN	Administrative VLAN	REP Convergence Time
0 (default)	Not configured	4 to 5 seconds
1 to 4093	Configured	Less than 200 milliseconds

b. Click **Apply**.

c. To associate the chosen SVLAN with the NNI ports, see "DLP-G382 Add and Remove SVLANS to/from GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE NNI Ports" task on page 11-397.

Step 5 To provision administrative VLAN for UNI ports in a REP segment, perform the following steps:

a. Enter the CVLAN in the CVLAN field.

b. Click **Apply**.

c. To associate the CVLAN with the UNI ports, see "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" task on page 11-400.

Step 6 Return to your originating procedure (NTP).

DLP-G645 Create a Segment Using CTC

Purpose	This task allows you to create a segment on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Before You Begin

- You can create up to three segments on a card. Each segment can have up to two ports on the same switch.
- You must configure the REP administrative VLAN to activate the Hardware Flood Layer (HFL).
- Before creating REP segments, you must configure the administrative VLAN or use the default VLAN 1 and add the ports to the segment. Only one SVLAN can be configured per card for all the three segments. REP uses the administrative VLAN to flood its own control traffic.
- The administrative CVLAN is required if a REP port is configured as a UNI port. However, the REP ports are configured as NNI ports in many configurations, and hence the administrative CVLAN is not required in these configurations. The option to configure the administrative CVLAN is present in CTC.

- You must configure two edge ports in the segment. A segment has only one primary edge port. If you configure two ports in a segment as the primary edge port, for example, ports on different switches, REP selects one of the ports to serve as the primary edge port based on port priority.
- If REP is enabled on two ports on a switch, both the ports must be either regular ports or edge ports. However, if the No-neighbor port is configured, one port can be an edge port and another port can be a regular port.
- You can also optionally configure where to send segment topology change notifications (STCNs) and VLAN load balancing (VLB). STCNs are enabled only for primary edge ports. VLB configurations are enabled on any edge ports.
- For information about interaction of REP with other protocols, see the "11.14.2 Protocol Compatibility list" section on page 11-62.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to create a segment. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > REP > Segment** tabs.

Step 4 Click **Create**. The **Create Segment** wizard appears.

Step 5 Enter the segment ID in the Segment field. The range of the segment ID is from 1 to 1024.

Step 6 From the Port drop-drown list, choose a REP port that must belong to this segment.

> **Note** A REP port can belong to only one segment.

Step 7 From the Port Role area, choose whether you want to configure the port as an edge port or a regular port. The options are:

a. Edge—The port is configured as an edge port.

- Check the **Primary** check box to configure the edge port as a primary edge port. A segment can have only one primary edge port.

> **Note** If an edge port is configured as primary edge port, the other edge port in the ring automatically becomes secondary edge port. If neither edge port is configured as primary edge port, one edge port is automatically selected as primary edge port, and the other edge port is secondary edge port. Configuring an edge port as a primary edge port is not mandatory. However, it is recommended since VLAN load balancing must be configured on the node with the primary edge port.

- Uncheck the **Primary** check box to configure the edge port as a secondary edge port.
- (Optional) Check the **Preferred** check box to configure the regular or edge port as a preferred alternate port (alternate to primary edge port). This port blocks a range of SVLANs for VLAN load balancing. There is no limit on the number of preferred ports in a REP ring. The preferred port, if configured, is relevant even without VLAN load balancing, as it takes priority over non-preferred ports for alternate port election.

> **Note** Configuring a port as **preferred** does not ensure that it becomes the alternate port; it only gets preference over the other ports that are not configured as preferred when an alternate port is elected.

- Check the **NoNeighbor** check box if the edge port must not have a neighbor port. REP does not check for neighbor adjacency.

> **Note** When the **NoNeighbor** check box is checked, ensure that only one segment is created.

b. None—The port is configured as a regular port. If you choose this option, Segment Topology Change Notifications (STCN) and VLAN Load Balancing (VLB) configurations are disabled.

Check the **Preferred** check box to configure the regular port as a preferred alternate port.

Step 8 From the STCN area, configure the destination of STCN messages:

a. Check the **Enable** check box to enable sending STCN messages.

b. From the Port drop-down list, choose the STCN port to send STCN messages or enter the segment ID in the Segment field to send STCN messages. The STCN port and REP port must be unique.

Step 9 From the VLAN Load Balancing area, configure VLAN Load Balancing on the primary edge port:

a. Check the **Enable** check box to enable VLB.

b. Enter a single SVLAN or range of SVLANs in the SVLAN field. These SVLANs are blocked at the alternate ports. The primary edge port blocks the remaining VLANs.

c. Enter the Rep PortId in the Rep PortId field to identify the VLAN blocking alternate port. This unique port ID is automatically generated when REP is enabled.

d. Check the **Preferred** check box to select the segment port previously identified as the preferred alternate port for VLAN load balancing.

When you check **Preferred** under VLAN Load Balancing area, you configure VLAN load balancing to use one of the previously configured preferred ports (under the Port Role area) to be the load balancing port. This restricts the load balancing port to be one among the preferred ports, but you cannot select a specific preferred port.

Step 10 From the VLB Preempt Delay area, enter the trigger delay for automatic VLB activation. The range is 15 to 300 seconds.

Step 11 Click **Next.**

Step 12 Enter the details of the second port to add it to the segment.

Repeat Step 6 to 10 when the first port is configured as a regular port and the second port is configured as a primary edge port. Repeat Step 6 to 7 when the first port is configured as a primary edge port and the second port is configured as a regular port.

Step 13 Click **Finish**.

Step 14 Return to your originating procedure (NTP).

DLP-G646 Edit a Segment Using CTC

Purpose	This task allows you to edit a segment on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note You can edit only the STCN and VLB entries for a segment.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to edit a segment. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > REP > Segment** tabs. The list of segments appear.

Step 4 Choose a segment from the list of segments.

Step 5 Click **Edit**.

Step 6 Modify the values as required and click **Finish**.

Step 7 Return to your originating procedure (NTP).

DLP-G647 Activate VLAN Load Balancing Using CTC

Purpose	This task allows you to activate VLAN load balancing on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Note When VLAN load balancing is activated, the default configuration is manual preemption with the delay timer disabled.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to activate VLAN load balancing. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > REP > Segment** tabs. The list of segments appear.

Step 4 Choose a segment from the list of segments.

Step 5 Click **Activate VLB**.

Step 6 Return to your originating procedure (NTP).

DLP-G648 Deactivate VLAN Load Balancing Using CTC

Purpose	This task allows you to deactivate VLAN load balancing on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to deactivate VLAN load balancing. If you are already logged in, continue with Step 2.

Step 2 Verify that the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card is installed in L2-over-DWDM mode. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 3 In card view, click the **Provisioning > REP > Segment** tabs. The list of segments appear.

Step 4 Choose a segment from the list of segments.

Step 5 Click **Deactivate VLB**.

Step 6 Return to your originating procedure (NTP).

NTP-G165 Modify the GE_XP, 10GE_XP, GE_XPE, 10GE_XPE Cards Ethernet Parameters, Line Settings, and PM Thresholds

Purpose	This procedure changes Ethernet, line, and PM threshold settings for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 DLP-G63 Install an SFP or XFP, page 14-72
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the card settings. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 Verify the card mode:

a. Display the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card in card view.

b. Click the **Provisioning > Card** tabs.

c. Verify that the card mode is set to the mode designated by your site plan:

- L2-over-DWDM (GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE)
- 10GE TXP (10GE_XP or 10 GE_XPE)
- 10GE MXP (GE_XP or GE_XPE)
- 20GE MXP (GE_XP or GE_XPE)

If the card mode is set correctly, continue with Step 4. If not, complete the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 4 Complete the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.

Step 5 If the ONS-SC-E1-T1-PW or ONS-SC-E3-T3-PW SFP is inserted in the GE_XPE card, complete the following tasks, as needed.

- DLP-G684 Provision the GE_XPE Card PDH Ethernet Settings, page 11-390
- DLP-G685 Provision the GE_XPE Card Electrical Lines Settings, page 11-392

Step 6 If the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card mode is L2-over-DWDM, complete the following tasks, as needed. If the card mode is not L2-over-DWDM, continue with Step 7.

- DLP-G381 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Layer 2 Protection Settings, page 11-394
- DLP-G421 Create and Store an SVLAN Database, page 16-79
- DLP-G382 Add and Remove SVLANS to/from GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE NNI Ports, page 11-397

- DLP-G383 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Quality of Service Settings, page 11-398
- DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings, page 11-400
- NTP-G205 Enable Link Integrity on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards, page 11-407.
- DLP-G385 Provision the MAC Filter Settings for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card, page 11-403
- NTP-G204 Enable IGMP Snooping on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards, page 11-412 or NTP-G220 Enable IGMP Snooping on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI.
- NTP-G206 Enable MVR on a GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card, page 11-414 or NTP-G224 Enable MVR on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI.
- DLP-G460 Enable MAC Address Learning on SVLANs for GE_XPE or 10GE_XPE Cards Using CTC, page 11-402 or NTP-G226 Enable MAC Address Learning on SVLANs for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI.

Step 7 Complete the following tasks, as needed:

- DLP-G386 Provision the Gigabit Ethernet Trunk Port Alarm and TCA Thresholds, page 11-415
- DLP-G387 Provision the Gigabit Ethernet Client Port Alarm and TCA Thresholds, page 11-417
- DLP-G388 Change the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card RMON Thresholds, page 11-418
- DLP-G389 Change the Gigabit Ethernet Optical Transport Network Settings, page 11-421

Note To use the Alarm Profiles tab, including creating alarm profiles and suppressing alarms, see the Alarm and TCA Monitoring and Management document.

Stop. You have completed this procedure.

DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings

Purpose	This task changes the Ethernet settings for the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the Ethernet settings. The card view appears.

Step 2 Click the **Provisioning > Ether Ports > Ethernet** tabs.

Step 3 Modify any of the settings for the Ethernet tab as described in Table 11-153. The parameters that appear depend on the card mode.

Table 11-153 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Ethernet Settings

Parameter	Description	Card Mode	Options
Port	(Display only) The Port number (*n*-*n*) and rate (GE or TEN_GE).	• L2-over-DWDM • 10GE TXP • 10GE MXP • 20GE MXP	—
MTU	The maximum size of the Ethernet frames accepted by the port. The port must be in OOS/locked state.	• L2-over-DWDM • 10GE TXP • 10GE MXP • 20GE MXP	Numeric. Default: 9700 Range 64 to 9700 (for R9.1 and later) (jumbo frame)
Mode	Sets the Ethernet mode. The port must be in OOS/locked state before setting the card mode. **Note** For GE_XP and GE_XPE cards that are in Y-cable protection groups, Mode must be set to 1000 Mbps for those client ports that are configured in Y-cable. For 10GE_XP and 10GE_XPE cards that are in Y-cable protection groups, Mode must be set to 10000 Mbps.	• L2-over-DWDM • 10GE TXP • 10GE MXP • 20GE MXP	• Auto (default) • Display Only • 1000 Mbps • 10000 Mbps • Auto_Fdx (10Mbps Full). This option applies to ONS-SE-ZE-EL copper SFP that carries traffic from GE_XP and GE_XPE cards. **Note** If Mode is set to Auto on the GE_XP or GE_XPE port, autonegotiation gets enabled on the peer port. **Note** On GE_XP card, the copper Pluggable Port Module (PPM) interface can auto-negotiate and carry traffic even when the peer interface operates at rates other than 1000 Mbps.

Table 11-153 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Ethernet Settings (continued)

Parameter	Description	Card Mode	Options
Flow Control	Enables/disables flow control messaging with its peer port. When enabled, the port can send and receive PAUSE frames when buffer congestion occurs. When disabled, no PAUSE frames are transmitted and the PAUSE frames received are discarded. **Note** Flow control messaging is symmetric and not negotiated. When flow control is enabled on one port, the other end of the link (peer port) is not considered. That is, even if flow control is disabled on the peer port, the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card will send PAUSE frames.	• L2-over-DWDM • 10GE MXP • 10GE TXP • 20GE MXP	• ON—Flow control is enabled. • OFF (default)—Flow control is disabled. • Display Only.
Media Type	(GE_XPE card only) Sets the Media Type. **Note** PROV-MISMATCH alarm is raised if the Media Type is not set to Ethernet Over DS1 (ANSI) or Ethernet Over E1 (ETSI) for ONS-SC-EOP1,Ethernet Over DS3 (ANSI) or Ethernet Over E3 (ETSI) for ONS-SC-EOP3, or DS1 Over Ethernet (ANSI) or E1 Over Ethernet (ETSI) for ONS-SC-E1-T1-PW or DS3 Over Ethernet (ANSI) or E3 Over Ethernet (ETSI) ONS-SC-E3-T3-PW. Set the correct Media Type to clear the PROV-MISMATCH alarm.	• L2-over-DWDM • 10GE MXP • 20GE MXP	• Ethernet Over DS1 (ANSI) (for ONS-SC-EOP1) • Ethernet Over E1 (ETSI) (for ONS-SC-EOP1) • Ethernet Over DS3 (ANSI) (for ONS-SC-EOP3) • Ethernet Over E3 (ETSI) (for ONS-SC-EOP3) • DS1 over Ethernet (ANSI) (for ONS-SC-E1-T1-PW) • DS3 over Ethernet (ANSI) (for ONS-SC-E3-T3-PW) • E1 Over Ethernet (ETSI) (for ONS-SC-E1-T1-PW) • E3 Over Ethernet (ETSI) (for ONS-SC-E3-T3-PW)
Committed Info Rate	Sets the guaranteed information rate as provided by the service provider service-level agreement. The port must be in OOS/locked state.	• L2-over-DWDM • 10GE MXP • 20GE MXP	Numeric. Default: 100 Range: 0 to 100%

Table 11-153 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Ethernet Settings (continued)

Parameter	Description	Card Mode	Options
Committed Burst Size	Sets the maximum number of bits that will be transferred per second. The port must be in OOS/locked state before the Committed Burst Size is provisioned.	• L2-over-DWDM • 10GE MXP • 20GE MXP	• 4k (default) • 8k • 16k • 32k • 64k • 128k • 256k • 512k • 1MB • 2MB • 8MB • 16MB
Excess Burst Size	The maximum number of bits that are credited for later transfer in the event the committed burst rate cannot be transmitted. The port must be in OOS/locked state before the Excess Burst Size is provisioned.	• L2-over-DWDM • 10GE MXP • 20GE MXP	• None • 4k (default) • 8k • 16k • 32k • 64k • 128k • 256k • 512k • 1MB • 2MB • 8MB • 16MB
NIM	Sets the port network interface mode (NIM). This parameter classifies port types designed for the Metro Ethernet market to simplify deployment, management, and troubleshooting. The port must be in OOS/locked state before the NIM is provisioned.	L2-over-DWDM	• UNI Mode—provisions the port as a user-to-network interface (UNI). This is the interface that faces the subscriber. • NNI Mode—provisions the port as a network-to-network interface. This is the interface that faces the service provider network.
Egress QoS	Enables Quality of Service (QoS) on the port's egress or output queues. The port must be in OOS/locked state before the Egress QoS is provisioned.	L2-over-DWDM	• Checked—QoS is enabled on the port's egress queues. • Unchecked—(Default) QoS is disabled on the port's egress queues.

Table 11-153 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Ethernet Settings (continued)

Parameter	Description	Card Mode	Options
MAC Learning	Enables or disables MAC learning for the port on GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards. MAC learning is used by Layer 2 switches to learn the MAC addresses of network nodes so the Layer 2 switches send traffic to the right location. Layer 2 switches, including the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards in L2-over-DWDM mode with MAC Learning configured, maintain a MAC learning table that associates the MAC addresses and VLANs with a given port. **Note** MAC addresses on SVLANs attached to the port must also be enabled to provision MAC address learning on GE_XPE and 10GE_XPE cards. **Note** MAC address table aging is 300 seconds. It cannot be changed.	L2-over-DWDM	• Checked—MAC learning is enabled for this port. • Unchecked—(Default) MAC learning is disabled.

Table 11-153 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Ethernet Settings (continued)

Parameter	Description	Card Mode	Options
Ingress CoS	Provisions the IEEE 802.1p ingress Class of Service (CoS). The CoS .1p bits set the Ethernet frame priority. The port must be in OOS/locked state before the Ingress CoS is provisioned. Ingress CoS is used to set the priority of the Ethernet frame in the service provider network, This parameter is used to set the CoS .1p bits in the SVLAN tag. Ingress CoS applies only to ports provisioned as UNI mode. It does not apply to ports provisioned as NNI mode.	L2-over-DWDM	• 0—(default) All incoming frames on the port will have the CoS .1p bits in the SVLAN tag set to 0. • 1—All incoming frames on the port will have the CoS .1p bits in the SVLAN tag set to 1. • 2—All incoming frames on the port will have the CoS .1p bits in the SVLAN tag set to 2. • 3—All incoming frames on the port will have the CoS .1p bits in the SVLAN tag set to 3. • 4—All incoming frames on the port will have the CoS .1p bits in the SVLAN tag set to 4. • 5—All incoming frames on the port will have the CoS .1p bits in the SVLAN tag set to 5. • 6—All incoming frames on the port will have the CoS .1p bits in the SVLAN tag set to 6. • 7—All incoming frames on the port will have the CoS .1p bits in the SVLAN tag set to 7. • Trust—Automatically copies customer VLAN tag into the service provider VLAN tag. • CVLAN—CoS can be provisioned based on CVLAN. For information on how CoS can be provisioned on the IEEE 802.1QinQ CVLAN tags, refer to the "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" task on page 11-400. If CVLAN CoS is configured on a GE_XP or a 10GE_XP card, a PROV-MISMATCH alarm is raised. Until this alarm is cleared, provisioning on the card is not possible. The CVLAN CoS configuration takes effect only after QinQ is configured.

Table 11-153 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Ethernet Settings (continued)

Parameter	Description	Card Mode	Options
Inner Ethertype (Hex)	Defines the inner Ethertype field. The Ethertype field indicates which protocol is being transported in an Ethernet frame. The inner Ethertype applies to ports provisioned in UNI mode only. It does not apply to ports provisioned as NNI mode. The ports must be OOS/locked before the inner Ethertype is provisioned.	L2-over-DWDM	Numeric. Default: 8100 (IEEE Std 802.1Q customer VLAN tag type) Range: 0x0600 to 0xFFFF
Outer Ethertype (Hex)	Defines the outer Ethertype field. The Ethertype field identifies which protocol is being transported in an Ethernet frame. The ports must be OOS/locked before the Outer Ethertype is provisioned. **Note** The PROV-MISMATCH alarm is raised on GE_XPE and 10GE_XPE cards if more than four different Outer Ethertype options are configured per card.	L2-over-DWDM	Numeric. Default: 8100 (IEEE 802.1Q customer VLAN tag type) Range: 0x0600 to 0xFFFF
IGMP Static Router Port	Adds multicast-capable ports to the forwarding table for every IP multicast.	L2-over-DWDM	• Checked—IGMP static router port is enabled. • Unchecked—(Default) IGMP static router port is disabled.
AIS Action	Defines the AIS action type provisioned on the port.	L2-over-DWDM	• None—No action. • Squelch—When an AIS packet is received on a SVLAN terminating on the UNI-port, the UNI port is squelched.
Protection Action	Configures the standby port behavior. Set Protection Action to None if Media Type is set to Ethernet Over DS1 (ANSI) or Ethernet Over E1 (ETSI) for ONS-SC-EOP1, Ethernet Over DS3 (ANSI) or Ethernet Over E3 (ETSI) for ONS-SC-EOP3, or DS1 Over Ethernet (ANSI) or E1 Over Ethernet (ETSI) for ONS-SC-E1-T1-PW or DS3 Over Ethernet (ANSI) or E3 Over Ethernet (ETSI) for ONS-SC-E3-T3-PW.	L2-over-DWDM	• None—No action. • Squelch—The laser on the standby port in a 1+1 protection group is squelched. This setting has no effect if the port is not part of the 1+1 protection group.

Table 11-154 shows the inner and outer Ethertype behavior based on the NIM setting (either NNI mode or UNI mode). When the NIM is set to UNI, and the QinQ mode is set to Selective, the Ethertype behavior depends on the SVLAN/CVLAN operation that is provisioned, either Add or Translate. (QinQ parameters are provisioned in the "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" task on page 11-400.)

Note A packet can exit out of any UNI/NNI port if the outermost tag in the packet matches with the SVLAN provisioned on that port. In other words, in the egress path, the inner tags (even if present) of the packet are not matched with the inner SVLAN or CVLAN provisioned on the port.

Note The Committed Burst Size and Excess Burst Size must be configured based on the expected packet size to ensure that no packets are dropped when Flow Control is enabled. For example, if the CIR is 40% and packet size is 1 KB, the Committed Burst Size and Excess Burst Size should be set to 1 MB.

Note When you set the Committed Info Rate above 40% on 10GE_XP and 10GE_XPE cards, the Committed Burst Size and Excess Burst Size must be set to at least 32K. The Committed Burst Size and Excess Burst Size can be increased based on the packet size and Committed Info Rate value.

Table 11-154 Ethertype Behavior

Port Type/ Ethertype	**NNI Mode**	**UNI Mode**		
		Transparent	**Selective Operation: Add**	**Selective Operation: Translate**
Inner Ethertype	Not applicable: the outer Ethertype value is used.	Not applicable: all packets are mapped over the SVLAN.	Working (card-based)	Working (card-based)
Outer Ethertype	Working (per port)	Not applicable: the outer Ethertype is contained in the inner VLAN (same as UNI Selective mode).	Not applicable: the outer Ethertype is the one contained in the inner VLAN.	This cannot be set by port, only by card. The outer Ethertype is automatically set to the inner Ethertype.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G684 Provision the GE_XPE Card PDH Ethernet Settings

Purpose	This task changes the PDH Ethernet settings for the GE_XPE card.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC • Set the Media Type as DS1 Over Ethernet in Provisioning > Ether Ports > Ethernet tab in DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings, page 11-382
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The Provisioning > Ether Ports > PDH Ethernet Parameters tab is available in GE_XPE card view only, provided the PPM for GE_XPE port is created in FE mode.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XPE card where you want to change the PDH Ethernet settings. The card view appears.

Step 2 Click the **Provisioning > Ether Ports > PDH Ethernet Parameters** tabs. The PDH Ethernet Parameters tab appear only when the ONS-SC-E1-T1-PW or ONS-SC-E3-T3-PW SFP is inserted.

Step 3 Modify any of the settings for the PDH Ethernet Parameters tab as described in Table 11-155.

Table 11-155 GE_XPE Card PDH Ethernet Settings

Parameter	Description	Card Mode	Options
Port	(Display only) The Port number (*n-n*) and rate.	• L2-over-DWDM • 10GE MXP • 20GE MXP	—
Port Name	(Display only) The port name.	• L2-over-DWDM • 10GE MXP • 20GE MXP	—
MPLS Inner Label	Sets the MPLS Inner Label value.	• L2-over-DWDM • 10GE MXP • 20GE MXP	Default: 16 Range: 16-65535.
MPLS Outer Label	Sets the MPLS Outer Label value.	• L2-over-DWDM • 10GE MXP • 20GE MXP	Default: 16 Range: 16-65535.

Table 11-155 GE_XPE Card PDH Ethernet Settings (continued)

Parameter	Description	Card Mode	Options
Jitter Buffer	Sets the jitter buffer value.	• L2-over-DWDM • 10GE MXP • 20GE MXP	Default: 1500 Range: 400-200000. Table 11-156 provides jitter buffer values for different payloads. **Note** The traffic is down if the jitter buffer is set to >=192000 when Media Type is set to DS1 over Ethernet (ANSI) (for ONS-SC-E1-T1-PW) and E1 Over Ethernet (ETSI) (for ONS-SC-E1-T1-PW).
RX Sensitivity	(ONS-SC-E1-T1-PW only) Sets the RX sensitivity value.	• L2-over-DWDM • 10GE MXP • 20GE MXP	Default: –36 (ANSI), –12 (ETSI) Range: –36 to –15 (ANSI), –12 to –43 (ETSI)
Source IP Address	Enter the source IP address. Only Unicast IP addresses are accepted.	• L2-over-DWDM • 10GE MXP • 20GE MXP	—
Peer IP Address	Enter the peer IP address. Only Unicast IP addresses are accepted.	• L2-over-DWDM • 10GE MXP • 20GE MXP	—

Table 11-156 Jitter Buffer Values for Various Payload Types

	Jitter Buffer Value	
Payload Type	**Lower Limit**	**Upper Limit**
T1 (DS1)	1500	20000
T3 (DS3)	400	4500
E1	1500	200000
E3	400	60000

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G685 Provision the GE_XPE Card Electrical Lines Settings

Purpose	This task changes the Electrical Lines settings for the GE_XPE card.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC • Set the Media Type as DS1 Over Ethernet in Provisioning > Ether Ports > Ethernet tab in DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings, page 11-382
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The Provisioning > Ether Ports > Electrical Lines tab is available in GE_XPE card view only, provided the PPM for GE_XPE port is created in FE mode.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XPE card where you want to change the Electrical Lines settings. The card view appears.

Step 2 Click the **Provisioning > Ether Ports > Electrical Lines** tabs. The Electrical Lines tab appear only when the ONS-SC-E1-T1-PW or ONS-SC-E3-T3-PW SFP is inserted.

Step 3 Modify any of the settings for the Electrical Lines > DS1 or Electrical Lines > DS3 tab as described in Table 11-157.

Table 11-157 GE_XPE Card Electrical Lines Settings

Parameter	Description	Card Mode	Options
Port	(Display only) The Port number (*n-n*) and rate.	• L2-over-DWDM • 10GE MXP • 20GE MXP	—
Port Name	(Display only) The port name.	• L2-over-DWDM • 10GE MXP • 20GE MXP	—
Clock Source	Sets the Clock Source	• L2-over-DWDM • 10GE MXP • 20GE MXP	Default: • Internal (for ONS-SC-E3-T3-PW) • Adaptive (for ONS-SC-E1-T1-PW) Options: • Loopback Timing • Internal • Adaptive

Table 11-157 GE_XPE Card Electrical Lines Settings (continued)

Parameter	Description	Card Mode	Options
Line Type	Sets the Line Type	• L2-over-DWDM • 10GE MXP • 20GE MXP	Default: • C-BIT (for ONS-SC-E3-T3-PW ANSI) • Unframed (for ONS-SC-E3-T3-PW ETSI) • ESF (for ONS-SC-E1-T1-PW ANSI) • Framed (for ONS-SC-E1-T1-PW ETSI) Options: • G.751 (ETSI) • G.832 (ETSI) • C-BIT (ANSI) • ESF (ANSI) • M23 (ANSI) • Framed (ETSI) • Unframed (ETSI)
Line Coding	Sets the Line Coding	• L2-over-DWDM • 10GE MXP • 20GE MXP	Default: • B3ZS (for ONS-SC-E3-T3-PW ANSI) • HDB3 (for ONS-SC-E3-T3-PW ETSI) • B8ZS (for ONS-SC-E1-T1-PW ANSI) • HDB3 (for ONS-SC-E1-T1-PW ETSI) Options: • AMI (ETSI) • B3ZS (ANSI) • B8ZS (ANSI) • HDB3 (ETSI)
Line Length	(ANSI only) Sets the Line Length	• L2-over-DWDM • 10GE MXP • 20GE MXP	Defaults: • 0-225 ft (for ONS-SC-E3-T3-PW ANSI) • 266-399 ft (for ONS-SC-E1-T1-PW ANSI) Options (ANSI only): • 0-133 ft • 0-225 ft • 133-266 ft • 225-450 ft • 266-399 ft • 399-533 ft • 533-655 ft

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G381 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Layer 2 Protection Settings

Purpose	This task provisions the Layer 2 protection settings for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards when the cards are provisioned in L2-over-DWDM mode.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card must be in L2-over-DWDM mode. To change the card mode, complete the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Note GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Layer 2 protection settings must be planned for the entire VLAN ring. One card in the ring is provisioned as the master card and one of its port is set to Blocking. The master card coordinates the protection switching for the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE in a VLAN ring.

Note You can choose to enable another card in the ring to be the master card. However, only one card in the ring can be provisioned as master card. Make sure that the provisioning settings on the card that was previously configured as the master are disabled as soon as another card is enabled as the master card. To perform this task complete the "DLP-G507 Enable a Different GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card as the Master Card" procedure on page 11-396

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the protection settings. The card view appears.

Step 2 Click the **Provisioning > Protection** tabs.

Step 3 In the Status column, modify the port protection status by clicking the appropriate table cell and choosing one of the following from the drop-down list:

- Forwarding—Forwards the Ethernet packets that are received by the port.
- Blocking—Blocks the Ethernet packets that are received by the port.

Note One port of the master card within a VLAN ring must be set to Blocking. All other ports must be set to Forwarding.

Step 4 Check the **Master** check box if you want the card to serve as the protection coordinator for the VLAN ring. If not, continue with Step 5.

Step 5 From the Protection drop-down list, choose one of the following:

- Enabled—Enables protection.
- Disabled—Disables protection.
- Forced—Converts all the SVLANs to protected SVLANs irrespective of the SVLAN protection configuration in the SVLAN database. This is applicable to a point-to-point linear topology. The SVLAN protection must be forced to move all SVLANs, including protected and unprotected SVLANs, to the protect path irrespective of provisioned SVLAN attributes.

Step 6 From the Hold Off Time drop-down list, choose one of the following:

- Disabled (default)—A FAPS switchover occurs immediately.
- 50 msec, 100 msec, 200 msec, 500 msec, 1 sec, 2 sec, or 5 sec—Holds off FAPS protection for the selected duration.

Note To get consistent results ensure Hold Off Time values are the same throughout the ring.

Note FAPS is an Layer 2 protection enabled on a VLAN. When a fiber fault occurs, Layer 1 protection is triggered immediately to restore the traffic. Setting the Hold Off Time option prevents Layer 2 FAPS protection from triggering at the same time as Layer 1 protection thereby avoiding traffic hits.

Step 7 Set the following parameters for FAPS switching with CRC errors:

a. Switch with CRC Alarm—Check this check box to enable FAPS switching with CRC errors.

b. CRC Threshold—Threshold for CRC error count. The default CRC threshold value is 10(-e)2. The available options are 10(-e)2, 10(-e)3, and 10(-e)4.

c. CRC Soak Count—Number of times the CRC error rate exceeds the CRC threshold value before raising the DATA-CRC alarm. The default CRC Soak Count is 10. The valid range is from 3 to 10.

d. CRC Poll Interval—Time interval (in seconds) between the successive polls. The default CRC Poll Interval is 60 seconds.

   For example, if the CRC Threshold value = 10(-e)2, CRC Soak Count = 10, and CRC Poll Interval = 60 seconds, then FAPS occurs when the incoming CRC error rate is more than 10(-e)2 continuously across 10 poll intervals (10*60 = 600 seconds).

e. Clear/Supress CRC Alarm—Uncheck the **Clear/Supress CRC Alarm** check box for FAPS to occur. If you check this check box, the DATA-CRC alarm gets cleared and FAPS does not occur.

Note As along as the **Clear/Supress CRC Alarm** checkbox is checked, the DATA-CRC alarm is not raised on that port and FAPS does not occur.

Note For consistent result, ensure that all the values that are set in Step 7 are same throughout the ring.

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G507 Enable a Different GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card as the Master Card

Purpose	This task provisions another GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card on a stable VLAN ring, to be the master card when the cards are provisioned in L2-over-DWDM mode.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G381 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Layer 2 Protection Settings, page 11-394
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card must be in L2-over-DWDM mode. To change the card mode, complete the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Note Do not attempt to change the master card when there is a failure in the FAPS ring.

Note GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Layer 2 protection must be enabled for the entire VLAN ring. One card in the ring is provisioned as the master card and one of its port is set to Blocking. The master card coordinates the protection switching for the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards in a VLAN ring.

Note You can choose to enable another card in the ring to be the master card. However, only one card in the ring can be provisioned as master card. Make sure that the provisioning settings on the card that was previously configured as the master are disabled as soon as another card is enabled as the master card.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card in a VLAN ring where you want to enable master card provisioning. The card view appears. Perform the following steps:

a. Click the **Provisioning** > **Protection** tabs.

b. From the Status drop-down list, choose **Blocking** for a trunk port.

Note One port of the master card within a VLAN ring must be set to Blocking. All other ports must be set to Forwarding.

c. Check the **Master** check box for the card that serves as the protection coordinator for the VLAN ring.

d. From the Protection drop-down list, choose **Enabled**.

e. Click **Apply**.

Step 2 The master card provisioning on the other card must be disabled. Perform the following steps:

a. Click the **Provisioning** > **Protection** tabs.

b. Uncheck the **Master** check box for the card where Master node provisioning must be disabled.

c. Click **Apply**.

d. From the Protection drop-down list, choose **Disabled**.

e. Click **Apply**.

Step 3 The protection on the card that was disabled in Step 2 must be enabled again. Perform the following steps:

a. Click the **Provisioning > Protection** tabs.

b. From the Protection drop-down list, choose **Enabled**.

c. Click **Apply**.

d. From the Status drop-down list, choose **Forwarding** on both ports.

e. Click **Apply**.

Step 4 Return to your originating procedure (NTP).

DLP-G382 Add and Remove SVLANS to/from GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE NNI Ports

Purpose	This task adds or removes service provider VLAN (SVLAN) provisioning to/from GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE ports. This task only applies to GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards in L2-over- DWDM mode.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
	DLP-G421 Create and Store an SVLAN Database, page 16-79
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card must be in L2-over-DWDM mode. To change the card mode, complete the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Note This task can only be performed on ports provisioned as NNI. See the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the SVLAN port settings. The card view appears.

Step 2 Click the **Provisioning > SVLAN** tabs.

Step 3 For each SVLAN shown in the table, click the check box under the Port [*port name*] table cell to include the SVLAN in that port. If you do not want the SVLAN included, uncheck the check box.

Note If no SVLANs appear in the SVLAN tab, complete the "DLP-G421 Create and Store an SVLAN Database" task on page 16-79.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G383 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Quality of Service Settings

Purpose	This task provisions the Weighted Round Robin (WRR) value and bandwidth for QoS Class of Service (CoS) egress queues on a GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card port.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card must be in L2-over-DWDM mode and the port must have QoS enabled. Refer to the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149 and the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382, if needed.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the QoS settings.

Step 2 Click the **Provisioning > QoS** tabs.

Step 3 In the Port field at the bottom of the window, choose the port where you want to provision the QoS settings.

Step 4 For each CoS egress queue, 0 through 7, define the following:

- WRR weight—sets the Weighted Round Robin (WRR) level for the CoS egress queue. The default is 1. The range is 0 to 15, where 0 is Strict Priority.)

> **Note** The GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE define a set of eight queues, one queue for each CoS. Only one of the queues can be assigned the 0 WRR weight (Strict Priority).

- Bandwidth—sets the bandwidth allocated for the CoS egress queue, 100 is the default. This bandwidth value is the percentage (%) of bandwidth with respect to the SFP, XFP, or port speed (100 Mbps for FE, 1 Gbps for GE, and 10 Gbps for 10GE) of the interface.

Step 5 Click **Apply**. Click **Yes** in the confirmation dialog box.

Step 6 Return to your originating procedure (NTP).

DLP-G470 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Class of Service (CoS) Settings

Purpose	This task provisions Class of Service (CoS) settings on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

> **Note** To perform this task, the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card must be in L2-over-DWDM mode and the port must be in OOS state.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the CoS settings.

Step 2 Complete the following task:

- Refer to Ingress CoS section in the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382

Step 3 Return to your originating procedure (NTP).

DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings

Purpose	This task provisions the IEEE 802.1QinQ VLAN tags on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card UNI ports. QinQ tags expand the VLAN capability by tagging the tagged packets to produce a "double-tagged" Ethernet frame. For service providers the expanded VLAN allows specific services to be provided on specific VLANs for specific customers, while other types of services can be provided to other customers on other VLANs.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G421 Create and Store an SVLAN Database, page 16-79
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE must be in L2-over-DWDM mode. To change the card mode, complete the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Note This task can only be performed on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards UNI ports. (To provision the port Ethernet parameters, see the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.)

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the QinQ settings.

Step 2 Click the **Provisioning > QinQ** tabs.

Step 3 Click the **Port** field and choose the port where you want to provision QinQ.

Channel groups configured in UNI mode appear in the Port field along with the physical ports.

Step 4 Click the **Mode** field and choose one of the following modes from the drop-down list:

- Selective—The incoming Ethernet packet is checked against the CVLAN and SVLAN table. If the CVLAN is not found, the packet is dropped. If you choose Selective, add an entry in the QinQ tab to map the administrative CVLAN to the SVLAN (if it is not same as the one used for data).
- Transparent—All incoming packets are transported with the additional VLAN chosen in the SVLAN field. If you choose transparent, the traffic on administrative CVLAN will pass through.

Step 5 Click the **BPDU** field and choose one of the following bridge protocol data unit (BPDU) modes from the drop-down list:

- Drop (default)—If checked, drops incoming packets with any of the following destination MAC addresses. The BPDU default can be applied for any UNI port.
  - 01-80-c2-00-00-00—IEEE 802.1D
  - 01-80-c2-00-00-02—Link Aggregation Control Protocol (LACP)

- 01-80-0c-cc-cc-cc—VLAN Spanning Tree Plus (PVST+)
- 01-00-c-cc-cc-cc—Cisco Discovery Protocol (CDP) type 0x2000, VLAN Trunk Protocol (VTP) type 0x2003, Port Aggregation Protocol (PAgP), type 0x0104, Uni-Directional Link Detection (UDLD) type 0x111, Dynamic Trunking Protocol (DTP) type 0x2004

- Tunnel—If checked, transparently sends any of the destination MAC addresses listed above.

Step 6 If the Mode was set to Selective, complete the following steps. If not, continue with Step 7.

a. To add a row, click **Add**.

b. Click the **CVLAN** table and type in the CVLAN range. You can enter a single value or a range using "–" between the two ends of the range.

Note If you are using Software Release 8.5 or earlier, it is recommended that you do not specify a CVLAN range due to certain limitations in the feature.

c. Click the **SVLAN** table cell and choose an SVLAN from the drop-down list.

d. Click the **Operation** table cell and choose an operation:

- Add (default)—Adds the SVLAN on top of the CVLAN. The operation default can be applied for any UNI port.
- Translate—CVLAN is translated with the SVLAN value.
- Double Add—(GE_XPE and 10GE_XPE cards only) Adds an inner and an outer SVLAN to double tagged packets only. CVLAN settings are not required. If this double tagged selective operation is present on a port, no other selective operation can be present.
- Translate Add—(GE_XPE and 10GE_XPE cards only) CVLAN gets translated to inner SVLAN and the SVLAN is added.

Note If Double Add and Translate Add are configured on a GE_XP or a 10GE_XP card, a PROV-MISMATCH alarm is raised. Until this alarm is cleared, provisioning on the card is not possible.

Note A CVLAN with a value of 0 means "untagged packet".

Note Two or more CVLANs cannot be translated over the same SVLAN.

e. (GE_XPE and 10GE_XPE cards only) Click the **COS** table cell and choose a value from the drop down list.

f. Click **Apply**.

g. Continue with Step 10.

Step 7 If the Mode was set to Transparent, in the SVLAN field, choose the SVLAN to be added to incoming packets.

Step 8 Click DSCP-Cos mapping Table to provision CoS based on DSCP for each port.

Step 9 For each DSCP, choose a CoS value from 0 to 7 and click **OK**.

Step 10 Return to your originating procedure (NTP).

DLP-G221 Enable MAC Address Learning on SVLANs for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards

Purpose	This task enables MAC address learning on SVLANS for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	VLANs must already be created on the selected card.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable MAC Address Learning. If you are already logged in, continue with Step 2.

Step 2 Complete the following tasks, as needed:

- DLP-G460 Enable MAC Address Learning on SVLANs for GE_XPE or 10GE_XPE Cards Using CTC, page 11-402
- NTP-G226 Enable MAC Address Learning on SVLANs for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI

Stop. You have completed this procedure.

DLP-G460 Enable MAC Address Learning on SVLANs for GE_XPE or 10GE_XPE Cards Using CTC

Purpose	This task enables MAC address learning on SVLANs attached to the port of a GE_XPE or 10GE_XPE card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
	DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode, page 11-149
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the GE_XPE or 10GE_XPE card must be in L2-over-DWDM mode. Refer to the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149 if needed.

Note MAC address learning is applicable only for GE_XPE and 10GE_XPE cards. If MAC address learning is configured on a GE_XP or a 10GE_XP card, a PROV-MISMATCH alarm is raised. Until this alarm is cleared, provisioning on the card is not possible.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XPE or 10GE_XPE card where you want to enable MAC address learning.

Step 2 Enable MAC address learning on the port. Perform the following steps:

a. Click **Provisioning** > **Ethernet**.

b. Check the **MAC Learning** check box.

Note If the per port MAC address learning is configured on a GE_XP or 10 GE_XP cards, before upgrading to a GE_XPE or 10 GE_XPE card, enable MAC address learning per SVLAN. Not doing so disables MAC address learning.

Step 3 Enable MAC address learning on the SVLAN attached to the port. Perform the following steps:

a. Click **SVLAN** > **SVLAN DB** tabs.

b. Click **Load**. This loads an SVLAN database from a network node or local file and replaces any SVLANs that are in the network view VLAN DB table.

c. Check the **MAC Learning** check box related to the SVLAN (one or more than one SVLAN) to be configured with MAC address learning.

d. Click **Store**. This records and enables the new configuration.

Step 4 Return to your originating procedure (NTP).

DLP-G385 Provision the MAC Filter Settings for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card

Purpose	This task provisions the MAC address filter for the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards when the cards are provisioned in L2-over-DWDM mode. The MAC address filter is a list of MAC addresses whose packets should be accepted or dropped.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card must be in L2-over-DWDM mode. To change the card mode, complete the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the MAC filter settings.

Step 2 Click the **Provisioning > Security > MAC Filter** tabs.

Step 3 Click the port for which you want to create a MAC filter.

Step 4 Click **Edit**.

Step 5 In the Edit MAC Address dialog box, click **Add**. A new table entry appears with the MAC address 00-00-00-00-00-00.

Step 6 In the MAC Address Port field, type in the MAC address you want to filter over the default 00-00-00-00-00-00 address.

Step 7 If you want to add more MAC addresses, repeat Steps 5 and 6. (Up to eight MAC addresses can be added for each port.) If not, click **OK**.

Step 8 On the MAC Filter table, provision the Allowed check box:

- Checked—All MAC addresses different from the address(es) entered in the table will be dropped.
- Unchecked—All MAC addresses matching the address(es) entered in the table will be dropped.

Step 9 Click **Apply**.

Step 10 Repeat Steps 3 through 9 for each port of the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card that you want to set up.

Step 11 Return to your originating procedure (NTP).

NTP-G237 Retrieve and Clear MAC Addresses on SVLANs for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards

Purpose	This procedure retrieves and clears MAC addresses learned on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC • DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode, page 11-149 • DLP-G221 Enable MAC Address Learning on SVLANs for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards, page 11-402
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Retrieving and clearing learned MAC addresses are CPU intensive and traffic affecting. You must clear the MAC addresses only during a scheduled maintenance window.

Note It is not possible to simultaneously retrieve learned MAC addresses from both CTC and TL1 interfaces.

Step 1 In the node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to retrieve the MAC addresses.

Step 2 To retrieve the MAC addresses learned, perform the following steps:

a. Click **Maintenance > MAC Addresses > Learned**.

b. In the SVLAN field, type a valid SVLAN range. The SVLAN range is from 1 to 4093.

c. Click **Refresh**.

The table displays the following fields:

- MAC Address—Displays the MAC address for the port.
- VLAN—Displays the VLAN identifier for the port.
- Port—Displays the port number.

Right-click the column heading to display the following options:

- Row Count—Displays the number of learned MAC addresses retrieved.
- Sort Column—Sorts the table by the column's values.
- Hide Column—Hides the column from view.
- Reorder Columns Visibility—Displays all hidden columns.

Step 3 Click **Refresh** to refresh the list of MAC addresses learned.

Step 4 Click **Clear** to clear the MAC addresses learned on all the SVLANS of the card.

Note It is not possible to delete the MAC addresses learned on a per SVLAN basis.

Step 5 To view card MAC addresses, complete the "DLP-G546 View Card MAC Addresses on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards" task on page 11-405.

Stop. You have completed this procedure.

DLP-G546 View Card MAC Addresses on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards

Purpose	This task allows you to view the MAC addresses for each client and trunk port and the CPU port of the card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 To view the card MAC addresses, click **Maintenance > MAC Addresses > Card**. The MAC addresses for each client and trunk port and the CPU port are displayed.

The table displays the following fields:

- Port—Displays the port number.
- MAC Address—Displays the MAC address for the port.

Step 2 Return to your originating procedure.

NTP-G311 Provision the Storm Control Settings for GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards

Purpose	This task provisions the storm control settings for the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards when the cards are provisioned in L2-over-DWDM mode.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card must be in L2-over-DWDM mode. To change the card mode, complete the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the storm control settings.

Step 2 Click the **Provisioning > Security > Storm Control** tabs.

Step 3 Modify any of the settings as described in Table 11-158.

Table 11-158 Storm Control Settings

Parameter	Description	Options
Port	(Display only) The Port number (*n-n*) and rate (GE or TEN_GE).	
DLF Storm Control	Enables or disables DLF storm control on the card.	• Checked—DLF storm control is enabled. • Unchecked—DLF storm control is disabled.
DLF Storm Control Threshold (pps)	Threshold value to set the number of unknown unicast packets per second.	Range: 0 to 16777215 packets per second

Table 11-158 Storm Control Settings

Parameter	Description	Options
Mcast Storm Control	Enables or disables Multicast storm control on the card.	• Checked—Multicast storm control is enabled. • Unchecked—Multicast storm control is disabled.
Mcast Storm Control Threshold (pps)	Threshold value to set the number of multicast packets per second.	Range: 0 to 16777215 packets per second
Bcast Storm Control	Enables or disables Broadcast storm control on the card.	• Checked—Broadcast storm control is enabled. • Unchecked—Broadcast storm control is disabled.
Bcast Storm Control Threshold (pps)	Threshold value to set the number of broadcast packets per second.	Range: 0 to 16777215 packets per second

Step 4 Click **Apply**.

Stop. You have completed this procedure.

NTP-G205 Enable Link Integrity on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards

Purpose	This task enables link integrity on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable link integrity. If you are already logged in, continue with Step 2.

Step 2 Complete the following tasks, as needed:

- DLP-G509 Enable Link Integrity on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using CTC, page 11-408
- NTP-G216 Enable Link Integrity on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI

Stop. You have completed this procedure.

DLP-G509 Enable Link Integrity on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using CTC

Purpose	This task enables link integrity on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Create or load an SVLAN profile. To create a SVLAN profile see the DLP-G471 Create a SVLAN or CVLAN Profile, page 11-411.

Note Make sure the **Link Integrity** check box is selected to enable link integrity for a profile and save it to the node.

Step 3 Associate the SVLAN profile (with Link Integrity enabled) to a SVLAN on a port. To do this perform the following steps:

a. In node view (single-shelf mode), or shelf view (multishelf mode), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card. The card view appears.

b. Click the **Provisioning > Profiles Mapping > SVLAN** tabs.

c. Enter the SVLANs or SVLAN range in the **SVLAN to View** text box.

   A table appears that displays SVLANs and available ports. The SVLAN profiles that was created must be applied to a SVLAN and a port. However, make sure the SVLAN has already been associated with the port via the QinQ tab (For information on how to associate a SVLAN to a port, see the "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" task on page 11-400).

d. Select the SVLAN for a port and choose the available SVLAN profile from the drop-box.

e. Click **Apply**.

Step 4 AIS action must be set on a per-UNI port basis. Select **None** or **Squelch** from the AIS action drop-down list. For detailed instructions, see the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.

Step 5 Return to your originating procedure (NTP).

NTP-G289 Provision CVLAN Rate Limiting on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card

Purpose	This task provisions CVLAN rate limiting on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note You cannot provision CVLAN rate limiting on channel groups.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to provision CVLAN rate limiting. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Create or load a CVLAN profile by setting Committed Info Rate, Committed Burst, Excess Info, Excess Burst. To create a CVLAN Profile see the "DLP-G471 Create a SVLAN or CVLAN Profile" task on page 11-411.

Step 4 Associate the CVLAN profile to a CVLAN on a UNI port. To do this perform the following steps:

a. In node view (single-shelf mode), or shelf view (multishelf mode), double-click the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card. The card view appears.

b. Click the **Provisioning > Profiles Mapping > CVLAN** tabs.

c. Enter the CVLANs or CVLAN range in the **CVLANS to View** text box.

A table appears that displays CVLANs and available ports. The CVLAN profiles that were created must be applied to a CVLAN and port. However, make sure the CVLAN has already been associated with the port via the QinQ tab (For information on how to associate a CVLAN profile to a UNI port, see the "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" task on page 11-400).

d. Select the CVLAN for a given port and choose the available CVLAN profile from the drop-down list.

e. Click **Apply**.

Stop. You have completed this procedure.

NTP-G208 Provision SVLAN Rate Limiting on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card

Purpose	This task provisions SVLAN rate limiting on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable SVLAN rate limiting. If you are already logged in, continue with Step 2.

Step 2 Complete the following tasks, as needed:

- DLP-G515 Provision SVLAN Rate Limiting on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card Using CTC, page 11-410
- NTP-G225 Provision SVLAN Rate Limiting on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card Using PCLI

Stop. You have completed this procedure.

DLP-G515 Provision SVLAN Rate Limiting on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card Using CTC

Purpose	This task provisions SVLAN rate limiting on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Create or load a SVLAN profile by setting Committed Info Rate, Committed Burst, Excess Info, Excess Burst. To create a SVLAN Profile see the "DLP-G471 Create a SVLAN or CVLAN Profile" task on page 11-411.

Step 3 Associate the SVLAN profile to a SVLAN on a port. To do this, perform the following steps:

a. In node view (single-shelf mode), or shelf view (multishelf mode), double-click the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE card. The card view appears.

b. Click the **Provisioning > Profiles Mapping > SVLAN** tabs.

c. Enter the SVLANs or SVLAN range in the **SVLAN to View** text box.

   A table appears that displays SVLANs and available ports. The SVLAN profiles that were created must be applied to a SVLAN and port. However, make sure the SVLAN has already been associated with the port via the QinQ tab (For information on how to associate a SVLAN profile to a UNI port, see the "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" task on page 11-400 and to a NNI port see the "DLP-G382 Add and Remove SVLANS to/from GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE NNI Ports" task on page 11-397).

d. Select the SVLAN for a given port and choose the available SVLAN profile from the drop-down list.

e. Click **Apply**.

Stop. You have completed this procedure.

DLP-G471 Create a SVLAN or CVLAN Profile

Purpose	This task creates an SVLAN profile.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note You cannot associate SVLAN or CVLAN profiles to channel groups. You can associate a CVLAN profile only to a UNI port.

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning > SVLAN > Profiles** tabs.

Step 3 Click **Add** and a profile is added to the Profiles tab. Modify any of the settings as follows:

- Name—The profile name can be up to 32 alphanumeric/special characters.
- Committed Info Rate—Sets the guaranteed information rate as provided by the service provider service-level agreement. The default value is 100 and the range is 0 to 100 percent.
- Committed Burst—Sets the maximum number of bits that will be transferred per second.
- Excess Info—Sets the excess rate as provided by the service provider service-level agreement. The default value is 100 and the range is 0 to 100 percent. However, the value must be greater or equal to than the Committed Info Rate.
- Excess Burst—The maximum number of bits that are credited for later transfer in the event the committed burst rate cannot be transmitted.
- Link Integrity—Enables link integrity for the SVLAN profile. Do not check this check box if you are creating a CVLAN profile.

Note When you set the Committed Info Rate above 40% on 10GE_XP and 10GE_XPE cards, the Committed Burst Size and Excess Burst Size must be set to at least 32K. The Committed Burst Size and Excess Burst Size can be increased based on the packet size and Committed Info Rate value.

Step 4 Click **Store**.

Step 5 In the Store Profile(s) dialog box, choose one of the following:

- To Node(s)—Stores the SVLAN profile at one or more network nodes. Choose the network nodes where you want to store the SVLAN profile. To choose more than one node, press the Shift key, or click Select All.
- To File—Stores the SVLAN profile in a file. Enter a file name, then click Browse to navigate to a local or network drive where you want to store the file.

Step 6 Click **OK**.

Step 7 Return to your originating procedure (NTP).

NTP-G204 Enable IGMP Snooping on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards

Purpose	This procedure enables Internet Group Management Protocol (IGMP) snooping on a per-SVLAN basis on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable IGMP snooping. If you are already logged in, continue with Step 2.

Step 2 Complete the following tasks, as needed:

- "DLP-G511 Enable IGMP Snooping, IGMP Fast Leave and IGMP Report Suppression on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using CTC" task on page 11-413.
- NTP-G220 Enable IGMP Snooping on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI.
- NTP-G217 Enable IGMP Fast-Leave Processing on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI.
- NTP-G219 Enable IGMP Report Suppression on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI.

Stop. You have completed this procedure.

DLP-G511 Enable IGMP Snooping, IGMP Fast Leave and IGMP Report Suppression on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using CTC

Purpose	This procedure explains how to enable IGMP snooping, IGMP fast leave and IGMP report suppression on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards using CTC.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning > SVLAN > SVLAN DB** tabs. Click **Load** to load the SVLANs on the card where IGMP must be enabled.

Step 3 For each SVLAN shown in the table, select the following:

- IGMP—Check the IGMP check box to enable IGMP for the selected SVLAN.
- IGMP Fast Leave—Checking the IGMP Fast Leave causes the switch to immediately remove a port from the IP multicast group when it detects an IGMP, version 2 (IGMPv2) leave message on that port.
- IGMP Suppression—Check the IGMP Suppression check box to enable a single IGMP report to be sent to each multicast group in response to a single query.

Step 4 Click **Store SVLAN DB**.

Step 5 In the Store SVLAN DB dialog box, choose one of the following:

- To Node/Shelf/Card—Select the node and shelf. All the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards in L2 over DWDM mode are displayed. Select the card where you want to store the SVLAN DB.
- Stores the SVLAN database at one or more network nodes. Choose the network nodes where you want to store the SVLAN database. To choose more than one node, press the Shift key, or click **Select All**.
- To File—Stores the SVLAN database in a file. Enter a file name, then click **Browse** to navigate to a local or network drive where you want to store the file.
- Select the card on which you want to save the changes made in step 3.

Step 6 Click **OK**.

Note If you want to add the multicast-capable ports to the forwarding table for every IP multicast, select the IGMP Static Router Port check box as described in the "DLP-G380 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Ethernet Settings" task on page 11-382.

Stop. You have completed this procedure.

NTP-G206 Enable MVR on a GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card

Purpose	This procedure enables Multicast VLAN Registration (MVR) on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable IGMP snooping. If you are already logged in, continue with Step 2.

Step 2 Complete the following tasks, as needed:

- "DLP-G513 Enable MVR on a GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card Using CTC" task on page 11-414.
- NTP-G224 Enable MVR on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Cards Using PCLI.

Stop. You have completed this procedure.

DLP-G513 Enable MVR on a GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card Using CTC

Purpose	This procedure enables Multicast VLAN Registration (MVR) on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards using CTC.
Tools/Equipment	None
Prerequisite Procedures	DLP-G382 Add and Remove SVLANS to/from GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE NNI Ports, page 11-397
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode), or shelf view (multishelf mode), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to enable MVR. The card view appears.

Note At least one SVLAN must be configured on the card.

Step 2 Click the **Provisioning** > **MVR** tabs. The MVR Settings tab appears.

Step 3 Check the **Enabled** check box and enter the following information:

- IGMP CVLAN—Check box to enable IGMP snooping on CVLAN. This check box is enabled only when MVR is enabled through the Enabled check box.
- Multicast SVLAN—Select the MVR SVLAN ID. The default value is the SVLAN with the lowest ID configured on the card. The drop box lists all the SVLANs on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card.

Note SVLAN selected here can not be used for UNI port, make sure that the corresponding SVLAN on the NNI port is checked.

- Multicast Address—Sets the specified multicast group address as the MVR multicast group. The default address is 239.255.255.255 and the range is 224.0.0.0 to 239.255.255.255. Except the subrange [224-239].[0/128].0.x.
- Count—Sets the range of any additional multicast group addresses. The default is 1, and range is 1 to 256.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G386 Provision the Gigabit Ethernet Trunk Port Alarm and TCA Thresholds

Purpose	This task changes the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card trunk port alarm and TCA thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards have two trunk ports. The GE_XP and GE_XPE trunk ports are 21-1 and 22-1 on the card graphic and 21 (Trunk) and 22 (Trunk) on the Optics Thresholds table. The 10GE_XP and 10GE_XPE card trunk ports are 3-1 and 4-1 on the card graphic and 3 (Trunk) and 4 (Trunk) on the Optics Thresholds table.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Step 3 If TCA is not selected, click **TCA** and then click **Refresh**. When TCA is selected, continue with Step 4.

Step 4 Verify the trunk port TCA thresholds are provisioned as shown in Table 11-159. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Table 11-159 GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card Trunk Interface TCA Thresholds

Pluggable Port Module (XFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
XFP WDM no FEC	–7	–23	6	–4
XFP WDM standard FEC	–7	–27	6	–4
XFP WDM Enhanced FEC	–7	–27	6	–4

Step 5 Under Types, click the **Alarm** radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Step 6 Verify the trunk port alarm thresholds are provisioned as shown in Table 11-160. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Table 11-160 GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card Trunk Interface Alarm Thresholds

Pluggable Port Module (XFP)	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
XFP WDM no FEC	–5	–26	5	–3
XFP WDM standard FEC	–5	–30	5	–3
XFP WDM Enhanced FEC	–5	–30	5	–3

Step 7 Click **Apply**.

Step 8 Repeat Steps 3 through 7 to provision the second trunk port.

Step 9 Return to your originating procedure (NTP).

DLP-G387 Provision the Gigabit Ethernet Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G277 Provision a Multirate PPM, page 11-152 DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The GE_XP card has 20 client ports. The ports are 1-1 through 20-1 on the card graphic and 1 (Client) through 20 (Client) on the Optics Thresholds table. The 10GE_XP card has 2 client ports. The ports are 1-1 and 2-1 on the card graphic and 1 (Client) and 2 (Client) on the Optics Thresholds table.

Note The hardware device that plugs into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable input/output devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the client port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs. The TCA thresholds are shown by default.

Step 3 If TCA is not selected, click **TCA** and then click **Refresh**. When TCA is selected, continue with Step 4.

Step 4 Verify the client port TCA thresholds are provisioned as shown in Table 11-161. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Table 11-161 GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card Client Interface TCA Thresholds

Pluggable Port Module (XFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
10GE LAN PHY 10GBASE-LR	1	–14	5	–12
1000Base-SX (1Gbps)[1]	0	–17	3	–16
1000Base-LX [1]	–3	–20	3	–16

1. Gigabit Ethernet client

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Step 5 Under Types, click the **Alarm** radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Step 6 Verify the client port Alarm thresholds are provisioned as shown in Table 11-162. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Table 11-162 GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card Client Interface Alarm Thresholds

Pluggable Port Module (XFP)	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
10GE LAN PHY 10GBASE-LR	3	–16	1	–8
1000Base-SX (1Gbps)[1]	3	–20	–2	–12
1000Base-SX (2Gbps)[1]	3	–18	–2	–12
1000Base-LX [1]	0	–23	–1	–12

1. Gigabit Ethernet client

Step 7 Click **Apply**.

Step 8 Repeat Steps 3 through 7 to provision each additional client port.

Step 9 Return to your originating procedure (NTP).

DLP-G388 Change the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card RMON Thresholds

Purpose	This task changes the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card RMON threshold settings.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), display the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the RMON thresholds.

Step 2 Click the **Provisioning > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose an individual port, or choose **All** to provision RMON thresholds for all ports.

Step 5 From the Variable drop-down list, choose an Ethernet variable. See Table 11-163 for a list of available Ethernet RMON variables.

Note Variable descriptions were obtained from the following Internet Engineering Task Force (IETF) Requests for Comment (RFCs): RFC 3635, RFC 2233, and RFC 1757. Refer to the RFCs for additional information.

Table 11-163 Gigabit Ethernet RMON Variables

Variable	Description
rxTotalPkts	Total number of receive packets.
ifInUcastPkts	The number of packets, delivered by this sub-layer to a higher (sub-)layer, which were not addressed to a multicast or broadcast address at this sub-layer.
ifInMulticastPkts	The number of packets, delivered by this sub-layer to a higher (sub-)layer, which were addressed to a multicast address at this sub-layer. For a MAC layer protocol, this includes both Group and Functional addresses.
ifInBroadcastPkts	The number of packets, delivered by this sub-layer to a higher (sub-)layer, which were addressed to a broadcast address at this sub-layer.
ifInDiscards	The number of inbound packets which were chosen to be discarded even though no errors had been detected to prevent their being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.
ifInOctets	Total number of octets received on the interface, including framing characters.
ifOutOctets	Total number of octets transmitted out of the interface, including framing characters.
txTotalPkts	Total number of transmitted packets.
ifOutMulticastPkts	The total number of packets that higher-level protocols requested be transmitted, and which were addressed to a multicast address at this sub-layer, including those that were discarded or not sent. For a MAC layer protocol, this includes both group and functional addresses.
ifOutBroadcastPkts	The total number of packets that higher-level protocols requested be transmitted, and which were addressed to a broadcast address at this sub-layer, including those that were discarded or not sent.
ifOutDiscards	The number of outbound packets which were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free up buffer space.
IfOutErrors	Number of outbound packets or transmission units that could not be transmitted because of errors.
dot3StatsFCSErrors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the FCS check.
dot3StatsFrameTooLong	A count of frames received on a particular interface that exceed the maximum permitted frame size.
dot3ControlInUnknownOpCode	A count of MAC control frames received on this interface that contain an opcode that is not supported by this device.
dot3InPauseFrames	A count of MAC control frames received on this interface with an opcode indicating the PAUSE operation.
dot33StatsFCSErrors	A count of frames received on a particular interface that are an integral number of octets in length but do not pass the FCS check.

Table 11-163 Gigabit Ethernet RMON Variables (continued)

Variable	Description
dot3StatsFrameTooLong	A count of frames received on a particular interface that exceed the maximum permitted frame size.
dot3ControlInUnknownOpCode	A count of MAC control frames received on this interface that contain an opcode that is not supported by this device.
dot3InPauseFrames	A count of MAC control frames received on this interface with an opcode indicating the PAUSE operation.
dot3OutPauseFrames	A count of MAC Control frames transmitted on this interface with an opcode indicating the PAUSE operation.
etherStatsCRCAlignErrors	Total number of packets received that had a length (excluding framing bits, but including FCS octets) of between 64 and 1518 octets, inclusive, but had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatsUndersizePkts	The total number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
etherStatsFragments	The total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad Frame Check Sequence (FCS) with an integral number of octets (FCS Error) or a bad FCS with a non-integral.
etherStatsPkts	The total number of packets (including bad packets, broadcast packets, and multicast packets) received.
etherStatsPkts64Octets	The total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts65to127Octets	The total number of packets (including error packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts128to255Octets	The total number of packets (including error packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts256to511Octets	The total number of packets (including error packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts512to1023Octets	The total number of packets (including error packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts1024to1518Octets	The total number of packets (including error packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts1519to1522Octets	The total number of packets (including error packets) received that were between 1519 and 1522 octets in length inclusive (excluding framing bits but including FCS octets). **Note** This variable is supported only on client ports.
etherStatsBroadcastPkts	The total number of good packets received that were directed to the broadcast address
etherStatsMulticastPkts	The total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
etherStatsOversizePkts	The total number of packets received that were longer than 1518 octets (for untagged packets) or 1522 octets (for tagged packets) (excluding framing bits, but including FCS octets) and were otherwise well formed.

Table 11-163 Gigabit Ethernet RMON Variables (continued)

Variable	Description
etherStatsJabbers	The total number of packets received that were longer than 1518 octets (for untagged packets) or 1522 octets (for tagged packets) (excluding framing bits, but including FCS octets), and were not an integral number of octets in length or had a bad FCS.
etherStatsOctets	The total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).

Step 6 From the Alarm Type drop-down list, indicate whether the event will be triggered by the rising threshold, the falling threshold, or both the rising and falling thresholds.

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Type in an appropriate number of seconds for the Sample Period.

Step 9 Type in the appropriate number of occurrences for the Rising Threshold.

For a rising type of alarm, the measured value must move from below the falling threshold to above the rising threshold. For example, if a network is running below a rising threshold of 1000 collisions every 15 seconds and a problem causes 1001 collisions in 15 seconds, the excess occurrences trigger an alarm.

Step 10 Enter the appropriate number of occurrences in the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the counterpart to a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded (otherwise, a single network problem might cause a rising threshold to be exceeded multiple times and cause a flood of events).

Step 11 Click **OK**.

Step 12 To view all RMON thresholds, click **Show All RMON thresholds**. If not, continue with Step 12

Step 13 Return to your originating procedure (NTP).

DLP-G389 Change the Gigabit Ethernet Optical Transport Network Settings

Purpose	This task changes the optical transport network (OTN) settings for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then choose one of the following subtabs: **OTN Lines**, **G.709 Thresholds**, **FEC Thresholds**, or **Trail Trace Identifier**.

Step 3 Modify any of the settings described in Tables 11-164 through 11-167.

Note You must modify Near End and Far End; 15 Min and 1 Day; and SM and PM independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-164 describes the values on the Provisioning > OTN > OTN Lines tab.

Table 11-164 GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card OTN Line Settings

Parameter	Description	Options
Port	(Display only) Port number and description:	3 (Trunk) and 4 (Trunk). 10GE_XP and 10GE_XPE cards 21 (Trunk) and 22 (Trunk). GE_XP and GE_XPE cards
ITU-T G.709 OTN	Sets the OTN lines according to ITU-T G.709.	• Enable • Disable
FEC	Sets the OTN lines to forward error correction (FEC).	• Standard • Enhanced
SF BER	(Display only) Sets the signal fail bit error rate.	• 1E-5
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9

Table 11-165 describes the values on the Provisioning > OTN > ITU-T G.709 Thresholds tab.

Table 11-165 GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card ITU-T G.709 Threshold Settings

Parameter	Description	Options
Port	(Display only) Port number and description:	3 (Trunk) and 4 (Trunk). 10GE_XP and 10GE_XPE cards 21 (Trunk) and 22 (Trunk). GE_XP and GE_XPE cards
ES	Errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.

Table 11-165 GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card ITU-T G.709 Threshold Settings

Parameter	Description	Options
SES	Severely errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
UAS	Unavailable seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
BBE	Background block errors	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.
FC	Failure counter	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select a bullet and click **Refresh**.

Table 11-166 describes the values on the Provisioning > OTN > FEC Threshold tab.

Table 11-166 GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE Card FEC Threshold Settings

Parameter	Description	Options
Port	(Display only) Port number and description:	3 (Trunk) and 4 (Trunk). 10GE_XP and 10GE_XPE cards 21 (Trunk) and 22 (Trunk). GE_XP and GE_XPE cards
Bit Errors Corrected	Sets the value for bit errors corrected.	Numeric. Can be set for 15-minute or one-day intervals.
Uncorrectable Words	Sets the value for uncorrectable words.	Numeric. Can be set for 15-minute or one-day intervals.

Table 11-167 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-167 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPECard Trail Trace Identifier Settings

Parameter	Description	Options
Port	(Display only) Port number.	2
Level	Sets the level.	• Section • Path
Received Trace Mode	Sets the trace mode.	• Off/None • Manual

Table 11-167 GE_XP, 10GE_XP, GE_XPE, and 10GE_XPECard Trail Trace Identifier Settings

Parameter	Description	Options
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Disable FDI on TTIM	If a Trace Identifier Mismatch on Section overhead alarm arises because of a J0 overhead string mismatch, no Forward Defect Indication (FDI) signal is sent to the downstream nodes if this box is checked.	• Checked (FDI on TTIM is disabled) • Unchecked (FDI on TTIM is not disabled)
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

NTP-G314 Add a GE_XP or 10GE_XP Card on a FAPS Ring

Purpose	This procedure adds a GE_XP or 10GE_XP card on a FAPS ring.
Tools/Equipment	Installed GE_XP or 10GE_XP cards.

Prerequisite Procedures	DLP-G46 Log into CTC
	"NTP-G15 Install the Common Control Cards" in the *Cisco ONS 15454 Hardware Installation Guide*
	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69
	DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode, page 11-149
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to add a GE_XP or 10GE_XP card on a FAPS ring. If you are already logged in, continue with Step 2.

Step 2 Perform any of the following tasks as needed:

- DLP-G687 Add a GE_XP or 10GE_XP Card Facing Master Card on a FAPS Ring, page 11-425
- DLP-G688 Add a GE_XP or 10GE_XP Card Between the Slave Cards on a FAPS Ring, page 11-426

Stop. You have completed this procedure.

DLP-G687 Add a GE_XP or 10GE_XP Card Facing Master Card on a FAPS Ring

Purpose	This procedure adds a GE_XP or 10GE_XP card that faces the master card on a FAPS ring.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to add a GE_XP or 10GE_XP card on a FAPS ring.

Step 2 Verify that the GE_XP or 10GE_XP card is installed according to the requirements specified in Table 14-7 on page 14-109.

Step 3 Insert the new GE-XP card with XFP on the slot.

Step 4 Change the GE_XP card mode to L2-over-DWDM. See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.

Step 5 Create and store an SVLAN database on the new GE_XP card. See the DLP-G421 Create and Store an SVLAN Database, page 16-79.

Step 6 Enable FAPS protection on the new card.

Step 7 Attach SVLAN to the trunk ports of the new card.

Step 8 Choose OOS,DSBLD from the Admin State column for port 22 on the master card that is facing toward the new card. This action places port 22 in the blocking state and port 21 in the forwarding state.

FAPS configuration mismatch alarm is raised on the master card.

Step 9 Switch the traffic to the protect path.

Step 10 Choose OOS,DSBLD from the Admin State column for port 21 on the slave card that is facing toward the new card.

Step 11 Connect the fiber from the slave card (that is facing toward the new card) to the new card in segment B.

Step 12 Connect the fiber from the master card to the new card in segment A.

Step 13 Choose IS from the Admin State column for port 21 on the slave card that is facing toward the new card.

Step 14 Choose IS from the Admin State column for port 22 on the new card to bring up segment B.

Step 15 Choose IS from the Admin State column for port 21 on the new card.

Note The FAPS state of the new card will be in the forwarding state for both the ports and port 21 of the slave card will be in the blocking state.

Step 16 Choose IS from the Admin State column for port 22 on the master card to bring up segment A.

Note The FAPS state of port 21 on the master card will be in the blocking state and port 22 will be in the forwarding state. The trunk ports of the remaining GE_XP cards will be in the forwarding state. The port 21 of the slave card (that is facing toward the new card) will change to the forwarding state.

Step 17 Return to your originating procedure (NTP).

DLP-G688 Add a GE_XP or 10GE_XP Card Between the Slave Cards on a FAPS Ring

Purpose	This procedure adds a GE_XP or 10GE_XP card between the two slave cards on a FAPS ring.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to add a GE_XP or 10GE_XP card on a FAPS ring.

Step 2 Verify that the GE_XP or 10GE_XP card is installed according to the requirements specified in Table 14-7 on page 14-109.

Step 3 Insert the new GE-XP card with XFP on the slot.

Step 4 Change the GE_XP card mode to L2-over-DWDM. See the DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode, page 11-149.

Step 5 Create and store an SVLAN database on the new GE_XP card. See the DLP-G421 Create and Store an SVLAN Database, page 16-79.

Step 6 Attach SVLAN to the trunk ports of the new card.

Step 7 Choose OOS,DSBLD from the Admin State column for port 22 on both the slave cards that are facing toward the new card.

Step 8 Connect the fiber from the slave card to the new card in segment B.

Step 9 Connect the fiber from the master card to the new card in segment A.

Step 10 Choose IS from the Admin State column for port 22 on the slave card.

Step 11 Choose IS from the Admin State column for port 22 on the new card to bring up segment B.

Step 12 Choose IS from the Admin State column for port 21 on the new card.

Step 13 Choose IS from the Admin State column for port 21 on the slave card to bring up segment A.

Step 14 Return to your originating procedure (NTP).

NTP-G197 Provision the OTU2_XP Card Line Settings, PM Parameters, and Thresholds

Purpose	This procedure changes line settings, PM parameters, and threshold setting for the OTU2_XP card.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 DLP-G63 Install an SFP or XFP, page 14-72 DLP-G452 Change the OTU2_XP Card Mode, page 11-151
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to change the card settings. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card.

Step 4 Verify the card mode:

a. Display the OTU2_XP card in card view.

b. Click the **Provisioning > Card** tabs.

c. Verify that the card mode is set to the mode designated by your site plan:

- Transponder

- Standard Regen
- Enhanced FEC
- Mixed
- 10G Ethernet LAN Phy to WAN Phy

If the card mode is set correctly, continue with Step 6. If not, complete the "DLP-G452 Change the OTU2_XP Card Mode" task on page 11-151.

Step 5 Refer to the "11.16.5 OTU2_XP Card Configuration Rules" section on page 11-103 before performing any task listed in Step 6.

Step 6 Perform any of the following tasks as needed.

- DLP-G453 Change the OTU2_XP Card Settings, page 11-428
- DLP-G454 Change the OTU2_XP Line Settings, page 11-429
- DLP-G455 Change the OTU2_XP Line Section Trace Settings, page 11-433
- DLP-G456 Change the OTU2_XP Line Thresholds for SONET or SDH Payloads, page 11-434
- DLP-G457 Provision the OTU2_XP Port Alarm and TCA Thresholds, page 11-436
- DLP-G462 Change the OTU2_XP Line RMON Thresholds for the 10G Ethernet and 10G FC Payloads, page 11-438
- DLP-G458 Change the OTU2_XP OTN Settings, page 11-441
- DLP-G523 Change the OTU2_XP Path Trace Settings, page 11-447
- DLP-G524 Provision the OTU2_XP Path Settings for 10G Ethernet LAN Phy to WAN Phy Configuration, page 11-448

Stop. You have completed this procedure.

DLP-G453 Change the OTU2_XP Card Settings

Purpose	This task changes the card settings for the OTU2_XP card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the card settings.

Step 2 Click the **Provisioning > Card** tab.

Step 3 Modify any of the settings described in Table 11-168.

Table 11-168 OTU2_XP Card Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Card Configuration	Sets the card configuration.	• Transponder • Standard Regen • Enhanced FEC • Mixed • 10G Ethernet LAN Phy to WAN Phy	• Transponder • Standard Regen • Enhanced FEC • Mixed • 10G Ethernet LAN Phy to WAN Phy
Port Mode	Sets the port configuration when the card configuration is set as Mixed. For card configurations other than Mixed, this is a display-only parameter. You can configure Ports 2 and 4 as port mode, when the card is in 10G Ethernet LAN Phy to WAN Phy mode.	• Transponder • Standard Regen	• Transponder • Standard Regen
Termination Mode	Sets the mode of operation. (This option is only available for SONET/SDH payloads). For Standard Regen and Enhanced FEC card configurations, this is a display-only parameter.	• Transparent • Section • Line	• Transparent • Regeneration Section (RS) • Multiplex Section (MS)
Framing Type	(Display only) The card framing type, either SONET or SDH.	—	—
AIS/Squelch	Sets the transparent termination mode configuration.	• AIS • Squelch	• AIS • Squelch
Regen Line Name	Sets the regeneration line name.	—	—
ODU Transparency	Sets the ODU overhead byte configuration. For Transponder card configuration, this is a display-only parameter.	• Transparent Standard Use • Cisco Extended Use	• Transparent Standard Use • Cisco Extended Use
Proactive Protection Regen	Enables or disables the proactive protection regen mode.	• Enable • Disable	• Enable • Disable

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G454 Change the OTU2_XP Line Settings

Purpose	This task changes the line settings for OTU2_XP card.
Tools/Equipment	None

Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > Ports/SONET/Ethernet** tabs.

Step 3 Modify any of the settings described in Table 11-169.

Table 11-169 OTU2_XP Line Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the port number.	• 1-1 (OC192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC) • 2-1 (OC192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC) • 3-1 (OC192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC) • 4-1 (OC192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC) • IB_5G	• 1-1 (STM-64/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC) • 2-1 (STM-64/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC) • 3-1 (STM-64/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC) • 4-1 (STM-64/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC) • IB_5G
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state. For more information about administrative states, see the Administrative and Service States document.	• IS • IS,AINS • OOS,DSBLD • OOS,MT	• Unlocked • Unlocked,automaticInService • Locked,disabled • Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR • OOS-AU,AINS • OOS-MA,DSBLD • OOS-MA,MT	• Unlocked-enabled • Unlocked-disabled, automaticInService • Locked-enabled,disabled • Locked-enabled,maintenance

Table 11-169 OTU2_XP Line Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled, or it can be set for one of three mode options.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.	• Disabled (default): ALS is off; the laser is not automatically shut down when traffic outages (LOS) occur. • Auto Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart: ALS is on; the laser automatically shuts down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test: Manually restarts the laser for testing.
Reach	Displays the optical reach distance of the client/trunk ports.	The Reach options depend on the traffic type that has been selected.	The Reach options depend on the traffic type that has been selected.
Wavelength	Displays the wavelength of the client/trunk ports.	• First Tunable Wavelength • Further wavelengths: 850 nm through 1610 nm, 100-GHz ITU spacing; coarse wavelength division multiplexing (CWDM) spacing **Note** Supported wavelengths are marked by asterisks (**).	• First Tunable Wavelength • Further wavelengths: 850 nm through 1610 nm, 100-GHz ITU spacing; CWDM spacing **Note** Supported wavelengths are marked by asterisks (**).
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card becomes in service (IS) automatically • 0 to 48 hours, 15-minute increments	• Duration of valid input signal, in hh.mm format, after which the card becomes IS automatically • 0 to 48 hours, 15-minute increments
SF BER	(SONET [ANSI] or SDH [ETSI] only) Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5	• 1E-3 • 1E-4 • 1E-5

Table 11-169 OTU2_XP Line Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
SD BER	(SONET [ANSI] or SDH [ETSI] only) Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
Type	(SONET [ANSI] or SDH [ETSI] only) The optical transport type.	• SONET • SDH **Note** When Type is set to SDH in a SONET (ANSI) provisioning, SDCC or LDCC on OTU2_XP cards cannot be provisioned.	• SONET • SDH
MTU	The maximum size of the Ethernet frames accepted by the port. The port must be in OOS/locked state.	• 1548 bytes • Jumbo (64 to 9,216 bytes)	• 1548 bytes • Jumbo (64 to 9,216 bytes)
Incoming MAC Address	Sets the incoming MAC address.	Value of MAC address. Six bytes in hexadecimal format.	Value of MAC address. Six bytes in hexadecimal format.
Flow Control (Only when the card is in 10G Ethernet LAN Phy to WAN Phy mode)	Enables/disables flow control messaging with its peer port. When enabled, the port can send and receive PAUSE frames when buffer congestion occurs. When disabled, no PAUSE frames are transmitted and the PAUSE frames received are discarded.	• ON (default)—Flow control is enabled. • OFF—Flow control is disabled.	• ON (default)—Flow control is enabled. • OFF—Flow control is disabled.
Client Distance (Only when the card is in 10G Ethernet LAN Phy to WAN Phy mode)	Sets the fiber distance between the client of OTU2_XP card and the LAN port that is connected to the OTU2_XP client port.	• 10 km (default) • 30 km	• 10 km (default) • 30 km

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G455 Change the OTU2_XP Line Section Trace Settings

Purpose	This task changes the line section trace settings for the OTU2_XP card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs.

Step 3 Modify any of the settings described in Table 11-170.

Table 11-170 OTU2_XP Section Trace Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	Sets the port number.	• 1-1 (OC192) • 2-1 (OC192) • 3-1 (OC192) • 4-1 (OC192)	• 1-1 (STM-64) • 2-1 (STM-64) • 3-1 (STM-64) • 4-1 (STM-64)
Received Trace Mode	Sets the trace mode.	• Off/None • Manual	• Off/None • Manual
Disable AIS/RDI on TIM-S	If a TIM on Section overhead alarm arises because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked. This is a display-only parameter under the following conditions: • Received Trace Mode is Off/None • Termination Mode is set to Transparent or Section (see the "DLP-G453 Change the OTU2_XP Card Settings" task on page 11-428)	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte	• 1 byte • 16 byte

Table 11-170 OTU2_XP Section Trace Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size	String of trace string size
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh check box to automatically refresh the display every 5 seconds.	String of trace string size	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked/unchecked (default)	Checked/unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G456 Change the OTU2_XP Line Thresholds for SONET or SDH Payloads

Purpose	This task changes the line threshold settings for the OTU2_XP card carrying SONET or SDH payload.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds > SONET Thresholds** (ANSI) or **SDH Thresholds** (ETSI) tabs.

Note If you have enabled 10G Ethernet LAN Phy to WAN Phy on the OTU2_XP card, the STS option is automatically enabled.
Only near end STS thresholds are supported. No STS thresholds are support for Far End.

Step 3 Modify any of the OTU2_XP card path threshold settings on a LAN Phy to WAN Phy mode, as seen in Table 11-171.

Table 11-171 OTU2_XP Card Path Threshold Settings on a 10G Ethernet LAN Phy to WAN Phy Mode

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Port number.	• Ports 3-1 (Trunk), STS-1 • Ports 4-1 (Trunk), STS-1	• Port 3-1 (Trunk), VC4-1 • Port 4-1 (Trunk), VC4-1

Step 4 Modify any of the OTU2_XP Card Line Threshold settings described in Table 11-172

Table 11-172 OTU2_XP Card Line Threshold Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Port number	• 1-1 (OC192) • 2-1 (OC192) • 3-1 (OC192) • 4-1 (OC192)	• 1-1 (STM-64) • 2-1 (STM-64) • 3-1 (STM-64) • 4-1 (STM-64)
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Line or Section Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Multiplex Section or Regeneration Section Choose an option in each category and click **Refresh**.
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Line or Section Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Multiplex Section or Regeneration Section Choose an option in each category and click **Refresh**.

Table 11-172 OTU2_XP Card Line Threshold Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Line or Section Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Multiplex Section or Regeneration Section Choose an option in each category and click **Refresh**.
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Line or Section Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Multiplex Section or Regeneration Section Choose an option in each category and click **Refresh**.
UAS	(Line or Multiplex Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Line or Section Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—(Near end only) Multiplex Section or Regeneration Section Choose an option in each category and click **Refresh**.

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

DLP-G457 Provision the OTU2_XP Port Alarm and TCA Thresholds

Purpose	This task provisions the OTU2_XP port alarm and threshold crossing alert (TCA) thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the trunk port alarm and TCA settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Step 3 Under Types, verify that the TCA radio button is checked. If not, select it, then click **Refresh**.

Step 4 Refer to Table 11-173 to provision the port TCA thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note Do not modify the Laser Bias parameters.

Table 11-173 OTU2_XP Port TCA Thresholds

Port	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
1-1 (OC-192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC/IB_5G)	1.0 dBm	–14.0 dBm	5.0 dBm	–12.0 dBm
2-1 (OC-192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC/IB_5G)	1.0 dBm	–14.0 dBm	5.0 dBm	–12.0 dBm
3-1 (OC-192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC/IB_5G)	1.0 dBm	–14.0 dBm	5.0 dBm	–12.0 dBm
4-1 (OC-192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC/IB_5G)	1.0 dBm	–14.0 dBm	5.0 dBm	–12.0 dBm

Step 5 Click **Apply**.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Refer to Table 11-174 to provision the port alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-174 OTU2_XP Port Alarm Thresholds

Port	Alarm RX Power High	Alarm RX Power Low	Alarm TX Power High	Alarm TX Power Low
1-1 (OC-192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC/IB_5G)	3.0 dBm	–16.0 dBm	1.0 dBm	–8.0 dBm
2-1 (OC-192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC/IB_5G)	3.0 dBm	–16.0 dBm	1.0 dBm	–8.0 dBm
3-1 (OC-192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC/IB_5G)	3.0 dBm	–16.0 dBm	1.0 dBm	–8.0 dBm
4-1 (OC-192/10G Ethernet WAN Phy/10G Ethernet LAN Phy/10G FC/IB_5G)	3.0 dBm	–16.0 dBm	1.0 dBm	–8.0 dBm

Step 8 Click **Apply**.

Step 9 Return to your originating procedure (NTP).

DLP-G462 Change the OTU2_XP Line RMON Thresholds for the 10G Ethernet and 10G FC Payloads

Purpose	This task changes the line threshold settings for OTU2_XP card carrying the 10G Ethernet or 10G FC payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the line threshold in the card view.

Step 2 Click the **Provisioning > Line Thresholds > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose the applicable port.

Step 5 From the Variable drop-down list, choose an Ethernet variable. See Table 11-175 and Table 11-176 for a list of available Ethernet variables.

Table 11-175 OTU2_XP Card 10G Ethernet Variables

Variable	Description

Table 11-175 OTU2_XP Card 10G Ethernet Variables (continued)

ifInOctets	Total number of octets received on the interface, including framing characters.
rxTotalPkts	Total number of received packets. rxTotalPkts increments for 10G FC payload packets with FCS errors. However, 10G Ethernet LAN Phy payload packets with CRC errors are not counted.
ifInMulticastPkts	Number of multicast frames received error free.
ifInBroadcastPkts	Number of packets, delivered by a sublayer to an higher sublayer, that were addressed to a broadcast address at this sublayer.
ifInErrors	Number of inbound packets that contained errors preventing them from being delivered to a higher-layer protocol.
dot3StatsFCSErrors	Number of frames with frame check errors, that is, there is an integral number of octets, but an incorrect Frame Check Sequence (FCS).
etherStatsUndersizePkts	Total number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
etherStatsFragments	Total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Note that it is entirely normal for etherStatsFragments to increment. This is because it counts both runts (which are normal occurrences due to collisions) and noise hits.
etherStatsPkts64Octets	Total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts65to127Octets	Total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts128to255Octets	The total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts256to511Octets	Total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts512to1023Octets	Total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts1024to1518Octets	Total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).

Table 11-175 OTU2_XP Card 10G Ethernet Variables (continued)

etherStatsBroadcastPkts	Total number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.
etherStatsMulticastPkts	Total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
etherStatsOversizePkts	Total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
etherStatsJabbers	Total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatsOctets	Total number of octets of data (including those in bad packets) received on the network (excluding framing bits but including FCS octets).
rxControlFrames	Number of MAC control frames passed by the MAC sublayer to the MAC control sublayer.

Table 11-176 OTU2_XP Card 10G FC Variables

Variable	Description
ifInOctets	Total number of octets received on the interface, including framing characters.
mediaIndStatsRxFramesTruncated	Total number of fiber channel frames received that are less than the minimum 36-byte frame. This is inclusive of header, SOF, EOF, and CRC with no data bytes.
mediaIndStatsRxFramesTooLong	Total number of fiber channel frames received that exceed the maximum 2148-byte frame. This is inclusive of header, SOF, EOF, CRC, and data bytes.
mediaIndStatsRxFramesBadCRC	Total number of fiber channel frames received with CRC errors.
ifInDiscards	The number of inbound packets, which were chosen to be discarded even though no errors had been detected to prevent their being delivered to a higher-layer protocol. One possible reason for discarding such a packet could be to free up buffer space.[1]
ifOutOctets	Total number of octets transmitted out of the interface, including framing characters.[1]
mediaIndStatsTxFramesBadCRC	Number of transmitted data frames with payload CRC errors when HDLC framing is used.[1]
transmitPauseFrames	Number of transmitted pause frames.[1]

Table 11-176 OTU2_XP Card 10G FC Variables (continued)

txTotalPkts	Total number of transmit packets.[1]

1. This variable is supported when the 10G Ethernet LAN Phy to WAN Phy mode is enabled on the OTU2_XP card.

Step 6 From the Alarm Type drop-down list, choose the event triggers. The available options are rising threshold, falling threshold, or rising and falling thresholds.

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Enter an appropriate number of seconds for the Sample Period.

Step 9 Enter in the appropriate number of occurrences for the Rising Threshold.

For a rising type of alarm, the measured value must move from below the falling threshold to above the rising threshold. For example, if a network is running below a rising threshold of 1000 collisions every 15 seconds and a problem causes 1001 collisions in 15 seconds, the excess occurrences trigger an alarm.

Step 10 Enter the appropriate number of occurrences in the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the counterpart to a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded (otherwise, a single network problem might cause a rising threshold to be exceeded multiple times and cause a flood of events).

Step 11 Click **OK**.

Note To view all RMON thresholds, click **Show All RMON thresholds**.

Step 12 Return to your originating procedure (NTP).

DLP-G458 Change the OTU2_XP OTN Settings

Purpose	This task changes the OTN line settings for the OTU2_XP card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs. Then click one of the following subtabs: **OTN Lines**, **ITU-T G.709 Thresholds**, **FEC Thresholds**, **Trail Trace Identifier,** or **Proactive Protection Regen**.

Step 3 Modify any of the settings described in Tables 11-64 through 11-67.

Note You must modify Near End and Far End independently, 15 Min and 1 Day independently, and SM and PM independently. To do so, select the appropriate radio button and click **Refresh**.

Table 11-177 describes the values on the **Provisioning > OTN > OTN Lines** tabs.

Table 11-177 OTU2_XP Card OTN Lines Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	—
ITU-T G.709 OTN	Sets the OTN lines according to ITU-T G.709. Check the box to enable.	• Enable • Disable
FEC	Sets the OTN lines FEC mode. Enhanced FEC mode can be enabled to provide greater range and lower bit error rate.	• Disable—FEC is off. • Standard—Standard FEC is on. • Enhanced—Enhanced FEC is on.
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
SF BER	(Display only) Indicates the signal fail bit error rate.	• 1E-5
No Fixed Stuff	Sets the insertion of stuffing bytes. This parameter only applies to 10G Ethernet LAN Phy signals in transponder card configuration. This is a display-only parameter for all other card configurations. When the "No Fixed Stuff" parameter is disabled, the bit rate is 11.09 Gbps. When the "No Fixed Stuff" parameter is enabled, the bit rate is 11.05 Gbps.	• Disable • Enable

Table 11-178 describes the values on the **Provisioning > OTN > ITU-T G.709 Thresholds** tab.

Table 11-178 OTU2_XP Card ITU-T G.709 Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	—
ES	Severely errored seconds. Two types of thresholds can be asserted. Selecting the SM (OTUk) radio button selects FEC, overhead management, and PM using OTUk. Selecting the PM radio button selects path PM using ODUk.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**. **Note** SM (OTUk) is the ITU-T G.709 optical channel transport unit order of k overhead frame used for management and performance monitoring. PM (ODUk) is the ITU-T G.709 optical channel data unit order of k overhead frame unit used for path performance monitoring.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
UAS	Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Table 11-178 OTU2_XP Card ITU-T G.709 Threshold Settings (continued)

Parameter	Description	Options
BBE	Background block errors	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.
FC	Failure counter	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—SM (OTUk) or PM (ODUk) Choose an option in each category and click **Refresh**.

Table 11-179 describes the values on the **Provisioning > OTN > FEC Thresholds** tab.

Table 11-179 OTU2_XP Card FEC Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and optional name.	—
Bit Errors Corrected	Displays the number of bit errors corrected during the selected time period.	Numeric display. Can be set for 15-minute or one-day intervals.
Uncorrectable Words	Displays the number of uncorrectable words in the selected time period.	Numeric display. Can be set for 15-minute or one-day intervals.

Table 11-180 describes the values on the **Provisioning > OTN > Trail Trace Identifier** tab.

Note You cannot change the Path Trail Trace Identifier settings when the OTU2_XP card is in the Standard Regen mode, and if the ODU transparency is set to "Transparent Standard Use".
You can change the Path Trail Trace Identifier settings when the OTU2_XP card is in the Standard Regen mode, and if the ODU transparency is set to "Cisco Extended Use".

Table 11-180 OTU2_XP Card Trail Trace Identifier Settings

Parameter	Description	Options
Port	Sets the port number.	—
Level	Sets the level.	• Section • Path

Table 11-180 OTU2_XP Card Trail Trace Identifier Settings (continued)

Parameter	Description	Options
Received Trace Mode	Sets the trace mode.	• Off/None • Manual
Disable FDI on TTIM	If a Trace Identifier Mismatch on Section overhead alarm arises because of a J0 overhead string mismatch, no Forward Defect Indication (FDI) signal is sent to the downstream nodes if this box is checked.	• Checked (FDI on TTIM is disabled) • Unchecked (FDI on TTIM is not enabled)
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size; trail trace identifier is 64 bytes in length.
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 minutes.	Checked/unchecked (default)

Table 11-181 describes the values on the **Provisioning > OTN > Proactive Protection Regen** tabs.

Note Proactive protection regen is supported on ports of OTU2_XP only in Standard Regen and Enhanced FEC mode.

Table 11-181 OTU2_XP Card Proactive Protection Regen Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and name (optional).	—
Trigger threshold	Sets the maximum BER threshold to trigger proactive protection.	• 1E-3 • 9E-4 to 1E-4 • 9E-5 to 1E-5 • 9E-6 to 1E-6 • 9E-7 to 1E-7
Trigger window (ms)	Sets the duration for which BER is monitored before triggering the proactive protection. The trigger window value must be a multiple of: • 10 ms for trigger thresholds between 1E-3 and 6E-6 • 100 ms for trigger threshold between 5E-6 to 1E-7 Trigger window must be less than or equal to 10000 ms.	Time in milliseconds.
Revert Threshold	Sets the revert threshold value of BER. **Note** Revert Threshold settings must be less than the Trigger Threshold values.	• 1E-4 • 9E-5 to 1E-5 • 9E-6 to 1E-6 • 9E-7 to 1E-7 • 9E-8 to 5E-8
Revert window (ms)	Sets the duration for which BER is monitored for settings that are less than the revert threshold value before which proactive protection provided to the router is removed. Revert Window value must be at least 2000ms and a multiple of: • 10ms for a Revert Threshold of 1E-4 to 6E-7 • 100ms for a Revert Threshold of 5E-7 to 5E-8. The revert window must be less than or equal to 10000ms.	Time in milliseconds.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G523 Change the OTU2_XP Path Trace Settings

Purpose	This task changes the path trace settings for the OTU2_XP card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the path trace settings.

Step 2 Click the **Provisioning > Path> J1 Path Trace** tabs.

Step 3 Modify any of the settings described in Table 11-182.

Table 11-182 OTU2_XP Path Trace Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	Sets the port number.	• 3-1 (OC192) • 4-1 (OC192)	• 3-1 (STM-64) • 4-1 (STM-64)
Received Trace Mode	Sets the trace mode.	• Off/None • Manual	• Off/None • Manual
Transmit	Displays the current transmit string; sets a new transmit string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size	String of trace string size

Table 11-182 OTU2_XP Path Trace Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Expected	Displays the current expected string; sets a new expected string. You can click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh check box to automatically refresh the display every 5 seconds.	String of trace string size	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked/unchecked (default)	Checked/unchecked (default)

Step 4 Click **Apply**.

Return to your originating procedure (NTP).

DLP-G524 Provision the OTU2_XP Path Settings for 10G Ethernet LAN Phy to WAN Phy Configuration

Purpose	This task changes the path settings of the OTU2_XP card for 10G Ethernet LAN Phy to WAN Phy configuration.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OTU2_XP card where you want to change the path settings.

Step 2 Click the **Provisioning > Path > SONET/SDH** tab. You can now provision the SF BER and SD BER values.

Step 3 Modify any of the OTU2_XP path settings described in Table 11-183.

Table 11-183 OTU2_XP Path Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	Sets the port number.	• Port 3-1 (trunk) • Port 4-1 trunk	• Port 3-1 (trunk) • Port 4-1 trunk
SF BER	Sets the signal fail bit error rate (SONET [ANSI] or SDH [ETSI]).	• 1E-3 • 1E-4 • 1E-5	• 1E-3 • 1E-4 • 1E-5
SD BER	Sets the signal degrade bit error rate (SONET [ANSI] or SDH [ETSI]).	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

NTP-G162 Change the ALS Maintenance Settings

Purpose	This procedure changes the ALS maintenance settings for the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, and AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The automatic laser shutdown (ALS) function is normally disabled for TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, and AR_XP cards. Enable ALS only when the cards are directly connected to each other.

Note ALS is applicable only for OCn and OTN payloads.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, or AR_XP card where you want to change the ALS maintenance settings.

Step 2 Click the **Maintenance > ALS** tabs.

Step 3 Modify any of the settings described in Table 11-184. The provisionable parameters are listed in the Options column in the table.

Table 11-184 ALS Settings

Parameter	Description	Options
ALS Mode	Automatic laser shutdown. ALS provides the ability to shut down the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, and AR_XP TX laser when the card detects an LOS.	From the drop-down list, choose one of the following: • Disable—Deactivates ALS. • Auto Restart—(Default) ALS is active. The power is automatically shut down when needed and automatically tries to restart using a probe pulse until the cause of the failure is repaired. • Manual Restart • Manual Restart for Test
Recovery Pulse Duration	(Display only) Displays the duration of the optical power pulse that begins when an amplifier restarts.	—
Recovery Pulse Interval	(Display only) Displays the interval between optical power pulses.	—
Currently Shutdown	(Display only) Displays the current status of the laser.	—
Request Laser Restart	If checked, allows you to restart the laser for maintenance.	Checked or unchecked

Step 4 Click **Apply**. If the change affects traffic, a warning message displays. Click **Yes** to complete the change.

Stop. You have completed this procedure.

NTP-G192 Force FPGA Update

Purpose	This procedure forces an upgrade of the FPGA image on the MXP_MR_10DME_C and MXP_MR_10DME_L cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Perform Step 1 through Step 4 if you are updating the node software. Otherwise continue with Step 5 to force FPGA image upgrade on MXP_MR_10DME_C or MXP_MR_10DME_L card.

Step 1 Close the CTC window, if open.

Step 2 Delete the CTC Cache from the CTC Launcher browser window.

Step 3 Close the CTC Launcher browser window.

Step 4 Relaunch the CTC Launcher browser window.

Step 5 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the MXP_MR_10DME_C or MXP_MR_10DME_L card to be upgraded.

Step 6 For all ports being provisioned on the card, click the **Provisioning > Line** tabs.

a. Click the **Admin State** table cell and choose **OOS,DSBLD** (ANSI) or **Locked,Disabled** (ETSI).

b. Click **Apply**, then **Yes**.

Step 7 Click the **Provisioning > Card** tabs.

Step 8 Change the Card Mode as needed:

- FC-GE_ISC—Choose this option if you will provision any of the following PPM port rates: FC1G (Ports 1-1 through 4-1), FC2G (Ports 1-1 and 3-1 only), FICON1G (Ports 1-1 through 4-1), FICON2G (Ports 1-1 and 3-1 only), ONE_GE (Ports 1-1 through 4-1), ISC3 COMPAT (Ports 1-1 through 4-1), ISC3 PEER 1G (Ports 1-1 through 4-1), and ISC3 PEER 2G (Ports 1-1 and 3-1 only).
- FC4G—Choose this option if you will provision an FC4G or FICON4G PPM (Port 1-1 only).

Step 9 Click the **Force FPGA Update** button. This upgrades the FPGA image in the MXP_MR_10DME_C or MXP_MR_10DME_L card, as appropriate. The MXP_MR_10DME_C or MXP_MR_10DME_L card reboots and the FPGA now contains the updated image.

Step 10 For all ports being provisioned on the card, click the **Provisioning > Line** tabs.

a. Click the **Admin State** table cell and choose **IS** (ANSI) or **Unlocked** (ETSI).

b. Click **Apply**, then **Yes**.

Stop. You have completed this procedure.

NTP-G196 Force FPGA Update When the Card is Part of a Protection Group

Purpose	This procedure forces an upgrade of the FPGA image on the MXP_MR_10DME_C and MXP_MR_10DME_L cards when the card is part of a protection group.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure applies to a near-end node that has two MXP_MR_10DME_C or MXP_MR_10DME_L cards, one card acting as the working card and the other as the protect card. The far-end node has a similar configuration. The near-end working card trunk port is connected to the far-end working card trunk port. The near-end protect card trunk port is connected to the far-end protect card trunk port.

Note Perform Step 1 through Step 4 if you are updating the node software. Otherwise, continue with Step 5 to force FPGA image upgrade on MXP_MR_10DME_C or MXP_MR_10DME_L card.

Step 1 Close the CTC window, if open.

Step 2 Delete the CTC Cache from the CTC Launcher browser window.

Step 3 Close the CTC Launcher browser window.

Step 4 Relaunch the CTC Launcher browser window.

Step 5 Ensure traffic is running on the near-end and far-end working cards for each protection group on the MXP_MR_10DME_C or MXP_MR_10DME_L card.

Step 6 In node view (single-node mode) or multishelf view (multishelf mode), click the **Provisioning > Protection** tab.

Step 7 For each protection group, verify that the working card client port is reported as working/active and the protect card client port is reported as protect/standby.

Step 8 Repeat Steps 6 and 7 for the far-end node.

Step 9 For each protection group on the near-end and far-end nodes, complete the "DLP-G182 Apply a Lockout" task to prevent traffic from switching to the protect card.

Step 10 At the near-end and far-end nodes, complete the "NTP-G192 Force FPGA Update" procedure on page 11-451 to force an upgrade of the FPGA image on the protect card.

Step 11 For each protection group on the near-end and far-end nodes, complete the "DLP-G183 Clear a Lock-On or Lockout" task to remove a lockout and return a protection group to its usual switching method.

Step 12 For each protection group on the near-end and far-end nodes, complete the "DLP-G179 Apply a Force Y-Cable or Splitter Protection Switch" task to move traffic from the working to the protect card.

Step 13 At the near-end and far-end nodes, complete the "NTP-G192 Force FPGA Update" procedure on page 11-451 to force an upgrade of the FPGA image on the working card.

Step 14 For each protection group on the near-end and far-end nodes, complete the "DLP-G180 Clear a Manual or Force Y-Cable or Splitter Protection Switch" task to clear a Force protection switch on the working card. If the protection group is revertive, this operation causes the traffic to revert to the working card. If the protection group is non-revertive, this operation causes the traffic to remain on the protect card.

Stop. You have completed this procedure.

NTP-G232 Enabling Error Decorrelator

Purpose	This task enables error decorrelator on a TXP_MR_10EX_C, MXP_2.5G_10EX_C, or MXP_MR_10DMEX_C card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP_MR_10EX_C, MXP_2.5G_10EX_C, or MXP_MR_10DMEX_C card where you want to enable error decorrelator.

Step 2 Click the **Provisioning > Line> Error Decorrelator Settings** tabs.

Step 3 In the Error Decorrelator Settings area, Select **Enable.**

Note To inter-operate with other cards, disable the error decorrelator.
Click the **Provisioning > Line> Error Decorrelator Settings** tabs and then select **Disable**.

NTP-G315 Enable or Disable the Wavelength Drifted Channel Automatic Shutdown Feature

Purpose	This procedure allows you to enable or disable the wavelength drifted channel automatic shutdown feature for 40-SMR1-C, 40-SMR2-C, 80-WXC-C, 40-WXC-C, and 40-WSS-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In the node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Defaults** tabs. The Node Defaults page opens.

Step 2 Select the card from the Defaults Selector pane where you want to enable or disable the wavelength drifted channel automatic shutdown feature.

Step 3 Select the <card name>.config.card.WavelengthDrift from the Default Name column. Choose Disable or Enable from the Default Value drop-down list for the selected card.

For example, if you select 40-SMR2-C card from the Defaults Selector folder, the Default Name column reads "40-SMR2-C.config.card.WavelengthDrift".

Step 4 Click **Apply** to save changes.

Stop. You have completed this procedure.

NTP-G316 Enable REP and FAPS on the same port

Purpose	This task allows you enable REP and FAPS on the same port for the GE_XP and 10GE_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The FAPS master node on the edge ring should never be the node that has a common FAPS and REP port.

You can configure REP and FAPS on port 22 and 21 for GE_XP cards, and port 4 and 3 for 10GE_XP cards.

Step 1 To enable REP, complete the following procedures:

a. DLP-G645 Create a Segment Using CTC, page 11-376

b. DLP-G647 Activate VLAN Load Balancing Using CTC, page 11-379

Step 2 To enable FAPS, complete the DLP-G381 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Layer 2 Protection Settings, page 11-394.

Stop. You have completed this procedure.

NTP-G321 Provision Multiple Operating Modes on AR_MXP or AR_XP Cards

Purpose	This procedure enables you to provision multiple operating modes on the AR_MXP or AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC • DLP-G277 Provision a Multirate PPM, page 11-152 • DLP-G278 Provision the Optical Line Rate, page 11-155
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Click the **Provisioning > Cards** tabs.

Step 2 In the Cards tab, click **Create**. The Operating Mode Configuration Creation window appears.

Step 3 From the Card Config Rate Selection section, select **Low Rate Mode** or **High Rate Mode**.

Step 4 In the Card Config Selection section:

a. Choose the Operating Mode from the drop-down list.

The Operating Mode options vary depending on the Card Type (AR_MXP or AR_XP) and Card Config Rate Selection.

b. For MXP_DME and MXPP_DME card modes, choose the Client Trunk Mapping from the drop-down list. For other card modes, CTC automatically selects the client trunk mapping.

Step 5 Click **Next**.

Step 6 Select the appropriate trunk port that is available and click **Next**.

Step 7 Select the appropriate client port that is available and click **Finish**.

The selected operating mode is provisioned on the AR_MXP or AR_XP card.

Stop. You have completed this procedure.

NTP-G322 Modify the AR_MXP or AR_XP Card Line Settings and PM Parameter Thresholds

Purpose	This procedure changes the line and PM parameter threshold settings of the AR_MXP or AR_XP cards.
Tools/Equipment	None

Prerequisite Procedures	• NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 • DLP-G63 Install an SFP or XFP, page 14-72 • DLP-G277 Provision a Multirate PPM, page 11-152 (if necessary) • DLP-G278 Provision the Optical Line Rate, page 11-155 (if necessary)
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to change the AR_MXP or AR_XP card line and PM threshold settings. If you are already logged in, proceed to Step 2.

Step 2 As needed, complete the "NTP-G103 Back Up the Database" procedure on page 24-2 to preserve the existing transmission settings.

Step 3 Perform any of the following tasks as needed:

- DLP-G695 Change the AR_MXP or AR_XP Card Line Settings, page 11-457
- DLP-G696 Change the AR_MXP or AR_XP Card Ethernet Settings, page 11-459
- DLP-G697 Change the AR_MXP or AR_XP Card SONET/SDH Settings, page 11-460
- DLP-G698 Change the AR_MXP or AR_XP Card Section Trace Settings, page 11-463
- DLP-G699 Enable Auto Sensing for AR_MXP or AR_XP Cards, page 11-465
- DLP-G700 Change the AR_MXP or AR_XP Card SONET/SDH Line Thresholds, page 11-465
- DLP-G701 Change the AR_MXP or AR_XP Card Line RMON Thresholds, page 11-468
- DLP-G702 Provision the AR_MXP or AR_XP Card with Trunk Port Alarm and TCA Thresholds, page 11-472
- DLP-G703 Provision the AR_MXP or AR_XP Card Client Port Alarm and TCA Thresholds, page 11-473
- DLP-G704 Change the AR_MXP or AR_XP Card OTN Settings, page 11-477

Note To use the Alarm Profiles tab, including creating alarm profiles and suppressing alarms, see the Alarm and TCA Monitoring and Management document.

Stop. You have completed this procedure.

DLP-G695 Change the AR_MXP or AR_XP Card Line Settings

Purpose	This task changes the line settings of the AR_MXP or AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to change the line settings.

Step 2 Click the **Provisioning > Line > Ports** tabs. Tabs and parameter selections vary according to PPM provisioning.

Step 3 Modify any of the line settings in the Ports tab as described in Table 11-185.

Table 11-185 AR_MXP or AR_XP Card Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	1 through 10
Port Name	Assigns a logical name for the specified port.	User-defined. Name can be up to 32 alphanumeric or special characters, or both. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16. **Note** You can provision a string (port name) for each fiber channel/FICON interface on the AR_MXP or AR_XP card, which allows the MDS Fabric Manager to create a link association between that SAN port and a SAN port on a Cisco MDS 9000 switch.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI) • IS,AINS (ANSI) or Unlocked,AutomaticInService (ETSI)
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)

Table 11-185 AR_MXP or AR_XP Card Line Settings (continued)

Parameter	Description	Options
ALS Mode	Sets the ALS function mode.	• Disabled (default)— ALS is off; the laser is not automatically shut down when traffic outage or loss of signal (LOS) occurs. • Manual Restart— ALS is on; the laser automatically shuts down when traffic outage or loss of signal (LOS) occurs. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test— Manually restarts the laser for testing.
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card state changes to in service (IS) automatically. • 0 to 48 hours, 15-minute increments.
Reach	Sets the optical reach distance of the client port.	The reach distances that appear in the drop-down list depend on the card: • Autoprovision—The system automatically provisions the reach from the pluggable port module (PPM) reach value on the hardware. • I1—Intermediate reach • S1—Short reach, up to 15-km distance • S2—Short reach up to 40-km distance • L1—long reach, up to 40-km distance • L2—long reach, up to 80-km distance • L3—long reach, up to 80-km distance • CWDM— CWDM Reach • MM— • ULH—Ultra long-haul (ULH) • DWDM—DWDM Reach
Wavelength	Displays the wavelength of the client port.	• First Tunable Wavelength • Further wavelengths: – 850 nm through 1561.83 nm – 100-GHz ITU spacing – CWDM spacing
Squelch	Shuts down the far-end laser in response to certain defects. (Squelch does not apply to ISC COMPACT payloads.)	• G AIS • Squelch • None
Termination Mode	Sets the mode of operation. (This option is only available for SONET/SDH payloads).	• Transparent

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G696 Change the AR_MXP or AR_XP Card Ethernet Settings

Purpose	This task changes the Ethernet settings of the AR_MXP or AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to change the Ethernet settings. The card view appears.

Step 2 Click the **Provisioning > Line > Ethernet** tabs.

Step 3 Modify any of the Ethernet settings in the Ethernet tab as described in Table 11-186. The parameters that appear depend on the card mode.

Table 11-186 AR_MXP and AR_XP Card Ethernet Settings

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
Port	(Display only) Displays the port number (*n-n*) and rate.	—	—
Port Name	(Display only) Displays the port Name.	—	—
MTU	Sets the maximum size of the Ethernet frames accepted by the port. The port must be in OOS/locked state.	Numeric. Default: 9700 Range 64 to 9700 (for R9.4 and later)	Numeric. Default: 9700 Range 64 to 9700 (for R9.4 and later)
Speed	Sets the expected speed of the ports.	100 Mbps for FE ports and 1000 Mbps for GE ports	100 Mbps for FE ports and 1000 Mbps for GE ports
Duplex	(Display only) Displays expected duplex capability of ports.	Full	Full
Auto negotiation	If checked, enables autonegotiation on the same port.	Checked or unchecked	Checked or unchecked
ProvidesSync	Sets the ProvidesSync card parameter. If checked, the card is provisioned as a network element (NE) timing reference.	Checked or unchecked	Checked or unchecked

Table 11-186 AR_MXP and AR_XP Card Ethernet Settings (continued)

Parameter	Description	ONS 15454 (ANSI) Options	ONS 15454 SDH (ETSI) Options
SyncMsgIn	Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked	Checked or unchecked
Admin SSM In	Overrides the synchronization status message (SSM) and the synchronization traceability unknown (STU) value. If the node does not receive an SSM signal, it defaults to STU.	• PRS—Primary Reference Source (Stratum 1) • ST2—Stratum 2 • TNC—Transit node clock • ST3E—Stratum 3E • ST3—Stratum 3 • SMC—SONET minimum clock • ST4—Stratum 4 • DUS—Do not use for timing synchronization • RES—Reserved; quality level set by user	• G811—Primary reference clock • STU—Sync traceability unknown • G812T—Transit node clock traceable • G812L—Local node clock traceable • SETS—Synchronous equipment • DUS—Do not use for timing synchronization
Termination Mode	(Display-only for Standard Regeneration and Enhanced FEC card configurations) Sets the mode of operation.	—	—
Send DoNotUse	When checked, sends a DUS message on the S1 byte.	Checked or unchecked	Checked or unchecked
Video Type	Video	—	—

DLP-G697 Change the AR_MXP or AR_XP Card SONET/SDH Settings

Purpose	This task changes the SONET (OC-192)/SDH (STM-64) settings of the AR_MXP or AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to change the SONET (OC-192)/SDH (STM-64) settings.

Step 2 Click the **Provisioning > Line > SONET** (ANSI) or **SDH** (ETSI) tabs. Tabs and parameter selections vary according to PPM provisioning.

Step 3 Modify any of the settings as described in Table 11-187.

Table 11-187 AR_MXP or AR_XP Card SONET/SDH Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	9 (Trunk)
Port Name	Assign a name for the specified port.	User-defined. Name can be up to 32 alphanumeric or special characters, or both. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the Administrative and Service States document.	• IS (ANSI) or Unlocked (ETSI) • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) • OOS,DSBLD (ANSI) or Locked,disabled (ETSI) • OOS,MT (ANSI) or Locked,maintenance (ETSI)
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the Administrative and Service States document.	• IS-NR (ANSI) or Unlocked-enabled (ETSI) • OOS-AU,AINS (ANSI) or Unlocked-disabled, automaticInService (ETSI) • OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) • OOS-MA,MT (ANSI) or Locked-enabled,maintenance (ETSI)
SF BER[1]	Sets the signal fail bit error rate.	• 1E-3 • 1E-4 • 1E-5
SD BER[1]	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
Type	Sets the optical transport type.	• SONET (ANSI) • SDH (ETSI)

Table 11-187 AR_MXP or AR_XP Card SONET/SDH Settings (continued)

Parameter	Description	Options
ALS Mode	Sets the ALS function mode. The DWDM transmitter supports ALS according to ITU-T G.644 (06/99). ALS can be disabled or enabled for one of the three mode options.	• Disabled (default)—ALS is off; the laser is not automatically shut down when traffic outage or loss of signal (LOS) occurs. • Auto Restart—ALS is on; the laser automatically shuts down when traffic outage or loss of signal (LOS) occurs. It automatically restarts when the conditions that caused the outage are resolved. • Manual Restart—ALS is on; the laser automatically shuts down when traffic outage or loss of signal (LOS) occurs. However, the laser must be manually restarted when conditions that caused the outage are resolved. • Manual Restart for Test—Manually restarts the laser for testing.
AINS Soak	Sets the automatic in-service soak period. Double-click the time and use the up and down arrows to change settings.	• Duration of valid input signal, in hh.mm format, after which the card state changes to in service (IS) automatically. • 0 to 48 hours, 15-minute increments.
ProvidesSync	Sets the ProvidesSync card parameter. If checked, the card is provisioned as a NE timing reference.	Checked or unchecked
SyncMsgIn	Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked
Admin SSM In	Overrides the synchronization status message (SSM) and the synchronization traceability unknown (STU) value. If the node does not receive an SSM signal, it defaults to STU.	STU

Table 11-187 AR_MXP or AR_XP Card SONET/SDH Settings (continued)

Parameter	Description	Options
Reach	Sets the optical reach distance of the client port.	The reach distances that appear in the drop-down list depend on the card: • Autoprovision—The system to automatically provision the reach from the pluggable port module (PPM) reach value on the hardware. • I1/IR1—Intermediate Reach • S1/SR1—Intermediate reach, up to 15-km distance • S2/SR2—Intermediate reach up to 40-km distance • L1/LR1—long reach, up to 40-km distance • L2/LR2—long reach, up to 80-km distance • L3/LR3—long reach, up to 80-km distance • CWDM—CWDM Reach • MM • SR—Short Reach • ULH—Ultra long-haul (ULH) • DWDM—DWDM Reach
Wavelength	Displays the wavelength of the client port.	• First Tunable Wavelength • Further wavelengths: – 850 nm through 1561.83 nm – 100-GHz ITU spacing – CWDM spacing

1. SF BER and SD BER thresholds apply only to trunk ports.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G698 Change the AR_MXP or AR_XP Card Section Trace Settings

Purpose	This task changes the section trace settings of the AR_MXP or AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to change the section trace settings.

Step 2 Click the **Provisioning > Line > Section Trace** tabs. Tabs and parameter selections vary according to PPM provisioning.

Step 3 Modify any of the settings in the Section Trace tab as described in Table 11-188.

Table 11-188 AR_MXP or AR_XP Card Line Section Trace Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	• Client Ports (1-8)
Received Trace Mode	Sets the received trace mode.	• Off/None • Manual
Disable AIS/RDI on TIM-S	If a TIM on section overhead alarm arises because of a J0 overhead string mismatch, no alarm indication signal is sent to downstream nodes if this box is checked.	• Checked (AIS/RDI on TIM-S is disabled) • Unchecked (AIS/RDI on TIM-S is not disabled)
Transmit Section Trace String Size	Sets the trace string size.	• 1 byte • 16 byte
Transmit	Displays the current transmit string or sets a new transmit string. Click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Expected	Displays the current expected string or sets a new expected string. Click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex). **Note** For OCn and OTU traces, the junk squares appear in the New Expected String field when you click the default button. Ignore the junk squares that appear in the New Expected String field.	String of trace string size
Received	(Display only) Displays the current received string. Click **Refresh** to manually refresh this display, or select the **Auto-refresh every 5** sec check box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked or unchecked (default)

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G699 Enable Auto Sensing for AR_MXP or AR_XP Cards

Purpose	This task enables the auto sensing for AR_MXP or AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to enable auto sensing.

Step 2 Click the **Provisioning > Line > Auto Ports** tabs. Tabs and parameter selections vary according to PPM provisioning.

Step 3 Modify any of the settings in the Auto Ports tab as described in Table 11-189.

Table 11-189 AR_MXP or AR_XP Auto Sensing Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	Client Ports (1-8)
Auto Sensing	If checked, enables auto sensing.	Checked or Unchecked
Actual Port Type	Displays the auto-sensed signal type.	—

DLP-G700 Change the AR_MXP or AR_XP Card SONET/SDH Line Thresholds

Purpose	This task changes the SONET/SDH line threshold settings of AR_MXP or AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to change the SONET/SDH line threshold settings.

Step 2 Click the **Provisioning > Line Thresholds > SONET Thresholds** (ANSI) or **SDH Thresholds** (ETSI) tabs.

Step 3 Modify any of the settings as shown in Table 11-190.

Note You must modify Near End and Far End independently; 15 Min and 1 Day independently; and Line and Section independently. To do so, choose the appropriate radio button and click **Refresh**.

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Table 11-190 AR_MXP or AR_XP Card SONET/SDH Line Threshold Settings

Parameter	Description	Options - ONS 15454	Options - ONS 15454 SDH
Port	(Display only) Displays the port number.	• Client Ports (1-8)	• Client Ports (1-8)
EB	Path Errored Block indicates that one or more bits are in error within a block.	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
CV	Coding violations	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	—
ES	Errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
SES	Severely errored seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Table 11-190 AR_MXP or AR_XP Card SONET/SDH Line Threshold Settings (continued)

Parameter	Description	Options - ONS 15454	Options - ONS 15454 SDH
SEFS	(Near End Section or Regeneration Section only) Severely errored framing seconds	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
BBE	Background block errors	—	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
FC	(Line or Multiplex Section only) Failure count	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.
UAS	(Line or Multiplex Section only) Unavailable seconds	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Line or Section (near end only) Choose an option in each category and click **Refresh**.	Numeric. Threshold display options include: • Direction—Near End or Far End • Interval—15 Min (minutes) or 1 day • Types—Multiplex Section or Regeneration Section (near end only) Choose an option in each category and click **Refresh**.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

DLP-G701 Change the AR_MXP or AR_XP Card Line RMON Thresholds

Purpose	This task changes the line threshold settings for AR_MXP or AR_XP cards carrying Ethernet, FC/FICON, or ISC/ISC3 payloads.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to change the line RMON threshold settings in card view.

Step 2 Click the **Provisioning > Line Thresholds > RMON Thresholds** tabs.

Step 3 Click **Create**. The Create Threshold dialog box appears.

Step 4 From the Port drop-down list, choose the applicable port, either the payload port, for example "1-1 (ONE_GE)", or the equivalent ITU-T G.7041 GFP (Generic Frame Procedure) port.

Step 5 From the Variable drop-down list, choose an Ethernet, FC, FICON, or ISC variable. See Table 11-191 for a list of available Ethernet variables, Table 11-192 for a list of FC and FICON variables, Table 11-193 for a list of ISC and ISC3 variables, and Table 11-194 for a list of GFP variables.

Table 11-191 AR_MXP or AR_XP Card Ethernet Variables

Variable	Description
ifInOctets	Number of bytes received since the last counter reset.
rxTotalPkts	Total number of received packets.
ifInUcastPkts	Number of packets delivered by this sublayer to a higher sublayer that are not addressed to a multicast or broadcast address.
ifInMulticastPkts	Number of packets delivered by this sublayer to a higher sublayer that are addressed to a multicast address. For a MAC layer protocol, this includes both group and functional addresses.
ifInBroadcastPkts	Number of packets delivered by this sublayer to a higher sublayer that are addressed to a broadcast address.
ifInErrors	Total number of received errors.
ifOutOctets	Total number of octets transmitted out of the interface, including framing characters.
txTotalPkts	Total number of transmitted packets.
IfOutUcastPkts	Total count of good frames transmitted to a unicast group destination address.

Table 11-191 AR_MXP or AR_XP Card Ethernet Variables (continued)

ifOutMulticastPkts	Total number of packets that higher-level protocols requested to be transmitted, which were addressed to a multicast address at this sublayer. These include packets that were discarded or not sent. For a MAC layer protocol, this includes both group and functional addresses.
ifOutBroadcastPkts	Total number of packets that higher-level protocols requested to be transmitted, which were addressed to a broadcast address at this sublayer. These include packets that were discarded or not sent.
dot3StatsFCSErrors	Number of frames received on a particular interface that are an integral number of octets in length but do not pass the FCS check.
dot3StatsFrameTooLong	Number of frames received on a particular interface that exceed the maximum permitted frame size.
dot3StatsSymbolErrors	Number of frames received on an associated RX_ER assertion during a data reception error event (MII) or data reception error event, or carrier extension error (GMII) from the PCS.
dot3StatsLayer1Errors	Number of Layer 1 errors as defined within the following conditions: • During Packet Reception—Layer 1 errors are only counted one time per packet. The Layer 1 error is indicated as a direct result of a line side protocol violation in which RX_DV is asserted. This is an uncommon event from which may be the reason why the device loses synchronization. • During Interpacket Reception—The Layer 1 error is indicated as a direct result of a line side protocol violation in which RX_DV is de-asserted. This is an uncommon event. The Layer 1 error is also asserted on detection of a False Carrier indication and is asserted on detection of Erred byte (interpacket) signal encoding. When the Layer 1 error is asserted during inter-packet reception, it is only statistically asserted in the vector.
etherStatsUndersizePkts	Total number of packets received that were less than 64 octets long (excluding framing bits, but including FCS octets) and were otherwise well formed.
etherStatsFragments	Total number of packets received that were less than 64 octets in length (excluding framing bits but including FCS octets) and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error). Note that it is entirely normal for etherStatsFragments to increment. This is because it counts both runts (which are normal occurrences due to collisions) and noise hits.

Table 11-191 AR_MXP or AR_XP Card Ethernet Variables (continued)

etherStatsPkts64Octets	Total number of packets (including bad packets) received that were 64 octets in length (excluding framing bits but including FCS octets).
etherStatsPkts65to127Octets	Total number of packets (including bad packets) received that were between 65 and 127 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts128to255Octets	Total number of packets (including bad packets) received that were between 128 and 255 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts256to511Octets	Total number of packets (including bad packets) received that were between 256 and 511 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts512to1023Octets	Total number of packets (including bad packets) received that were between 512 and 1023 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsPkts1024to1518Octets	Total number of packets (including bad packets) received that were between 1024 and 1518 octets in length inclusive (excluding framing bits but including FCS octets).
etherStatsBroadcastPkts	Total number of good packets received that were directed to the broadcast address. Note that this does not include multicast packets.
etherStatsMulticastPkts	Total number of good packets received that were directed to a multicast address. Note that this number does not include packets directed to the broadcast address.
etherStatsOversizePkts	Total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets) and were otherwise well formed.
etherStatsJabbers	Total number of packets received that were longer than 1518 octets (excluding framing bits, but including FCS octets), and had either a bad FCS with an integral number of octets (FCS Error) or a bad FCS with a non-integral number of octets (Alignment Error).
etherStatsOctets	Total number of octets of data (including those in bad packets) received on the network (excluding framing bits, but including FCS octets).
etherStatsPkts1519tomaxOctets	Total number of packets (including bad packets) received that were 1591 octets in length (excluding framing bits, but including FCS octets).
mediaIndStatsTXShortPkts	Number of transmitted frames containing less than the minimum permitted frame size as programmed with the transmit MAC Min Frame Length Configuration Register.

Table 11-192 AR_MXP or AR_XP FC/FICON Variables

Variable	Description
rxTotalPkts	Total number of received packets.
txTotalPkts	Total number of transmitted packets.
mediaIndStatsRxFramesBadCRC	Number of received data frames with payload CRC errors when HDLC framing is used.
mediaIndStatsTxFramesBadCRC	Number of transmitted data frames with payload CRC errors when HDLC framing is used.
mediaIndStatsRxLcvErrors	Number of L1 line code violations received for lower rate FC, which equate to invalid 8b10b ordered sets.
mediaIndStatsTxLcvErrors	Number of L1 line code violations transmitted for lower rate FC, which equate to invalid 8b10b ordered sets.
rx8b10bWords	Number of 8B/10B words received.
tx8b10bWords	Number of 8B/10B words transmitted.

Table 11-193 AR_MXP and AR_XP ISC Variables

Variable	Description
mediaIndStatsRxLcvErrors	Number of L1 line code violations received for constant bit rate protocols, which equate to invalid 8b10b ordered sets.
mediaIndStatsTxLcvErrors	Number of L1 line code violations transmitted for constant bit rate protocols, which equate to invalid 8b10b ordered sets.

Table 11-194 AR_MXP and AR_XP GFP RMON Variables

Variable	Description
gfpStatsRxCRCErrors	Total number of CRC errors with the receive transparent GFP frame.
gfpStatsRxSblkCRCErrors	Total number of superblock CRC errors with the receive transparent GFP frame. A transparent GFP frame has multiple superblocks which each contain fiber channel data.
gfpStatsCSFRaised	Number of Rx client management frames with Client Signal Fail indication.
gfpStatsLFDRaised	Number of Core HEC CRC Multiple Bit Errors. **Note** This count is only for cHEC multiple bit error when in frame. It is a count of when the state machine goes out of frame.

Table 11-194 AR_MXP and AR_XP GFP RMON Variables (continued)

gfpStatscHecRxMBitErrors	Number of received GFP frames with single bit errors in the core header (these errors are uncorrectable).
gfpStatstHecRxMBitErrors	Number of received GFP frames with single bit errors in the tHec (these errors are uncorrectable).

Step 6 From the Alarm Type drop-down list, indicate whether the event will be triggered by the rising threshold, the falling threshold, or both the rising and falling thresholds.

The available options are Rising Threshold, Falling Threshold, and Both Rising and Falling Threshold

Step 7 From the Sample Type drop-down list, choose either **Relative** or **Absolute**. Relative restricts the threshold to use the number of occurrences in the user-set sample period. Absolute sets the threshold to use the total number of occurrences, regardless of time period.

Step 8 Enter the appropriate number of seconds in the Sample Period field.

Step 9 Enter the appropriate number of occurrences in the Rising Threshold field.

For a rising type of alarm, the measured value must move from below the falling threshold to above the rising threshold. For example, if a network is running below a rising threshold of 1000 collisions every 15 seconds and a problem causes 1001 collisions in 15 seconds, the excess occurrences trigger an alarm.

Step 10 Enter the appropriate number of occurrences in the Falling Threshold field. In most cases a falling threshold is set lower than the rising threshold.

A falling threshold is the counterpart to a rising threshold. When the number of occurrences is above the rising threshold and then drops below a falling threshold, it resets the rising threshold. For example, when the network problem that caused 1001 collisions in 15 seconds subsides and creates only 799 collisions in 15 seconds, occurrences fall below a falling threshold of 800 collisions. This resets the rising threshold so that if network collisions again spike over a 1000 per 15-second period, an event again triggers when the rising threshold is crossed. An event is triggered only the first time a rising threshold is exceeded (otherwise, a single network problem might cause a rising threshold to be exceeded multiple times and cause a flood of events).

Step 11 Click **OK**.

Note To view all RMON thresholds, click **Show All RMON thresholds**.

Step 12 Return to your originating procedure (NTP).

DLP-G702 Provision the AR_MXP or AR_XP Card with Trunk Port Alarm and TCA Thresholds

Purpose	This task provisions the AR_MXP and AR_XP card with trunk port alarm and TCA thresholds.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed

Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to provision the trunk port alarm and TCA threshold settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

> **Note** You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

> **Note** Do not modify the Laser Bias parameters.

Step 3 If TCA is not checked, check the **TCA** check box and then click **Refresh**. If it is checked, continue with Step 4.

Step 4 Verify if the trunk port (Port 9) TCA thresholds are set. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and pressing Enter.

Step 5 Under Types, click the **Alarm** radio button and click **Refresh**.

> **Note** Do not modify the Laser Bias parameters.

Step 6 Verify if the trunk port (Port 9) Alarm thresholds are set. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and pressing Enter.

Step 7 Click **Apply**.

Step 8 Return to your originating procedure (NTP).

DLP-G703 Provision the AR_MXP or AR_XP Card Client Port Alarm and TCA Thresholds

Purpose	This task provisions the client port alarm and TCA thresholds for the AR_MXP and AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G278 Provision the Optical Line Rate, page 11-155
	DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP and AR_XP card where you want to change the client port alarm and TCA threshold settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs. The TCA thresholds are shown by default.

Step 3 Referring to Table 11-128, verify the TCA thresholds for client ports (ports 1 through 8) for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface at the other end. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and pressing Enter.

Note Do not modify the Laser Bias parameters.

Note You must modify 15 Min and 1 Day independently. To do so, choose the appropriate radio button and click **Refresh**.

Note The hardware device that plugs into a AR_MXP or AR_XP card faceplate to provide a fiber interface to the card is called a Small Form-factor Pluggable (SFP or XFP). In CTC, SFPs and XFPs are called pluggable port modules (PPMs). SFPs/XFPs are hot-swappable I/O devices that plug into a port to link the port with the fiber-optic network. Multirate PPMs have provisionable port rates and payloads. For more information about SFPs and XFPs, see the "11.22 SFP and XFP Modules" section on page 11-142.

Table 11-195 AR_MXP and AR_XP Card Client Interfaces TCA Thresholds

PPM Port Rate	Pluggable Port Module (XFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
FC1G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–17	3	–16
FC2G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–15	3	–16
FICON1G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–17	3	–16
FICON2G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–17	3	–16
FC4G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–12	4	–15
FICON4G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–12	4	–15
FC8G	ONS-XC-8G-MM ONS-XC-8G-SM	0	–12	4	–15

Table 11-195 AR_MXP and AR_XP Card Client Interfaces TCA Thresholds (continued)

PPM Port Rate	Pluggable Port Module (XFP)	TCA RX Power High	TCA RX Power Low	TCA TX Power High	TCA TX Power Low
FICON8G	ONS-XC-8G-MM ONS-XC-8G-SM	0	–12	4	–15
1GE	ONS-SI-GE-SX ONS-SI-GE-LX ONS-SI-GE-ZX ONS-SE-ZE-EL				
FE	ONS-SE-GE-BXU ONS-SE-GE-BXD				
ESCON	ONS-SE-200-MM				
OC3/STM1	ONS-SC-155-EL ONS-SI-155-SR-MM ONS-SI-155-I1 ONS-SI-155-L1 ONS-SI-155-L2				
OC12	ONS-SI-622-SR-MM				
OC12/STM4	ONS-SI-622-I1 ONS-SI-622-L1 ONS-SI-622-L2				
OC48/STM16	ONS-SI-2G-S1 ONS-SI-2G-L1 ONS-SI-2G-L2				
OTU1	ONS-SI-2G-S1 ONS-SE-Z1 ONS-SI-2G-L2 ONS-SC-2G-xxxx				
3G-SDI, HD-SDI, SD-SDI	ONS-SC-HD3GV-RX=				

Step 4 Click **Apply**.

Step 5 Repeat Steps 3 and 4 to provision each additional client port.

Step 6 Under Types, click the **Alarm** radio button and click **Refresh**.

Step 7 Referring to Table 11-196, verify the client port (Ports 1 through 8) Alarm thresholds for RX Power High, RX Power Low, TX Power High, and TX Power Low based on the client interface that is provisioned. Provision new thresholds as needed by double-clicking the threshold value you want to change, deleting it, entering a new value, and hitting **Enter**.

Table 11-196 AR_MXP and AR_XP Card Client Interface Alarm Thresholds

PPM Port Rate	Pluggable Port Module (XFP)	Alarm RX Power Low	Alarm RX Power High	Alarm TX Power Low	Alarm TX Power High
FC1G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–17	3	–16
FC2G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–15	3	–16
FICON1G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–17	3	–16
FICON2G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–17	3	–16
FC4G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–12	4	–15
FICON4G	ONS-SE-4G-SM ONS-SC-2G-XX.X ONS-SC-4G-XX.X	0	–12	4	–15
FC8G	ONS-XC-8G-MM ONS-XC-8G-SM	0	–12	4	–15
FICON8G	ONS-XC-8G-MM ONS-XC-8G-SM	0	–12	4	–15
1GE	ONS-SI-GE-SX ONS-SI-GE-LX ONS-SI-GE-ZX ONS-SE-ZE-EL				
FE	ONS-SE-GE-BXU ONS-SE-GE-BXD				
ESCON	ONS-SE-200-MM				
OC3/STM 1	ONS-SC-155-EL ONS-SI-155-SR-MM ONS-SI-155-I1 ONS-SI-155-L1 ONS-SI-155-L2				
OC12	ONS-SI-622-SR-MM				
OC12/STM4	ONS-SI-622-I1 ONS-SI-622-L1 ONS-SI-622-L2				
OC48/STM16	ONS-SI-2G-S1 ONS-SI-2G-L1 ONS-SI-2G-L2				

Table 11-196 AR_MXP and AR_XP Card Client Interface Alarm Thresholds (continued)

PPM Port Rate	Pluggable Port Module (XFP)	Alarm RX Power Low	Alarm RX Power High	Alarm TX Power Low	Alarm TX Power High
OTU1	ONS-SI-2G-S1 ONS-SE-Z1 ONS-SI-2G-L2 ONS-SC-2G-xxxx				
3G-SDI, HD-SDI, SD-SDI	ONS-SC-HD3GV-RX=				

Step 8 Click **Apply**.

Step 9 Repeat Steps 7 and 8 to provision each additional client port.

Step 10 Return to your originating procedure (NTP).

DLP-G704 Change the AR_MXP or AR_XP Card OTN Settings

Purpose	This task changes the OTN settings for the AR_MXP and AR_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the AR_MXP or AR_XP card where you want to change the OTN settings.

Step 2 Click the **Provisioning > OTN** tabs, then choose one of the following subtabs: OTN Lines, G.709 Thresholds, FEC Thresholds, Trail Trace Identifier, or Proactive Protection Regen.

Step 3 Modify any of the settings described in Tables 11-197 through 11-201.

Note You must modify Near End and Far End; 15 Min and 1 Day; and SM and PM independently. To do so, choose the appropriate radio button and click **Refresh**.

Table 11-197 describes the values on the Provisioning > OTN > OTN Lines tab.

Table 11-197 AR_MXP and AR_XP Card OTN Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	All client and trunk ports
G.709 OTN	Sets the OTN lines according to ITU-T G.709.	Enabled by default

Table 11-197 AR_MXP and AR_XP Card OTN Line Settings (continued)

Parameter	Description	Options
FEC	Sets the OTN lines to forward error correction (FEC).	• Disable • Standard • Enhanced-I.4 • Enhanced-I.7
SF BER	(Display only) Displays the signal fail bit error rate.	• 1E-5
SD BER	Sets the signal degrade bit error rate.	• 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
Asynch/Synch Mapping	Sets how the ODUk (client payload) is mapped to the optical channel (OTUk).	• Asynch mapping • Synch mapping
OTU Mapping	Sets the client payload mapping to the trunk	• ODU1e • ODU2e • CBR10G • ODU1Mux • ODU1
ProvidesSync	Sets the ProvidesSync card parameter. If checked, the card is provisioned as a NE timing reference.	Checked or unchecked
SyncMsgIn	Sets the EnableSync card parameter. Enables synchronization status messages (S1 byte), which allow the node to choose the best timing source.	Checked or unchecked
Admin SSM In	Overrides the synchronization status message (SSM) and the synchronization traceability unknown (STU) value. If the node does not receive an SSM signal, it defaults to STU.	STU
Send DoNotUse	If checked, sends a DUS message on the S1 byte.	Checked or unchecked
ODU Transparency	Sets the ODU overhead byte configuration.	• Transparent Standard Use • Cisco Extended Use
Proactive Protection Regen	Enables or disables the proactive protection regen mode.	• Enable • Disable

Table 11-198 describes the values on the Provisioning > OTN > G.709 Thresholds tab.

Table 11-198 AR_MXP and AR_XP ITU-T G.709 Threshold Settings

Parameter	Description	Options
Port[1]	(Display only) Displays the port number.	9 (Trunk)
ES	Errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select an option and click **Refresh**.
SES	Severely errored seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select an option and click **Refresh**.
UAS	Unavailable seconds	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select an option and click **Refresh**.
BBE	Background block errors	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select an option and click **Refresh**.
FC	Failure counter	Numeric. Can be set for Near End or Far End, for 15-minute or one-day intervals, or for SM (OTUk) or PM (ODUk). Select an option and click **Refresh**.

1. Latency for a 1G-FC payload without ITU-T G.709 is 4 microseconds, and with ITU-T G.709 is 40 microseconds. Latency for a 2G-FC payload without ITU-T G.709 is 2 microseconds, and with ITU-T G.709 is 20 microseconds. Consider these values when planning a FC network that is sensitive to latency.

Table 11-199 describes the values on the Provisioning > OTN > FEC Threshold tab.

Table 11-199 AR_MXP and AR_XP Card FEC Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	2
Bit Errors Corrected	Sets the value for bit errors corrected.	Numeric. Can be set for 15-minute or one-day intervals.
Uncorrectable Words	Sets the value for uncorrectable words.	Numeric. Can be set for 15-minute or one-day intervals.

Table 11-200 describes the values on the Provisioning > OTN > Trail Trace Identifier tab.

Table 11-200 AR_MXP and AR_XP Card Trail Trace Identifier Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	2
Level	Sets the level.	• Section • Path
Received Trace Mode	Sets the trace mode.	• Off/None • Manual

Table 11-200 AR_MXP and AR_XP Card Trail Trace Identifier Settings (continued)

Parameter	Description	Options
Transmit	Displays the current transmit string or sets a new transmit string. Click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Disable FDI on TTIM	If a Trace Identifier Mismatch on Section overhead alarm arises because of a J0 overhead string mismatch, no Forward Defect Indication (FDI) signal is sent to the downstream nodes if this box is checked.	• Checked (FDI on TTIM is disabled) • Unchecked (FDI on TTIM is not disabled)
Expected	Displays the current expected string or sets a new expected string. Click the button on the right to change the display. Its title changes, based on the current display mode. Click **Hex** to change the display to hexadecimal (button changes to ASCII); click **ASCII** to change the display to ASCII (button changes to Hex).	String of trace string size
Received	(Display only) Displays the current received string. You can click Refresh to manually refresh this display, or check the Auto-refresh every 5 sec check box to keep this panel updated.	String of trace string size
Auto-refresh	If checked, automatically refreshes the display every 5 seconds.	Checked Unchecked (default)

Table 11-201 describes the values on the **Provisioning > OTN > Proactive Protection Regen** tabs.

Note Proactive protection regen is supported only when the AR_MXP or AR_XP card is in high-rate REGEN card mode.

Table 11-201 AR_MXP and AR_XP Card Proactive Protection Regen Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and name (optional).	—
Trigger threshold	Sets the maximum BER threshold to trigger proactive protection.	• 1E-3 • 9E-4 to 1E-4 • 9E-5 to 1E-5 • 9E-6 to 1E-6 • 9E-7 to 1E-7
Trigger window (ms)	Sets the duration for which BER is monitored before triggering the proactive protection. The trigger window value must be a multiple of: • 10 ms for trigger thresholds between 1E-3 and 6E-6 • 100 ms for trigger threshold between 5E-6 to 1E-7 Trigger window must be less than or equal to 10000 ms.	Time in milliseconds.
Revert Threshold	Sets the revert threshold value of BER. **Note** Revert Threshold settings must be less than the Trigger Threshold values.	• 1E-4 • 9E-5 to 1E-5 • 9E-6 to 1E-6 • 9E-7 to 1E-7 • 9E-8 to 5E-8
Revert window (ms)	Sets the duration for which BER is monitored for settings that are less than the revert threshold value before which proactive protection provided to the router is removed. Revert Window value must be at least 2000ms and a multiple of: • 10ms for a Revert Threshold of 1E-4 to 6E-7 • 100ms for a Revert Threshold of 5E-7 to 5E-8. The revert window must be less than or equal to 10000ms.	Time in milliseconds.

Step 4 Click **Apply**.

Step 5 Return to your originating procedure (NTP).

CHAPTER 12

Node Reference

This chapter explains the ONS 15454 dense wavelength division multiplexing (DWDM) node types that are available for the ONS 15454. The DWDM node type is determined by the type of amplifier and filter cards that are installed in an ONS 15454. The chapter also explains the DWDM automatic power control (APC), reconfigurable optical add/drop multiplexing (ROADM) power equalization, span loss verification, and automatic node setup (ANS) functions.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Note In this chapter, "OPT-BST" refers to the OPT-BST, OPT-BST-E, OPT-BST-L cards, and to the OPT-AMP-L and OPT-AMP-17-C cards when they are provisioned in OPT-LINE (optical booster) mode. "OPT-PRE" refers to the OPT-PRE card and to the OPT-AMP-L and OPT-AMP-17-C cards provisioned in OPT-PRE (preamplifier) mode.

Note In this chapter, "RAMAN-CTP" refers to the 15454-M-RAMAN-CTP card. "RAMAN-COP" refers to the 15454-M-RAMAN-COP card.

Note In this chapter, the "NFV view" refers to the "DWDM Network Functional View (NFV)". The "GMPLS view" refers to the "DWDM Network Functional View (GMPLS)".

Chapter topics include:

12.1 DWDM Node Configurations

The ONS 15454 supports the following DWDM node configurations: hub, terminal, optical add/drop multiplexing (OADM), reconfigurable OADM (ROADM), anti-amplified spontaneous emission (anti-ASE), line amplifier, optical service channel (OSC) regeneration line, multishelf nodes, and node configurations for mesh networks. All node configurations can be provisioned with C-band or L-band cards except the OADM and anti-ASE nodes. These nodes require AD-xB-xx.x or AD-xC-xx.x cards, which are C-band only. All node configurations can be single-shelf or multishelf.

Note The Cisco TransportPlanner tool creates a plan for amplifier placement and proper node equipment.

Note To support multiple optical sides in mesh DWDM networks, east and west are no longer used to reference the left and right sides of the ONS 15454 shelf. If a network running a previous software release is upgraded to this release, west will be mapped to A and east to B. In two-sided nodes, such as a hub or ROADM node, Side A refers to Slots 1 through 6 and Side B refers to Slots 12 through 17. Terminal nodes have one side labeled "A," regardless of which slots have cards installed. For more information about configuring the ONS 15454 in mesh DWDM networks, see the "12.7 Configuring Mesh DWDM Networks" section on page 12-61.

12.1.1 Terminal Node

A terminal node is a single ONS 15454 node equipped with two TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards and one of the following combinations:

- One 32MUX-O card and one 32DMX-O card
- One 32WSS card and either a 32DMX or a 32DMX-O card
- One 40-WSS-C or 40-WSS-CE card and one 40-DMX-C or 40-DMX-CE card
- One 40-MUX-C and one 40-DMX-C or 40-DMX-CE card
- One 80-WXC-C card, one 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel, and one 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN (ONS 15216 40 or 48-channel mux/demux patch panel), and 15216-MD-ID-50 or 15216-MD-48-CM
- One 40-SMR1-C and one 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel
- One 40-SMR2-C and one 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel

Note Although it is recommended that you use the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel along with the 40-SMR1-C and 40-SMR2-C cards, you can alternatively use the 40-MUX-C and 40-DMX-C cards instead of the 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel.

Cards in the terminal nodes can be installed in Slots 1 through 6 or Slots 12 through 17. The side where cards are installed is always assigned as Side A.

Figure 12-1 shows an example of a terminal configuration with a 2MUX-O card installed. The channel flow for a terminal node is the same as the hub node (Figure 12-31).

Figure 12-1 Terminal Node Configuration With 32MUX-O Cards Installed

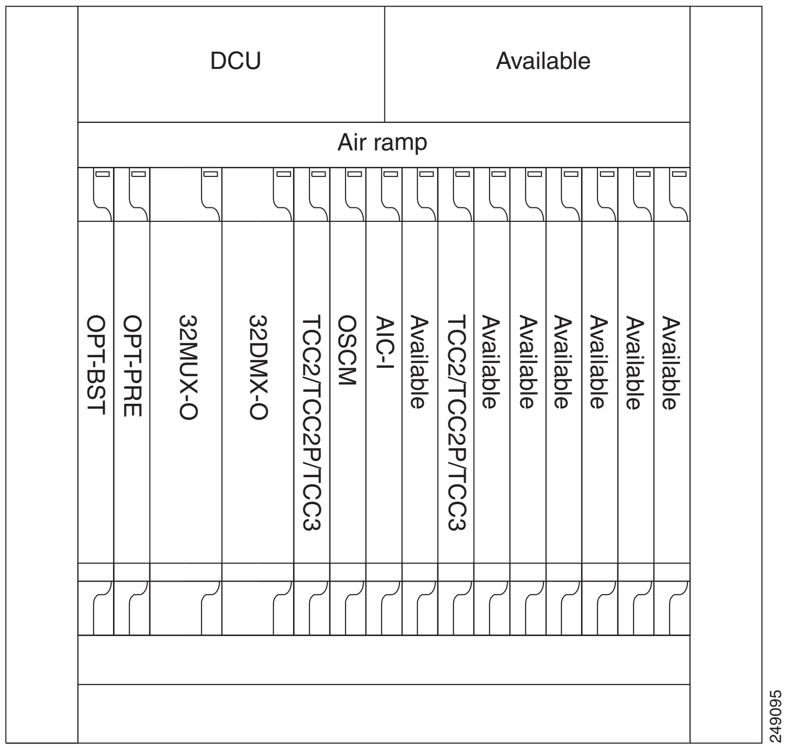


Figure 12-2 shows an example of a terminal configuration with a 40-WSS-C card installed.

Figure 12-2 Terminal Node Configuration with 40-WSS-C Cards Installed

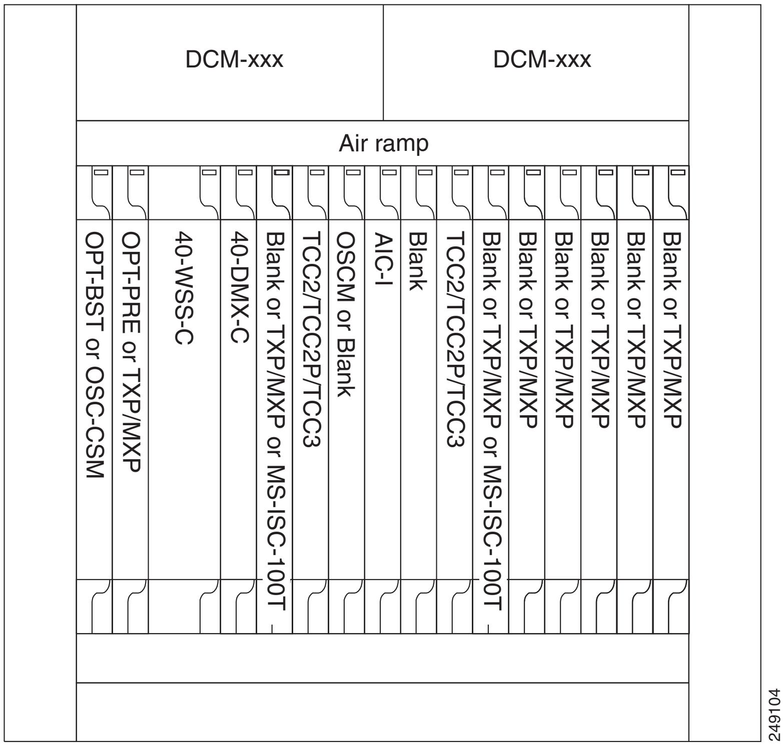


Figure 12-3 shows an example of a terminal configuration with a 40-MUX-C card installed.

Figure 12-3 Terminal Node with 40-MUX-C Cards Installed

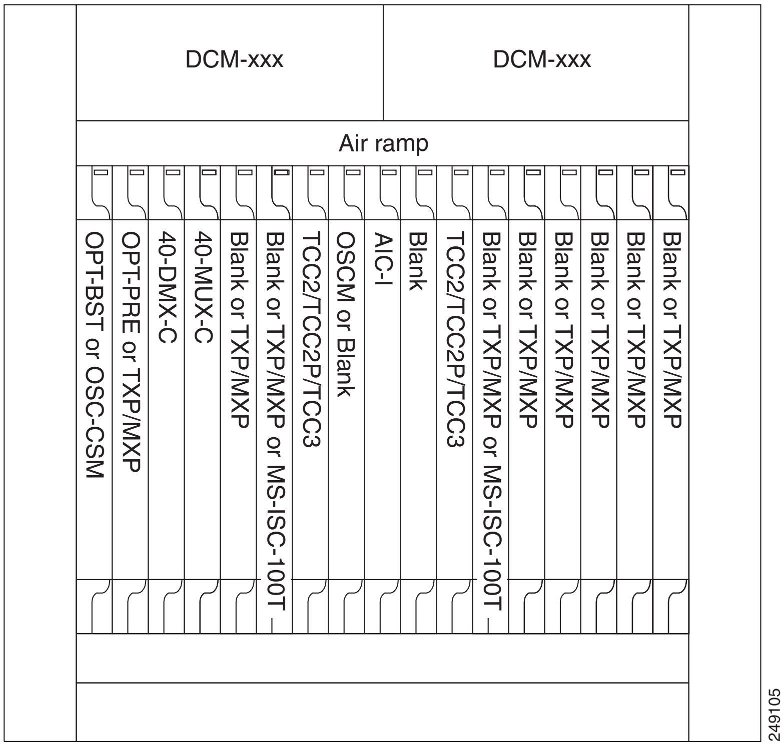
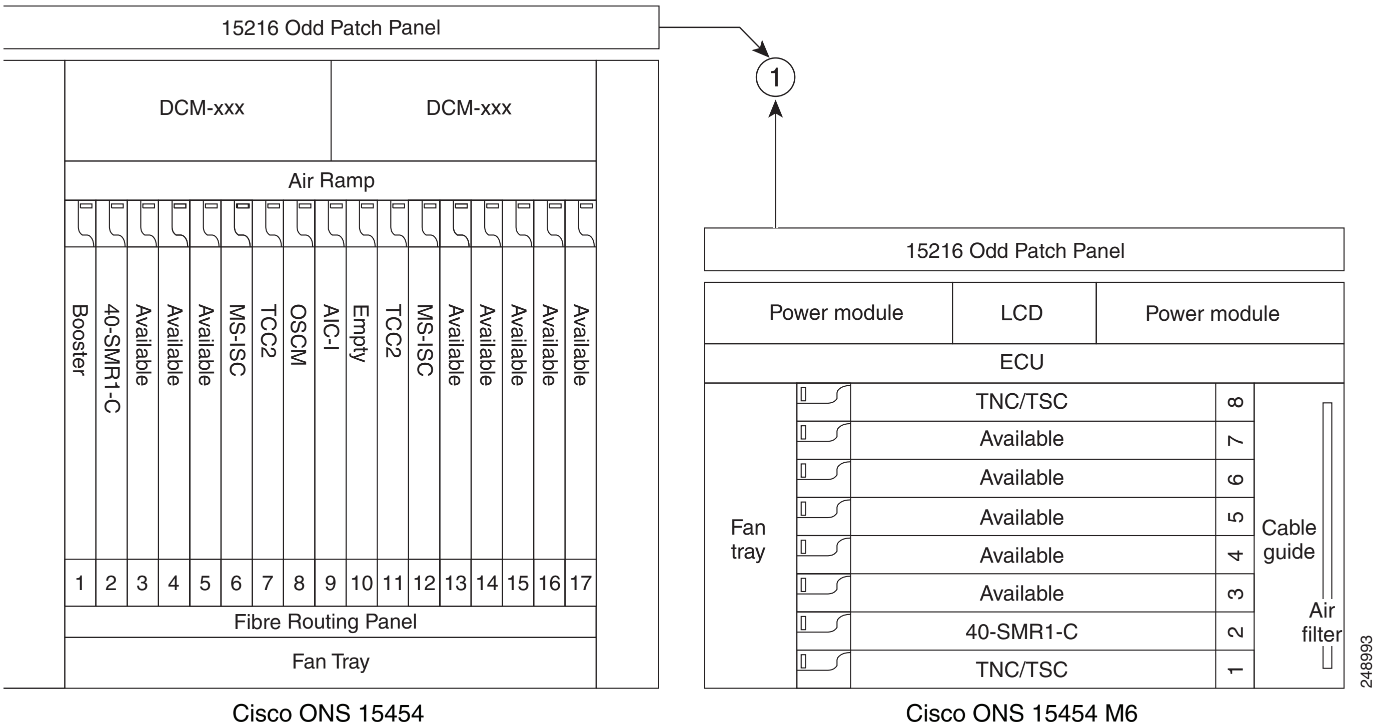


Figure 12-4 shows an example of a terminal configuration with a 40-SMR1-C card installed.

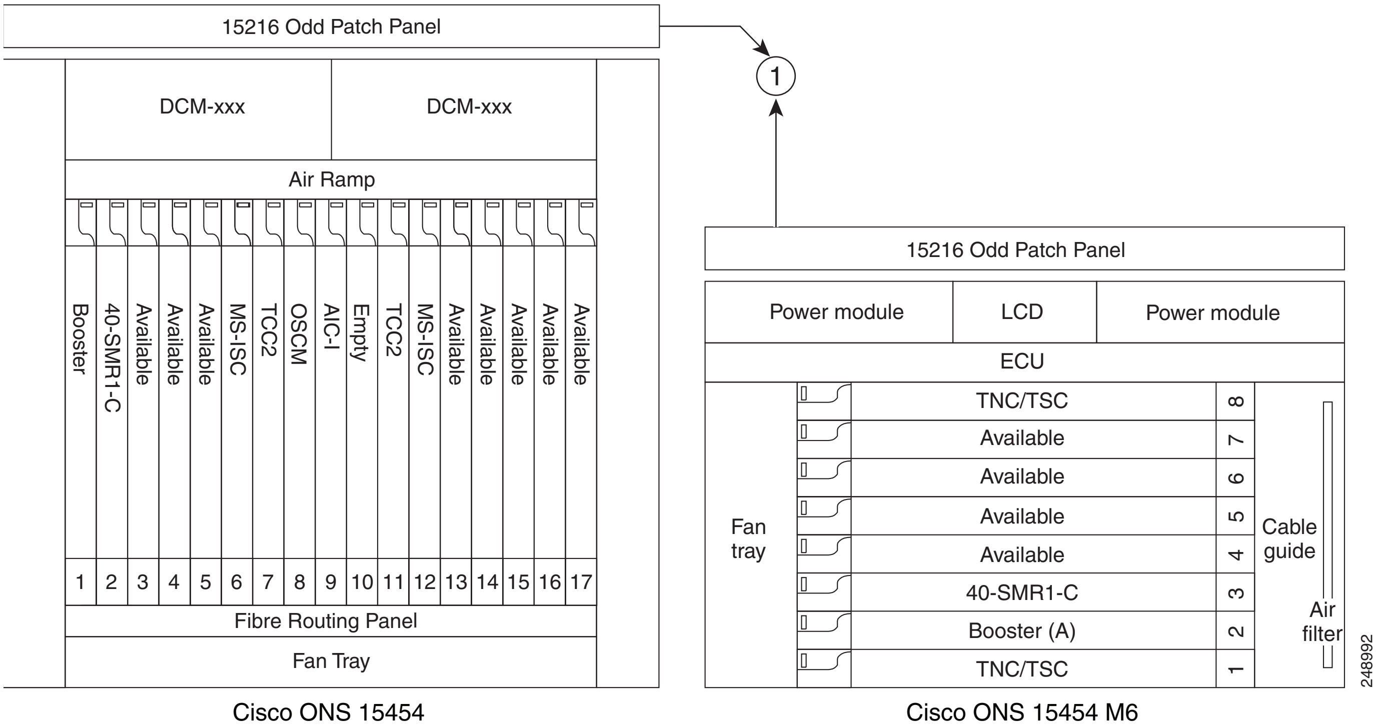
Figure 12-4 Terminal Node with 40-SMR1-C Card Installed - Cisco ONS 15454 and Cisco ONS 15454 M6



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-5 shows an example of a terminal configuration with 40-SMR1-C and booster amplifier cards installed.

Figure 12-5 Terminal Node with 40-SMR1-C and Booster Amplifier Cards Installed - Cisco ONS 15454 and Cisco ONS 15454 M6

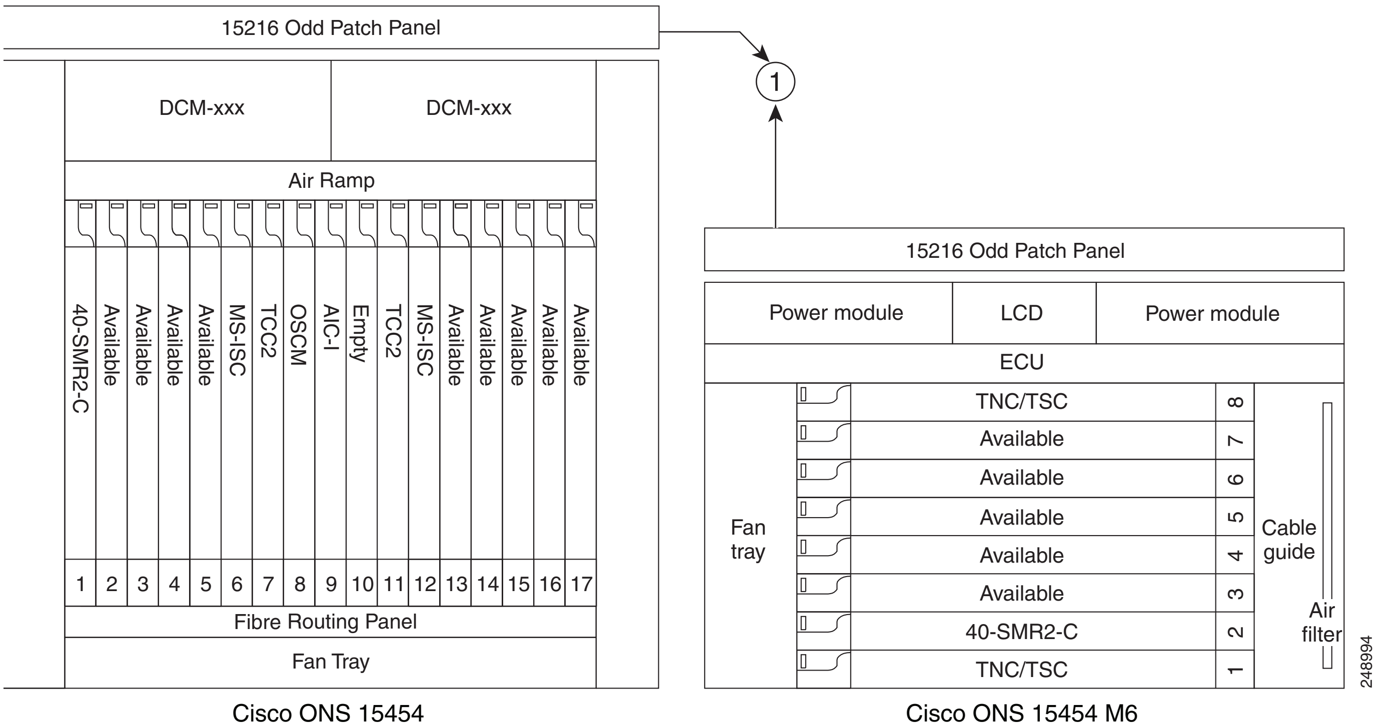


1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Note When you use the 40-SMR1-C card along with a booster amplifier, the OSCM card must be connected to the booster amplifier.

Figure 12-6 shows an example of a terminal configuration with a 40-SMR2-C card installed.

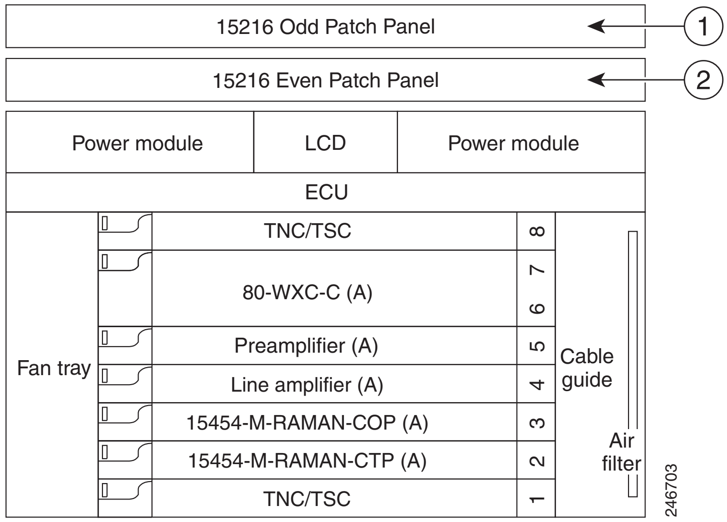
Figure 12-6 Terminal Node with 40-SMR2-C Card Installed - Cisco ONS 15454 and Cisco ONS 15454 M6



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-7 shows an example of a 80-channel terminal configuration with RAMAN-CTP and RAMAN-COP cards installed.

Figure 12-7 80-Channel Terminal Node with RAMAN-CTP and RAMAN-COP Cards Installed - Cisco ONS 15454 M6



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**
2	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**

12.1.2 OADM Node

An OADM node is a single ONS 15454 node equipped with cards installed on both sides and at least one AD-xC-xx.x (or FLD-4-xx.x) card or one AD-xB-xx.x card (plus their related 4MD-xx.x cards) and two TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards. This configuration supports 32 channels. In an OADM node, channels can be added or dropped independently from each direction and then passed through the reflected bands of all OADMs in the DWDM node (called express path). They can also be passed through one OADM card to another OADM card without using a TDM ITU-T line card (called optical pass-through) if an external patchcord is installed.

Unlike express path, an optical pass-through channel can be converted later to an add/drop channel in an altered ring without affecting another channel. OADM amplifier placement and required card placement is determined by the Cisco TransportPlanner tool or your site plan.

OADM nodes can be amplified or passive. In amplified OADMs, booster and preamplifier cards are installed on bode sides of the node. Figure 12-8 shows an example of an amplified OADM node configuration. In addition, OADM nodes can be asymmetric. Amplifiers may be installed in one side, but not the other. Or preamplifiers may be installed in one side, and a booster in the other.

Figure 12-8 Amplified OADM Node Configuration Example

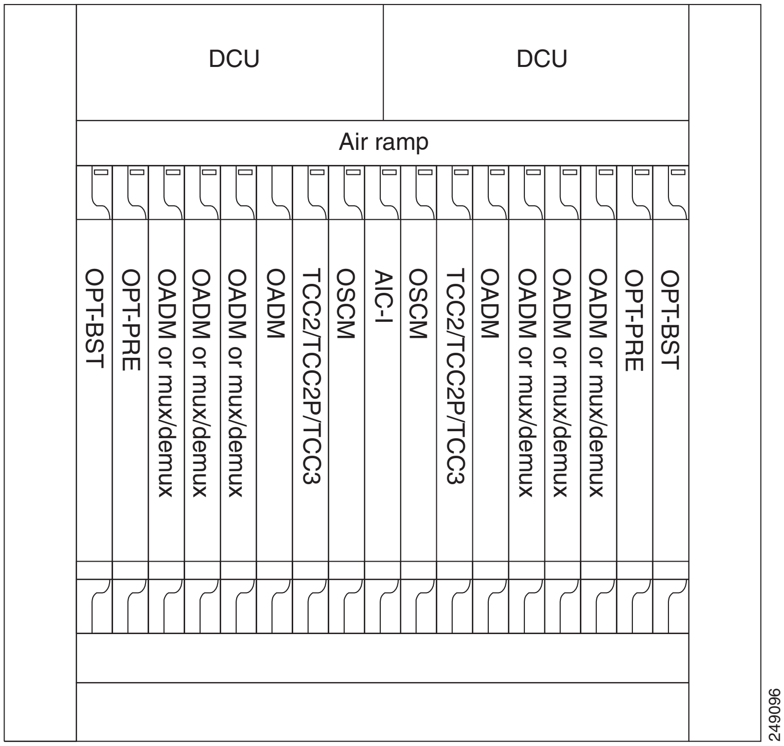
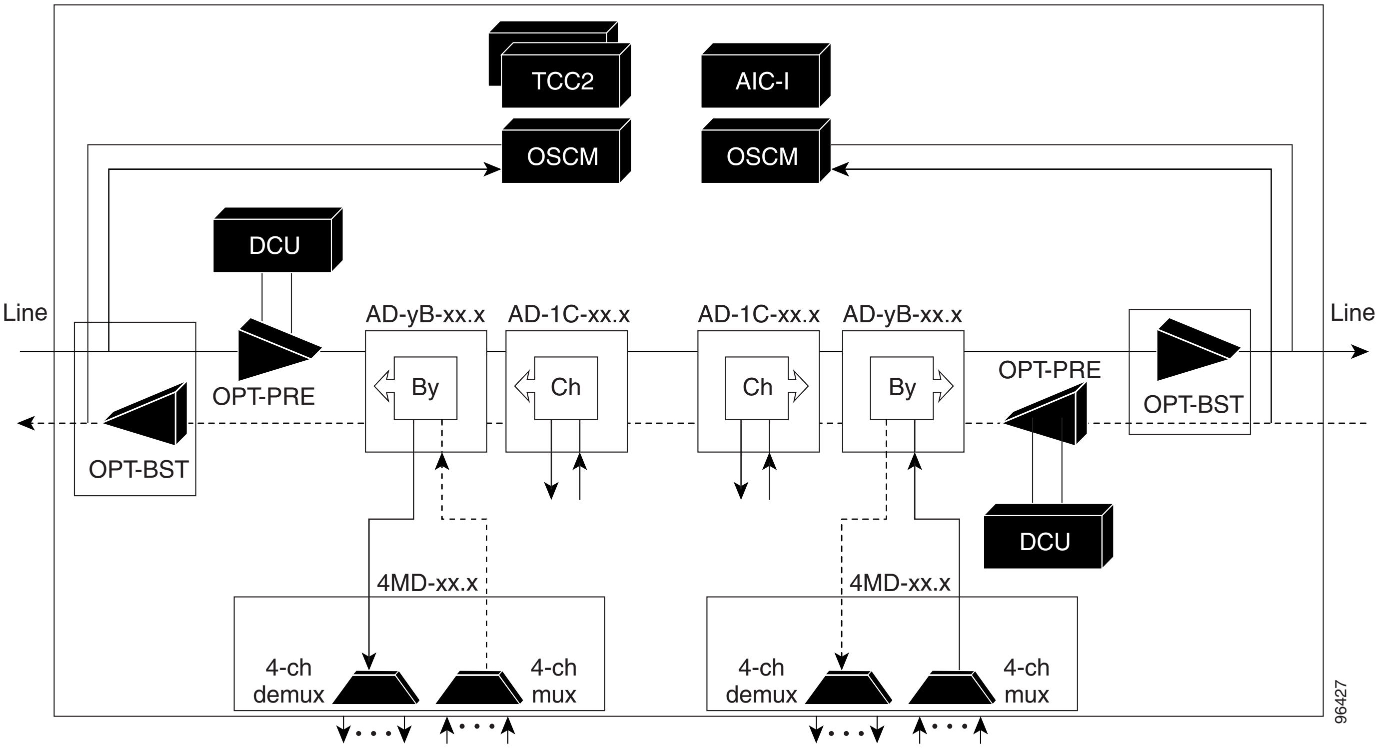


Figure 12-9 shows an example of the channel flow on the amplified OADM node. Since the 32-wavelength plan is based on eight bands (each band contains four channels), optical adding and dropping can be performed at the band level and/or at the channel level (meaning individual channels can be dropped).

Figure 12-9 Amplified OADM Node Channel Flow Example



Specifying the number of circuits that are currently present on an amplifier that is receiving the power directly from the15216-FLD-4 passive units (in case of an OADM node with FLD-4 cards and when an APC domain is in passive state) enables an accurate calculation of the power gain on the amplified port. This also ensures that the amplifier works effectively when the number of circuits is lesser than the actual circuits provisioned (where APC does not run in those domains.

To provision the number of active circuits, in CTC go to the card view, click > **Maintenance** > **Manual Gain Calc** tabs and enter the number of circuits currently active and then click **Apply**. Changing the value forces the system to recalculate the gain in order to obtain a more suitable output power.

You can manually provision the number of active circuits only if one of the following conditions are satisfied:

- The amplified port that belongs to the APC domain is in passive state (an APC domain involving the OADM with 15216-FLD-4 passive modules and the APC is disabled).
- The APC in the active domain where the APC is temporarily disabled by an alarm.

12.1.3 ROADM Node

A ROADM node adds and drops wavelengths without changing the physical fiber connections. A ROADM node is equipped with two TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards and one of the following combinations:

- Two 32WSS cards and either, two 32DMX or 32DMX-O cards

- Two 40-WSS-C or 40-WSS-CE cards and either, two 40-DMX-C or 40-DMX-CE cards
- Two 40-SMR1-C cards and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD (ONS 15216 40 or 48-channel mux/demux) patch panels
- Two 40-SMR1-C cards, two line amplifiers (OPT-BST, OPT-BST-E, OPT-AMP-C, or OPT-AMP-17C cards), two OPT-RAMP-C or OPT-RAMP-CE cards, and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panels
- Two 40-SMR2-C cards and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panels
- Two 80-WXC-C cards and two 15216-MD-40-ODD, 15216-EF-40-ODD, 15216-MD-48-ODD, 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panels

Note Although it is recommended that you use the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel along with the 40-SMR1-C and 40-SMR2-C cards, you can alternatively use the 40-MUX-C and 40-DMX-C cards instead of the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel.

Transponders (TXPs) and muxponders (MXPs) can be installed in Slots 6 and 12 and, if amplification is not used, in any open slot.

Note Although not required, 32DMX-O can be used in a ROADM node. Cisco TransportPlanner automatically chooses the demultiplexer card that is best for the ROADM node based on the network requirements.

Figure 12-10 shows an example of an amplified ROADM node configuration with 32DMX cards installed.

Figure 12-10 ROADM Node with 32DMX Cards Installed

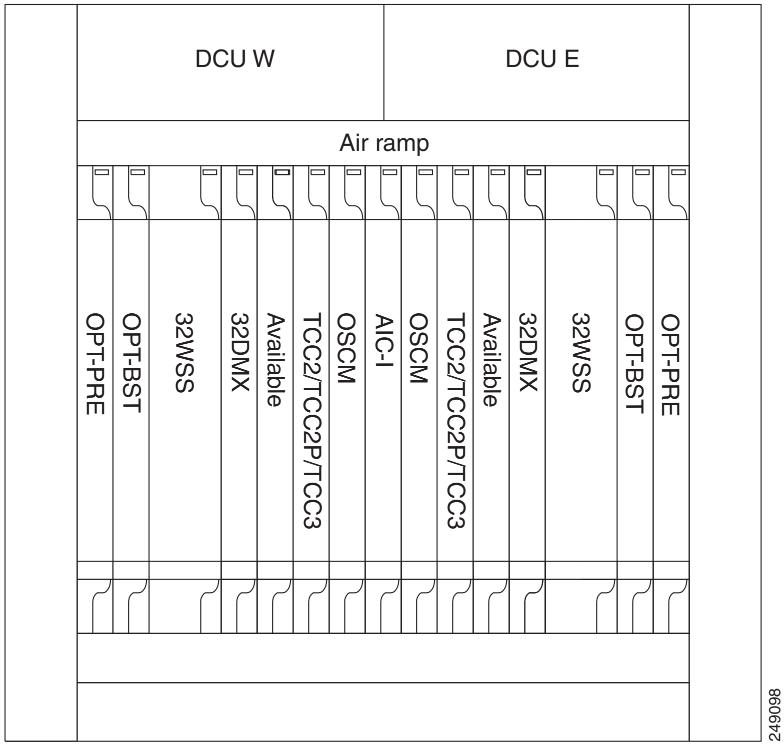


Figure 12-11 shows an example of an amplified ROADM node configuration with 40-WSS-C cards installed.

Figure 12-11 ROADM Node with 40-WSS-C Cards Installed

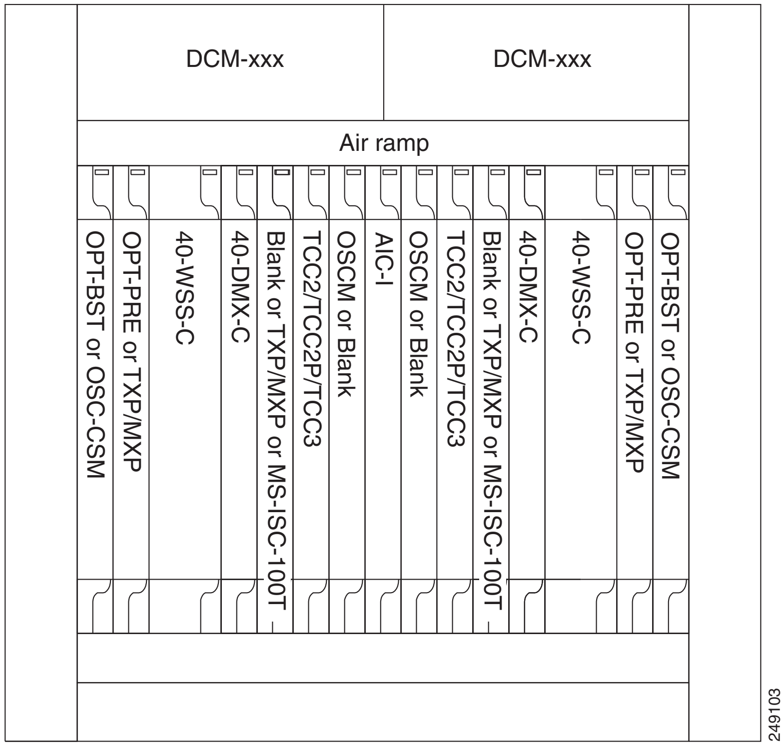
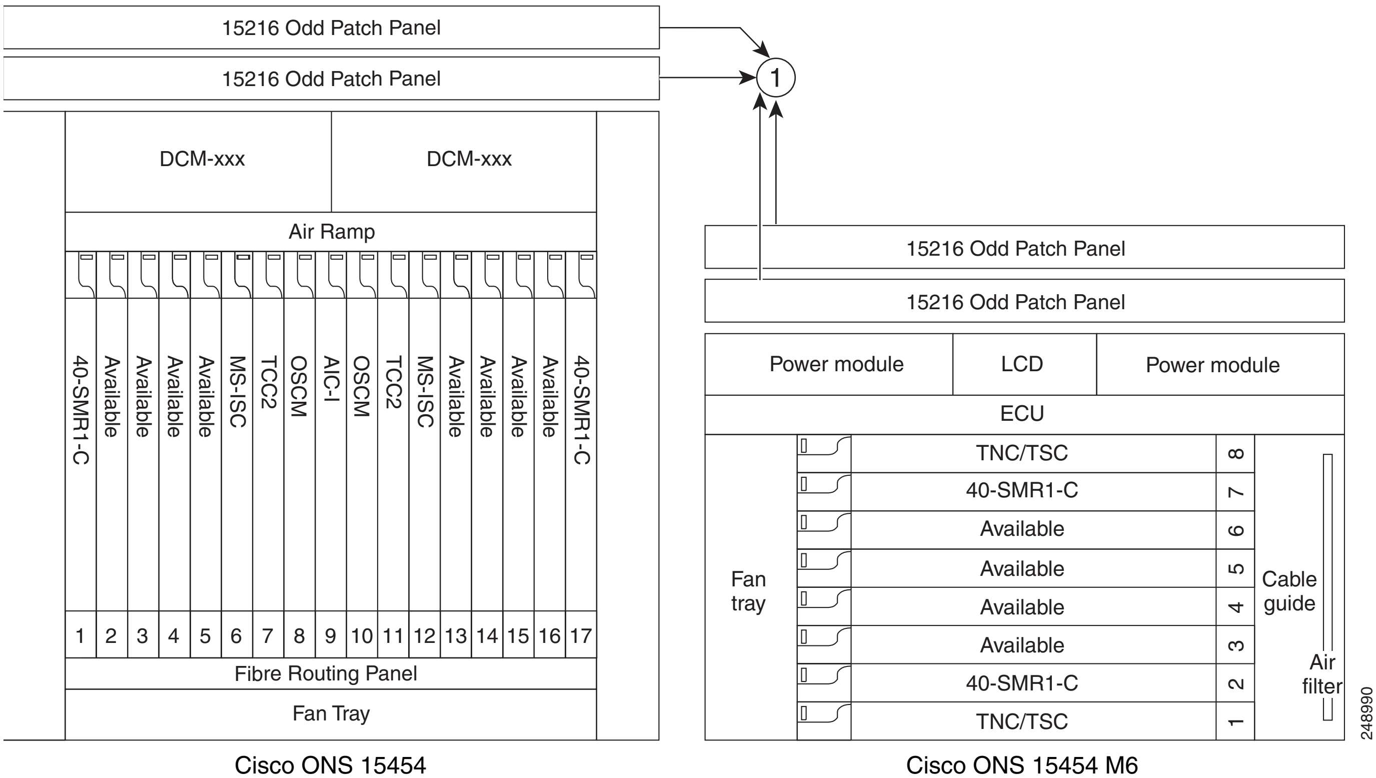


Figure 12-12 shows an example of a ROADM node with 40-SMR1-C cards installed.

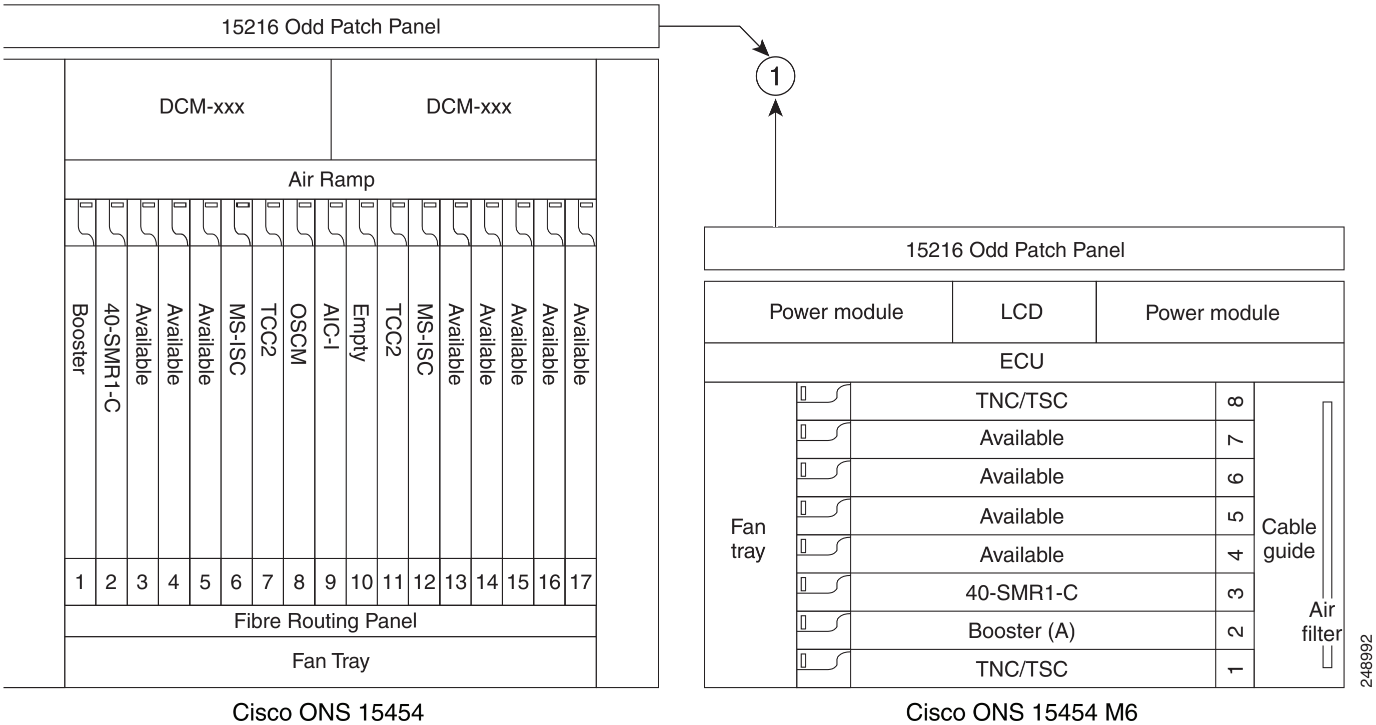
Figure 12-12 ROADM Node with 40-SMR1-C Cards Installed - Cisco ONS 15454 and Cisco ONS 15454 M6



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-13 shows an example of a ROADM node with 40-SMR1-C and booster amplifier cards installed.

Figure 12-13 ROADM Node with 40-SMR1-C and Booster Amplifier Cards Installed - Cisco ONS 15454 and Cisco ONS 15454 M6

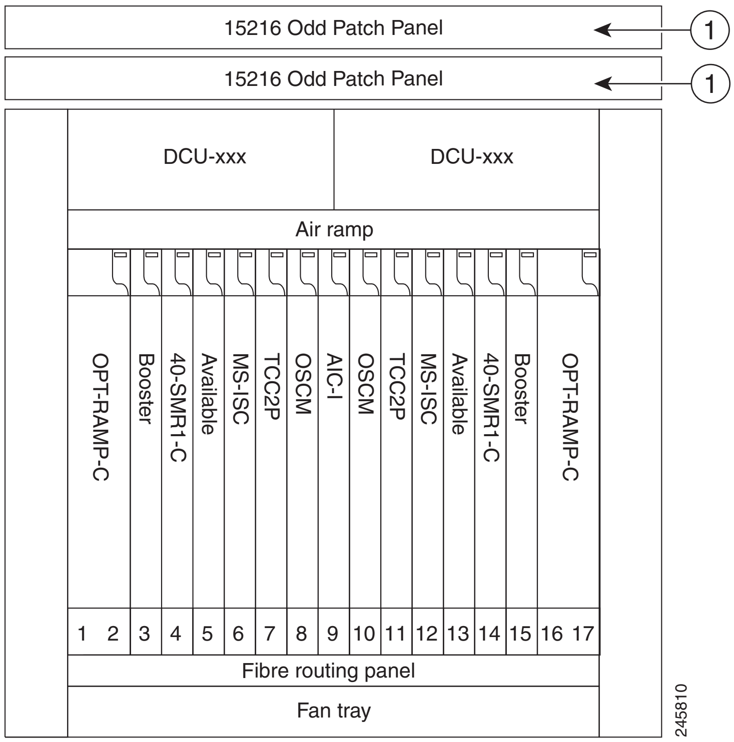


1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Note When you use the 40-SMR1-C card along with a booster amplifier, the OSCM card must be connected to the booster amplifier.

Figure 12-14 shows an example of a ROADM node with 40-SMR1-C and OPT-RAMP-C cards installed.

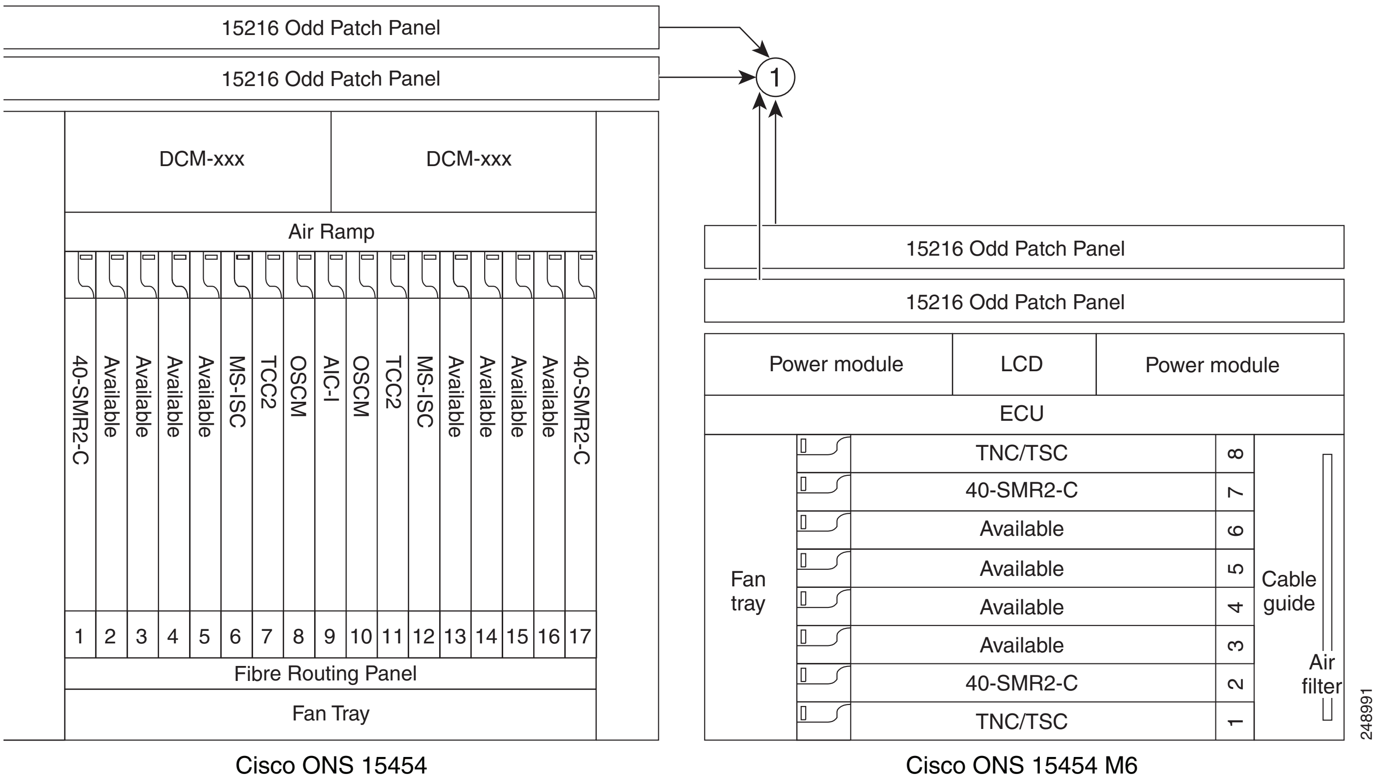
Figure 12-14 ROADM Node with 40-SMR1-C and OPT-RAMP-C Cards Installed



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-15 shows an example of a ROADM node with 40-SMR2-C cards installed.

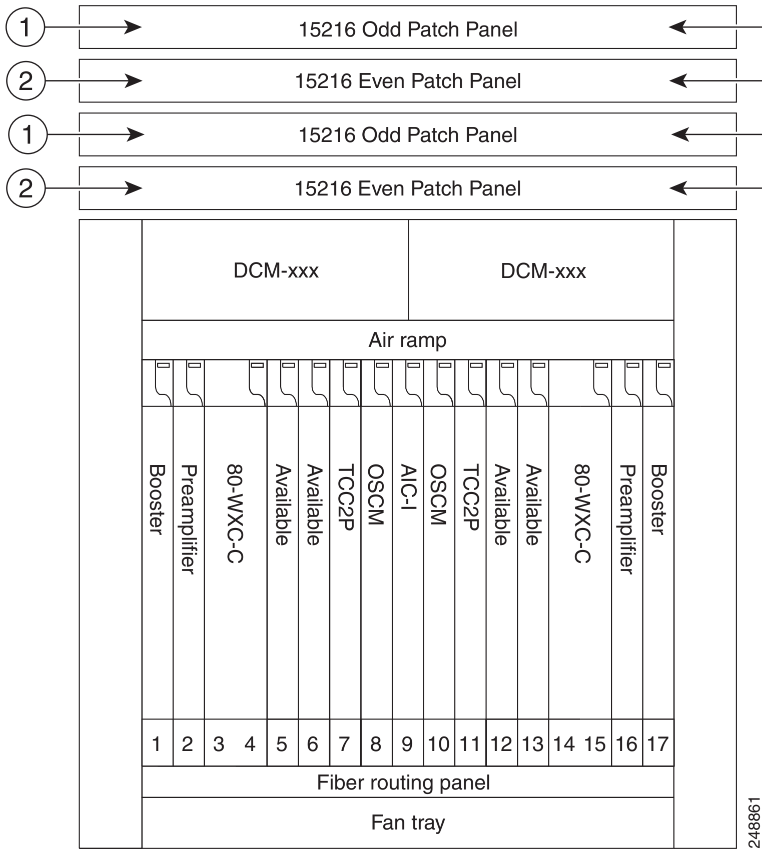
Figure 12-15 ROADM Node with 40-SMR2-C Cards Installed - Cisco ONS 15454 and Cisco ONS 15454 M6



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-16 shows an example of a colored two-degree ROADM node using 80-WXC-C cards with booster and preamplifier cards. The 80-WXC-C cards are inserted in Slots 3 and 14, and function in the bidirectional mode.

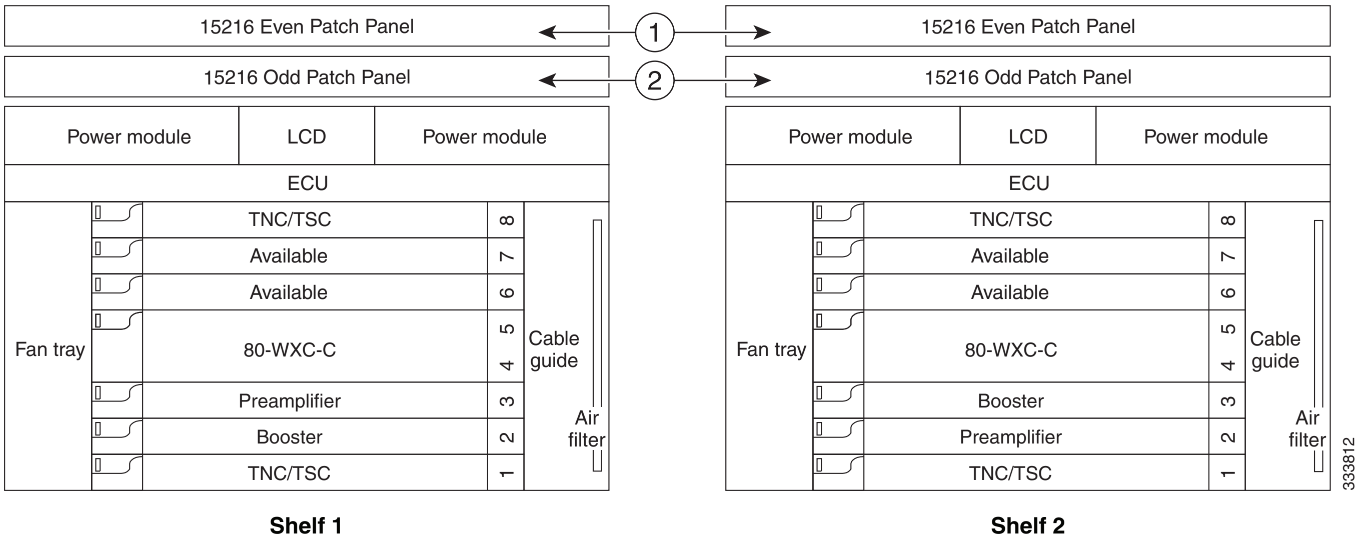
Figure 12-16 Colored Two-Degree ROADM Node with 80-WXC-C, Booster, and Preamplifier Cards



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**
2	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**

Figure 12-17 shows an example of an ONS 15454 M6 80-channel colored two-degree ROADM node.

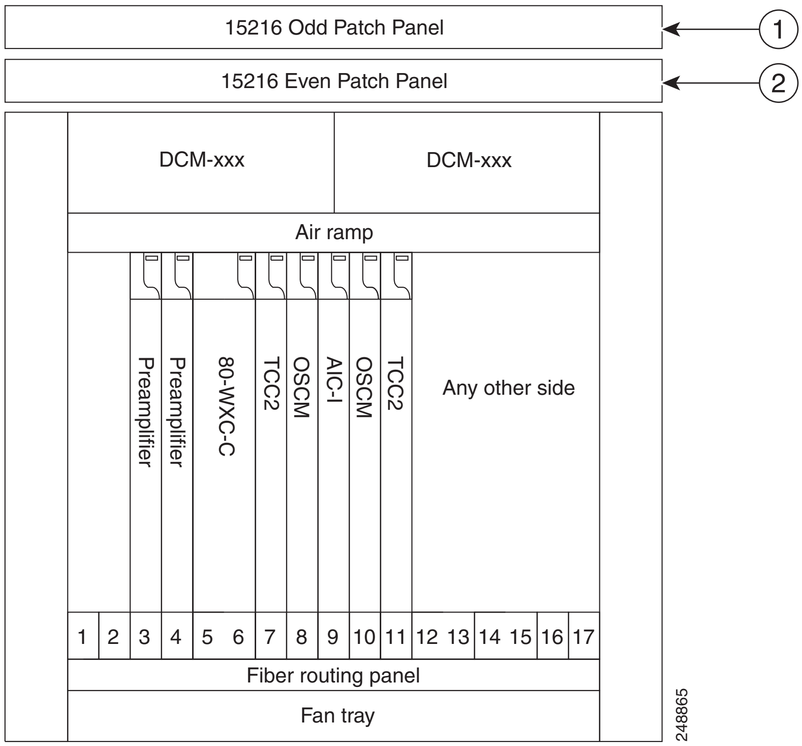
Figure 12-17 ONS 15454 M6 80-Channel Colored Two-degree ROADM Node



1	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**
2	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-18 shows the layout of an 80-channel n-degree ROADM node with omni-directional side.

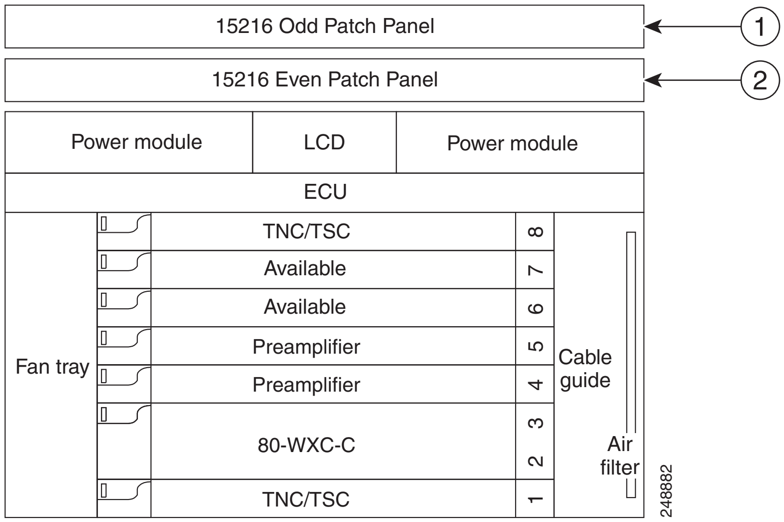
Figure 12-18 80-Channel n-degree ROADM node with Omni-directional Side



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**
2	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**

Figure 12-19 shows the layout of an ONS 15454 M6 80-channel n-degree ROADM node with omni-directional side.

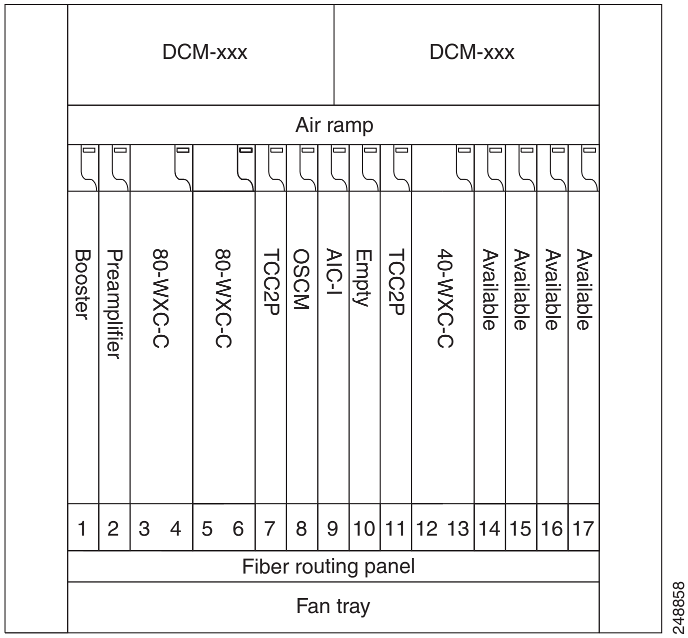
Figure 12-19 ONS 15454 M6 80-Channel n-degree ROADM Node with Omni-directional Side



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**
2	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**

Figure 12-20 shows the layout of a 40-channel n-degree ROADM node with a 40-WXC-C based colorless side.

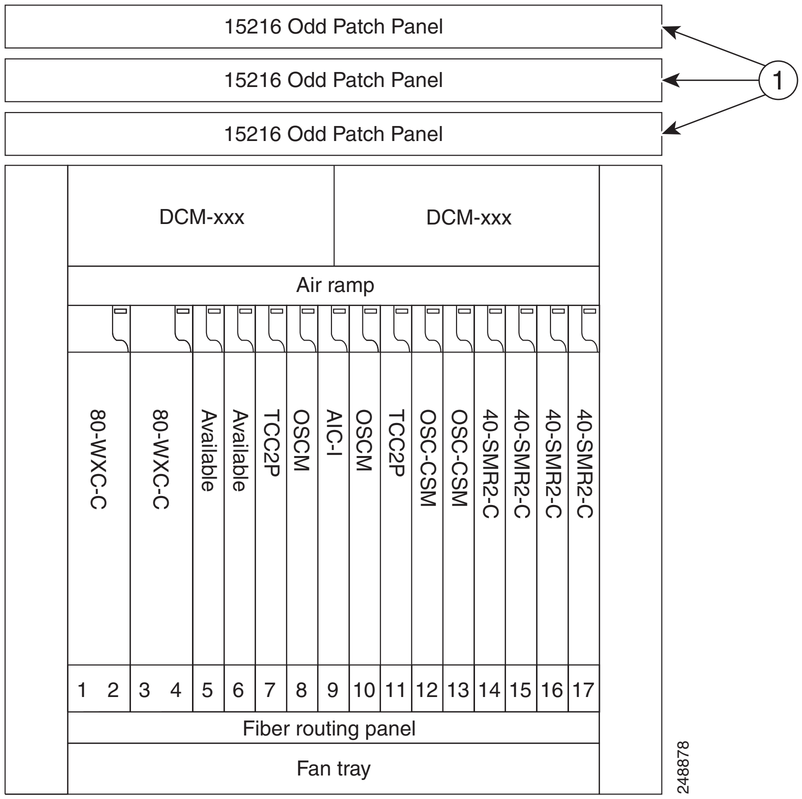
Figure 12-20 40-Channel n-degree ROADM Node with 40-WXC-C Based Colorless Side



The 80-WXC-C cards are connected to the ADD/DROP ports of the 40-WXC-C card and function as colorless multiplexer and demultiplexer units.

Figure 12-21 shows the layout of a 40-channel four-degree ROADM node with a 40-SMR2-C based colorless side.

Figure 12-21 40-Channel Four-degree ROADM Node with 40-SMR2-C Based Colorless Side

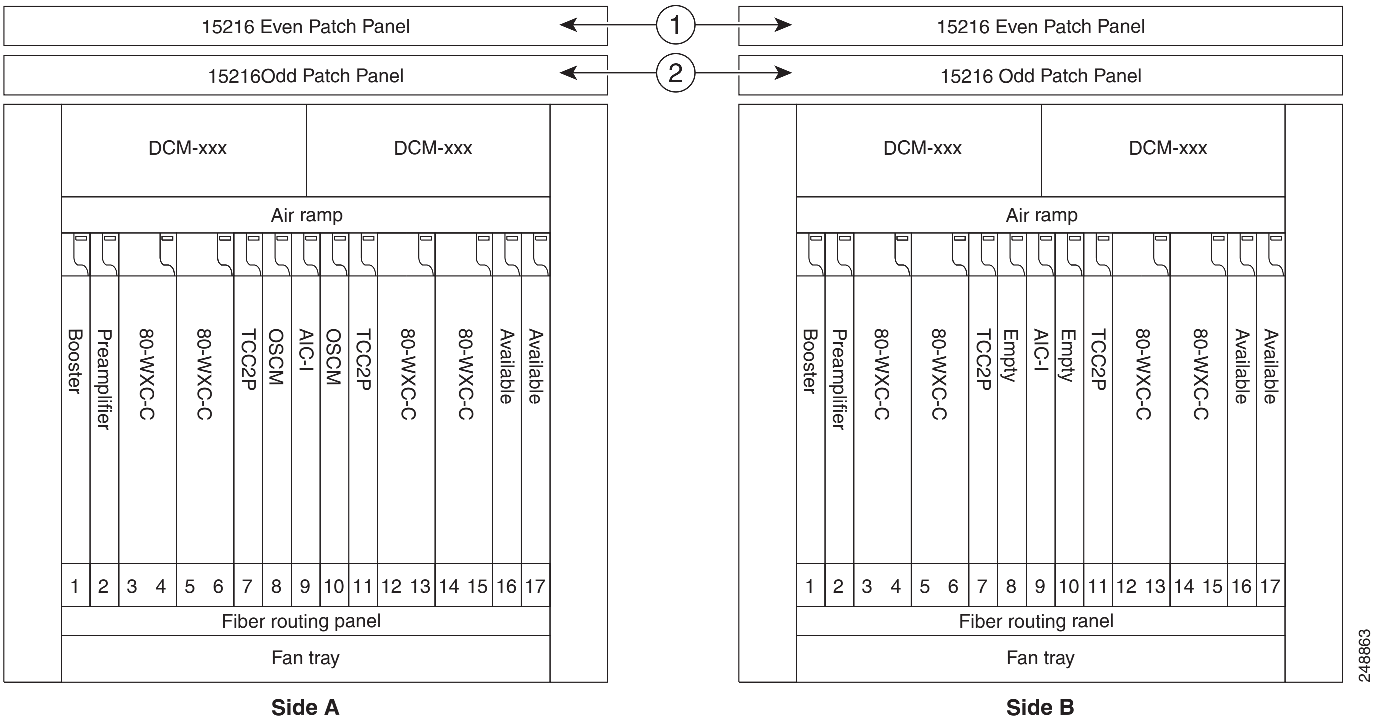


1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

The 80WXC-C (multiplexer) card is inserted in Slot 3 and the 80-WXC-C (demultiplexer) card is inserted in Slot 5. The 80-WXC-C cards are connected to the ADD/DROP ports of the 40-SMR2-C card and function as the colorless multiplexer and demultiplexer units.

Figure 12-22 shows the layout for an 80-channel colorless ROADM node.

Figure 12-22 80-Channel Colorless ROADM Node



1	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**
2	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

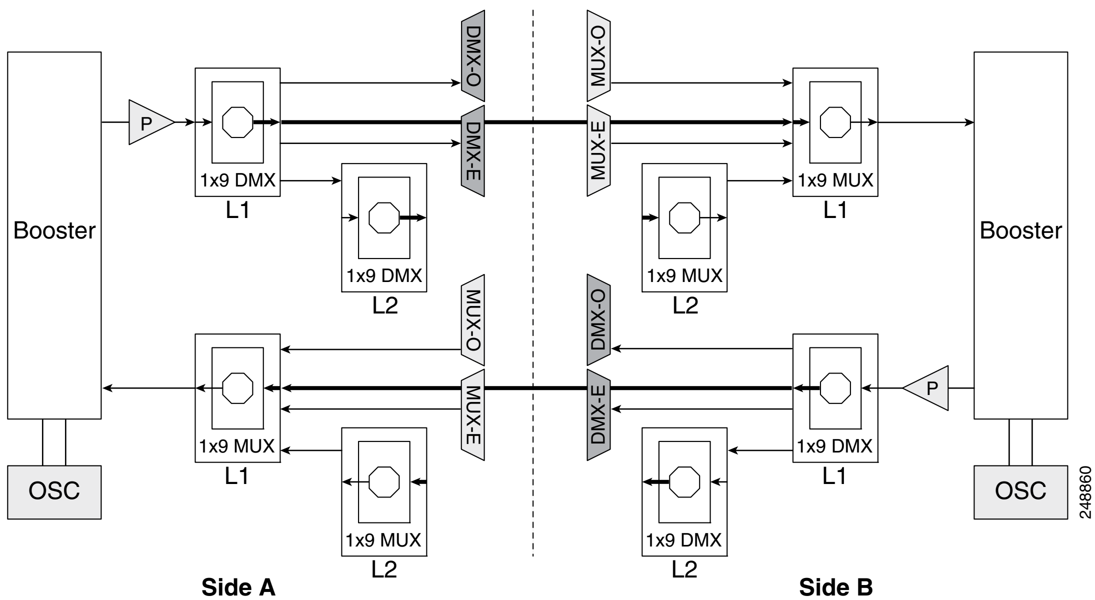
An 80 channel colorless two-degree ROADM node requires the following cards: 80-WXC-C, 15216-MD-40-ODD, 15216-EF-40-ODD, 15216-MD-48-ODD, 15216-MD-40-EVEN, 15216-EF-40-EVEN, 15216-MD-48-EVEN, preamplifiers, and boosters.

The 80-WXC-C cards can be used at two levels; level1 (L1) and level2 (L2).

The L1 80WXC-C (multiplexer) card is inserted in Slot 3 and the L1 80-WXC-C (demultiplexer) card is inserted in Slot 5. The L2 80WXC-C (multiplexer) card is inserted in Slot 12 and the L2 80-WXC-C (demultiplexer) card is inserted in Slot 14.

Figure 12-23 shows an example of the optical signal flow in an 80-channel colorless two-degree ROADM node from Side A to Side B using 80-WXC-C cards. The optical signal flow from Side B to Side A follows an identical path.

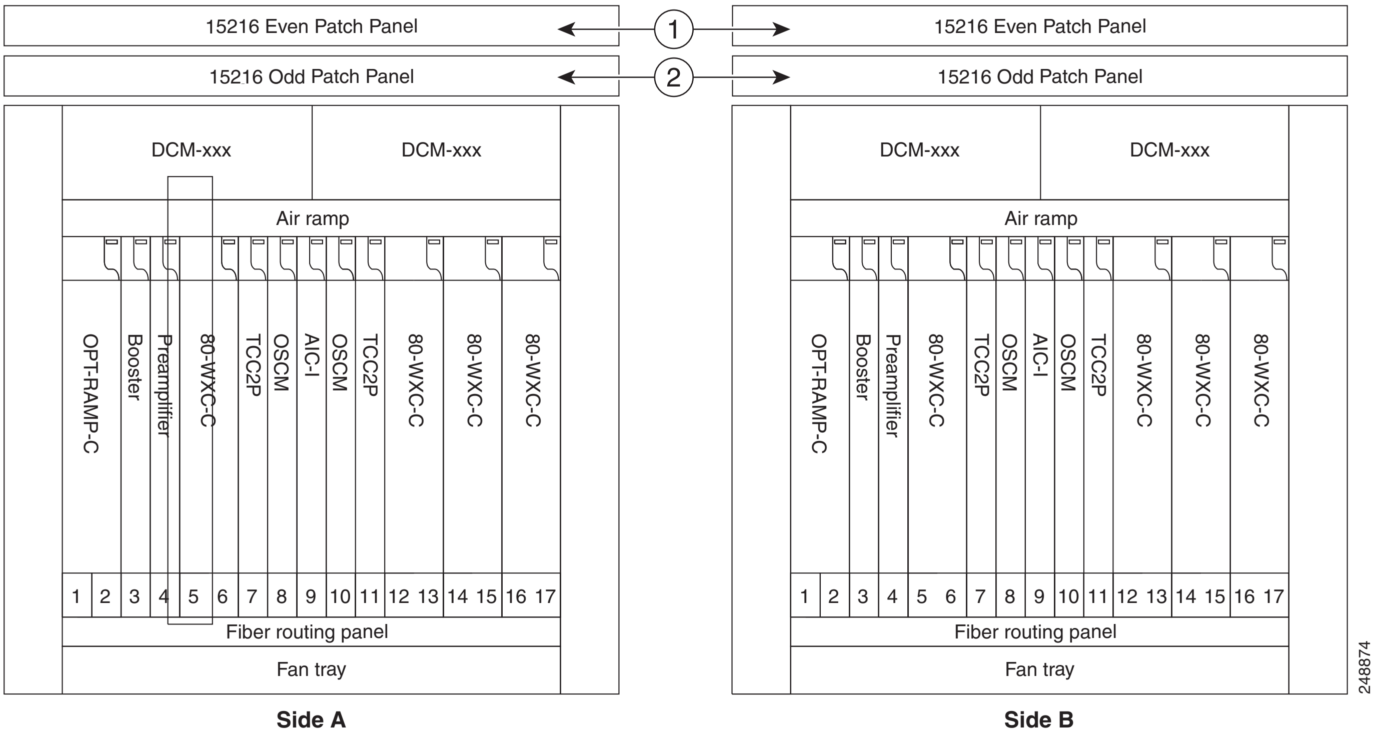
Figure 12-23 80-Channel Colorless Two-degree ROADM Node



1	The booster on Side A receives the composite optical signal. It separates the optical service channel from the optical payload and sends the payload to the preamplifier on Side A.
2	The preamplifier compensates for chromatic dispersion, amplifies the optical payload and sends it to the L1 80-WXC-C card (demultiplexer).
3	Up to eight colorless ports are available on the L1 80-WXC-C card if no colored wavelength is terminated. In Figure 12-23, two EAD ports are connected to 40-DMX-C or 40-DMX-CE cards, 15216-MD-40-ODD, 15216-EF-40-ODD, 15216-MD-48-ODD, 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN units where the colored odd and even wavelengths are dropped. The express wavelengths are sent to the L1 80-WXC-C card (multiplexer) on Side B where the wavelengths are multiplexed with other colored or colorless wavelengths.
4	The L1-80-WXC-C card on Side B sends the composite signal to the booster on Side B.
5	The booster on Side B receives the composite optical signal, adds the optical service channel to the optical payload and sends it to the transmission line.
6	It is possible to configure more colorless ports by cascading the 80-WXC-C cards at two levels. For example, to get 14 colorless ports connect one of the EAD ports of the L1 80-WXC-C card to another 80-WXC-C cards at level 2. There are five colorless ports on the L1 80-WXC-C card and nine colorless ports on the L2 80-WXC-C card. To achieve an 80 channel colorless configuration, connect nine L2 80-WXC-C cards to the nine EAD ports of the L1 80-WXC-C card.

Figure 12-24 shows the layout for an 80-channel colorless ROADM node with OPT-RAMP-C cards.

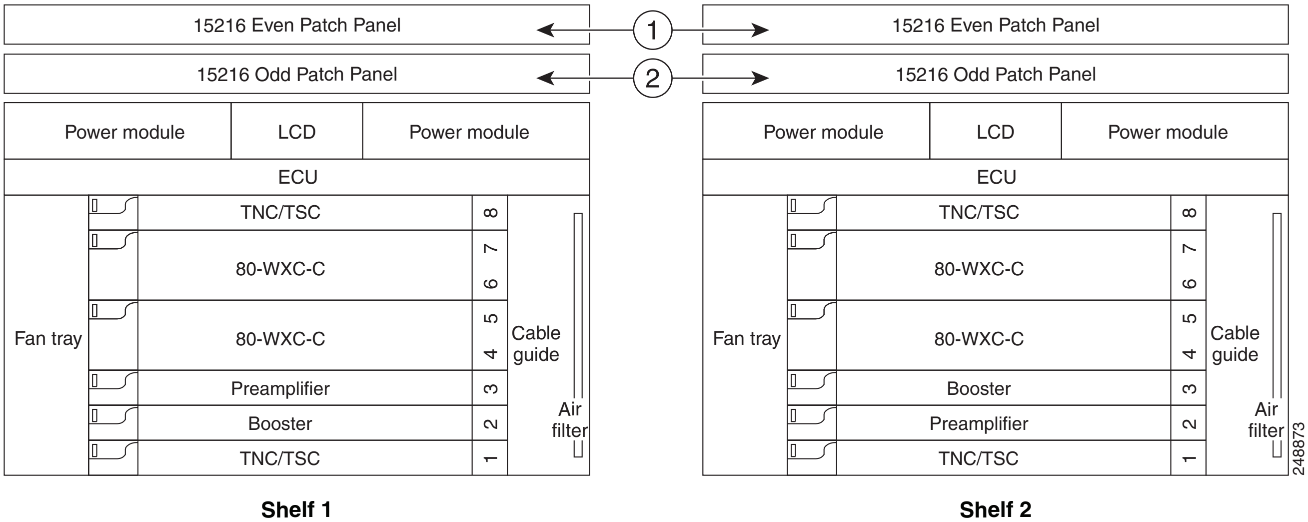
Figure 12-24 80-Channel Colorless ROADM Node with OPT-RAMP-C Card



1	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**
2	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-25 shows an example of an ONS 15454 M6 80-channel two degree colorless ROADM node.

Figure 12-25 ONS 15454 M6 80-Channel Two-degree Colorless ROADM Node



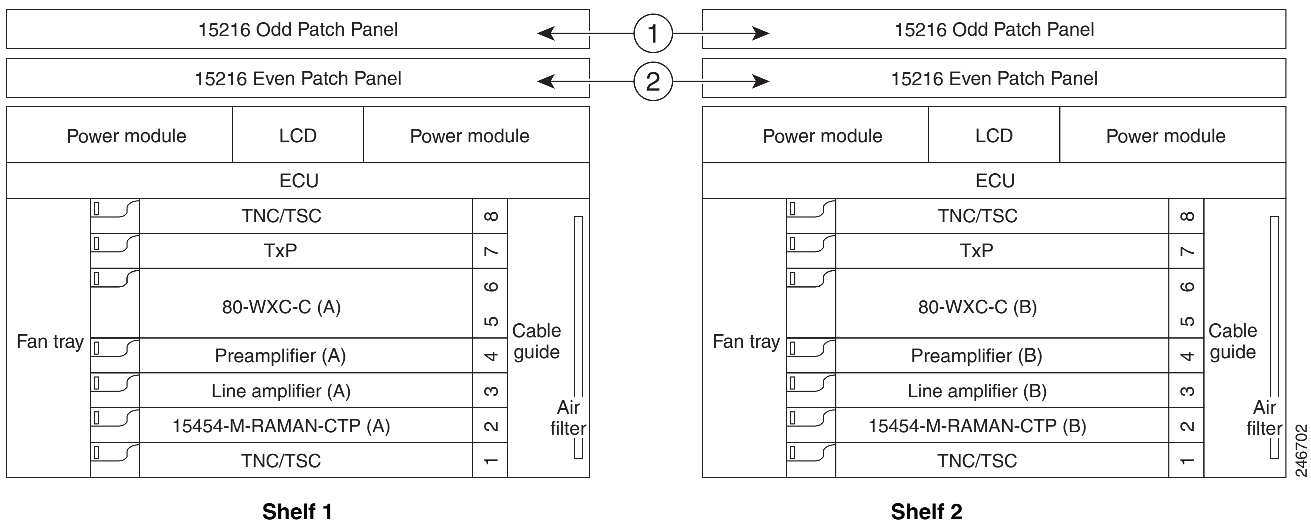
1	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**
2	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

The L1 80WXC-C (multiplexer) card is inserted in Slot 4 and the L1 80-WXC-C (demultiplexer) is inserted in Slot 6. The L2 80WXC-C (multiplexer) card is inserted in Slot 2 and the L2 80-WXC-C (demultiplexer) is inserted in Slot 4.

Figure 12-27 shows an example of a ROADM optical signal flow from Side A to Side B using the 32WSS or 40-WSS-C cards. The optical signal flow from Side B to Side A follows an identical path through the Side B OSC-CSM and 32WSS or 40-WSS-C cards. In this example, OSC-CSM cards are installed, hence OPT-BSTs are not needed.

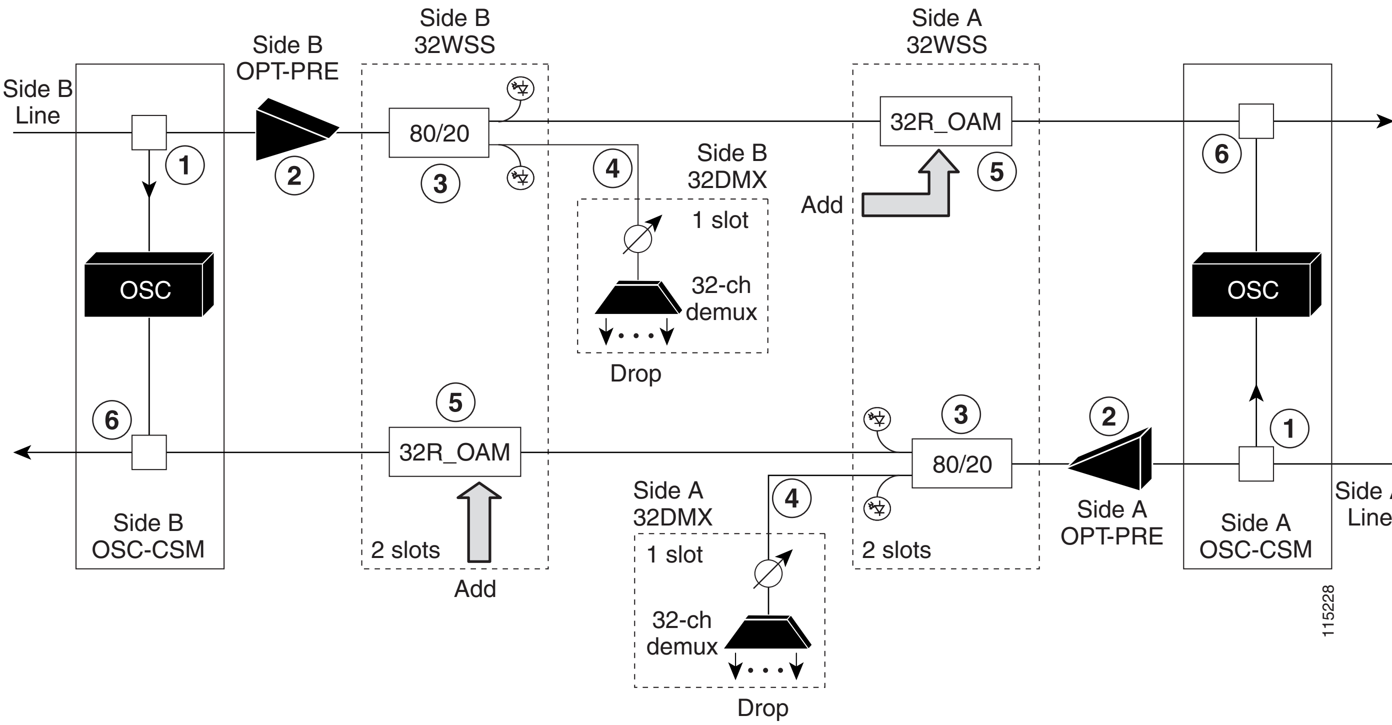
Figure 12-26 shows an example of an ONS 15454 M6 80-channel ROADM node with RAMAN-CTP cards installed.

Figure 12-26 Cisco ONS 15454 M6 80-Channel ROADM Node Using RAMAN-CTP Cards



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**
2	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**

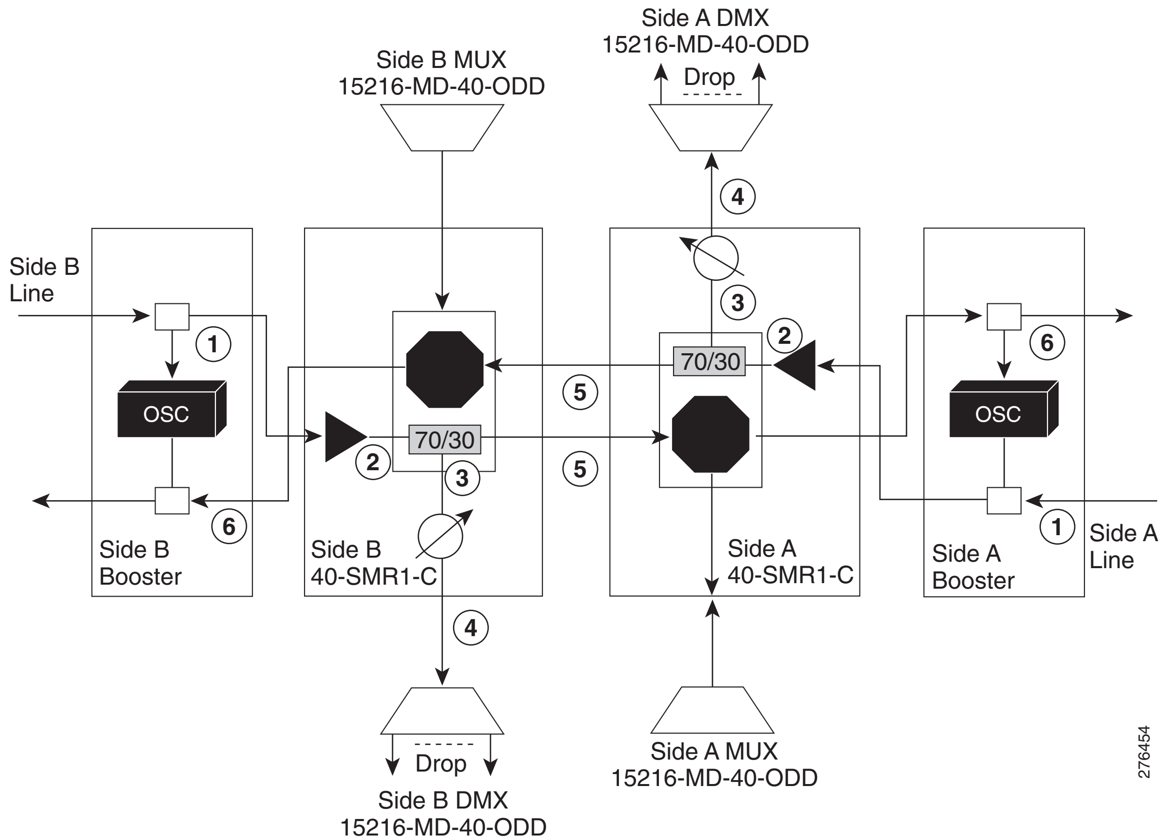
Figure 12-27 ROADM Optical Signal Flow Example Using 32WSS or 40-WSS-C Card



1	The OSC-CSM receives the optical signal. It separates the optical service channel from the optical payload and sends the payload to the OPT-PRE module.
2	The OPT-PRE compensates for chromatic dispersion, amplifies the optical payload, and sends it to the 32WSS or 40-WSS-C/40-WSS-CE.
3	The 32WSS or 40-WSS-C/40-WSS-CE splits the signal into two components. The 80 percent component is sent to the DROP-TX port and the 20 percent component is sent to the EXP-TX port.
4	The drop component goes to the 32DMX card or 40-DMX-C/40-DMX-CE card where it is demultiplexed and dropped.
5	The express wavelength aggregate signal goes to the 32WSS or 40-WSS-C/40-WSS-CE on the other side where it is demultiplexed. Channels are stopped or forwarded based upon their switch states. Forwarded wavelengths are merged with those coming from the ADD path and sent to the OSC-CSM module.
6	The OSC-CSM combines the multiplexed payload with the OSC and sends the signal out the transmission line.

Figure 12-28 shows an example of an ROADM optical signal flow from Side A to Side B using the 40-SMR1-C card. The optical signal flow from Side B to Side A follows an identical path through the Side B booster and 40-SMR1-C card.

Figure 12-28 ROADM Optical Signal Flow Example Using 40-SMR1-C Card



1	The booster receives the optical signal. It separates the optical service channel from the optical payload and sends the payload to the preamplifier module within the 40-SMR1-C card.
2	The preamplifier module compensates for chromatic dispersion, amplifies the optical payload, and sends it to the 70/30 splitter within the 40-SMR1-C card.
3	The 70/30 splitter splits the signal into two components. The 70 percent component is sent to the DROP-TX port and the 30 percent component is sent to the EXP-TX port.
4	The drop component goes to the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit where it is demultiplexed and dropped.
5	The express wavelength aggregate signal goes to the 40-SMR1-C card on the other side where it is demultiplexed. Channels are stopped or forwarded based upon their switch states. Forwarded wavelengths are merged with those coming from the ADD path and sent to the booster module.
6	The booster combines the multiplexed payload with the OSC, amplifies it, and sends the signal out the transmission line.

12.1.4 Hub Node

A hub node is a single ONS 15454 node equipped with two TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards and one of the following combinations:

- Two 32MUX-O cards and two 32DMX-O or 32DMX cards
- Two 32WSS cards and two 32DMX or 32DMX-O cards

- Two 40-WSS-C or 40-WSS-CE cards and two 40-DMX-C or 40DMX-CE cards
- Two 40-SMR1-C and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD (ONS 15216 40 or 48-channel mux/demux patch panel)
- Two 40-SMR2-C and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD

Note Although it is recommended that you use the 15216-MD-40-ODD patch panel along with the 40-SMR1-C and 40-SMR2-C cards, you can alternatively use the 40-MUX-C and 40-DMX-C cards instead of the 15216-MD-40-ODD patch panel.

Note The configuration for a hub node using 40-SMR1-C or 40-SMR2-C cards is identical to the ROADM node, except that there is no patchcord connecting the two 40-SMR1-C or 40-SMR2-C cards. For more details on the ROADM node configuration, see the "12.1.3 ROADM Node" section on page 12-11.

Note The 32WSS/40-WSS-C/40-WSS-CE and 32DMX/32DMX-L/40-DMX-C/ 40-DMX-CE cards are normally installed in ROADM nodes, but they can also be installed in hub and terminal nodes. If the cards are installed in a hub node, the 32WSS/32WSS-L/ 40-WSS-C/40-WSS-CE express ports (EXP RX and EXP TX) are not cabled.

A dispersion compensation unit (DCU) can also be added, if necessary. Figure 12-29 shows a hub node configuration with 32MUX-O and 32DMX-O cards installed.

Figure 12-29 Hub Node Configuration Example with 32-Channel C-Band Cards

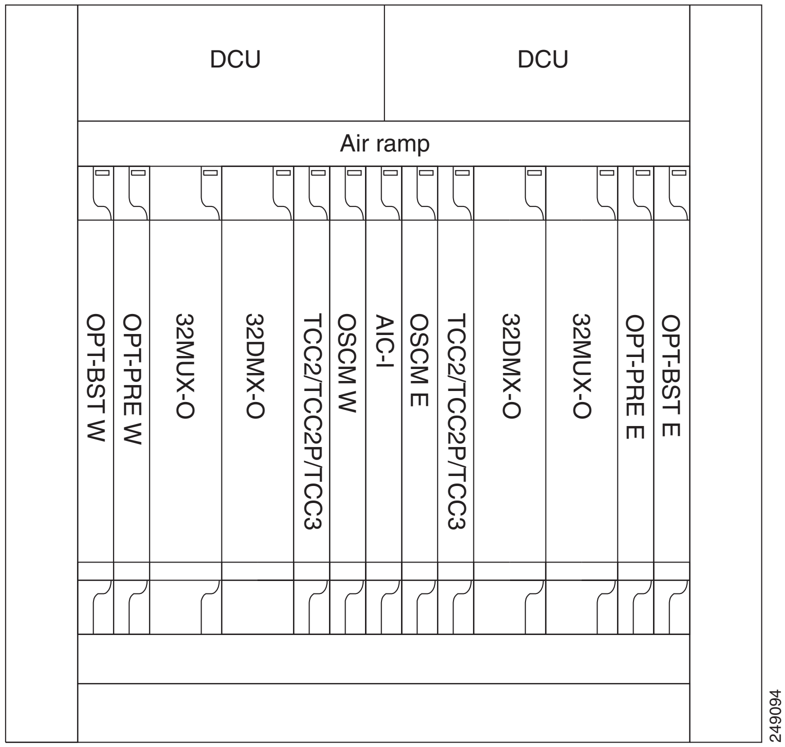


Figure 12-30 shows a 40-channel hub node configuration with 40-WSS-C cards installed.

Figure 12-30 Hub Node Configuration Example with 40-WSS-C Cards

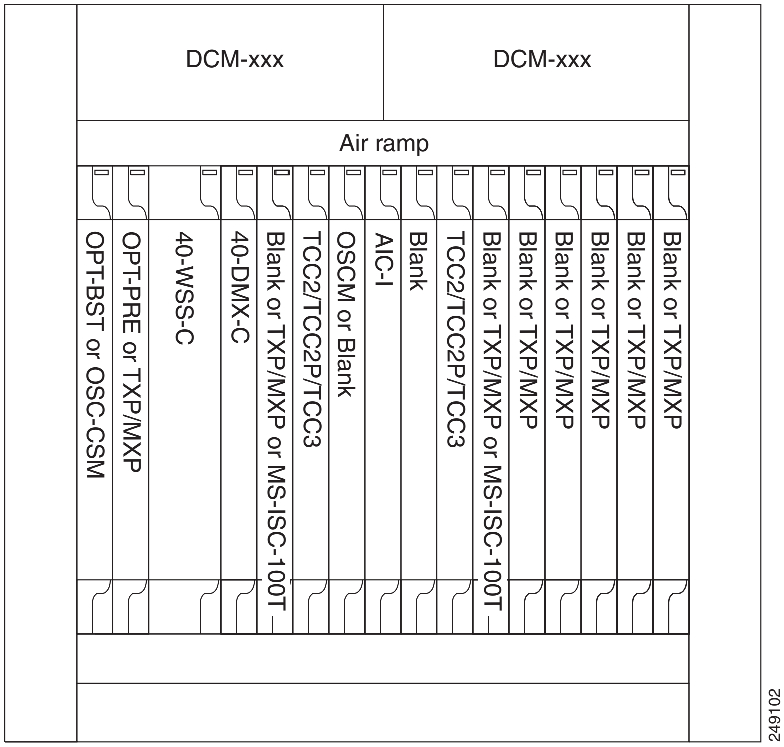
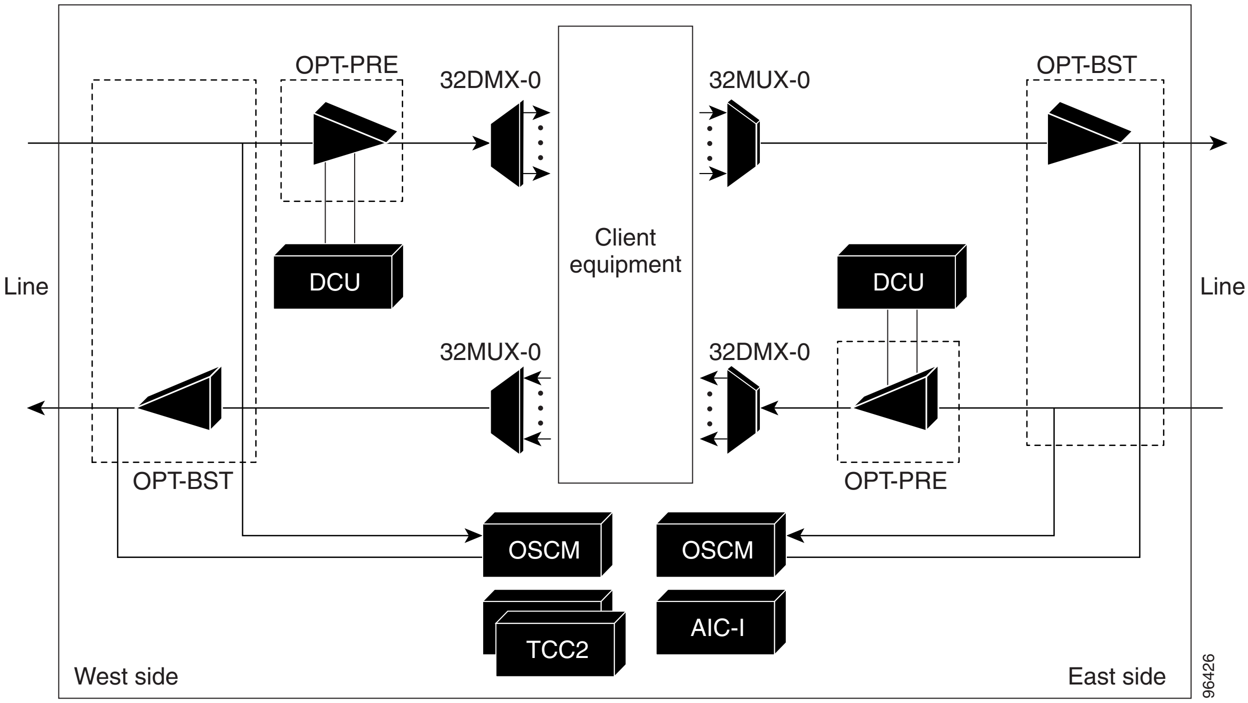


Figure 12-31 shows the channel flow for a hub node. Up to 32 channels from the client ports are multiplexed and equalized onto one fiber. Then, multiplexed channels are transmitted to the OPT-BST amplifier. The OPT-BST output is combined with an output signal from the OSCM card and transmitted to the other side.

Received signals are divided between the OSCM card and an OPT-PRE card. Dispersion compensation is applied to the signal received by the OPT-PRE amplifier, and it is then sent to the 32DMX-O card, which demultiplexes and attenuates the input signal.

Figure 12-31 Hub Node Channel Flow Example



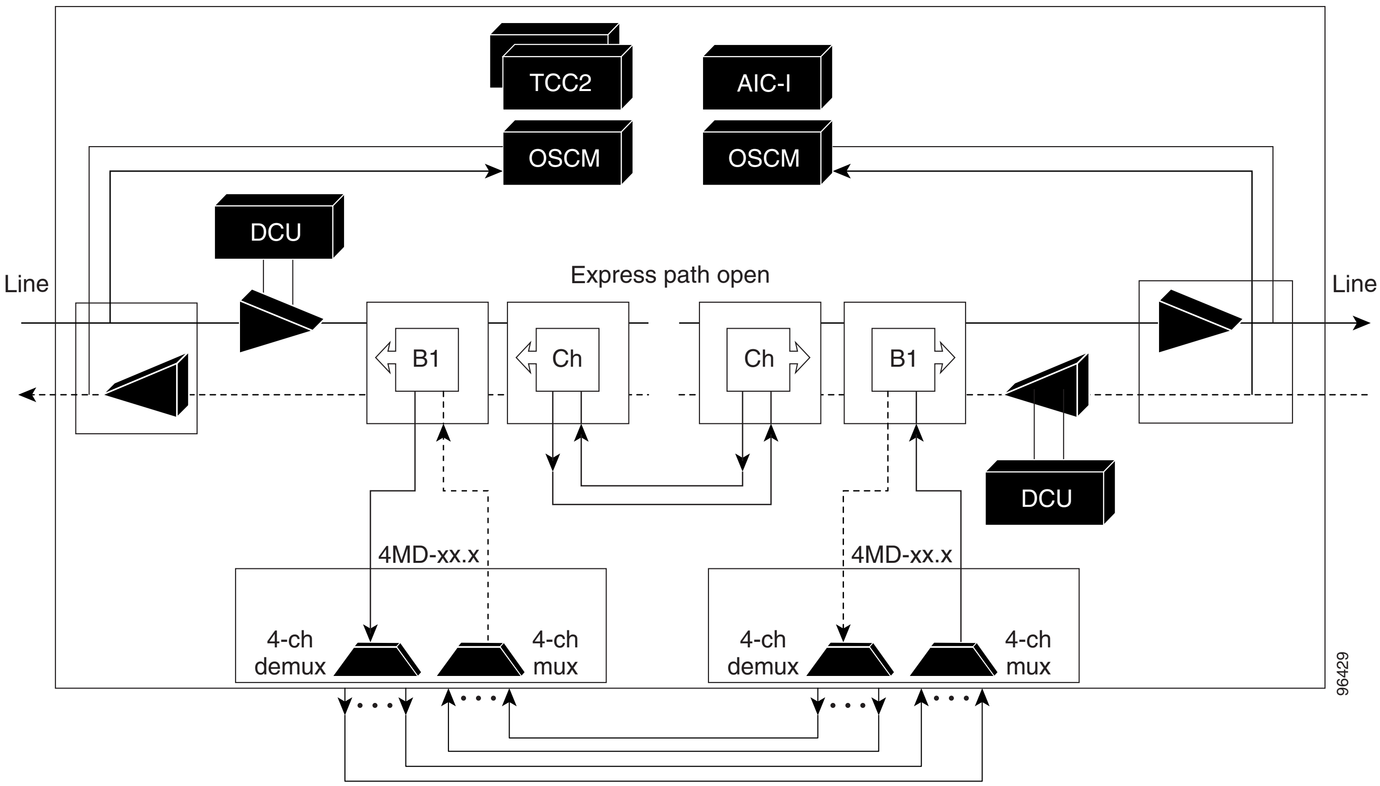
12.1.5 Anti-ASE Node

In a mesh ring network, the ONS 15454 requires a node configuration that prevents ASE accumulation and lasing. An anti-ASE node can be created by configuring a hub node or an OADM node with some modifications. No channels can travel through the express path, but they can be demultiplexed and dropped at the channel level on one side and added and multiplexed on the other side.

The hub node is the preferred node configuration when some channels are connected in pass-through mode. For rings that require a limited number of channels, combine AD-xB-xx.x and 4MD-xx.x cards, or cascade AD-xC-xx.x cards. See Figure 12-9 on page 12-11.

Figure 12-32 shows an anti-ASE node that uses all wavelengths in the pass-through mode. Use Cisco TransportPlanner to determine the best configuration for anti-ASE nodes.

Figure 12-32 Anti-ASE Node Channel Flow Example



12.1.6 Line Amplifier Node

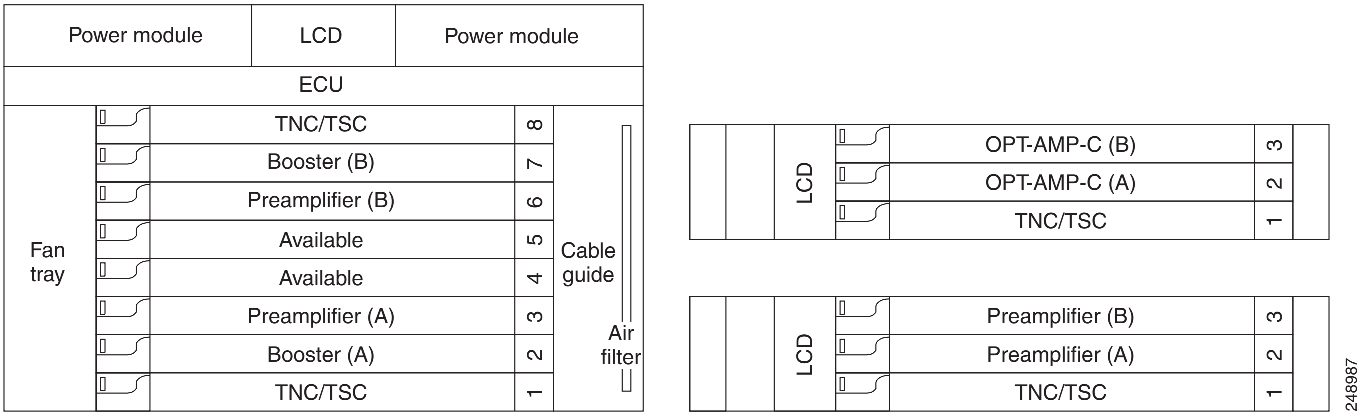
A line amplifier node is a single ONS 15454 node that is used to amplify the optical signal in long spans. The line amplifier node can be equipped with one of the following sets of cards:

- Two OPT-PRE cards, two OPT-BST cards, and two OSCM cards
- Two OPT-PRE cards and two OSC-CSM cards
- Two OPT-AMP-17-C cards and two OSCM cards
- Two OPT-AMP-C cards and two OSCM cards

Attenuators might also be required between each preamplifier and OPT-BST amplifier to match the optical input power value and to maintain the amplifier gain tilt value.

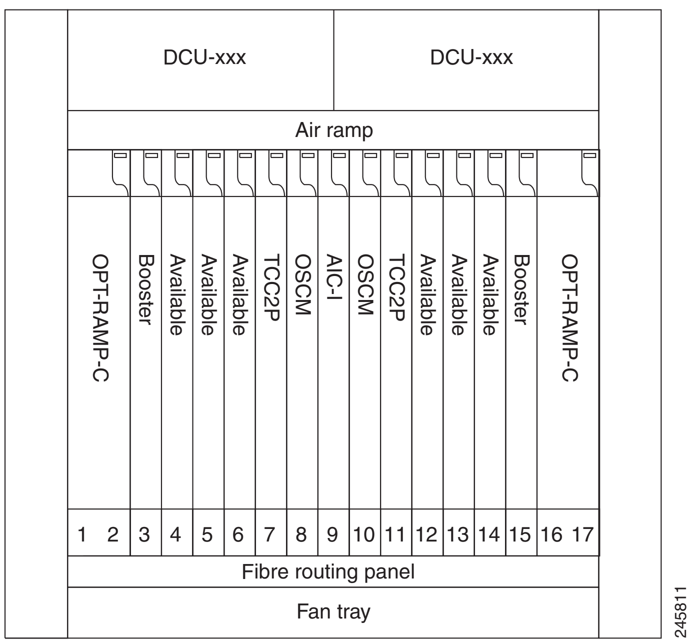
Two OSCM cards are connected to the OPT-BST cards to multiplex the OSC signal with the pass-though channels. If the node does not contain a booster card, OSC-CSM cards must be installed instead of OSCM cards. Figure 12-33 shows an example of a line amplifier node configuration using OPT-BST, OPT-PRE, and OSCM cards.

Figure 12-33 Line Amplifier Node Configuration Example - Cisco ONS 15454 M6 and Cisco ONS 15454 M2



The line amplifier can be equipped with OPT-RAMP-C or OPT-RAMP-CE cards to achieve in fiber amplification. Figure 12-34 shows an example of a line amplifier node with Raman amplification using OPT-RAMP-C cards.

Figure 12-34 Line Amplifier Node with OPT-RAMP-C Cards



A node layout equipped with OPT-RAMP-C or OPT-RAMP-CE cards without post-amplifiers is used when post-amplification of the optical signal is not required.

This layout is used in the following scenarios:

- The fiber is non-linear with high Raman gain (12.5 dB)
- The span length is 13 to 22 dB

There are three node layouts without post-amplifiers:

1. Line amplifier node equipped with OPT-RAMP-C or OPT-RAMP-CE cards on Side A and Side B.
2. Line amplifier node equipped with OPT-RAMP-C or OPT-RAMP-CE and booster cards on Side A and OPT-RAMP-C or OPT-RAMP-CE cards on Side B and vice-versa.
3. Line amplifier node equipped with OPT-RAMP-C or OPT-RAMP-CE and booster cards on Side A and OSC-CSM cards on Side B and vice-versa.

Figure 12-35 shows an example of a line amplifier node with OPT-RAMP-C cards on Side A and Side B.

Figure 12-35 Line Amplifier Node with OPT-RAMP-C Cards on Sides A and B

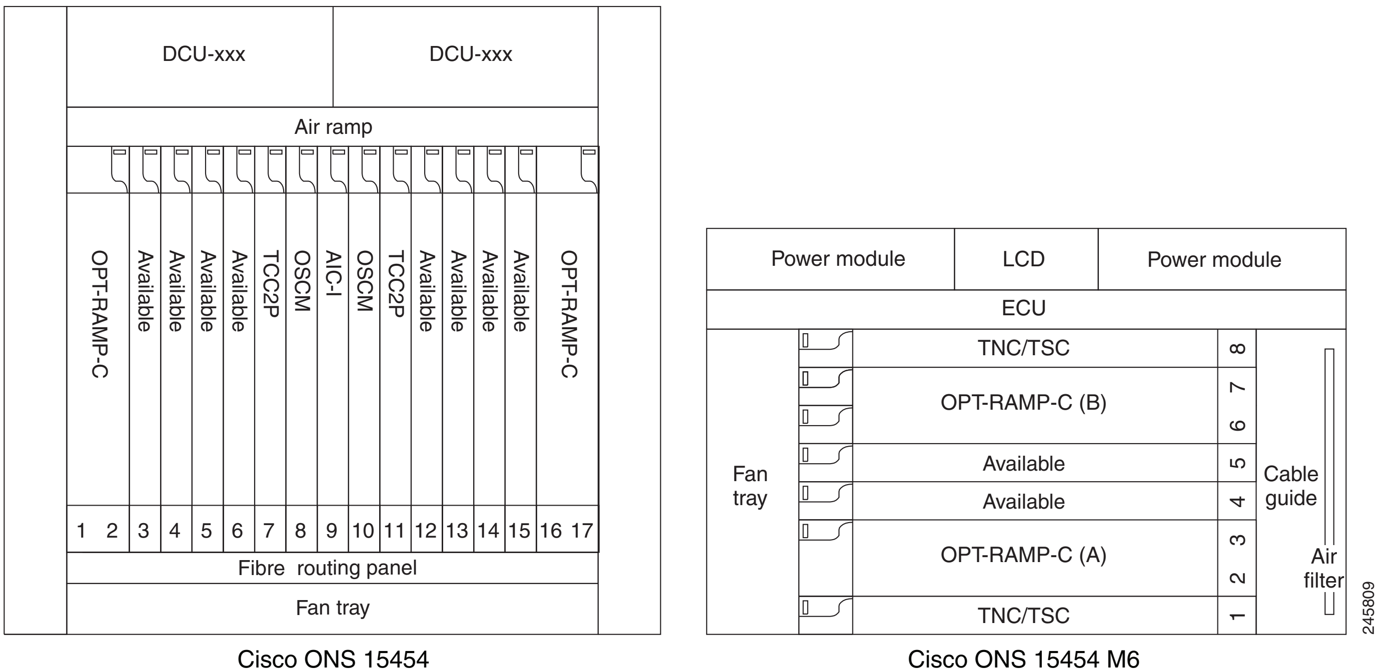


Figure 12-36 shows an example of a line amplifier node with a standard Raman configuration (OPT-RAMP-C or OPT-RAMP-CE and booster cards) on Side A and a Raman only configuration (OPT-RAMP-C or OPT-RAMP-CE cards) on Side B.

Figure 12-36 Line Amplifier Node with OPT-RAMP-C and Booster Cards (Side A) and OPT-RAMP-C Cards (Side B)

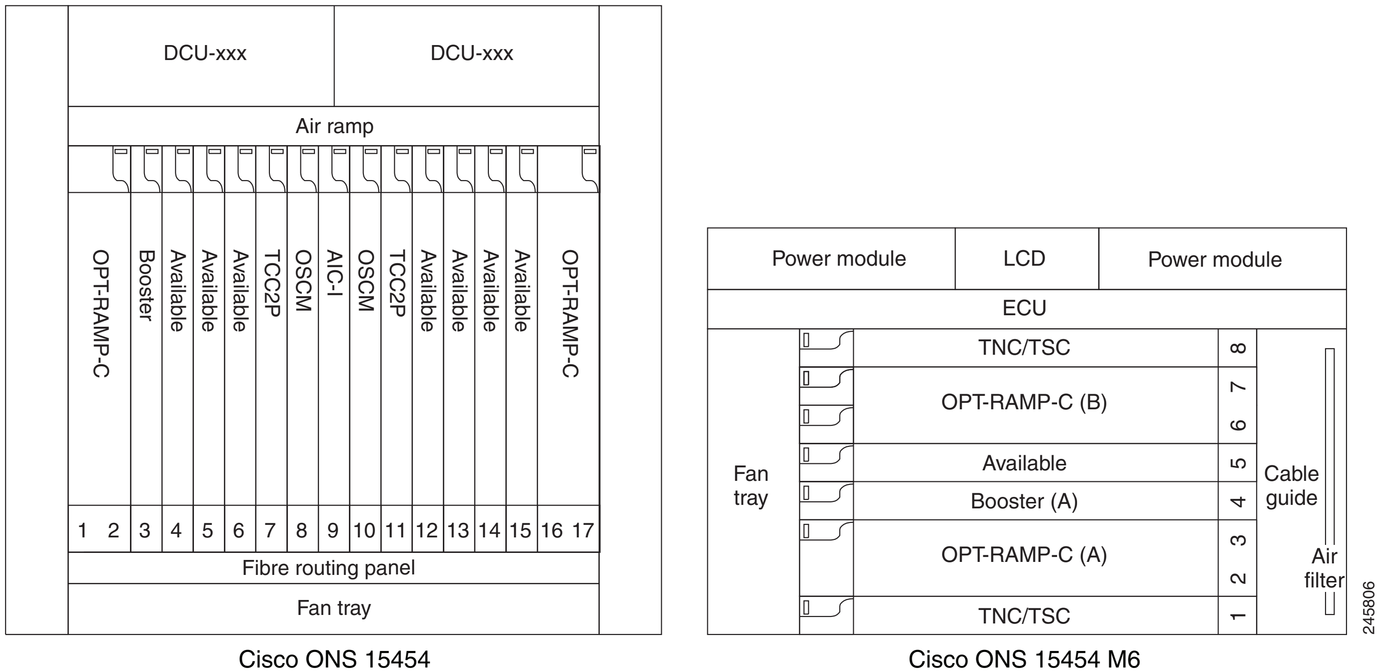
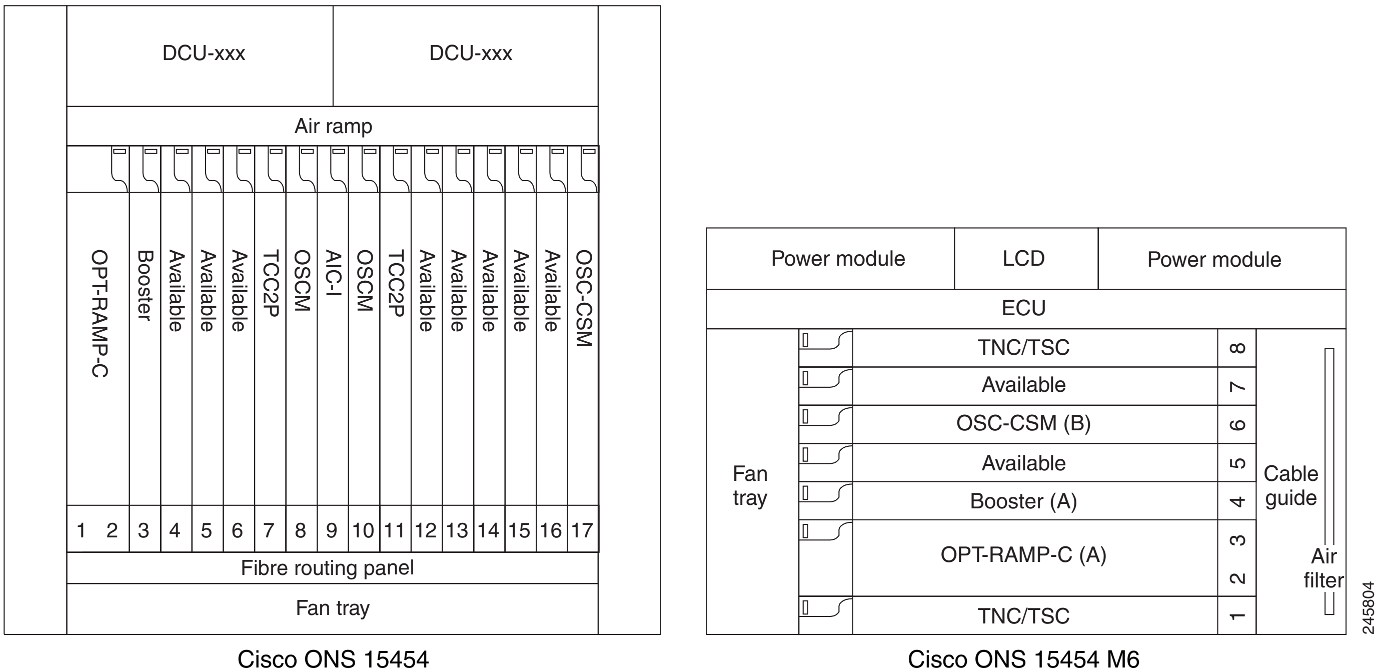


Figure 12-37 shows an example of a line amplifier node with a standard Raman configuration (OPT-RAMP-C or OPT-RAMP-CE and booster cards) on Side A and an OSC-CSM configuration on Side B.

Figure 12-37 Line Amplifier Node with OPT-RAMP-C and Booster Cards (Side A) and OSC-CSM Cards (Side B)



12.1.7 OSC Regeneration Node

The OSC regeneration node is added to the DWDM networks for two purposes:

- To electrically regenerate the OSC channel whenever the span links are 37 dB or longer and payload amplification and add/drop capabilities are not present. Cisco TransportPlanner places an OSC regeneration node in spans longer than 37 dB. The span between the OSC regeneration node and the next DWDM network site cannot be longer than 31 dB.
- To add data communications network (DCN) capability wherever needed within the network.

OSC regeneration nodes require two OSC-CSM cards, as shown in Figure 12-38. The cards are installed in each side of the shelf.

Figure 12-38 OSC Regeneration Line Node Configuration Example - Cisco ONS 15454, Cisco ONS 15454 M6, and Cisco ONS 15454 M2

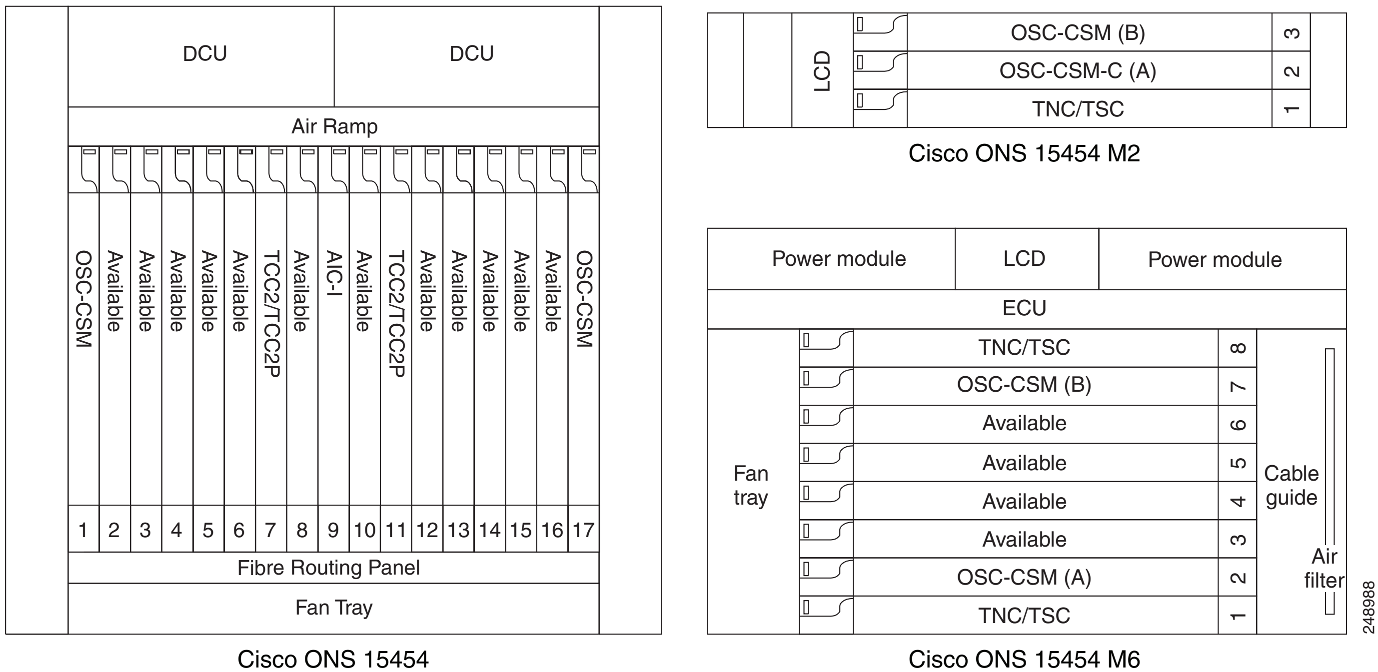
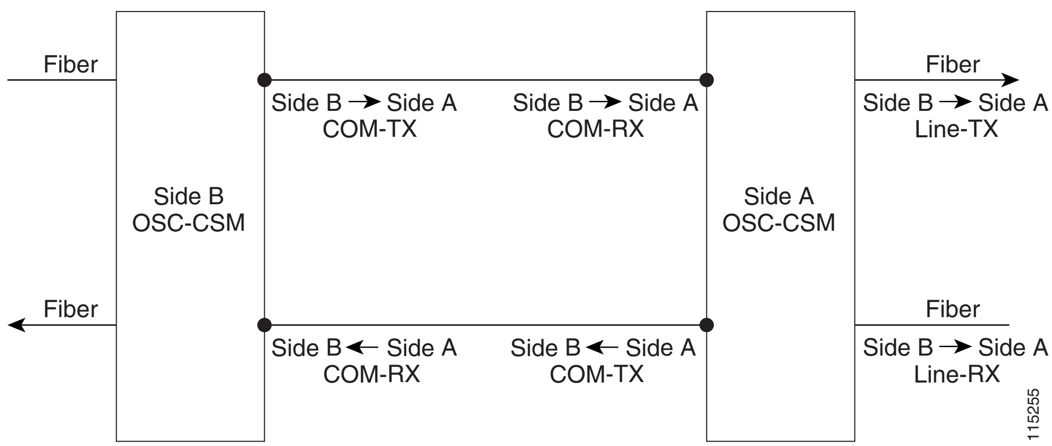


Figure 12-39 shows the OSC regeneration line node signal flow.

Figure 12-39 OSC Regeneration Line Node Flow



12.2 Supported Node Configurations for OPT-RAMP-C and OPT-RAMP-CE Cards

The OPT-RAMP-C and OPT-RAMP-CE cards can be equipped in the following network element type configurations:

- C-band odd systems:
  - C-band terminal site with 32-MUX-O and 32-DMX-O cards
  - C-band hub node with 32-MUX-O and 32-DMX-O cards
  - C-band fixed OADM node
  - C-band line site
  - C-band 32-channel reconfigurable OADM (ROADM)
  - C-band terminal site using a 32-WSS and 32-DMX cards
  - C-band flexible terminal site using AD-xC cards
  - C-band hub node using a 32-WSS and 32-DMX cards
  - C-band 40-channel ROADM
  - C-band terminal site using a 40-WSS-C and 40-DMX-C cards
  - C-band terminal site using 40-MUX-C and 40-DMX-C cards
  - C-band hub node using a 40-WSS-C and 40-DMX-C cards
  - C-band up to 4 degree mesh node
  - C-band up to 8 degree mesh node
  - C-band multiring/mesh with MMU node
  - C-band 4 degree multiring/mesh node (MMU based)
- C-band odd and even systems:
  - C-band 64-channel terminal site
  - C-band 72-channel terminal site
  - C-band 80-channel terminal site
  - C-band 64-channel hub site
  - C-band 72-channel hub site
  - C-band 80-channel hub site
  - C-band 64-channel ROADM site
  - C-band 72-channel ROADM site
  - C-band 80-channel ROADM site

The following amplifier cards are defined as booster or preamplifiers:

- Booster:
  - OPT-BST
  - OPT-BST-E
  - OPT-AMP-17-C
  - OPT-AMP-C
- Preamplifier:
  - OPT-PRE
  - OPT-AMP-C
  - OPT-BST
  - OPT-BST-E

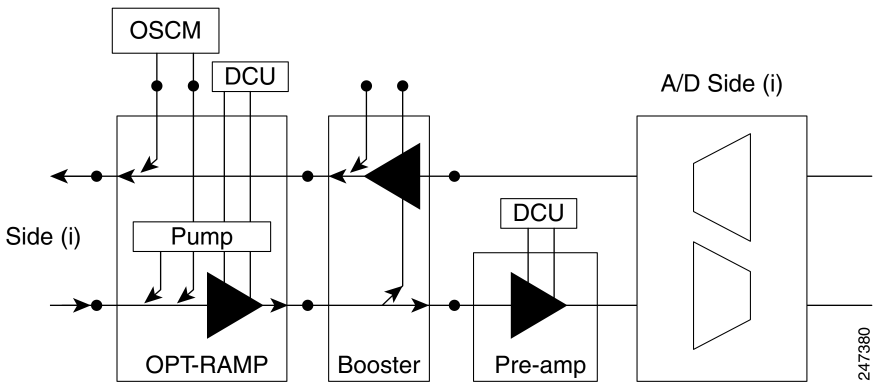
Note When the booster is not needed, it must be replaced with an OSC-CSM card.

12.2.1 OPT-RAMP-C or OPT-RAMP-CE Card in an Add/Drop Node

When the OPT-RAMP-C or OPT-RAMP-CE card is equipped in an add/drop node, the booster amplifier is mandatory and cannot be replaced by an OSC-CSM card. The preamplifier is an OPT-BST, OPT-BST-E, or OPT-AMP-C card, and must be cabled as an unidirectional card. Note that the COM-TX and LINE-RX ports must not be used for any other connections. If a single module ROADM 40-SMR-1-C is used as an add/drop card, a preamplifier is not required. If a single module ROADM 40-SMR-2-C is used as an add/drop card, both the preamplifier and booster are not required.

Figure 12-40 shows the OPT-RAMP-C or OPT-RAMP-CE card in an add/drop node.

Figure 12-40 OPT-RAMP-C or OPT-RAMP-CE Card in an Add/Drop Node



When required, a DCN extension can be used on A/D Side (i) in Figure 12-40.

Side (i) in Figure 12-40 can be equipped with the following cards:

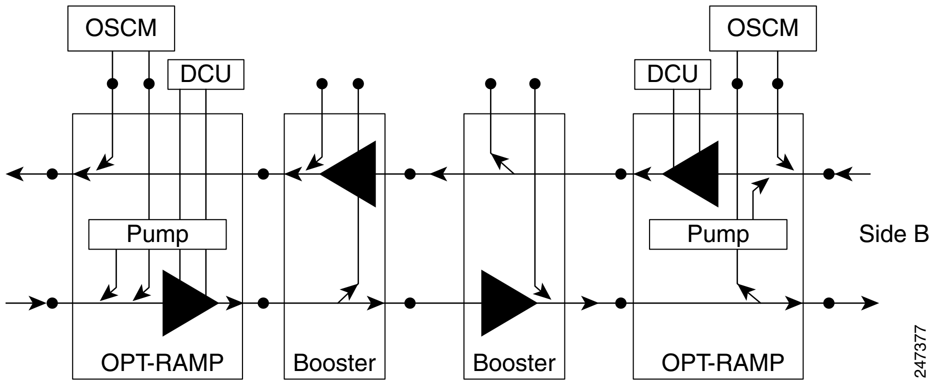
- WSS + DMX
- AD-xC
- 40-WXC-C or 80-WXC-C + MUX + DMX
- Single module ROADM

12.2.2 OPT-RAMP-C or OPT-RAMP-CE Card in a Line Site Node with Booster Amplification

The OPT-RAMP-C or OPT-RAMP-CE card can be equipped in a line site node with a booster amplifier in the following configurations:

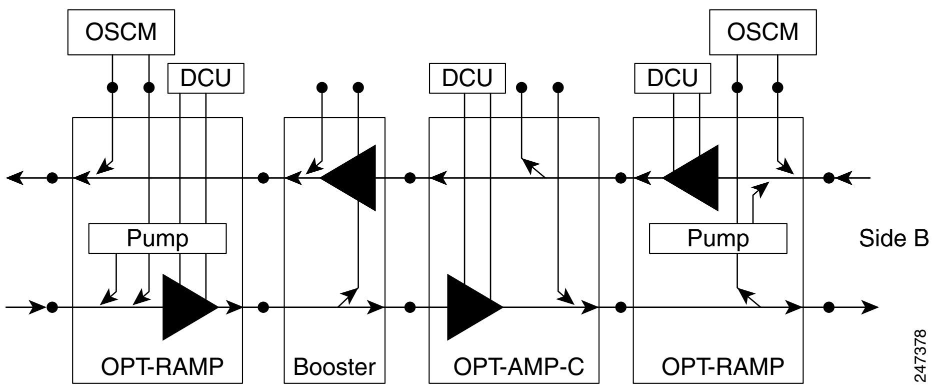
- OPT-BST and OPT-BST-E can be used as booster in a line site node with OPT-RAMP-C or OPT-RAMP-CE. The booster cards need to be cabled as bidirectional units. Figure 12-41 shows the OPT-RAMP-C or OPT-RAMP-CE card in a line site configuration.

Figure 12-41 OPT-RAMP-C Card or OPT-RAMP-CE Card in a Line Site Configuration



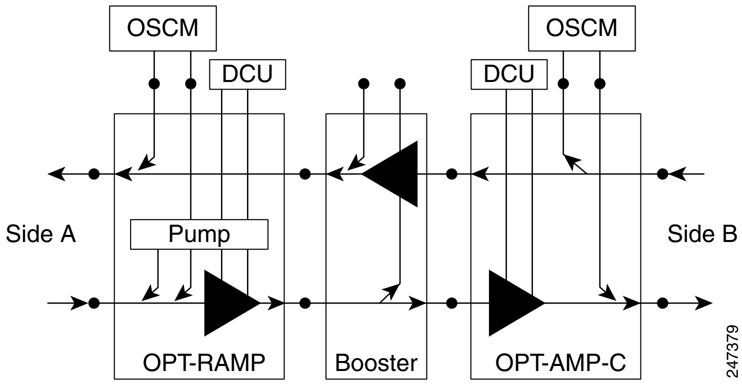
- The OPT-AMP-C can be used as a booster in a line site node with OPT-RAMP-C or OPT-RAMP-CE and needs to be cabled as a bidirectional unit. An additional DCU unit can be equipped between the OPT-AMP-C DC ports. Figure 12-42 shows a line site configured with OPT-AMP-C card and an additional DCU unit.

Figure 12-42 Line Site Configured with OPT-AMP-C



- A line site can be configured with OPT-RAMP-C or OPT-RAMP-CE card on one side only. Figure 12-43 shows the line site configured with OPT-RAMP-C or OPT-RAMP-CE on side A only. The booster is configured on side B.

Figure 12-43 Line Site with OPT-RAMP-C or OPT-RAMP-CE On One Side



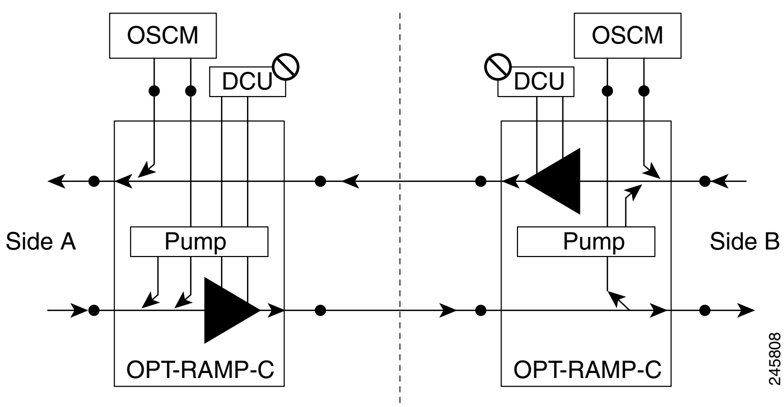
In all configurations, the booster amplifier facing the OPT-RAMP-C or OPT-RAMP-CE card is mandatory for safety reasons.

12.2.3 OPT-RAMP-C or OPT-RAMP-CE Card in a Line Site Node Without Post - Amplification

The OPT-RAMP-C or OPT-RAMP-CE card can be equipped in a line site node in the following configurations:

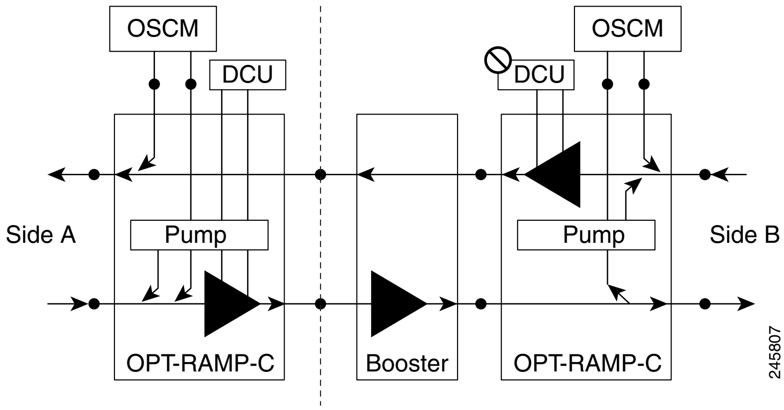
- A symmetric Raman configuration without post-amplifiers with an OPT-RAMP-C or OPT-RAMP-CE card on Side A and Side B in a line site node (see Figure 12-44). In this configuration, the OPT-RAMP-C or OPT-RAMP-CE cards do not support DCU units.

Figure 12-44 Symmetric Raman Configuration Without Post-Amplifiers



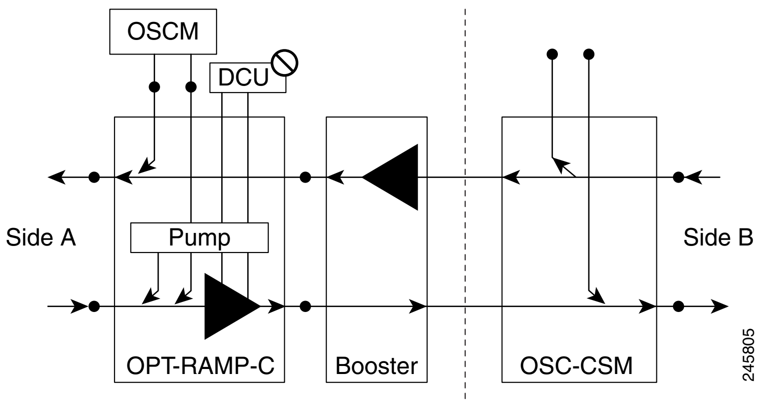
- An asymmetric configuration of a line site node where Side A is a standard Raman configuration equipped with OPT-RAMP-C or OPT-RAMP-CE and booster cards and Side B is a Raman configuration without post-amplifiers and is equipped with OPT-RAMP-C or OPT-RAMP-CE cards (see Figure 12-45). Side B does not support DCU units.

Figure 12-45 Asymmetric Configuration With Standard Raman on Side A and Raman Without Post-Amplifier on Side B



- An asymmetric configuration of a line site node where Side A is a Raman configuration without post-amplifier equipped with OPT-RAMP-C or OPT-RAMP-CE cards (without DCU units) and Side B is configured with OSC-CSM cards (see Figure 12-46).

Figure 12-46 Asymmetric configuration With One Side Configured as Raman Without Post-Amplifier



12.3 Supported Node Configurations for PSM Card

The PSM card supports the following node configurations:

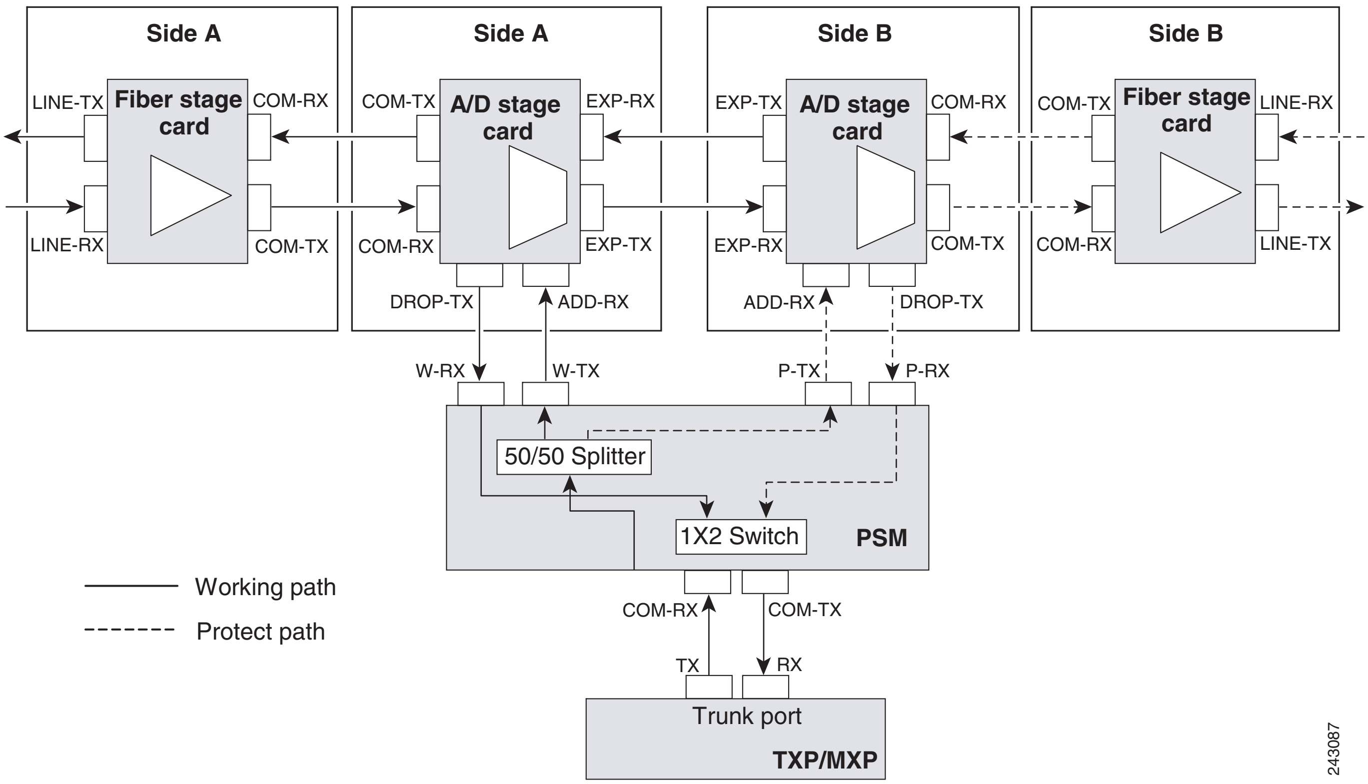
- 12.3.1 Channel Protection
- 12.3.2 Multiplex Section Protection
- 12.3.3 Line Protection
- 12.3.4 Standalone

12.3.1 Channel Protection

In a channel protection configuration, the PSM card is used in conjunction with a TXP/MXP card. The PSM card in a channel protection configuration can be used in any site apart from a terminal site.

Figure 12-47 shows the DWDM functional view of a PSM card in channel protection configuration.

Figure 12-47 PSM Channel Protection Configuration



In this configuration, the COM-RX and COM-TX ports of the PSM card are connected to the TXP/MXP trunk ports. This configuration is applicable to an *n*-degree MSTP node, for example, a two-degree ROADM, an *n*-degree ROADM, or an OADM node. The example block diagram shows a two-degree node with Side A and Side B as the two sides. The Side A and Side B fiber-stage block can be DWDM cards that are used to amplify transmitted or received signal (see the "12.6.1.1 Fiber Stage" section on page 12-53 for the list of cards). The Side A and Side B add/drop stage block can be DWDM cards that can add and drop traffic (see the "12.6.1.2 A/D Stage" section on page 12-55 for the list of cards).

In the transmit direction, the traffic originating from a TXP/MXP trunk port is split by the PSM card on to the W-TX and P-TX ports. The W-TX and P-TX ports are connected to the ADD-RX ports of the add/drop stage cards in Side A and Side B respectively. The add/drop stage cards multiplex traffic on Side A and Side B line ports that become the working and protect paths respectively.

In the receive direction, the W-RX and P-RX ports of the PSM card are connected to the DROP-TX ports of the add/drop stage cards on Side A and Side B respectively. The add/drop stage cards demultiplex traffic received from Side A and Side B line ports that are the working and protect paths respectively. The PSM card selects one of the two input signals on the W-RX and P-RX ports to be transmitted to the COM-RX port of the PSM card.

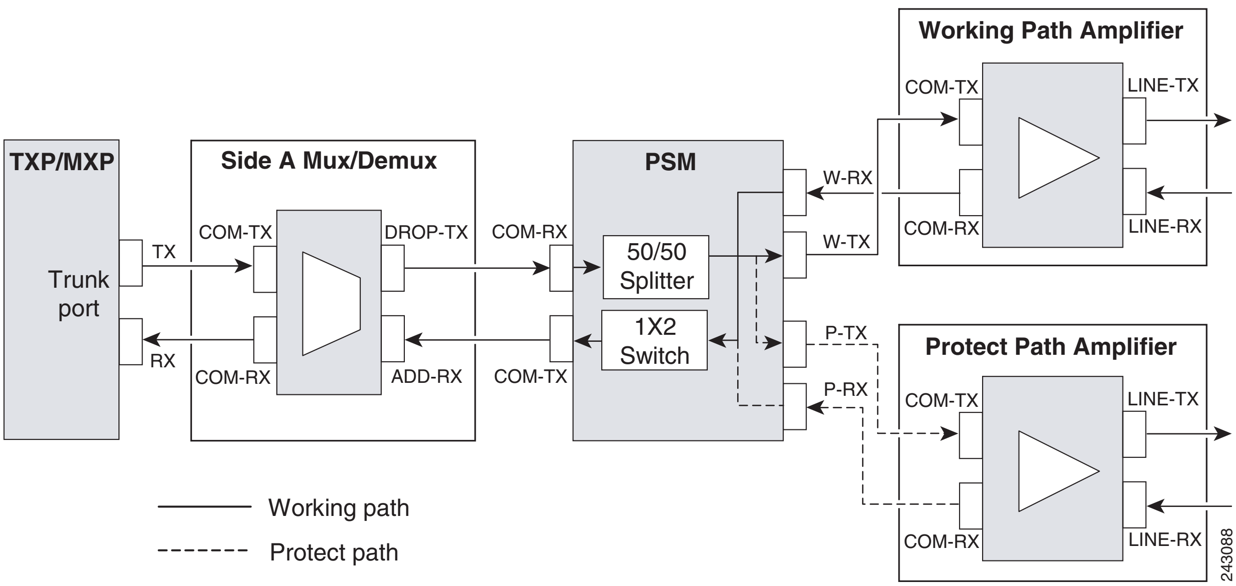
Note All traffic multiplexed or demultiplexed by the two add/drop stage cards is not protected.

12.3.2 Multiplex Section Protection

The PSM card performs multiplex section protection when connected between a multiplexer/demultiplexer card in a terminal site. The multiplexer/demultiplexer stage can be built using WSS and DMX or 40MUX and 40DMX cards. The terminal sites can be 50/100 Ghz band. The number of supported channels can therefore be 32/40 or 72/80.

Figure 12-48 shows the block diagram of a PSM card in multiplex section protection configuration.

Figure 12-48 PSM Multiplex Section Protection Configuration



In the transmit direction, the traffic originating from a TXP trunk port is multiplexed by the Side A multiplexer. The PSM card splits traffic on to the W-TX and P-TX ports, which are independently amplified by two separated booster amplifiers.

In the receive direction, the signal on the line ports is preamplified by two separate preamplifiers and the PSM card selects one of the two input signals on the W-RX and P-RX ports to be transmitted to the COM-RX port of the PSM card. The received signal is then demultiplexed to a TXP card.

The presence of a booster amplifier is not mandatory. However, if a DCN extension is used, the W-TX and P-TX ports of the PSM card can be connected directly to the line. The presence of a preamplifier is also not mandatory.

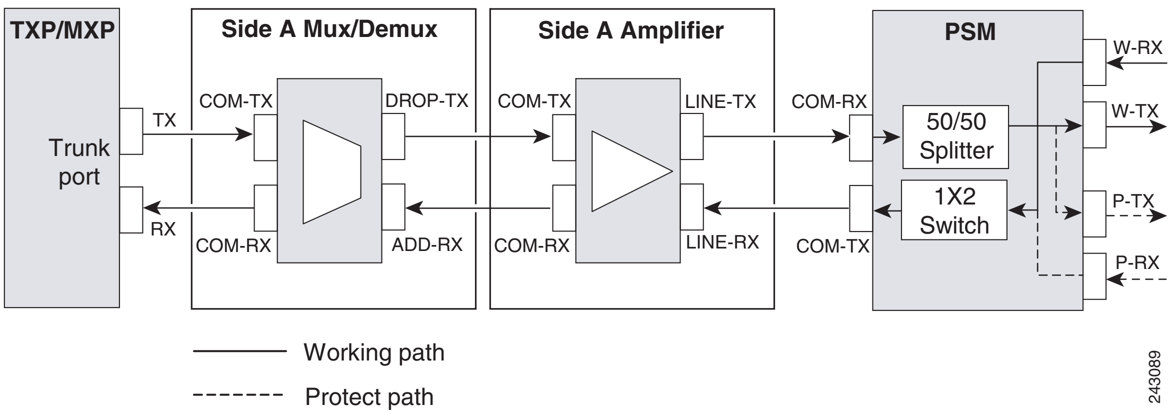
Note The PSM card cannot be used with Raman amplification in a line protection or section protection configuration.

12.3.3 Line Protection

In a line protection configuration, the working and protect ports of the PSM card are connected directly to the external line. This configuration is applicable to any MSTP node that is configured as a terminal site. The multiplexer/demultiplexer stage can be built using WSS and DMX, 40MUX and 40DMX, 40-SMR1-C and 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD, or 40-SMR2-C and 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD units. The terminal sites can be 50/100 Ghz band. The number of supported channels can therefore be 32/40 or 72/80.

Figure 12-49 shows the block diagram of a PSM card in line protection configuration.

Figure 12-49 PSM Line Protection Configuration



In the transmit direction, the traffic originating from a transponder trunk port is multiplexed by the Side A multiplexer and amplified by a booster amplifier. The Line-TX port of the amplifier is connected to the COM-RX port of the PSM card. The PSM card splits traffic received on the COM-RX port on to the W-TX and P-TX ports, which form the working and protect paths.

In the receive direction, the PSM card selects one of the two input signals on the W-RX and P-RX ports to be transmitted to the COM-RX port of the PSM card. The received signal is then preamplified and demultiplexed to the TXP card.

The presence of a booster amplifier is not mandatory. However, if a DCN extension is used, the COM-RX port of the PSM card is connected to the multiplex section. The presence of a preamplifier is also not mandatory; the COM-TX port of the PSM card can be connected to the demultiplexer.

Note The PSM card cannot be used with Raman amplification in a line protection or section protection configuration.

12.3.4 Standalone

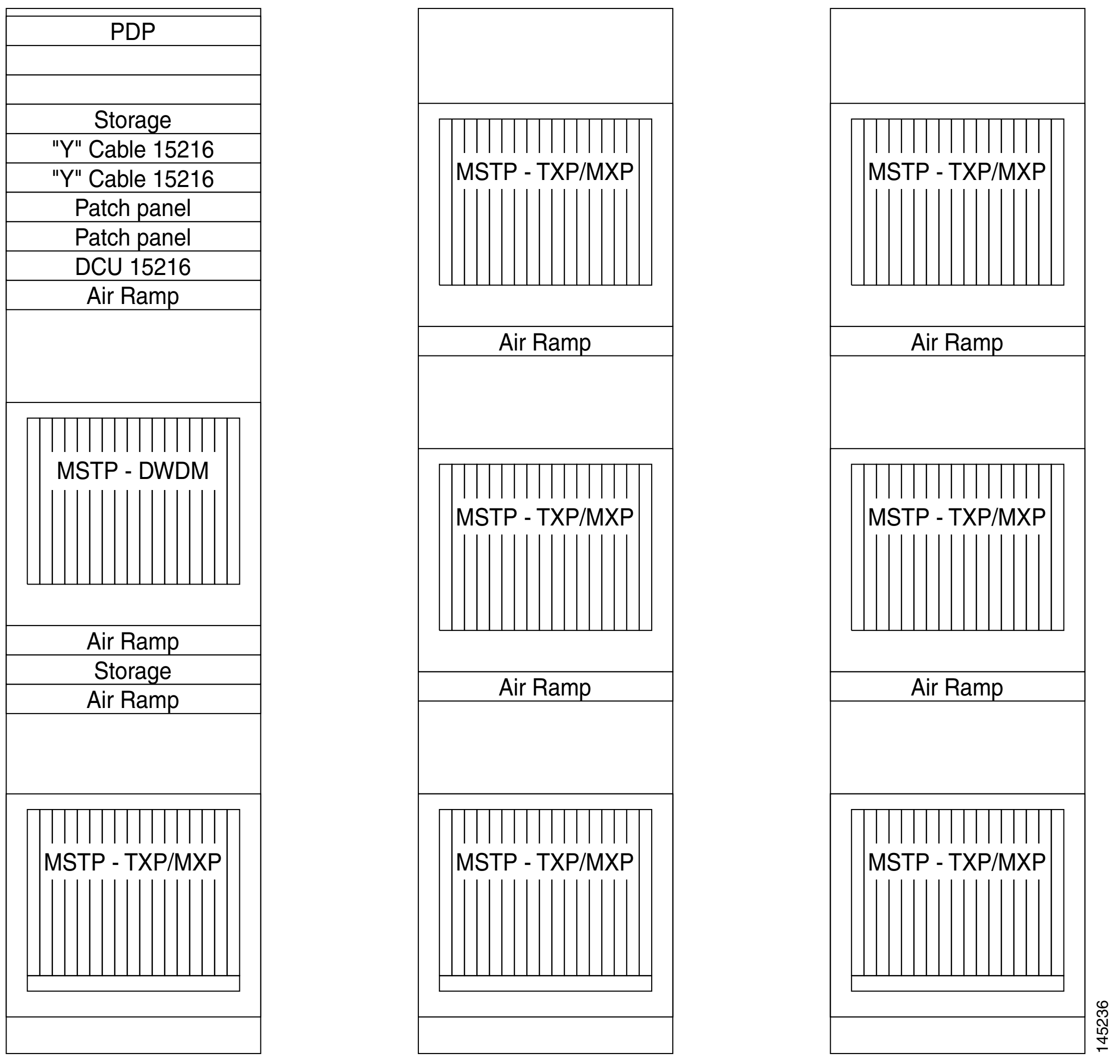
In a standalone configuration, the PSM card can be equipped in any slot and supports all node configurations. In this configuration, the PSM card provides only basic functionality, such as, protection against a fiber cut, optical safety, and automatic laser shutdown (ALS). It does not provide other functionalities such as, automatic power control (APC), automatic node setup (ANS), network and node alarm correlation, circuit management, and so on.

12.4 Multishelf Node

In a multishelf configuration, the ONS 15454-M6 node or the ONS 15454-DWDM node with TCC3 card as the node controller can manage up to 29 subtending shelves as a single entity. The subtending shelves can be 15454-M6 or 15454-DWDM.

The node controller is the main shelf with the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards running the multishelf functions. Each subtending shelf must be equipped with TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards, which run the shelf functions. For internal data exchange between the node controller shelf and subtending shelves, the node controller shelf must be equipped with redundant MS-ISC-100T cards or, as an alternative, the Catalyst 2950 switch. We recommend that you use the MS-ISC-100T cards. If using the Catalyst 2950, it is installed on one of the multishelf racks. All subtending shelves must be located in the same site at a maximum distance of 100 meters or 328 feet from the Ethernet switches used to support the communication LAN. Figure 12-50 shows an example of a multishelf node configuration.

Figure 12-50 Multishelf Node Configuration



A multishelf node has a single public IP address for all client interfaces (Cisco Transport Controller [CTC], Transaction Language One [TL1], Simple Network Management Protocol [SNMP], and HTTP); a client can only connect to the node controller shelf, not to the subtending shelves. The user interface and subtending shelves are connected to a patch panel using straight-through (CAT-5) LAN cables.

The node controller shelf has the following functions:

- IP packet routing and network topology discovery at the node controller level.
- Open Shortest Path First (OSPF) centralized on the node controller shelf.

The subtending shelves have the following functions:

- Overhead circuits are not routed within a multishelf node but are managed at the subtending controller shelf only. To use overhead bytes, the AIC-I must be installed on the subtending shelf where it is terminated.
- Each subtending shelf will act as a single shelf node that can be used as a timing source line, TCC/TCC2P/TCC3/TNC/TNCE/TSC/TSCE clock, or building integrated timing supply (BITS) source line.

12.4.1 Multishelf Node Layout

Multishelf configurations are configured by Cisco TransportPlanner and are automatically discovered by the CTC software. In a typical multishelf installation, all optical units are equipped on the node controller shelf and TXP/MXP cards are equipped in the aggregated subtended shelves. In addition, all empty slots in the node controller shelf can be equipped with TXP/MXP cards. In a DWDM mesh network, up to eight optical sides can be configured with client and optical cards installed in different shelves to support mesh and ring-protected signal output.

Note When a DWDM ring or network has to be managed through a Telcordia operations support system (OSS), every node in the network must be set up as multi-shelf. OLA sites and nodes with one shelf must be set up as "multi-shelf stand-alone" to avoid the use of LAN switches.

12.4.2 DCC/GCC/OSC Terminations

A multishelf node provides the same communication channels as a single-shelf node:

- OSC links terminate on OSCM/OSC-CSM cards. Two links are required between each ONS 15454 node. An OSC link between two nodes cannot be substituted by an equivalent generic communications channel/data communications channel (GCC/DCC) link terminated on the same pair of nodes. OSC links are mandatory and they can be used to connect a node to a gateway network element (GNE).
- GCC/DCC links terminate on TXP/MXP cards.

The maximum number of DCC/GCC/OSC terminations that are supported in a multishelf node is 48.

Note Optical Service Channel can be created on the OC3 port of the TNC and TNCE cards.

12.5 Connecting Passive Modules to a ONS 15454 M2 or ONS 15454 M6 Node

The non-volatile flash memory of the passive optical modules store inventory and insertion loss (IL) data of the optical paths. The stored data can be retrieved through the USB port of the passive optical module by connecting it to the transport node controller card (TNC) of the Cisco ONS 15454 M2 or Cisco ONS 15454 M6 shelf assembly.

You can connect the following passive modules to an USB port of the Cisco ONS 15454 M2 or Cisco ONS 15454 M6 node:

- 15216-FLD-4
- 15216-MD-40-EVEN
- 15216-EF-40-EVEN
- 15216-MD-48-EVEN
- 15216-MD-40-ODD
- 15216-EF-40-ODD
- 15216-MD-48-ODD
- 15216-MD-ID-50
- 15216-MD-48-CM

For the related procedure, see NTP-G319 Connect a Passive Module to the Cisco ONS 15454 M2 or Cisco ONS 15454 M6 Node, page 12-122.

12.6 Optical Sides

From a topological point of view, all DWDM units equipped in an MSTP node belongs to a side. A side can be identified by a letter (A, B, C, D, E, F, G, or H), or by the ports (called as side line ports, see 12.6.2 Side Line Ports, page 12-56) that are physically connected to the spans. An MSTP node can be connected to a maximum of 8 different spans. Each side identifies one of the spans the MSTP node is connected to.

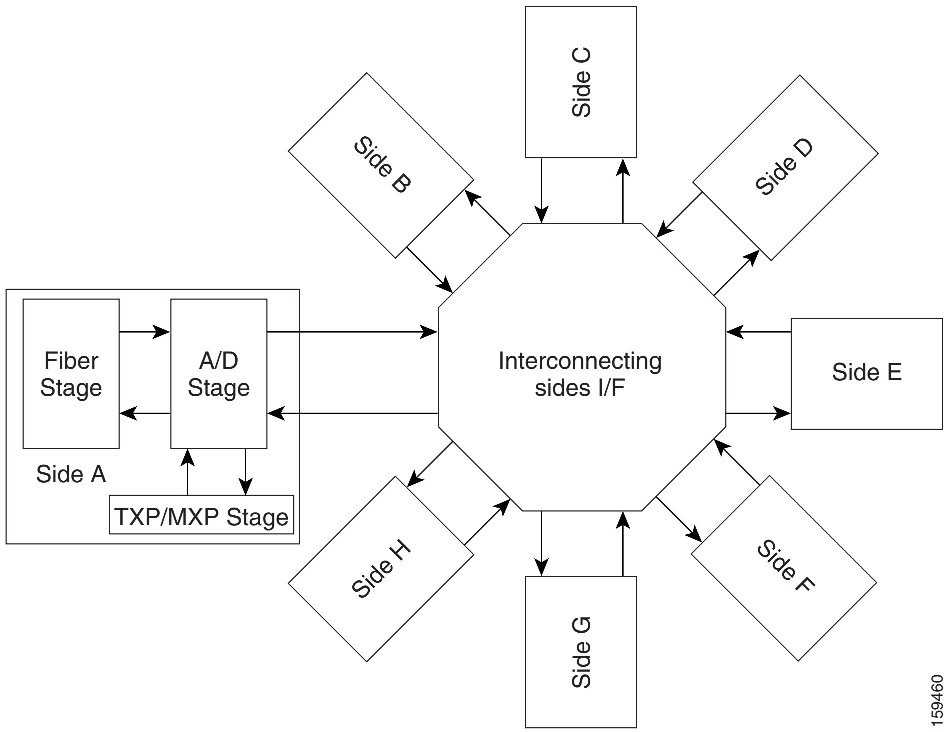
Note Side A and Side B replace "west" and "east" when referring to the two sides of the ONS 15454 shelf. Side A refers to Slots 1 through 6 (formerly "west"), and Side B refers to Slots 12 through 17 (formerly "east"). The line direction port parameter, East-to-West and West-to-East, has been removed.

Sides are viewed and managed from the Provisioning > WDM-ANS > Optical Sides tab in CTC.

12.6.1 Optical Side Stages

All MSTP nodes can be modelled according to Figure 12-51.

Figure 12-51 Interconnecting Sides Conceptual View



According to Figure 12-51, each MSTP node side includes DWDM units that can be conceptually divided into three stages.

- Fiber stage—The set of DWDM cards with ports that directly or indirectly face the span.
- A/D stage—The add/drop stage.
- TXP/MXP stage—The virtual grouping of all TXP or MXP cards with signals multiplexed or demultiplexed to and from the physical fiber stage.

12.6.1.1 Fiber Stage

The fiber stage includes DWDM cards that are used to amplify transmitted or received signals and cards that are used to add optical supervision channels. The fiber stage cards are:

- Booster amplifier cards that directly connect to the span, such as:
  - OPT-BST
  - OPT-BST-E
  - OPT-BST-L
  - OPT-AMP-C, when provisioned in OPT-LINE (booster amplifier) mode
  - OPT-AMP-L, when provisioned in OPT-LINE (booster amplifier) mode
  - OPT-AMP-17-C, when provisioned in OPT-LINE (booster amplifier) mode
- Preamplifier cards, such as:
  - OPT-PRE
  - OPT-AMP-C, when provisioned in OPT-PRE (preamplifier) mode

- OPT-AMP-L, when provisioned in OPT-PRE (preamplifier) mode
- OPT-AMP-17-C, when provisioned in OPT-PRE (preamplifier) mode

- OSC cards, such as:
  - OSCM
  - OSC-CSM
- OPT-RAMP-C card

Table 12-1 shows the commonly deployed fiber stage layouts supported by DWDM mesh nodes. In the table, OPT-BST includes the OPT-BST, OPT-BST-E, and OPT-BST-L cards. OPT-AMP includes the OPT-AMP-L and OPT-AMP-17-C cards configured in either OPT-PRE or OPT-LINE mode.

Note In the table, L and C suffix is not reported because C-band and L-band amplifiers cannot be mixed in the same layout.

Table 12-1 Supported Fiber Stage Configurations

Layout	Cards	Configurations
A	OPT-BST <-> OPT-PRE/OPT-AMP (OPT-PRE mode)	• OPT-BST OSC ports connected to OSCM OSC ports or OSC-CSM LINE ports • OPT-BST LINE ports connected to the span • OPT-BST COM-TX ports connected to OPT-AMP (OPT-PRE mode) or OPT-PRE COM-RX ports • OPT-AMP (OPT-PRE mode) or OPT-PRE LINE-TX or COM-TX ports connected to the next stage (for example, a 40-WSS-C/40-WSS-CE COM-RX port in a ROADM node) • OPT-BST COM-RX ports connected to the next stage (for example, a 40-WSS-C/40-WSS-CE COM-TX port in a ROADM node)
B	OPT-AMP (OPT-BST mode) <-> OPT-PRE/OPT-AMP (OPT-PRE mode)	• OPT-AMP (BST) OSC ports connected to OSCM OSC ports or OSC-CSM LINE ports • OPT-AMP (BST) LINE ports connected to the span • OPT-AMP (BST) COM-TX ports connected to OPT-AMP (PRE)/OPT-PRE COM-RX ports • OPT-AMP (PRE)/OPT-PRE LINE-TX/COM-TX port connected to the next stage (for example, a 40-WSS-C/40-WSS-CE COM-RX port in a ROADM node) • OPT-AMP (BST) COM-RX port connected to the next stage (for example, a 40-WSS-C/40-WSS-CE COM-TX port in a ROADM node)

Table 12-1 Supported Fiber Stage Configurations (continued)

Layout	Cards	Configurations
C	OSC-CSM <-> OPT-PRE/OPT-AMP(OPT-PRE mode)	• OSC-CSM LINE ports connected to the span • OSC-CSM COM-TX ports connected to OPT-AMP COM-RX ports • OPT-AMP(PRE)/OPT-PRE LINE-TX/COM-TX port connected to the next stage (for example, 40-WSS-C/40-WSS-CE COM-RX ports in ROADM) • OSC-CSM COM-RX port connected to the next stage (for example, a 40-WSS-C/40-WSS-CE COM-TX port in a ROADM node)
D	OPT-BST	• OPT-BST OSC ports connected to OSCM OSC ports or OSC-CSM LINE ports • OPT-BST LINE ports connected to the span • OPT-BST COM ports connected to the next stage (for example, a 40-WSS-C/40-WSS-CE COM port in a ROADM node)
E	OPT-AMP (OPT-BST mode)	• OPT-AMP OSC ports connected to OSCM OSC ports or OSC-CSM LINE ports • OPT-AMP LINE ports connected to the span • OPT-AMP COM ports connected to the next stage (for example, a 40-WSS-C/40-WSS-CE COM port in a ROADM node)
F	OSC-CSM	• OSC-CSM LINE ports connected to the span • OSC-CSM COM ports connected to the next stage (for example, a 40-WSS-C/40-WSS-CE COM port in a ROADM node)

12.6.1.2 A/D Stage

The A/D stage includes DWDM cards that can add and drop traffic. The A/D stage is divided into three node types:

- Mesh nodes—ONS 15454 nodes configured in multishelf mode can connect to eight different sides. For more detail on mesh node, see 12.7 Configuring Mesh DWDM Networks, page 12-61.
- Legacy—Half of a ROADM node or an OADM node with cascaded AD-xB-xx-x or AD-xC-xx.x cards
- Non-A/D—A line node or a side that does not have A/D capability is included in the A/D stage

Stages are built by active cards and patchcords. However, the interconnecting sides are completed by the mesh patch panels (four-degree patch panel or eight-degree patch panel) in mesh nodes, or by patchcords connected to EXP-RX/EXP-TX ports in legacy nodes.

12.6.2 Side Line Ports

Side line ports are ports that are physically connected to the spans. Side line ports can be:

- All ports terminating the fiber stage and physically labeled as LINE, such as ports on the following cards:
  - Booster amplifier (OPT-BST, OPT-BST-E, or OPT-BST-L cards, and the OPT-AMP-C, OPT-AMP-L, or OPT-AMP-17-C cards when provisioned in OPT-LINE mode)
  - OSC-CSM
  - OPT-RAMP-C
- All ports that can be physically connected to the external span using DCN terminations, such as:
  - Booster amplifier LINE-RX and LINE-TX ports
  - OSC-CSM LINE-RX and LINE-TX ports
  - 40-WXC-C COM-RX and COM-TX ports
  - MMU EXP-A-RX and EXP-A-TX ports
- All ports that can be physically connected to the external span using DCN terminations in a line node, such as:
  - Preamplifier (OPT-PRE card and the OPT-AMP-C, OPT-AMP-L, or OPT-AMP-17-C cards when provisioned in OPT-PRE mode) COM-RX and COM-TX ports
  - Booster amplifier COM-TX port
  - OSC-CSM COM-TX port
- All ports that can be physically connected to the external span using DCN terminations in a 40-channel MUX/DMX terminal node, such as:
  - 40-MUX-C COM-TX port
  - 40-DMX-C COM-RX port
- All ports that can be physically connected to the external span when PSM cards implement line protection:
  - PSM W-TX and W-RX ports
  - PSM P-TX and P-RX ports

Note PSM card will support two sides A(w) and A(p).

12.6.3 Optical Side Configurations

You can use the following Side IDs depending on the type of node layout:

- In legacy nodes (that is, a node with no provisioned or installed 40-WXC-C cards), the permissible Side IDs are only A and B.
- In four-degree mesh nodes with four or less 40-WXC-C cards installed, the permissible Side IDs are A, B, C, and D.
- In eight-degree mesh nodes with eight or less 40-WXC-C cards installed, the allowed Side IDs are A, B, C, D, E, F, G, and H.

The system automatically assigns Side IDs when you import the CTP XML configuration file into CTC. You can create a side manually using CTC or TL1 if the following conditions are met:

- You use a permissible side identifier, A through H.
- The shelf contains a TX and an RX side line port (see the "12.6.2 Side Line Ports" section on page 12-56).
- The side line ports are not connected to an internal patchcord.

Note We do not recommend that you manually create or modify ONS 15454 optical sides.

The following tables show examples of how the system automatically assigns Side IDs for common DWDM layouts.

Table 12-2 shows a standard ROADM shelf with Sides A and B provisioned. The shelf is connected to seven shelves containing TXP, MXP, ADM-10G, GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

Table 12-2 Multishelf ROADM Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WSS+DMX	A	WSS+DMX	B
2	TXP/MXP	—	TXP/MXP	—
3	TXP/MXP	—	TXP/MXP	—
4	TXP/MXP	—	TXP/MXP	—
5	TXP/MXP	—	TXP/MXP	—
6	TXP/MXP	—	TXP/MXP	—
7	TXP/MXP	—	TXP/MXP	—
8	TXP/MXP	—	TXP/MXP	—

Table 12-3 shows a protected ROADM shelf. In this example, Side A and B are Slots 1 through 6 in Shelves 1 and 2. 40-WSS-C/40-WSS-CE/40-DMX-C or 40-WSS-CE/40-DMX-CE cards are installed in Sides A and B. Slots 12 through 17 in Shelves 1 and 2 contain TXP, MXP, ADM-10G, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.

Table 12-3 Multishelf Protected ROADM Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WSS+DMX	A	TXP/MXP	—
2	WSS+DMX	B	TXP/MXP	—
3	TXP/MXP	n/a	TXP/MXP	—
4	TXP/MXP	n/a	TXP/MXP	—
5	TXP/MXP	n/a	TXP/MXP	—
6	TXP/MXP	n/a	TXP/MXP	—
7	TXP/MXP	n/a	TXP/MXP	—
8	TXP/MXP	n/a	TXP/MXP	—

Table 12-4 shows a four-degree mesh node. Side A is Shelf 1, Slots 1 through 6. Side B and C are Shelf 2, Slots 1 through 6 and 12 through 17, and Side D is Shelf 3, Slots 1 through 6. 40-WXC-C cards in line termination mode are installed in Sides A through D.

Table 12-4 Multishelf Four-Degree Mesh Node Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WXC Line Termination	A	TXP/MXP	—
2	WXC Line Termination	B	WXC Line Termination	C
3	WXC Line Termination	D	TXP/MXP	—
4	TXP/MXP	n/a	TXP/MXP	—
5	TXP/MXP	n/a	TXP/MXP	—
6	TXP/MXP	n/a	TXP/MXP	—
7	TXP/MXP	n/a	TXP/MXP	—
8	TXP/MXP	n/a	TXP/MXP	—

Table 12-5 shows a protected four-degree mesh node example. In the example, Sides A through D are assigned to Slots 1 through 6 in Shelves 1 through 4.

Table 12-5 Multishelf Four-Degree Protected Mesh Node Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WXC Line Termination	A	TXP/MXP	—
2	WXC Line Termination	B	TXP/MXP	—
3	WXC Line Termination	C	TXP/MXP	—
4	WXC Line Termination	D	TXP/MXP	—
5	TXP/MXP	—	TXP/MXP	—
6	TXP/MXP	—	TXP/MXP	—
7	TXP/MXP	—	TXP/MXP	—
8	TXP/MXP	—	TXP/MXP	—

Table 12-6 shows a protected four-degree mesh node example. In the example, Sides A through D are assigned to Slots 1 through 4 in Shelves 1 through 4, and TXP, MXP, ADM-10G, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards are installed in Shelves 1 through 4, Slots 12-17, and Shelves 5 through 8, Slots 1 through 6 and 12 through 17.

Table 12-6 Multishelf Four-Degree Protected Mesh Node Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WXC Line Termination	A	TXP/MXP	—
2	WXC Line Termination	B	TXP/MXP	—
3	WXC Line Termination	C	TXP/MXP	—
4	WXC Line Termination	D	TXP/MXP	—
5	TXP/MXP	—	TXP/MXP	—
6	TXP/MXP	—	TXP/MXP	—
7	TXP/MXP	—	TXP/MXP	—
8	TXP/MXP	—	TXP/MXP	—

Table 12-7 shows a four-degree mesh node provisioned as an upgrade. In the example, Sides A through D are assigned to Slots 1 through 4. and 12 through 17 in Shelves 1and 2. 40-WXC-C cards in XC termination mode are installed in Sides A and B, and 40-WXC-C cards in line termination mode are installed in Sides C and D.

Table 12-7 Multishelf Four-Degree Mesh Node Upgrade Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WXC XC Termination	A	WXC XC Termination	B
2	WXC Line Termination	C	WXC Line Termination	D
3	TXP/MXP	—	TXP/MXP	—
4	TXP/MXP	—	TXP/MXP	—
5	TXP/MXP	—	TXP/MXP	—
6	TXP/MXP	—	TXP/MXP	—
7	TXP/MXP	—	TXP/MXP	—
8	TXP/MXP	—	TXP/MXP	—

Table 12-8 shows an eight-degree mesh node. In the example, Sides A through H are assigned to Slots 1 through 6 in Shelf 1, Slots 1 through 6 and 12 through 17 in Shelves 2 through 4, and Slots 1 through 6 in Shelf 5. 40-WXC-C cards in line termination mode are installed in Sides A through H.

Table 12-8 Multishelf Eight-Degree Mesh Node Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WXC Line Termination	A	TXP/MXP	—
2	WXC Line Termination	B	WXC Line Termination	C
3	WXC Line Termination	D	WXC Line Termination	E
4	WXC Line Termination	F	WXC Line Termination	G
5	WXC Line Termination	H	TXP/MXP	—
6	TXP/MXP	—	TXP/MXP	—
7	TXP/MXP	—	TXP/MXP	—
8	TXP/MXP	—	TXP/MXP	—

Table 12-9 shows another eight-degree mesh node. In the example, Sides A through H are assigned to Slots 1 through 6 in all shelves (Shelves 1 through 8). 40-WXC-C cards in line termination mode are installed in Sides A through H.

Table 12-9 Multishelf Four-Degree Mesh Node Upgrade Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WXC Line Termination	A	TXP/MXP	—
2	WXC Line Termination	B	TXP/MXP	—
3	WXC Line Termination	C	TXP/MXP	—
4	WXC Line Termination	D	TXP/MXP	—
5	WXC Line Termination	E	TXP/MXP	—
6	WXC Line Termination	F	TXP/MXP	—
7	WXC Line Termination	G	TXP/MXP	—
8	WXC Line Termination	H	TXP/MXP	—

Table 12-10 shows a four-degree mesh node with a user-defined side. Because the software assigns sides consecutively, and because the mesh node is four-degrees, the side assigned to Shelf 5, Slots 1 through 6 is “Unknown.”

Table 12-10 Multishelf Four-Degree Mesh Node User-Defined Layout Example

Shelf	Slots 1–6	Side	Slots 12–17	Side
1	WXC Line Termination	A	TXP/MXP	—
2	TXP/MXP	—	WXC Line Termination	C[1]
3	WXC Line Termination	D	TXP/MXP	—
4	TXP/MXP	—	TXP/MXP	—
5	WXC Line Termination	U[2]	TXP/MXP	—
6	TXP/MXP	—	TXP/MXP	—
7	TXP/MXP	—	TXP/MXP	—
8	TXP/MXP	—	TXP/MXP	—

1. User-defined
2. Unknown

12.7 Configuring Mesh DWDM Networks

ONS 15454 shelves can be configured in mesh DWDM networks using the 40-WXC-C or 80-WXC-C wavelength cross-connect cards and four-degree patch panel or eight-degree patch panels. Mesh DWDM networks can also be configured using the 40-SMR2-C cards and the four-degree patch panel.

ONS 15454 DWDM mesh configurations can be up to four degrees (four optical directions) when the four-degree patch panel is installed, and up to eight degrees (eight optical directions) when the eight-degree patch panel is installed. Two mesh node types are available, the line termination mesh node and the cross-connect (XC) termination mesh node.

Note Mesh nodes using the 40-WXC-C or 80-WXC-C card requires multishelf management.

12.7.1 Line Termination Mesh Node Using 40-WXC-C Cards

The line termination mesh node is installed in mesh networks. Line termination mesh nodes can support between one and eight line terminations. Each line direction requires the following cards: 40-WXC-C, 40-MUX-C, 40-DMX-C or 40-DMX-CE, a preamplifier and a booster. Within this configuration, the following substitutions can be used:

- The 40-MUX-C cards can be replaced with 40-WSS-C/40-WSS-CE cards.
- The OPT-BST cards can be replaced with OPT-AMP-17-C (in OPT-BST mode) and/or OPT-BST-E cards.
- The OPT-PRE can be replaced with an OPT-AMP-17-C (in OPT-LINE mode) card.

Each side of the line termination mesh node is connected as follows:

- The 40-WXC-C COM-RX port is connected to the preamplifier output port.

- The 40-WXC-C COM-TX port is connected to the booster amplifier COM-RX port.
- The 40-WXC-C DROP TX port is connected to the 40-DMX-C or 40-DMX-CE COM-RX port.
- The 40-WXC-C ADD-RX port is connected to the 40-MUX-C COM-TX port.
- The 40-WXC-C EXP-TX port is connected to the mesh patch panel.
- The 40-WXC-C EXP-RX port is connected to the mesh patch panel.

Figure 12-52 shows one shelf from a line termination node.

Figure 12-52 Line Termination Mesh Node Shelf

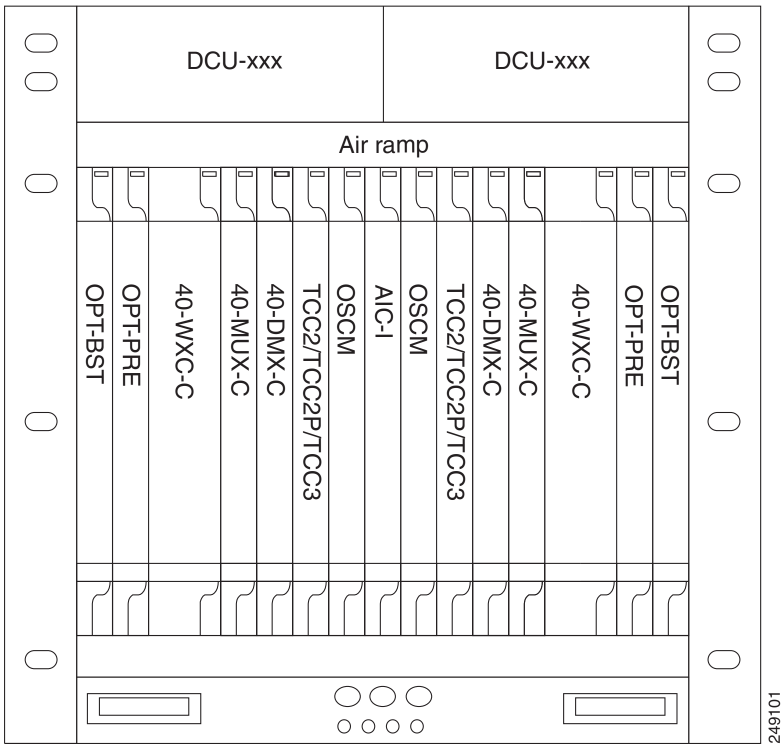


Figure 12-53 shows a functional block diagram of one line termination side using 40-WXC-C and 40-MUX-C cards.

Figure 12-53 Line Termination Mesh Node Side—40-MUX-C Cards

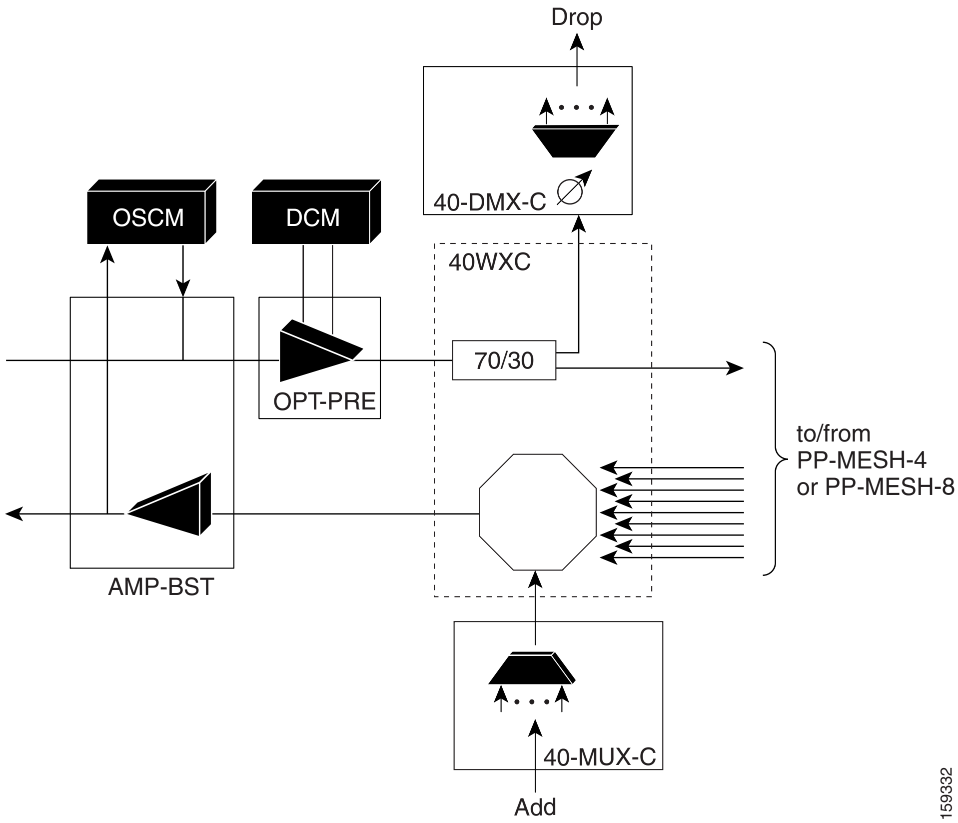


Figure 12-54 shows a functional block diagram line termination side using 40-WXC-C and 40-WSS-C cards.

Figure 12-54 Line Termination Mesh Node Side—40-WSS-C Cards

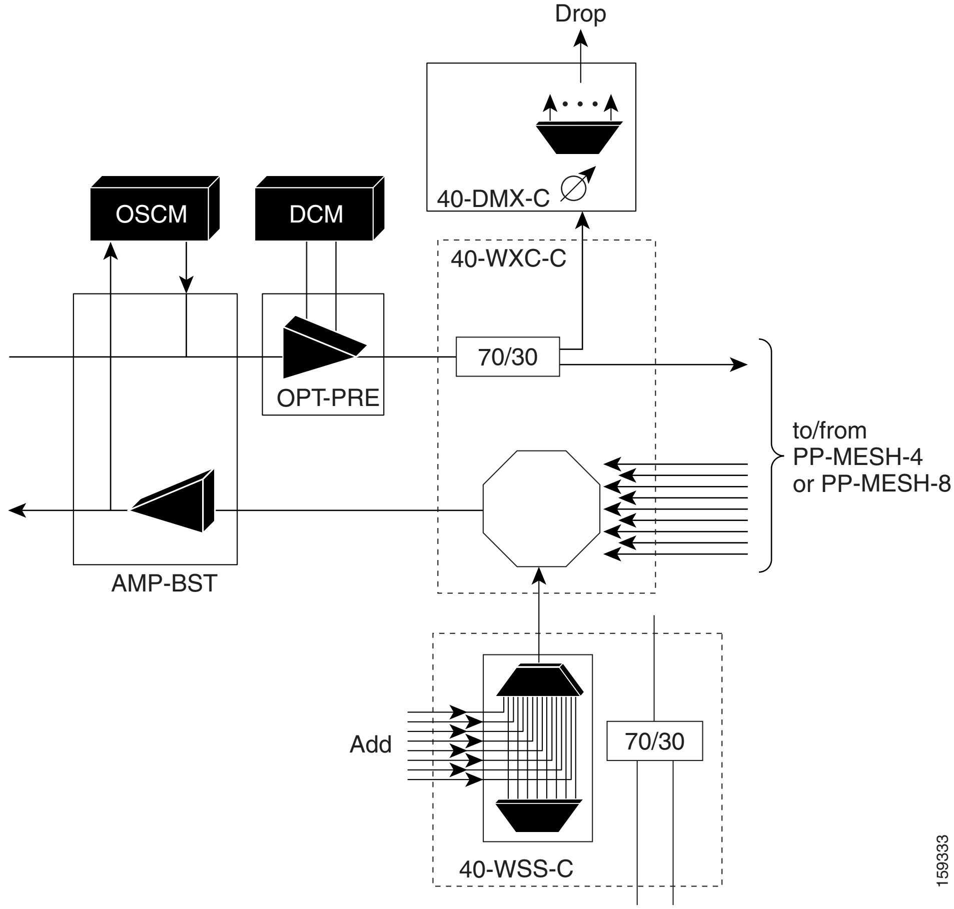
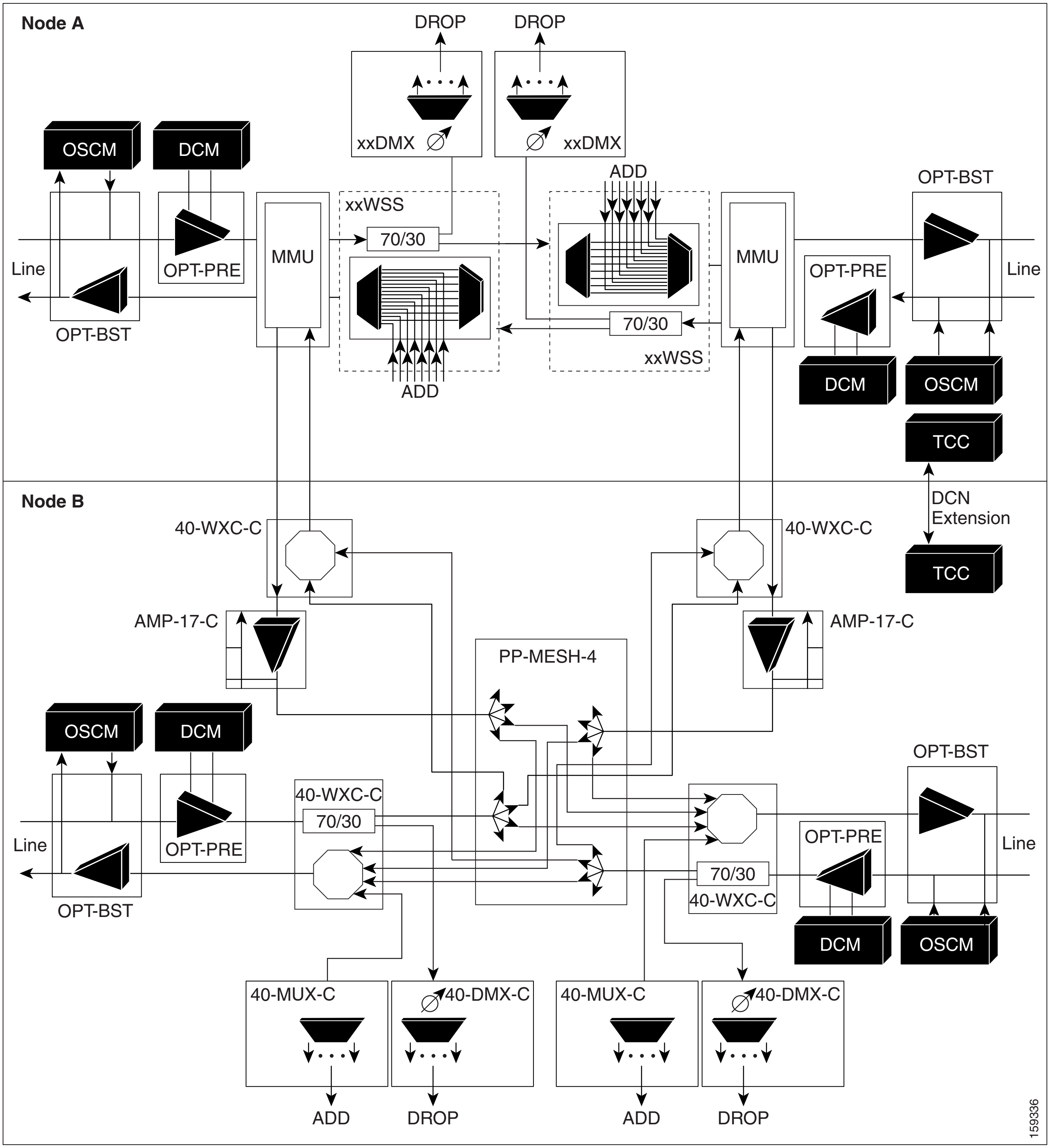


Figure 12-55 shows a functional block diagram of a node that interconnects a ROADM with MMU cards with two native line termination mesh sides.

Figure 12-55 Line Termination Mesh Nodes—ROADM With MMU Cards

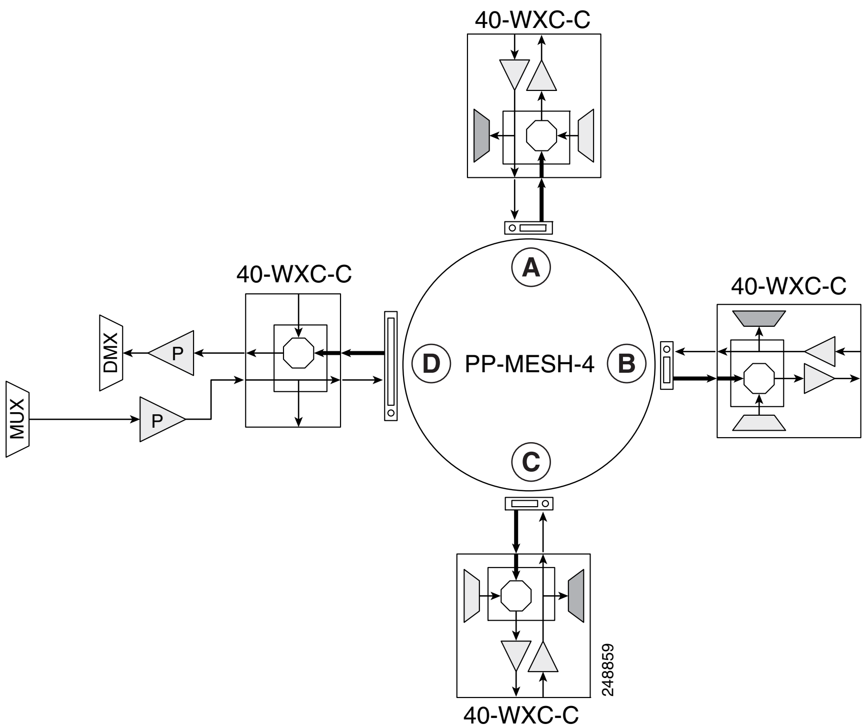


12.7.1.1 40-Channel Omni-directional n-degree ROADM Node

Any side in the line termination mesh node can be configured as an omni-directional side. The side that is configured as the omni-directional side is connected to a local multiplexer and demultiplexer that can add or drop traffic to or from any of the node directions.

In Figure 12-56 side D is configured as the omni-directional side. Wavelengths from the local multiplexer on side D is routed to sides A, B, or C by the patch panel. Wavelengths from sides A, B, or C can be dropped on side D. The maximum number of omni-directional channels is 40.

Figure 12-56 40-Channel Omni-directional Four-Degree ROADM Node

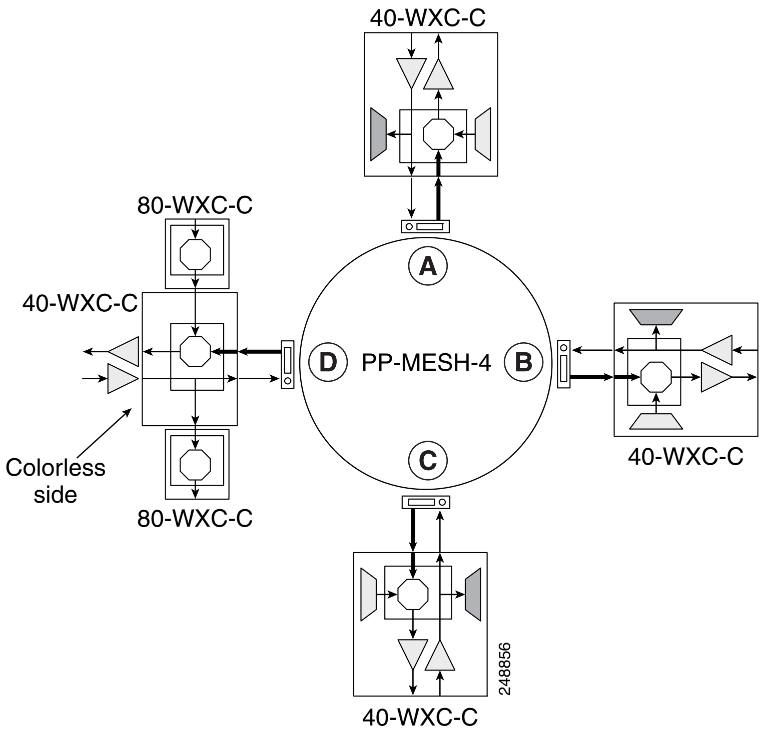


12.7.1.2 40-Channel Colorless n-Degree ROADM Node

Any side in the line termination mesh node can be configured as a colorless side where any wavelength can be added or dropped. The side that is configured as the colorless side is connected to two 80-WXC-C cards configured as a multiplexer and demultiplexer respectively. In Figure 12-57 side D is configured as the colorless side. The 80-WXC-C cards are connected to the add and drop ports of the 40-WXC-C cards and function as a colorless multiplexer and demultiplexer.

A combination of wavelengths from any of the nine ports is sent to the common output port of the 80-WXC-C card (multiplexer) that is connected to the 40-WXC-C card. The wavelengths entering the 40-WXC-C card are sent to the common input port of the 80-WXC-C card (demultiplexer) and dropped at any of the nine output ports.

Figure 12-57 40-Channel Colorless Four-Degree ROADM Node

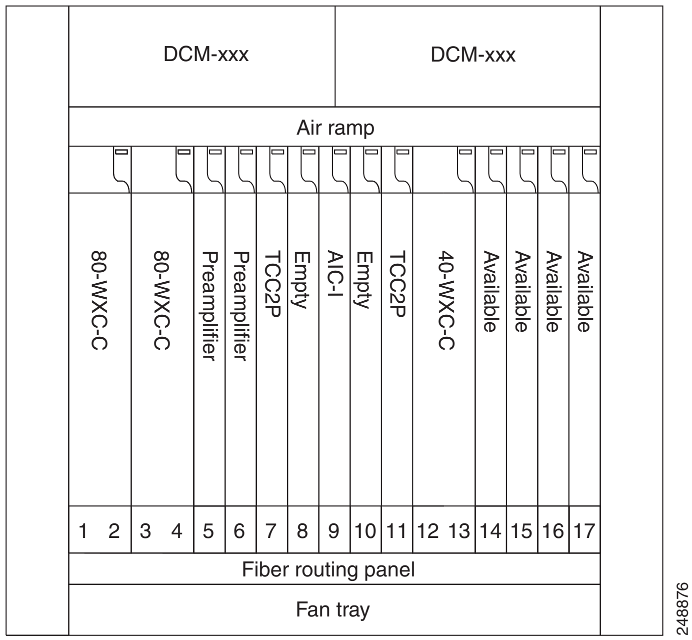


12.7.1.3 40-Channel Colorless and Omni-directional n-Degree ROADM Node

Any side in the line termination mesh node can be configured as a colorless and omni-directional side. The side that is configured as the colorless and omni-directional side is connected to a multiplexer (80-WXC-C) and demultiplexer (80-WXC-C) that can add or drop traffic to or from any of the node directions.

Figure 12-58 shows the layout of a 40-channel n-degree ROADM node with colorless and omni-directional side.

Figure 12-58 40-Channel n-Degree ROADM Node with Colorless and Omni-directional Side

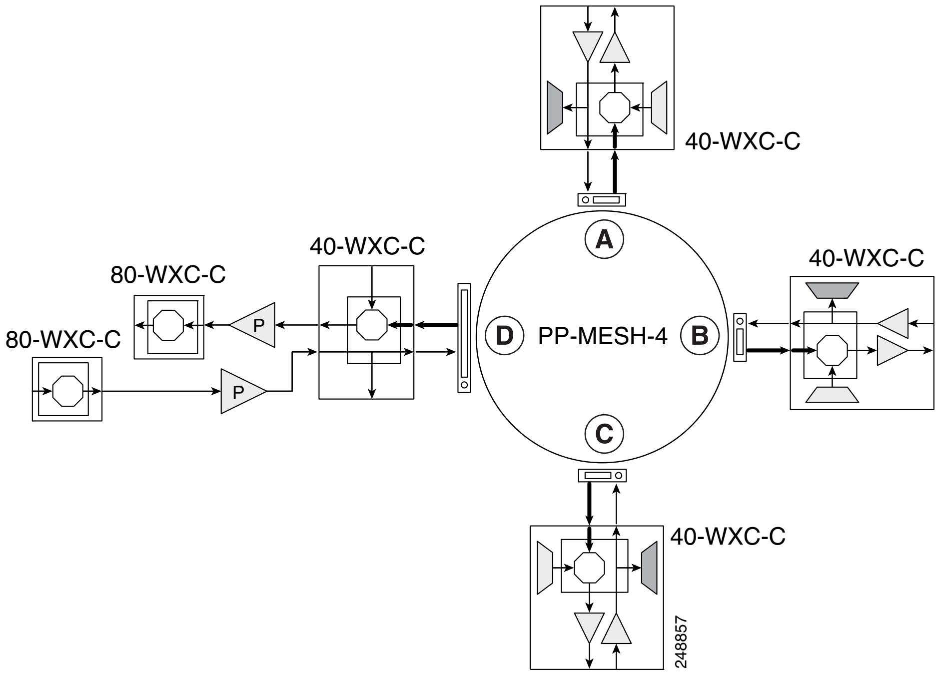


In Figure 12-59 side D is configured as the colorless and omni-directional side.

A combination of wavelengths from any of the nine ports is sent to the common output port of the 80-WXC-C card (multiplexer) and then routed to the preamplifier. The preamplifier sends the wavelengths to the 40-WXC-C card that is connected to the patch panel. The patch panel routes the wavelengths to sides A, B, or C.

Wavelengths from sides A, B, or C are dropped on side D. The incoming wavelengths from the 40-WXC-C card are sent to the preamplifier. The preamplifier amplifies the signal and sends it to the common input port of the 80-WXC-C card (demultiplexer). The wavelengths are then dropped at any of the nine output ports.

Figure 12-59 40-Channel Colorless and Omni-directional Four-Degree ROADM Node



12.7.2 Line Termination Mesh Node Using 80-WXC-C Cards

Line termination mesh nodes using 80- WXC-C cards can support between one and eight line terminations. Each line direction requires the following units: 80-WXC-C, 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD, and 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN, 15216-MD-ID-50 or 15216-MD-48-CM, a preamplifier, and a booster.

- The OPT-BST cards can be replaced with OPT-AMP-17-C (in OPT-BST mode) or OPT-BST-E cards.
- The OPT-PRE can be replaced with an OPT-AMP-17-C (in OPT-LINE mode) card.

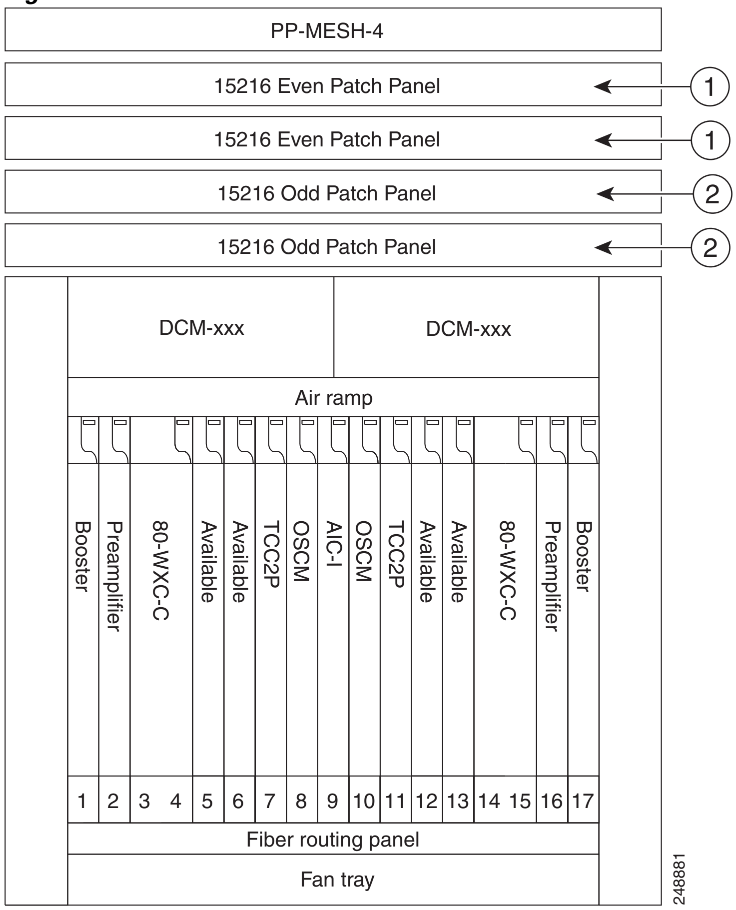
Each side of the line termination mesh node is connected as follows:

- The 80-WXC-C COM-RX port is connected to the preamplifier output port.
- The 80-WXC-C COM port is connected to the booster amplifier COM-RX port.
- The 80-WXC-C DROP TX port is connected to the COM-RX (ODD+EVEN-RX) port of 15216-MD-ID-50 or 15216-MD-48-CM. The ODD-TX port of the 15216-MD-ID-50 or 15216-MD-48-CM is connected to the COM-RX port of 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD; and the EVEN-TX port of the 15216-MD-ID-50 or 15216-MD-48-CM is connected to the COM-RX port of 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN.
- The 80-WXC-C AD port is connected to the COM-TX (ODD+EVEN-TX) port of 15216-MD-ID-50 or 15216-MD-48-CM. The ODD-RX port of the 15216-MD-ID-50 or 15216-MD-48-CM is connected to the COM-TX port of 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD; and the EVEN-RX port of the 15216-MD-ID-50 or 15216-MD-48-CM is connected to the COM-TX port of 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN.

- The 80-WXC-C EXP-TX port is connected to the mesh patch panel.

Figure 12-60 shows the layout for a line termination node.

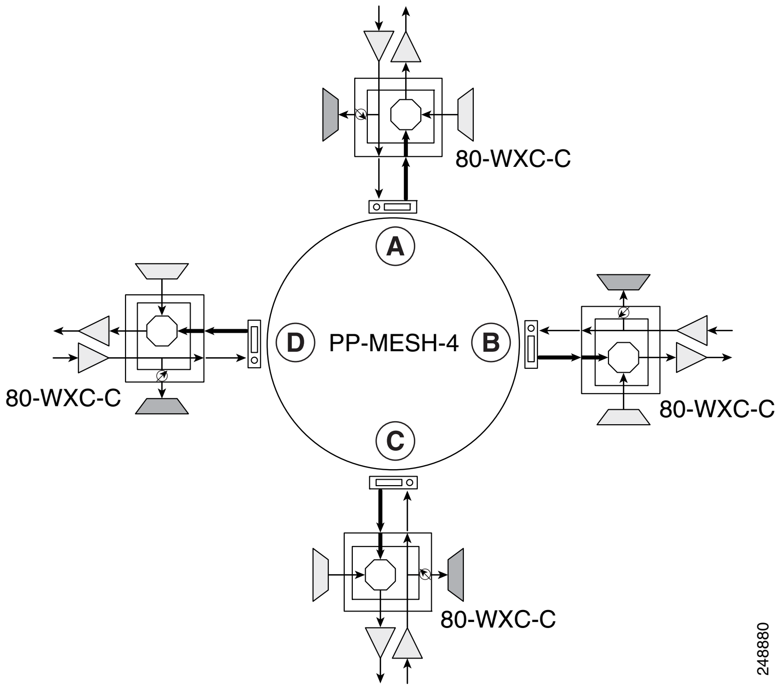
Figure 12-60 Line Termination Node



1	**15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel**
2	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-61 shows the functional block diagram of a four-degree line termination mesh node using 80-WXC-C, 15216-MD-40-ODD, 15216-EF-40-ODD, 15216-MD-48-ODD, 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN and a PP MESH-4. All the 80-WXC-C cards are in bidirectional mode. Wavelengths entering from side(i) can be routed to any of the other n-1 sides where n is defined by the PP MESH type.

Figure 12-61 Four-Degree Line Termination Mesh Node Functional Diagram

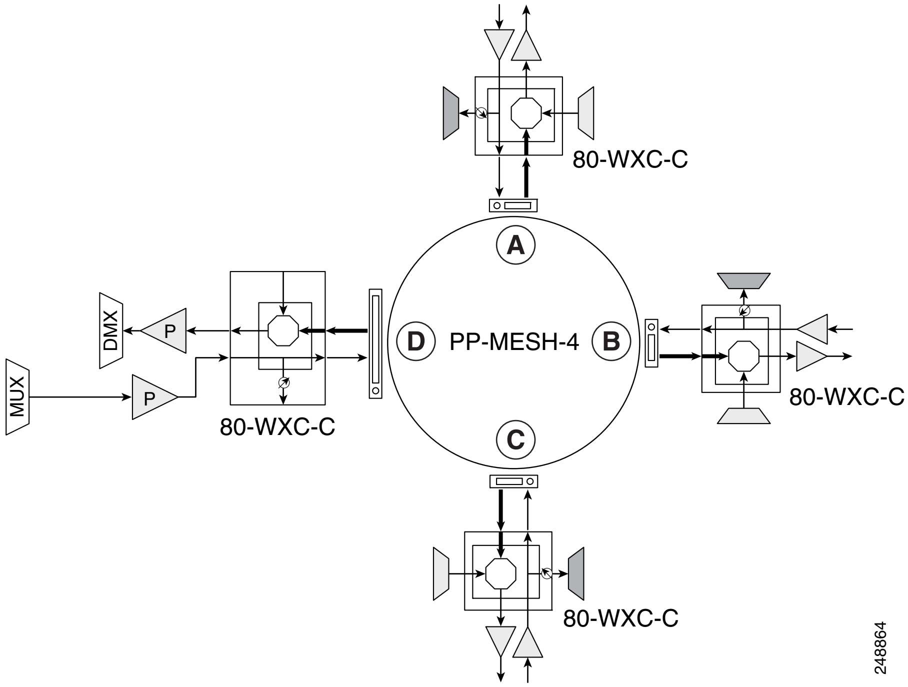


12.7.2.1 80-Channel Omni-directional n-degree ROADM Node

Any side in the line termination mesh node can be configured as a omni-directional side. The side that is configured as the omni-directional side is connected to a local multiplexer and demultiplexer that can add or drop traffic to or from any of the node directions.

In Figure 12-62, side D is configured as the omni-directional side. Wavelengths from the local multiplexer on side D are routed to sides A, B, or C by the patch panel. Wavelengths from sides A, B, or C are dropped on side D.

Figure 12-62 80-Channel Omni-directional Four-Degree ROADM Node

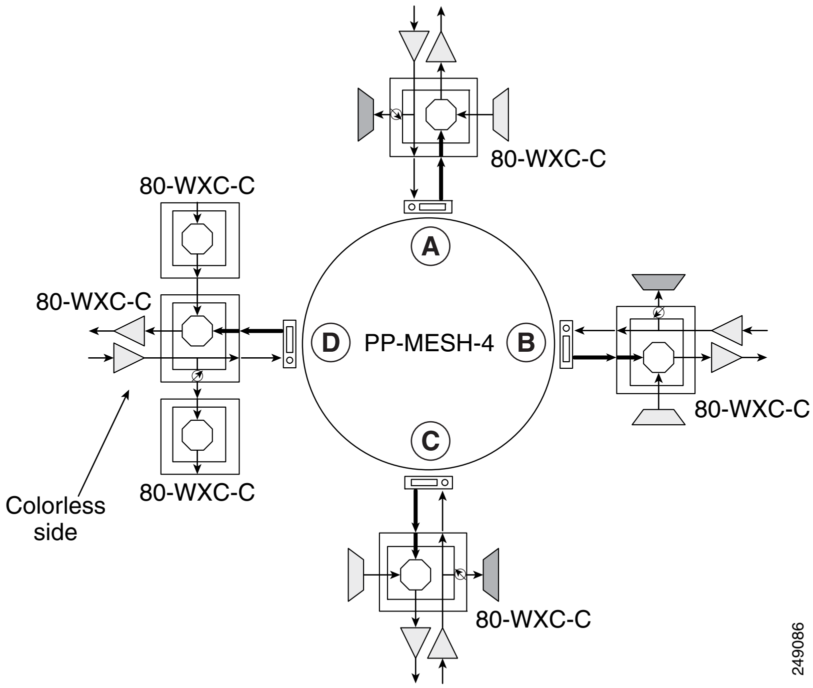


12.7.2.2 80-Channel Colorless n-degree ROADM Node

Any side in the line termination mesh node can be configured as a colorless side where any wavelength can be added or dropped. The side that is configured as the colorless side is connected to two 80-WXC-C cards configured as a multiplexer and demultiplexer respectively. In Figure 12-63, side D is configured as the colorless side. The 80-WXC-C cards are connected to the add and drop ports of the 80-WXC-C cards as a colorless multiplexer and demultiplexer.

A combination of wavelengths from any of the nine ports is sent to the common output port of the 80-WXC-C card (multiplexer) that is connected to the 80-WXC-C card. The wavelengths entering the 80-WXC-C card is passed to the common input port of the 80-WXC-C card (demultiplexer) and dropped at any of the nine output ports.

Figure 12-63 80-Channel Colorless Four-Degree ROADM Node

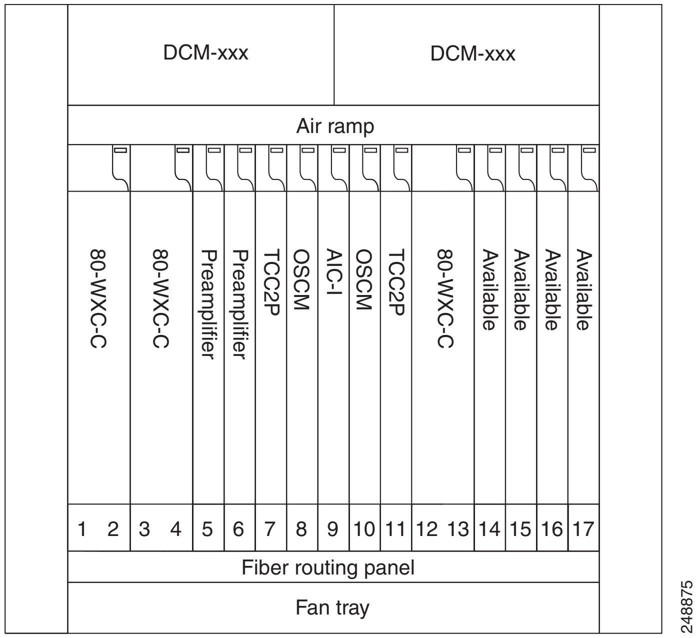


12.7.2.3 80-Channel Colorless and Omni-directional n-Degree ROADM Node

Any side in the line termination mesh node can be configured as a colorless and omni-directional side. The side that is configured as the colorless and omni-directional side is connected to a multiplexer (80-WXC-C) and demultiplexer (80-WXC-C) that can add or drop traffic to or from any of the node directions.

Figure 12-64 shows the layout of a 80-channel n-degree ROADM node with colorless and omnidirectional side.

Figure 12-64 80-Channel n-degree ROADM Node with Colorless and Omnidirectional Side

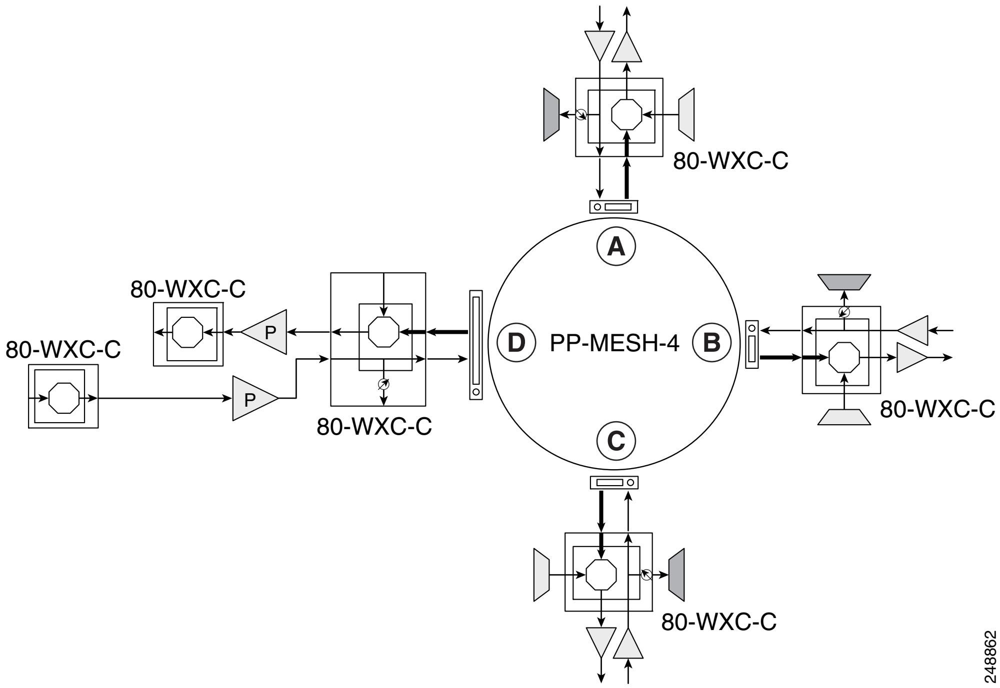


In Figure 12-65 side D is configured as the colorless and omni-directional side.

A combination of wavelengths from any of the nine ports is sent to the common output port of the 80-WXC-C card (multiplexer) and is then routed to the preamplifier. The preamplifier sends the wavelengths to the 80-WXC-C card that is connected to the patch panel. The patch panel routes the wavelengths to sides A, B, or C.

Wavelengths from sides A, B, or C can be dropped on side D. The incoming wavelengths from the 80-WXC-C card are sent to the preamplifier. The preamplifier amplifies the signal and sends it to the common input port of the 80-WXC-C card (demultiplexer). The wavelengths are then dropped at any of the nine output ports.

Figure 12-65 80-Channel Colorless and Omni-directional Four-Degree ROADM Node



12.7.3 Line Termination Mesh Node Using 40-SMR2-C Cards

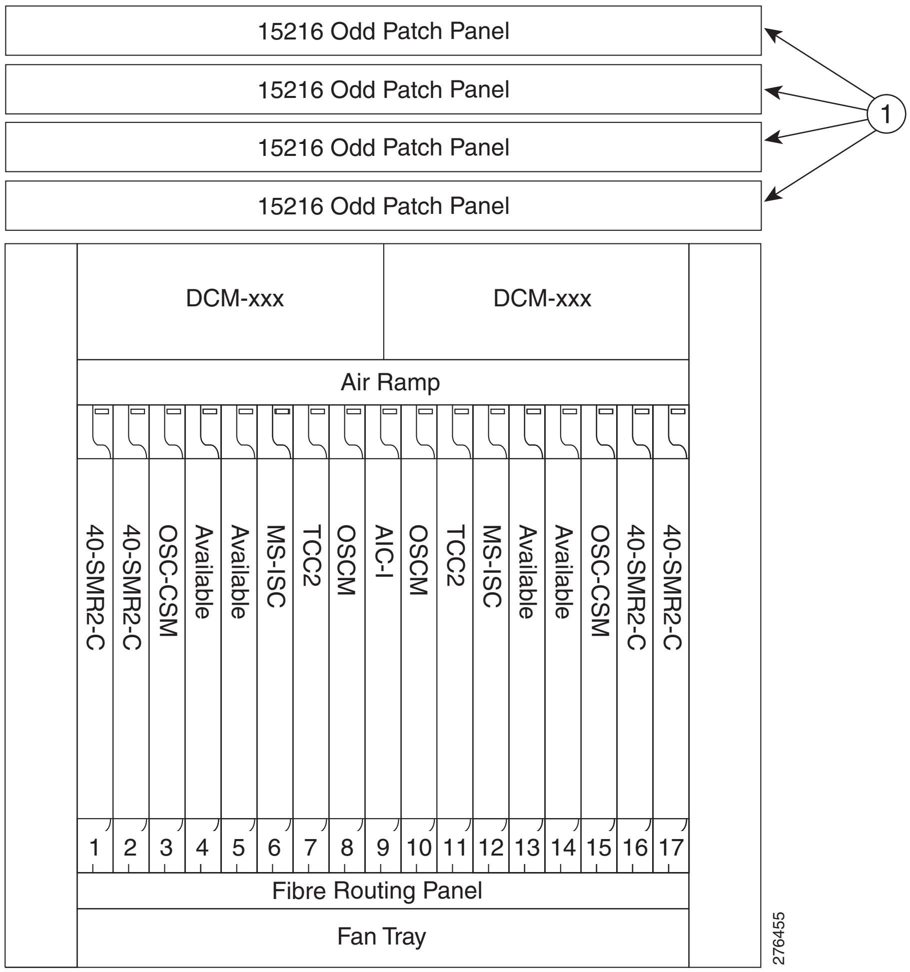
Line termination mesh nodes using the 40-SMR2-C cards can support between one and four line terminations. Each line direction requires the 40-SMR2-C and 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD units. Although it is recommended that you use the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel along with the 40-SMR2-C card, you can alternatively use the 40-MUX-C and 40-DMX-C cards instead of the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel.

Each side of the line termination mesh node is connected as follows:

- The 40-SMR2-C LINE-RX port is connected to the external line.
- The 40-SMR2-C LINE-TX port is connected to the external line.
- The 40-SMR2-C DROP TX port is connected to the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD (or 40-DMX-C) COM-RX port.
- The 40-SMR2-C ADD-RX port is connected to the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD (or 40-DMX-C) COM-TX port.
- The 40-SMR2-C EXP-TX port is connected to the mesh patch panel.
- The 40-SMR2-C EXP*i*-RX (where *i* = 1, 2, 3) port is connected to the mesh patch panel.

Figure 12-66 shows the layout for a line termination node.

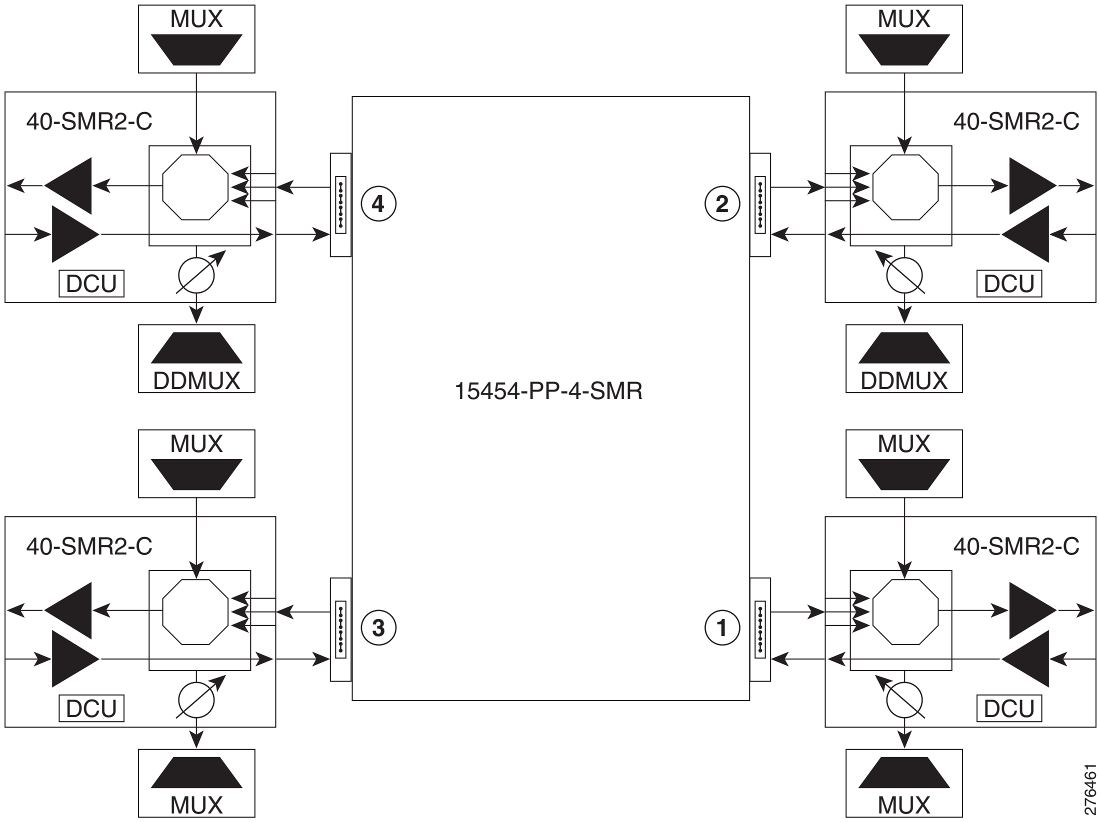
Figure 12-66 Line Termination Mesh Node Shelf



1	**15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel**

Figure 12-67 shows the functional block diagram of a four-degree line termination mesh node using 40-SMR2-C, 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD, and 15454-PP-4-SMR patch panel.

Figure 12-67 Four-Degree Line Termination Mesh Node Functional Diagram



12.7.4 XC Termination Mesh Node

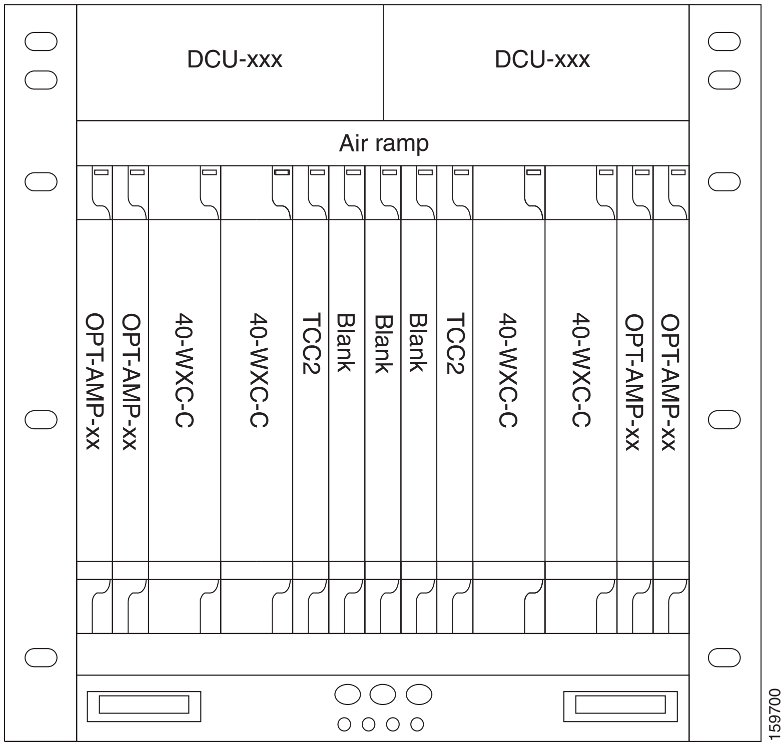
The XC termination mesh node, shown in Figure 12-68, is the second mesh node type. It is used to upgrade a non-mesh node to a mesh node or to interconnect two non-mesh nodes. The XC termination mesh nodes contain the following cards:

- 40-WXC-C cards
- OPT-AMP-17-C cards configured in OPT-PRE mode

The XC termination mesh node is connected as follows:

- The 40-WXC-C COM-RX port is connected to the MMU EXP-A-TX port.
- The 40-WXC-C COM-TX port is connected to the MMU EXP-A-RX port.
- The 40-WXC-C EXP-TX port is connected to the OPT-AMP-17-C COM-RX port.
- The 40-WXC-C EXP-RX port is connected to the OPT-AMP-17-C COM-TX port.
- The 40-WXC-C EXP-TX port is connected to the mesh patch panel.
- The 40-WXC-C EXP-RX port is connected to the mesh patch panel.

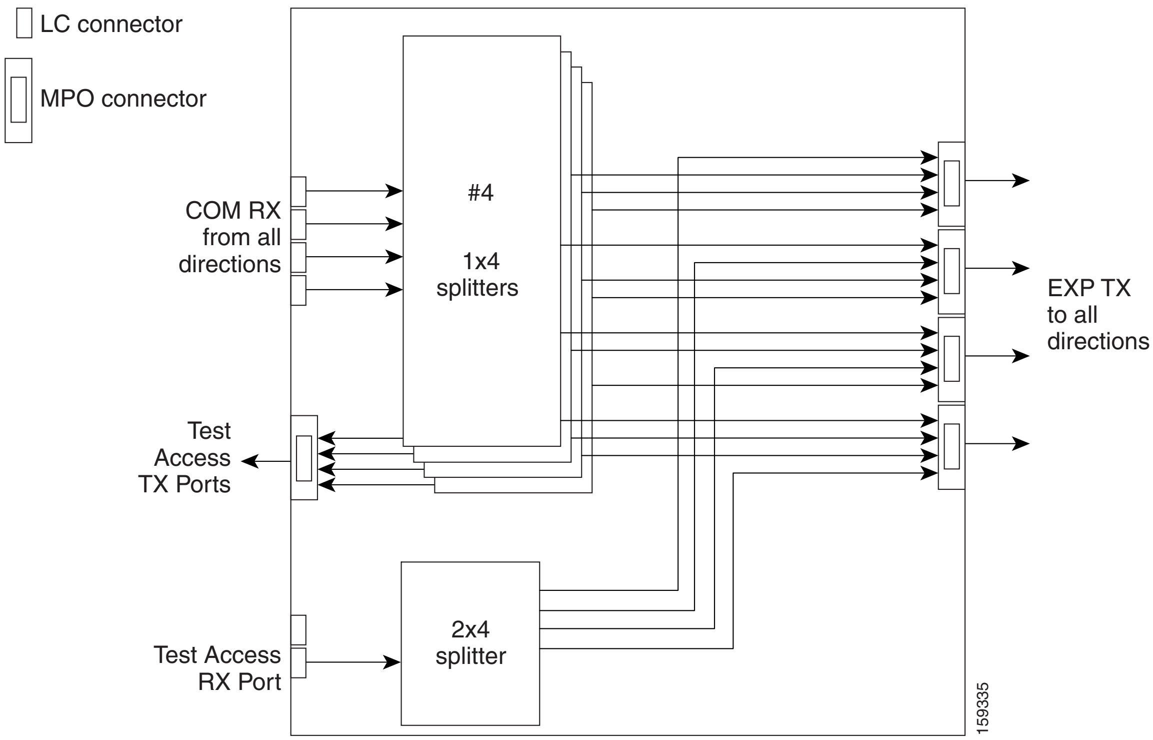
Figure 12-68 XC Termination Mesh Node Shelf



12.7.5 Mesh Patch Panels and Shelf Layouts

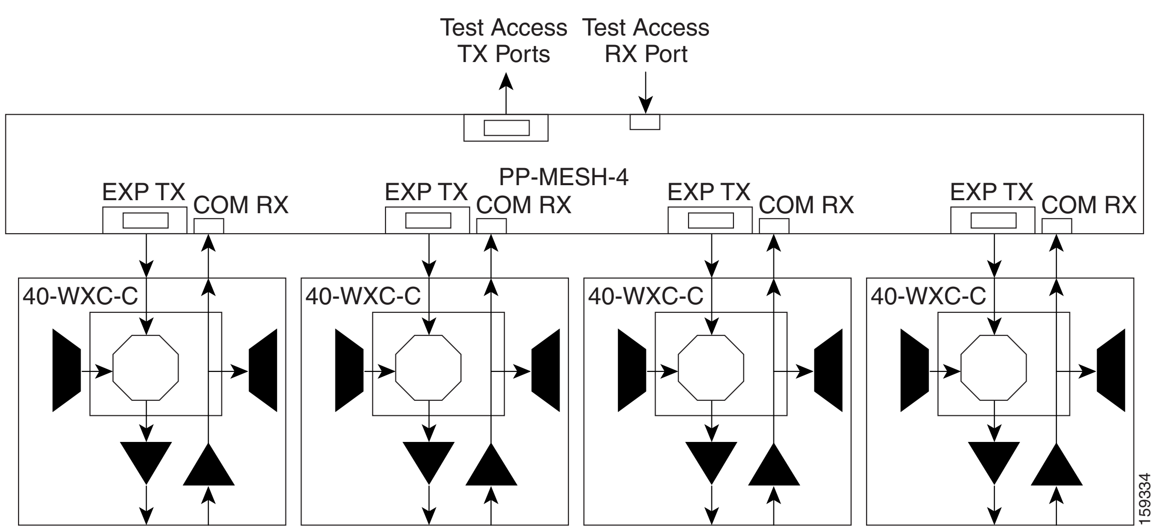
ONS 15454 mesh topologies require the installation of a four-degree patch panel, PP-MESH-4 (for 40-WXC-C cards) or 15454-PP-4-SMR (for 40-SMR2-C cards) or an eight-degree patch panel, PP-MESH-8 (for 40-WXC-C cards). If the four-degree patch panel is installed, mesh topologies of up to four degrees can be created. If the eight-degree patch panel is installed, mesh topologies of up to eight degrees can be created. The four-degree patch panel contains four 1x4 optical splitters, and the eight-degree patch panel contains eight 1x8 splitters. Each mesh patch panel contains a 2x8 splitter that is used for the test access transmit and receive ports. Figure 12-69 shows a block diagram for the PP-MESH-4 patch panel.

Figure 12-69 PP-MESH-4 Patch Panel Block Diagram



At the mesh patch panel, the signal is split into four signals (if a four-degree patch panel is used) or eight signals (if an eight-degree patch panel is used). Figure 12-70 shows the signal flow at the four-degree PP-MESH-4 patch panel. 40-WXC-C cards connect to the four-degree patch panel at the EXP TX and COM RX ports.

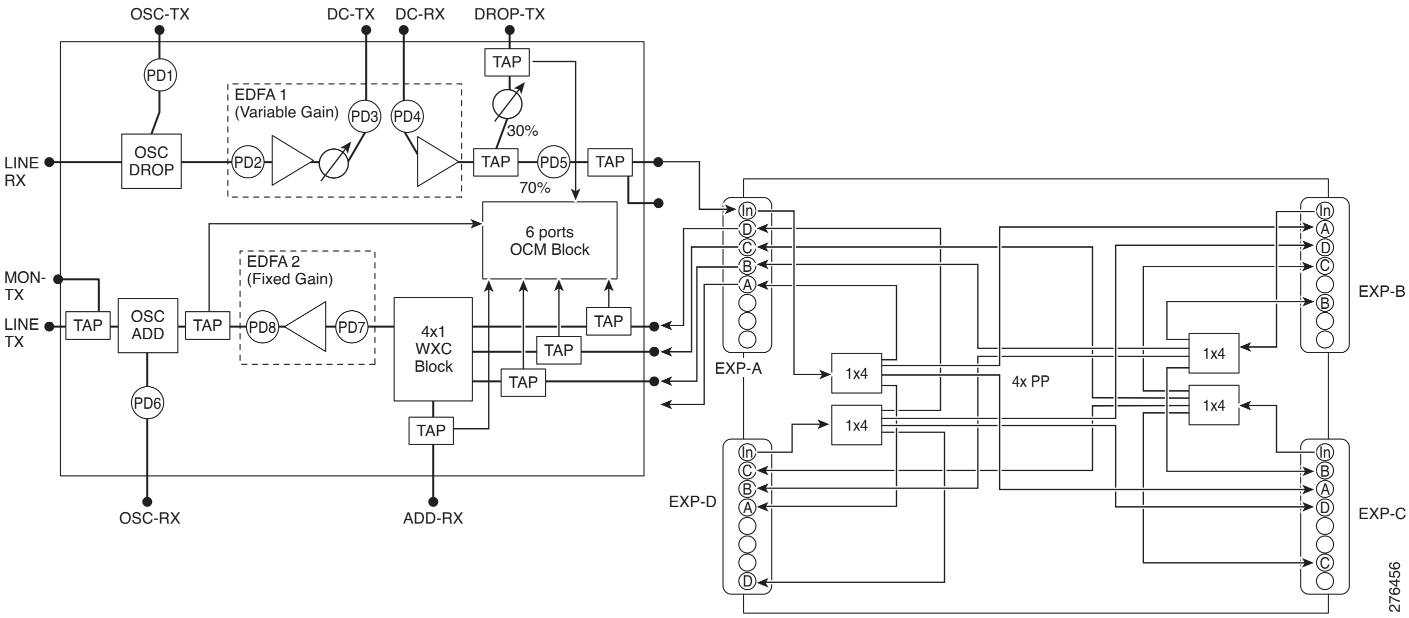
Figure 12-70 PP-MESH-4 Patch Panel Signal Flow



The mesh patch panels interconnect 40-WXC-C cards to create mesh networks, including four-degree and eight-degree mesh topologies. In addition, shelves with 40-WXC-C cards can be configured with mesh patch panels to create multiring, MMU-based mesh nodes. 40-WXC-C cards can be installed in ROADM nodes with MMU cards to upgrade a two-degree MMU-based ROADM node into four-degree or eight-degree mesh nodes.

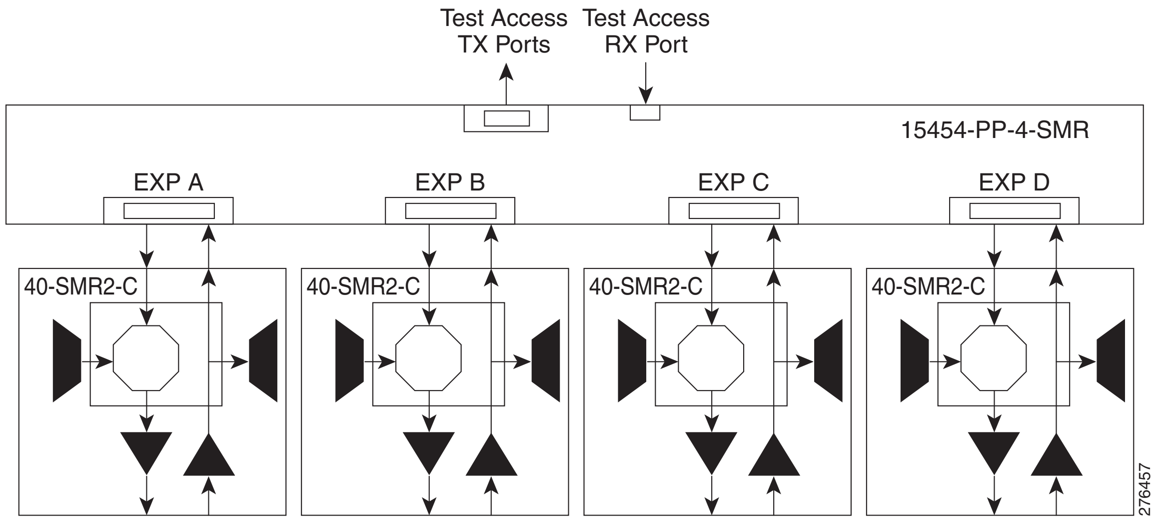
Figure 12-71 shows the block diagram of the four-degree 15454-PP-4-SMR patch panel connected to one 40-SMR2-C card. The 40-SMR2-C cards connect to the 15454-PP-4-SMR patch panel at the EXP RX ports.

Figure 12-71 15454-PP-4-SMR Patch Panel Block Diagram



You can use the 15454-PP-4-SMR patch panel to connect up to four 40-SMR2-C cards in a four-degree mesh node. The optical splitters inside the patch panel forward the output signal (EXP-TX port) of the 40-SMR2-C card on each side of the mesh node to the input port of the 40-SMR2-C cards on the other three sides of the mesh node. The 4x1 WXC block inside the 40-SMR2-C card selects which wavelength from which side must be propagated at the output of each side. Figure 12-70 shows the signal flow at the four-degree 15454-PP-4-SMR patch panel. 40-SMR2-C cards connect to the four-degree patch panel at the EXP-TX and EXP-RX ports.

Figure 12-72 15454-PP-4-SMR Patch Panel Signal Flow



12.7.6 Using a Mesh Node With Omni-Directional Add/Drop Section

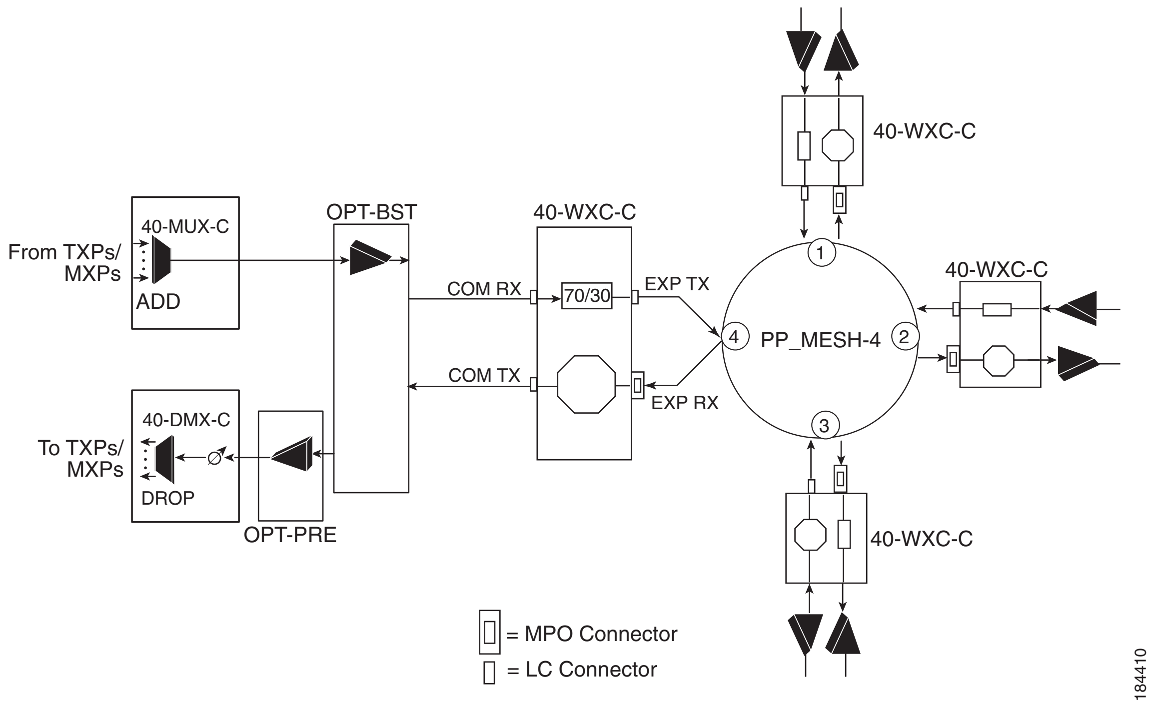
Normally, multidegree mesh node use four or eight 40-WXC-C cards and a four-degree or eight-degree patch panel. Each of the 40-WXC-C cards uses a 40-MUX-C card to add wavelengths going to the span and a 40-DMX-C card to drop wavelengths coming in from the span. The 40-MUX-C and 40-DMX-C cards are connected to only one of the node directions. These cards can add/drop traffic only to/from the side that is associated to the 40-WXC-C card. The omni-directional configuration allows you to install a local multiplexer/demultiplexer that can add/drop traffic to/from any of the node directions. Figure 12-73 shows an example of how to set up a omni-directional add/drop configuration.

By setting up a NE as shown in the figure, it is possible to connect the transmit ports of TXP or MXP cards to a 40-MUX-C card and then connect the output of the 40-MUX-C card to an OPT-BST card. The OPT-BST card then connects to a preferred 40-WXC-C card in the four-degree or eight-degree ROADM node (40-WXC-C connected to port 4 of PP-MESH-4, as shown in the figure).

The patch panel splits the traffic coming from the OPT-BST card in all the node directions, through the software configuration. The wavelengths entering the 40-WXC-C cards (ports 1, 2, and 3) can be selectively sent out in any desired outbound direction. In the inbound direction, the patch panel on the preferred 40-WXC-C card, splits any of the wavelengths entering the NE through the 40-WXC-C cards (ports 1, 2, and 3). Through the software configuration, the wavelength can be passed to an OPT-PRE card or stopped. This whole configuration can be managed using a single IP address

An example of using a mesh node for omni-directional add/drop section is shown in Figure 12-73.

Figure 12-73 Mesh Node With Omni-Directional Add/Drop Section



12.8 DWDM Node Cabling

DWDM node cabling is specified by the Cisco TransportPlanner Internal Connections table. The following sections provide examples of the cabling that you will typically install for common DWDM node types.

Note The cabling illustrations shown in the following sections are examples. Always install fiber-optic cables based on the Cisco TransportPlanner Internal Connections table for your site.

12.8.1 OSC Link Termination Fiber-Optic Cabling

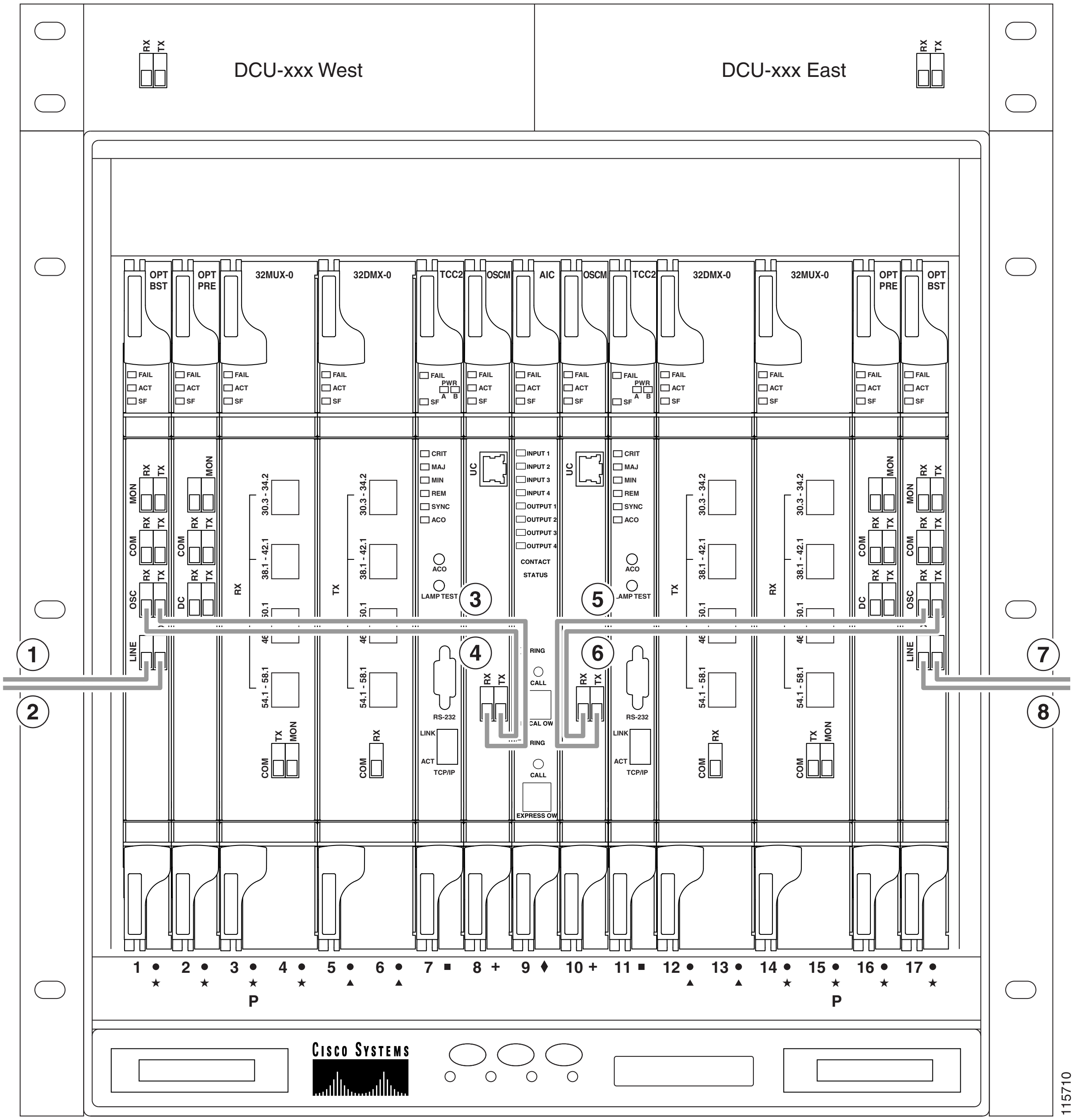
OSC link termination cabling include the following characteristics:

- The OPT-BST and OSC-CSM cards are the only cards that directly interface with the line (span) fiber.
- The OSCM card only carries optical service channels, not DWDM channels.
- The OSCM and OSC-CSM cards cannot both be installed on the same side of the shelf (Side B or Side A). You can have different cards on each side, for example an OSCM card on Side A and an OSC-CSM card on Side B.
- When an OPT-BST card and an OSC-CSM card are both used on the same side of the node, the OPT-BST card combines the supervision channel with the DWDM channels and the OSC-CSM card acts as an OSCM card; it does not carry DWDM traffic.

- If an OPT-BST and an OSCM card are installed on Side B, the Side B OPT-BST OSC RX port is connected to the Side B OSCM TX port, and the Side B OPT-BST OSC TX port is connected to the Side B OSCM RX port.
- If an OPT-BST and an OSC-CSM card are installed on Side B, the Side B OPT-BST OSC RX port is connected to the Side B OSC-CSM LINE TX port, and the Side B OPT-BST OSC TX port is connected to the Side B OSC-CSM LINE RX port.
- If an OPT-BST and an OSCM card are installed on Side A, the Side A OPT-BST OSC TX port is connected to the Side A OSCM RX port, and the Side A OPT-BST OSC RX port is connected to the Side A OSCM TX port.
- If an OPT-BST and an OSC-CSM card are installed on Side A, the Side A OPT-BST OSC TX port is connected to the Side A OSC-CSM LINE RX port, and the Side A OPT-BST OSC RX port is connected to the Side A OSC-CSM LINE TX port.

Figure 12-74 shows an example of OSC fibering for a hub node with OSCM cards installed.

Figure 12-74 Fibering OSC Terminations—Hub Node with OSCM Cards



1	Side A OPT-BST LINE RX to Side B OPT-BST or OSC-CSM LINE TX on adjacent node	**5**	Side B OSCM TX to Side B OPT-BST OSC RX

2	Side A OPT-BST LINE TX to Side B OPT-BST or OSC-CSM LINE RX on adjacent node	6	Side B OSCM RX to Side B OPT-BST OSC TX
3	Side A OPT-BST OSC TX to Side A OSCM RX	7	Side B OPT-BST LINE TX to Side A OPT-BST or OSC-CSM LINE RX on adjacent node
4	Side A OPT-BST OSC RX to Side A OSCM TX	8	Side B OPT-BST LINE RX to Side A OPT-BST or OSC-CSM LINE TX on adjacent node

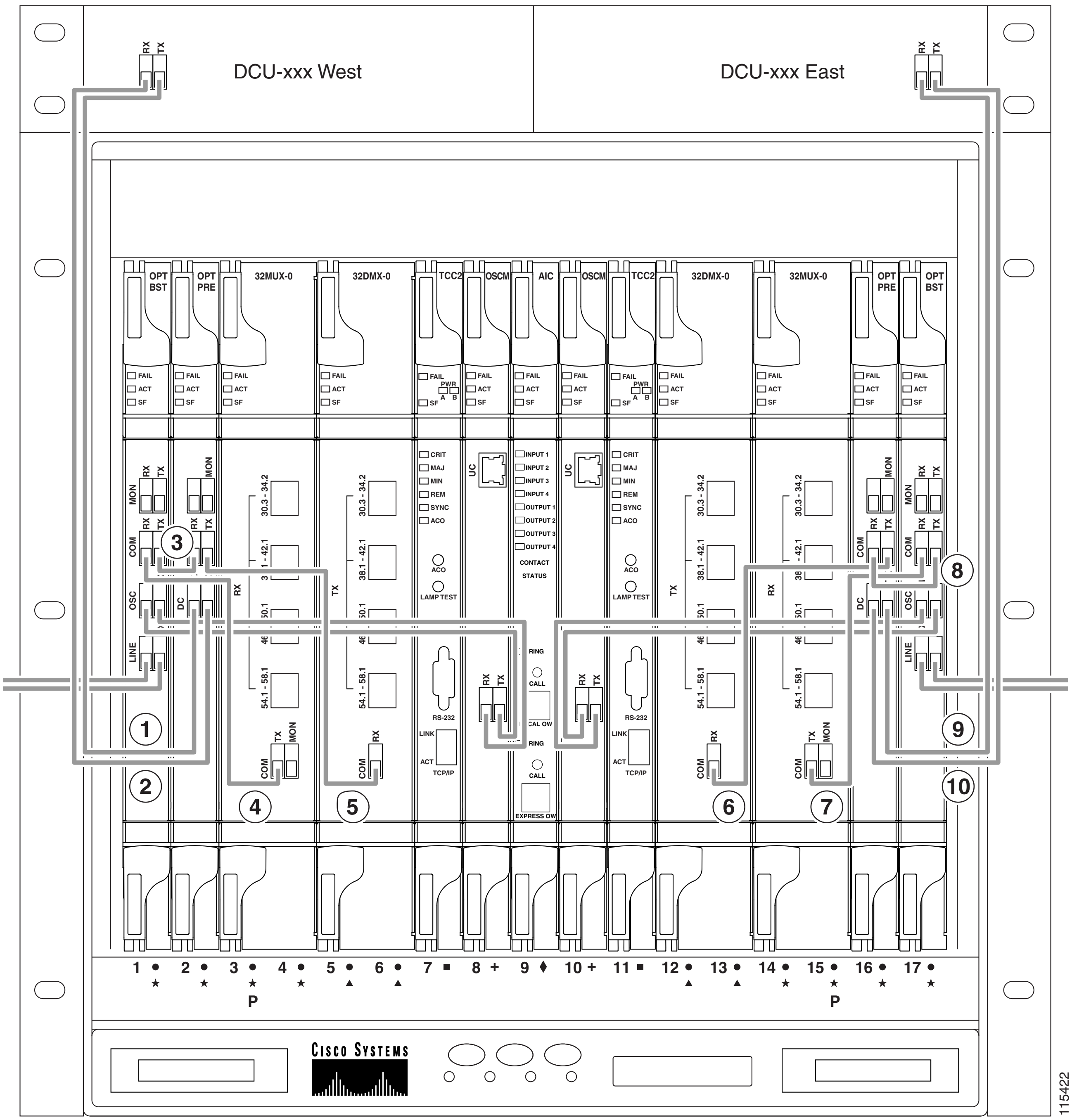
12.8.2 Hub Node Fiber-Optic Cabling

The following rules generally apply to hub node cabling:

- The Side A OPT-BST or OSC-CSM card common (COM) TX port is connected to the Side A OPT-PRE COM RX port or the Side A 32DMX-O/40-DMX-C/40-DMX-CE COM RX port.
- The Side A OPT-PRE COM TX port is connected to the Side A 32DMX-O/40-DMX-C/40-DMX-CE COM RX port.
- The Side A 32MUX-O/32WSS/32WSS-L COM TX port is connected to the Side A OPT-BST or Side A OSC-CSM COM RX port.
- The Side B 32MUX-O/32WSS/32WSS-L COM TX port is connected to the Side B OPT-BST or Side B OSC-CSM COM RX port.
- The Side B OPT-BST or Side B OSC-CSM COM TX port is connected to the Side B OPT-PRE COM RX port or the Side B 32DMX-O/32DMX COM RX port.
- The Side B OPT-PRE COM TX port is connected to the Side B 32DMX-O/32DMX COM RX port.

Figure 12-75 shows an example of a hub node with cabling. In the example, OSCM cards are installed. If OSC-CSM cards are installed, they are usually installed in Slots 1 and 17.

Figure 12-75 Fibering a Hub Node



1	Side A DCU TX to Side A OPT-PRE DC RX[1]	**6**	Side B 32DMX-O COM RX to Side B OPT-PRE COM TX
2	Side A DCU RX to Side A OPT-PRE DC TX[1]	**7**	Side B 32MUX-O COM TX to Side B OPT-BST COM RX

3	Side A OPT-BST COM TX to Side A OPT-PRE COM RX	**8**	Side B OPT-PRE COM RX to Side B OPT-BST COM TX
4	Side A OPT-BST COM RX to Side A 32MUX-O COM TX	**9**	Side B DCU TX to Side B OPT-PRE DC RX[1]
5	Side A OPT-PRE COM TX to Side A 32DMX-O COM RX	**10**	Side B DCU RX to Side B OPT-PRE DC TX[1]

1. If a DCU is not installed, a 4-dB attenuator loop, +/– 1 dB must be installed between the OPT-PRE DC ports.

12.8.3 Terminal Node Fiber-Optic Cabling

The following rules generally apply to terminal node cabling:

- A terminal site has only one side (as compared to a hub node, which has two sides). The terminal side can be either Side B or Side A.
- The terminal side OPT-BST or OSC-CSM card COM TX port is connected to the terminal side OPT-PRE COM RX port or the 32DMX-O/40-DMX-C/40-DMX-CE COM RX port.
- The terminal side OPT-PRE COM TX port is connected to the terminal side 32DMX-O/40-DMX-C/40-DMX-CE COM RX port.
- The terminal side 32MUX-O/40-MUX-C COM TX port is connected to the terminal side OPT-BST or OSC-CSM COM RX port.

12.8.4 Line Amplifier Node Fiber-Optic Cabling

The following rules generally apply to line amplifier node cabling:

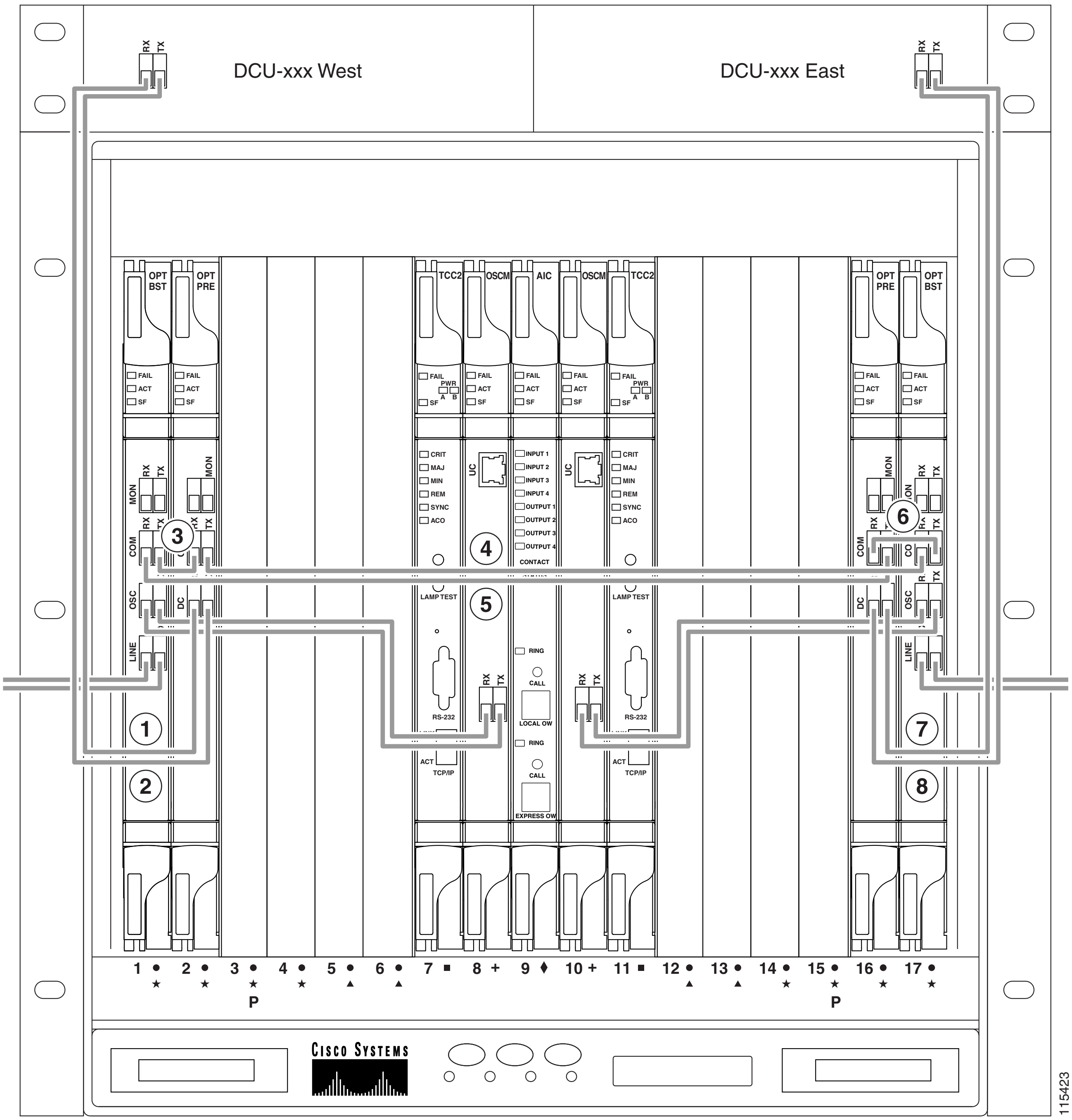
- The line amplifier node layout allows all combinations of OPT-PRE and OPT-BST cards and allows you to use asymmetrical card choices in Side A-to-Side B and Side B-to-Side A configurations. For a given line direction, you can configure the four following possibilities:
  - Only preamplification (OPT-PRE)
  - Only booster amplification (OPT-BST)
  - Both preamplification and booster amplification (where a line amplifier node has amplification in at least one direction)
  - Neither preamplification nor booster amplification
- If a Side A OPT-PRE card is installed:
  - The Side A OSC-CSM or OPT-BST COM TX is connected to the Side A OPT-PRE COM RX port.
  - The Side A OPT-PRE COM TX port is connected to the Side B OSC-CSM or OPT-BST COM RX port.
- If a Side A OPT-PRE card is not installed, the Side A OSC-CSM or OPT-BST COM TX port is connected to the Side B OSC-CSM or OPT-BST COM RX port.
- If a Side B OPT-PRE card is installed:
  - The Side B OSC-CSM or OPT-BST COM TX port is connected to the Side B OPT-PRE COM RX port.

- The Side B OPT-PRE COM TX port is connected to the Side A OSC-CSM or OPT-BST COM RX port.

- If an Side B OPT-PRE card is not installed, the Side B OSC-CSM or OPT-BST COM TX port is connected to the Side A OSC-CSM or OPT-BST COM RX port.

Figure 12-76 shows an example of a line amplifier node with cabling.

Figure 12-76 Fibering a Line Amplifier Node



1	Side A DCU TX to Side A OPT-PRE DC RX[1]	5	Side A OPT-BST COM RX to Side B OPT-PRE COM TX
2	Side A DCU RX to Side A OPT-PRE DC TX[1]	6	Side A OPT-BST COM RX to Side B OPT-PRE COM TX
3	Side A OPT-BST COM TX to Side A OPT-PRE COM RX	7	Side B DCU TX to Side B OPT-PRE DC RX[1]
4	Side A OPT-PRE COM TX to Side B OPT-BST COM RX	8	Side B DCU RX to Side B OPT-PRE DC TX[1]

1. If a DCU is not installed, a 4-dB attenuator loop, +/– 1 dB, must be installed between the OPT-PRE DC ports.

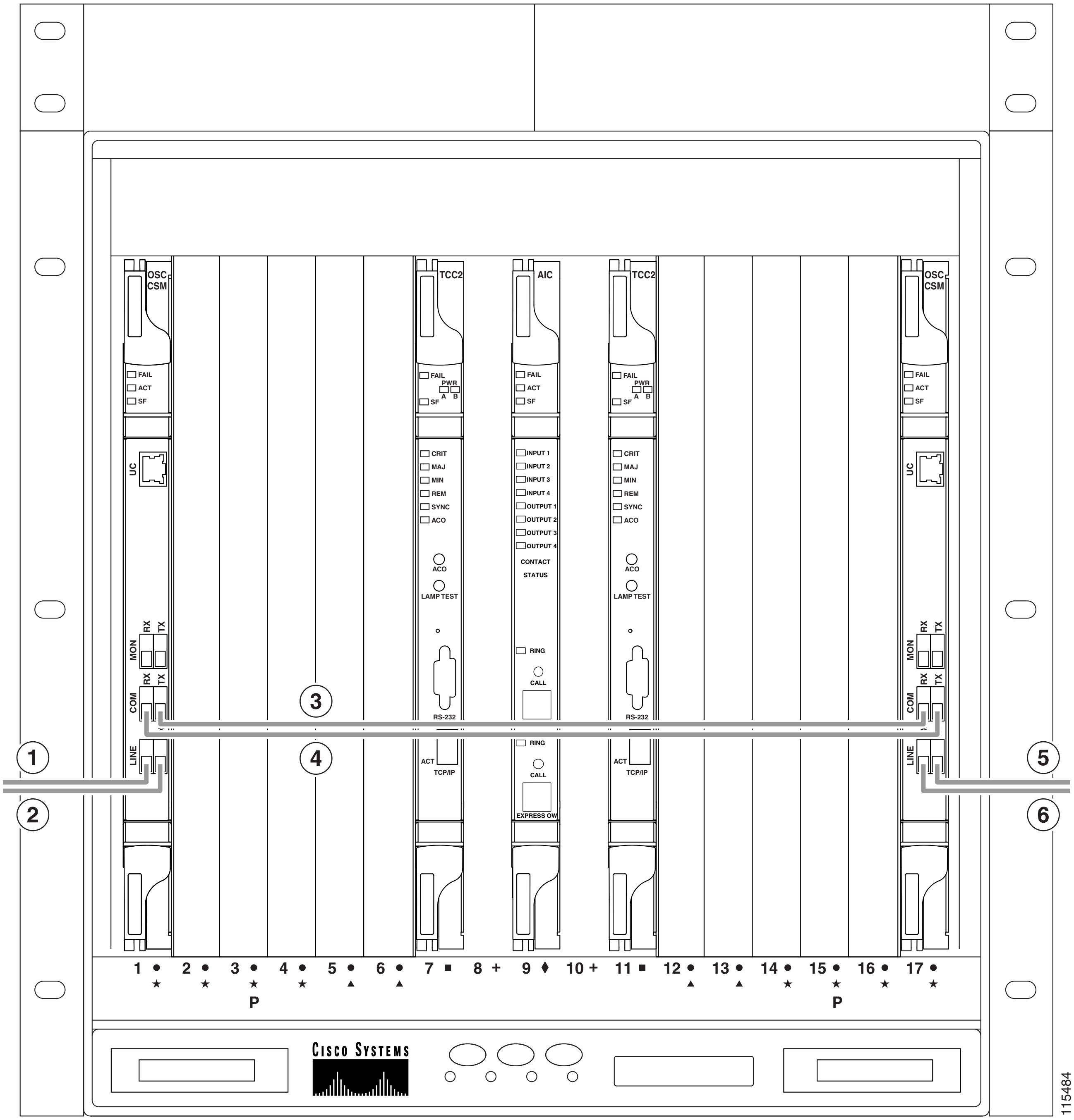
12.8.5 OSC Regeneration Node Fiber-Optic Cabling

The following rules generally apply to OSC regeneration node cabling:

- The Side A OSC-CSM COM TX port connects to the Side B OSC-CSM COM RX port.
- The Side A OSC-CSM COM RX port connects to the Side B OSC-CSM COM TX port.
- Slots 2 through 5 and 12 through 16 can be used for TXP and MXP cards.

Figure 12-77 shows an example of an OSC regeneration node with cabling.

Figure 12-77 Fibering an OSC Regeneration Node



1	Side A OSC-CSM LINE RX to Side B OSC-CSM or OPT-BST LINE TX on adjacent node	4	Side A OSC-CSM COM RX to Side B OSC-CSM COM TX
2	Side A OSC-CSM LINE TX to Side B OSC-CSM or OPT-BST LINE RX on adjacent node	5	Side B OSC-CSM LINE RX to Side A OSC-CSM or OPT-BST LINE TX on adjacent node
3	Side A OSC-CSM COM TX to Side B OSC-CSM COM RX	6	Side B OSC-CSM LINE TX to Side A OSC-CSM or OPT-BST LINE RX on adjacent node

12.8.6 Amplified or Passive OADM Node Fiber-Optic Cabling

The two sides of the OADM node do not need to be symmetrical. On each side, Cisco TransportPlanner can create one of the following four configurations:

- OPT-BST and OPT-PRE
- OSC-CSM and OPT-PRE
- Only OSC-CSM
- Only OPT-BST

Note Amplified OADM nodes contain OPT-PRE cards and/or OPT-BST cards. Passive OADM nodes do not. Both contain add/drop channel or band cards.

The following rules generally apply for OADM node express path cabled connections:

- TX ports should only be connected to RX ports.
- EXP ports are connected only to COM ports in between AD-xC-xx.x or AD-xB-xx.x cards that all belong to Side B (that is, they are daisy-chained).
- EXP ports are connected only to COM ports in between AD-xC-xx.x or AD-xB-xx.x cards that all belong to Side A (that is, they are daisy-chained).
- The EXP port of the last AD-xC-xx.x or AD-xB-xx.x card on Side A is connected to the EXP port of the first AD-xC-xx.x or AD-xB-xx.x card on Side B.
- The OPT-BST COM RX port is connected to the nearest (in slot position) AD-xC-xx.x or AD-xB-xx.x COM TX port.
- The OPT-PRE COM TX port is connected to the nearest (in slot position) AD-xC-xx.x or AD-xB-xx.x COM RX port.
- If OADM cards are located in adjacent slots, the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card assumes that they are connected in a daisy-chain between the EXP ports and COM ports as noted previously.
- The first Side A AD-xC-xx.x or AD-xB-xx.x card COM RX port is connected to the Side A OPT-PRE or OSC-CSM COM TX port.
- The first Side A AD-xC-xx.x or AD-xB-xx.x card COM TX port is connected to the Side A OPT-BST or OSC-CSM COM RX port.
- The first Side B AD-xC-xx.x or AD-xB-xx.x card COM RX port is connected to the Side B OPT-PRE or OSC-CSM COM TX port.

- The first Side B AD-xC-xx.x or AD-xB-xx.x card COM TX port is connected to the Side B OPT-BST or OSC-CSM RX port.
- If a Side A OPT-PRE is present, the Side A OPT-BST or OSC-CSM COM TX port is connected to the Side A OPT-PRE COM RX port.
- If a Side B OPT-PRE is present, the Side B OPT-BST or OSC-CSM COM TX port is connected to the Side B OPT-PRE COM RX port.

The following rules generally apply for OADM node add/drop path cabled connections:

- AD-xB-xx.x add/drop (RX or TX) ports are only connected to the following ports:
  - 4MD-xx.x COM TX or 4MD-xx.x COM RX ports
  - Another AD-xB-xx.x add/drop port (a pass-through configuration)
- An AD-xB-xx.x add/drop band port is only connected to a 4MD-xx.x card belonging to the same band.
- For each specific AD-xB-xx.x card, the add and drop ports for that band card are connected to the COM TX and COM RX ports of the same 4MD-xx.x card.
- The AD-xB-xx.x and 4MD-xx.x cards are located in the same side (the connected ports all have the same line direction).

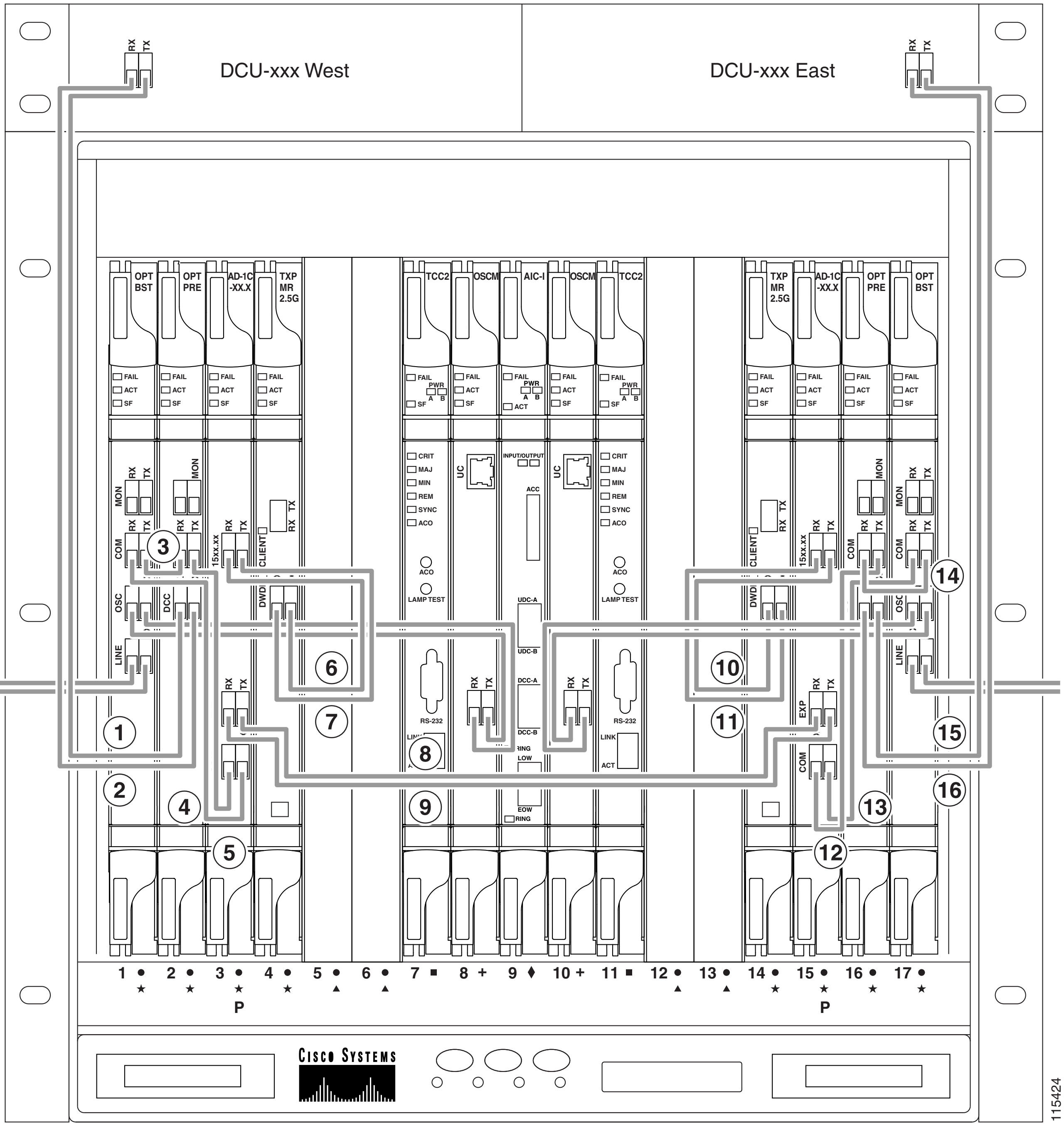
The following rules generally apply for OADM node pass-through path cabled connections:

- Pass-through connections are only established between add and drop ports on the same band or channel and in the same line direction.
- AD-xC-xx.x or AD-xB-xx.x add/drop ports must be connected to other AD-xC-xx.x or AD-xB-xx.x add/drop ports (as pass-through configurations).
- Add (RX) ports must be connected to drop (TX) ports.
- 4MD-xx.x client input/output ports must be connected to other 4MD-xx.x client input/output ports.
- A Side A AD-xB-xx.x drop (TX) port is connected to the corresponding Side A 4MD-xx.x COM RX port.
- A Side A AD-xB-xx.x add (RX) port is connected to the corresponding Side A 4MD-xx.x COM TX port.
- An Side B AD-xB-xx.x drop (TX) port is connected to the corresponding Side B 4MD-xx.x COM RX port.
- An Side B AD-xB-xx.x add (RX) port is connected to the corresponding Side B 4MD-xx.x COM TX port.

Figure 12-78 shows an example of an amplified OADM node with AD-1C-xx.x cards installed.

Note Figure 12-78 is an example. Always install fiber-optic cables based on the Cisco TransportPlanner Internal Connections table for your site.

Figure 12-78 Fibering an Amplified OADM Node



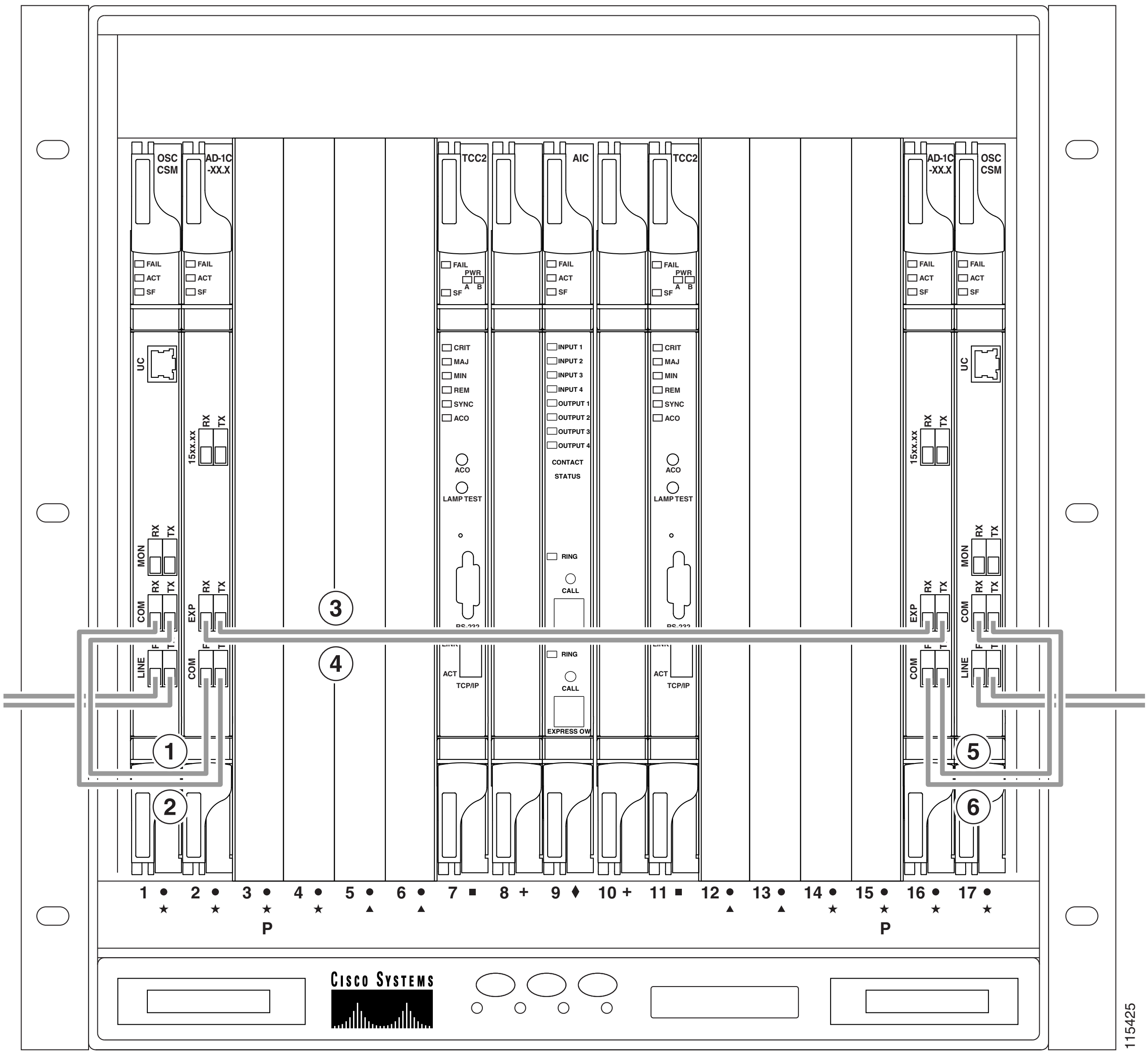
1	Side A DCU TX to Side A OPT-PRE DC RX[1]	**9**	Side A AD-1C-xx.x EXP RX to Side B AD-1C-xx.x EXP TX
2	Side A DCU RX to Side A OPT-PRE DC TX[1]	**10**	Side B TXP_MR_2.5G DWDM RX to Side B AD-1C-xx.x (15xx.xx) TX
3	Side A OPT-BST COM TX to Side A OPT-PRE COM RX	**11**	Side B TXP_MR_2.5G DWDM TX to Side B AD-1C-xx.x (15xx.xx) RX

4	Side A OPT-BST COM RX to Side A AD-1C-xx.x COM TX	**12**	Side B AD-1C-xx.x COM RX to OPT-PRE COM TX
5	Side A OPT-PRE COM TX to Side A AD-1C-xx.x COM RX	**13**	Side B AD-1C-xx.x COM TX to OPT-BST COM RX
6	Side A AD-1C-xx.x (15xx.xx) RX to Side A TXP_MR_2.5G DWDM TX	**14**	Side B OPT-PRE COM RX to Side B OPT-BST COM TX
7	Side A AD-1C-xx.x (15xx.xx) TX to Side A TXP_MR_2.5G DWDM RX	**15**	Side B DCU TX to Side B OPT-PRE DC RX[1]
8	Side A AD-1C-xx.x EXP TX to Side B AD-1C-xx.x EXP RX	**16**	Side B DCU RX to Side B OPT-PRE DC TX[1]

1. If a DCU is not installed, a 4-dB attenuator loop, +/ 1 dB, must be installed between the OPT-PRE DC ports.

Figure 12-79 shows an example of a passive OADM node with two AD-1C-xx.x cards installed.

Figure 12-79 Fibering a Passive OADM Node



1	Side A OSC-CSM COM TX to Side A AD-1C-xx.x COM RX	**4**	Side A OSC-CSM EXP RX to Side B AD-1C-xx.x EXP TX
2	Side A OSC-CSM COM RX to Side A AD-1C-xx.x COM TX	**5**	Side B AD-1C-xx.x COM TX to Side B OSC-CSM COM RX
3	Side A OSC-CSM EXP TX to Side B AD-1C-xx.x EXP RX	**6**	Side B AD-1C-xx.x COM RX to Side B OSC-CSM COM TX

12.8.7 ROADM Node Fiber-Optic Cabling

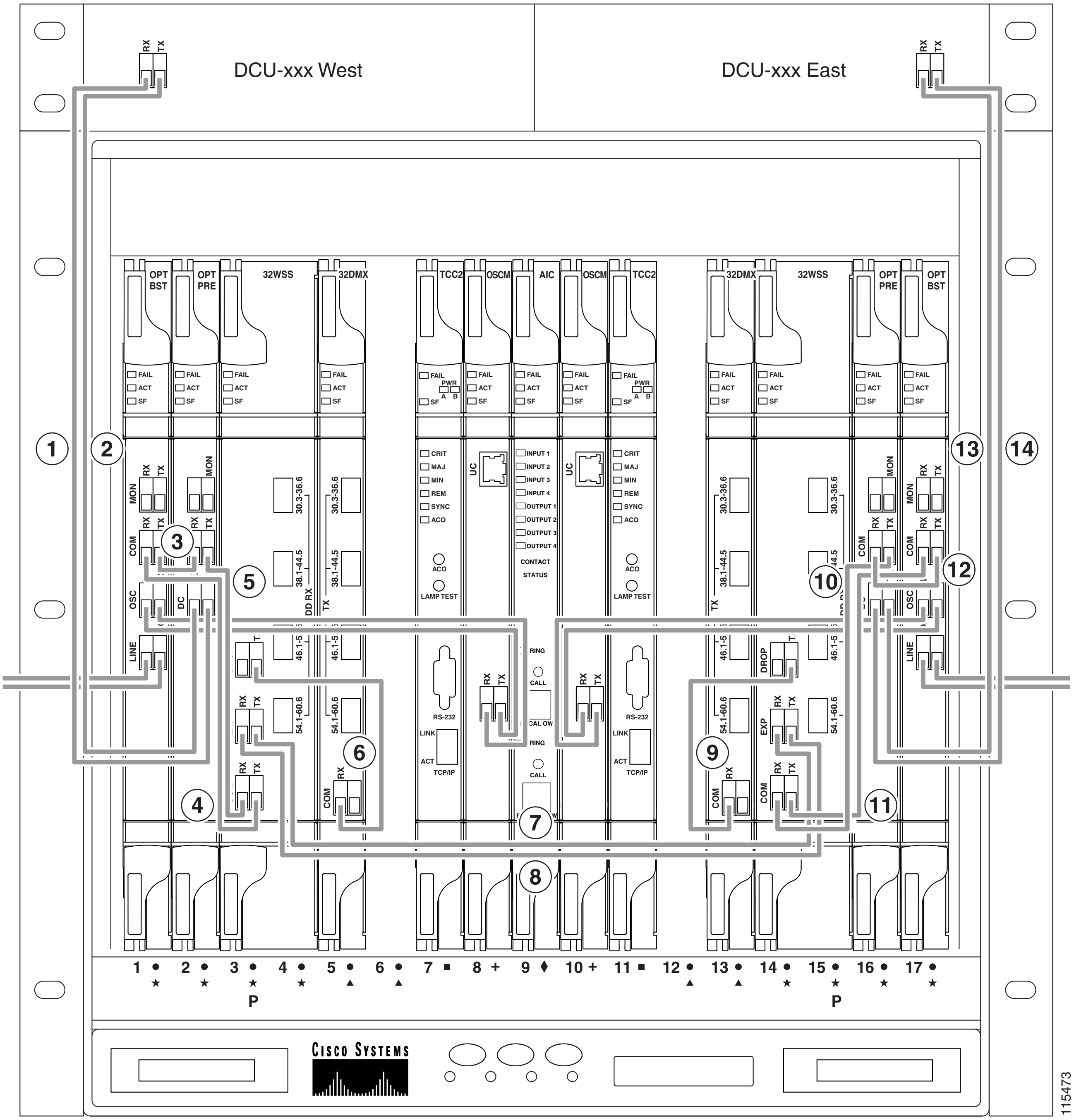
The following rules generally apply to ROADM node cabling:

- The Side A OPT-BST or OSC-CSM COM TX port is connected to the Side A OPT-PRE COM RX port.
- The Side A OPT-PRE COM TX port is connected to the Side A 32WSS COM RX port.
- The Side A OPT-BST or OSC-CSM COM RX port is connected to the Side A 32WSS COM TX port.
- The Side A OPT-BST (if installed) OSC TX port is connected to the Side A OSCM RX port.
- The Side A OPT-BST (if installed) OSC RX port is connected to the Side A OSCM TX port.
- The Side A 32WSS EXP TX port is connected to the Side B 32WSS EXP RX port.
- The Side A 32WSS EXP RX port is connected to the Side B 32WSS EXP TX port.
- The Side A 32WSS DROP TX port is connected to the Side A 32DMX COM RX port.
- The Side A 40-WSS-C/40-WSS-CE DROP TX port is connected to the Side A 40-DMX-C or 40-DMX-CE COM RX port.
- The Side B OPT-BST or OSC-CSM COM TX port is connected to the Side B OPT-PRE COM RX port.
- The Side B OPT-PRE COM TX port is connected to the Side B 32WSS COM RX port.
- The Side B OPT-BST or OSC-CSM COM RX port is connected to the Side B 32WSS COM TX port.
- The Side B OPT-BST (if installed) OSC TX port is connected to the Side B OSCM RX port.
- The Side B OPT-BST (if installed) OSC RX port is connected to the Side B OSCM TX port.
- The Side B 32WSS DROP TX port is connected to the Side B 32DMX COM RX port.
- The Side B 40-WSS-C/40-WSS-CE DROP TX port is connected to the Side B 40-DMX-C or 40-DMX-CE COM RX port.

Figure 12-80 shows an example of an amplified ROADM node with cabling.

Note Figure 12-80 is an example. Always install fiber-optic cables based on the Cisco TransportPlanner Internal Connections table for your site.

Figure 12-80 Fibering a ROADM Node



1	Side A DCU TX to Side A OPT-PRE DC RX[1]	**8**	Side A 32WSS EXP RX to Side B 32WSS EXP TX
2	Side A DCU RX to Side A OPT-PRE DC TX[1]	**9**	Side B 32DMX COM RX to Side B 32WSS DROP TX
3	Side A OPT-BST COM TX to Side A OPT-PRE COM RX	**10**	Side B 32WSS COM RX to Side B OPT-PRE COM TX

4	Side A 32WSS COM TX to Side A OPT-BST COM RX	**11**	Side B 32WSS COM TX to Side B OPT-BST COM RX
5	Side A 32WSS COM RX to Side A OPT-PRE COM TX	**12**	Side B OPT-BST COM TX to Side B OPT-PRE COM RX
6	Side A 32DMX COM RX to Side A 32WSS DROP TX	**13**	Side B DCU RX to Side B OPT-PRE DC TX[1]
7	Side A 32WSS EXP TX to Side B 32WSS EXP RX	**14**	Side B DCU TX to Side B OPT-PRE DC RX[1]

1. If a DCU is not installed, a 4-dB attenuator loop, +/–1 dB must be installed between the OPT-PRE DC ports.

12.9 Automatic Node Setup

Automatic node setup (ANS) is a TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE function that adjusts values of the variable optical attenuators (VOAs) on the DWDM channel paths to equalize the per channel power at the amplifier input. This power equalization means that at launch, all channels have the same amplifier power, independent of the input signal on the client interface and independent of the path crossed by the signal inside the node. This equalization is needed for two reasons:

- Every path introduces a different penalty on the signal that crosses it.
- Client interfaces add their signal to the ONS 15454 DWDM ring with different power levels.

To support ANS, integrated VOAs and photodiodes are provided in the following cards:

- AD-xB-xx.x card express and drop paths
- AD-xC-xx.x card express and add paths
- 4MD-xx.x card add paths
- 32MUX-O card add paths
- 32WSS/40-WSS-C/40-WSS-CE/40-WXC-C/80-WXC-C add, drop, and pass through paths
- 32DMX-O card drop paths
- 32DMX, 40-DMX-C, 40-DMX-CE card input port
- 40-MUX-C card output port
- 40-SMR1-C/40-SMR2-C add, drop, and pass through ports
- PSM card input and output ports (both working and protect path)

Optical power is equalized by regulating the VOAs. Based on the expected per channel power, ANS automatically calculates the VOA values by:

- Reconstructing the different channel paths.
- Retrieving the path insertion loss (stored in each DWDM transmission element).

VOAs operate in one of three working modes:

- Automatic VOA Shutdown—In this mode, the VOA is set at maximum attenuation value. Automatic VOA shutdown mode is set when the channel is not provisioned to ensure system reliability in the event that power is accidentally inserted.
- Constant Attenuation Value—In this mode, the VOA is regulated to a constant attenuation independent from the value of the input signal. Constant attenuation value mode is set on VOAs associated to aggregated paths.

- Constant Power Value—In this mode, the VOA values are automatically regulated to keep a constant output power when changes occur to the input power signal. This working condition is set on VOAs associated to a single channel path.

ANS calculates the following VOA provisioning parameters:

- Target attenuation
- Target power

Optical patchcords are passive devices that are modeled by the two termination points, each with an assigned slot and port. If user-provisioned optical patchcords exist, ANS checks if the new connection is feasible according to internal connection rules. If the user connection violates one of the rules, ANS returns a denied message. ANS requires the expected wavelength to be provisioned. When provisioning the expected wavelength, the following rules apply:

- The card family generically characterizes the card name, and not the particular wavelengths supported (for example, AD-2C-xx.x for all two-channel OADMs).
- At the provisioning layer, you can provision a generic card for a specific slot using CTC or TL1.
- Wavelength assignment is done at the port level.
- An equipment mismatch alarm is raised when a mismatch between the identified and provisioned value occurs. The default value for the provisioned attribute is AUTO.

ONS 15454 ANS parameters set the values required for the node to operate successfully.
Cisco Transport Planner calculates the ANS parameters based on the requirements of a planned network. Cisco Transport Planner exports the parameters to NE update file. When the NE update file is imported in CTC, the Provisioning > WDM-ANS > Provisioning tab is populated with the ANS parameters to provision the node for the network. These ANS parameters can be modified even when the card port is in IS state. All the ANS parameters are mapped to the physical ports of the cards. ANS parameters can also be manually added, modified, or deleted in the Provisioning tab. ANS parameters cannot be deleted when the port is in IS state and if any active circuit uses the ANS parameters. If the new or updated value is not within the default range as shown in Table 12-11, an error message is displayed. For more information on how to add, modify, or delete an ANS parameter, see the "NTP-G328 Add, Modify, or Delete ANS Parameters" procedure on page 14-59.

Note The Provisioning > WDM-ANS > Provisioning tab in CTC is empty if the NE update file is not imported.

Note It is recommended that you use the Cisco Transport Planner NE Update file to provision the ANS parameters instead of manually adding all the parameters in CTC. ANS provisioning parameters must be manually changed by Cisco qualified personnel only. Setting incorrect ANS provisioning (either as preamplifier or booster input power thresholds) may impact traffic.

Table 12-11 Ranges, Values, and Edit Options for the ANS Parameters

ANS Parameter	Range/Value	Editable with Port in IS
OSC LOS Threshold	-50.0 to +30.0 dBm	Yes
Channel LOS Threshold	-50.0 to +30.0 dBm	Yes
Amplifier Working Mode	Control Power, Control Gain, Fixed Gain	Yes[1]

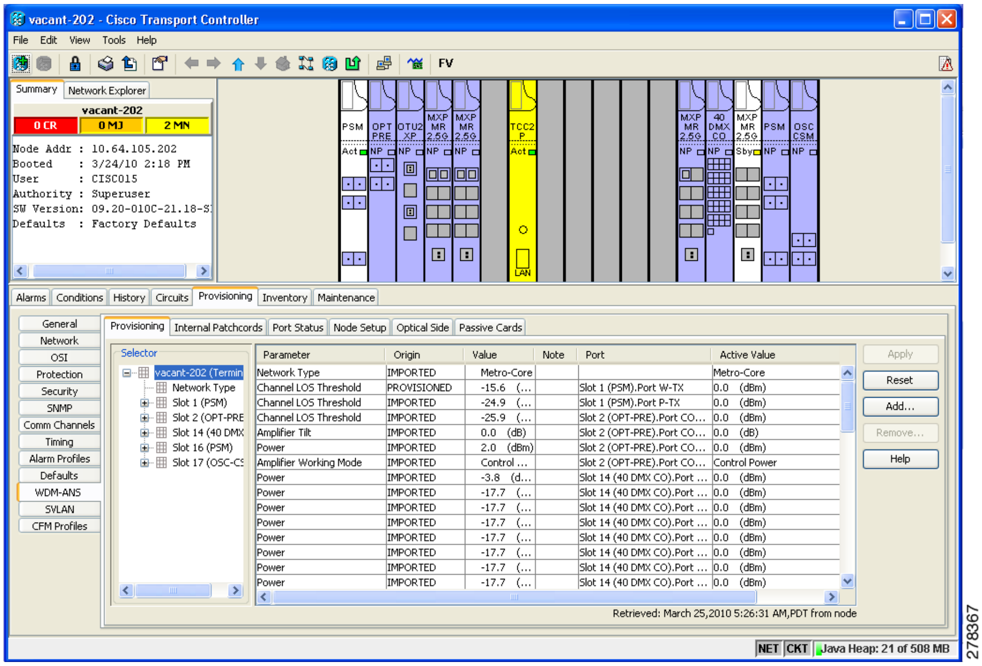
Table 12-11 Ranges, Values, and Edit Options for the ANS Parameters

ANS Parameter	Range/Value	Editable with Port in IS
Amplifier Gain	0.0 to 40.0 dB	No
Amplifier Tilt	-15.0 to +15.0 dB	No
OSC Power	-24.0 to 0.0 dBm	No
Raman Ratio	0.0 to 100.0%	Yes
Raman Total Power	100 to 450 mW	Yes
Raman Expected Gain[2]	0.0 to 12.0 dB	Yes
Power	-30.0 to +50 dBm	Yes[3]
WXC Dithering	0 to 33	No
Min Expected Span Loss	0.0 to 60.0 dB	No
Max Expected Span Loss	0.0 to 60.0 dB	No
VOA Attenuation	0 to 30 dB	Yes[4]
Raman Installation Gain (RAMAN-COP only)	30.0 to 8.0 dB	Yes
DFB Power (RAMAN-CTP only)	+6.0 to -5.0 dBm	Yes
DFB LOS Optical Threshold (RAMAN-CTP only)	-20.0 to -70.0 dBm	Yes

1. Per-channel power and tilt can be edited when the Amplifier Working Mode is Control Gain or Control Power and Fixed Gain when Amplifier Working Mode is Fixed Gain
2. Editable only on OPT-RAMP-C and OPT-RAMP-CE cards.
3. The APC increases or decreases power by 0.5 dB till the new power setpoint is reached. The APC-OUT-OF-RANGE alarm is raised if the updated power setpoint is outside the expected range.
4. VOA Attenuation associated with a single channel path can be edited when the working mode is Constant Power Value; VOA Attenuation associated with aggregated paths can be edited when the working mode is Constant Attenuation Value.

ANS parameters can be viewed in the node view Provisioning > WDM-ANS > Provisioning tab, as shown in Figure 12-81.

Figure 12-81 WDM-ANS Provisioning



The Provisioning > WDM-ANS > Provisioning tab presents the following information:

- Selector—Presents the ANS parameters in a tree view based on physical position. Clicking the + or – expands or collapses individual tree elements. Clicking a tree element displays the element parameters in the table on the right. For example, clicking the node name at the top displays all the node ANS parameters or clicking Slot 1 (PSM) displays the PSM amplifier parameters only. The ANS parameters can be sorted according to physical position.
- Parameter—Displays the ANS parameter name.
- Origin—Indicates how the parameter was calculated:
  - Imported—The value was set by importing the CTP XML file.
  - Provisioned—The value was manually provisioned.
  - Automatic—The value is automatically calculated by the system using the Raman provisioning wizard. For more information on how to provision using a wizard, see the "DLP-G468 Configure the Raman Pump Using the Installation Wizard" task on page 15-5.
- Value—Displays the ANS parameter value. The values can be modified manually, although manually modifying the ANS parameters is not recommended.
- Note—Displays information for parameters that could not be calculated, that is, parameters with Unknown appearing in the Value column.
- Port —Displays the port value. Port is represented as Slot.Port.
- Active Value —Displays the active parameter value. The active value cannot be modified manually. When you modify the parameter value in the Value field, the active value is updated with the modified value after you run ANS.

The Provisioning > WDM-ANS > Port Status tab presents the following information:

- Port—Displays the port value. The port is represented as Slot.Port.

- Parameter—Displays the ANS parameter name.
- Result—After you run ANS, the status for each ANS parameter in the Results column is provided:
  - Success - Changed—The parameter setpoint was recalculated successfully.
  - Fail - Out of Range—The calculated setpoint is outside the expected range.
  - Fail - Missing Input Parameter—The parameter could not be calculated because the required provisioning data is unknown or unavailable.
  - Not Applicable State—Ports are not in use.
- Value—Displays the parameter value.
- Set By—Displays the application that sets this parameter. This field can take the following values:
  - ANS
  - APC
  - Circuit Creation
  - Raman Wizard

A parameter could be set by more than one application. For example, VOA Attenuation parameter could be set by both ANS and APC. In this case, individual entries will be displayed for ANS and APC.

- Last Change—Displays the date and time when the parameter was last modified.

12.9.1 ANS Parameters in a Raman Node With Post-Amplifiers

The following ANS parameters drive the node regulations in the Raman node:

- Power (DC-TX port)—It is the per channel output power level that is allowed on the embedded erbium-doped fiber amplifier (EDFA) amplification stage of the OPT-RAMP-C or OPT-RAMP-CE card. The power can be measured accurately only when the value of the internal VOA is set to 0 dB. During circuit creation, the Power (DC-TX port) setpoint is used to calculate the Gain of the embedded EDFA(G^{EDFA}) in the OPT-RAMP-C or OPT-RAMP-CE card. The G^{EDFA} setpoint has a direct impact on the actual gain tilt that the embedded EDFA generates. If the value of the G^{EDFA} is greater than or less than the optimum Gain ($G^{OPTIMUM}$) setpoint of the OPT-RAMP-C or OPT-RAMP-CE card, the output spectrum is affected by a positive or negative gain tilt.

  The $G^{OPTIMUM}$ setpoints for the OPT-RAMP-C or OPT-RAMP-CE cards are:
  - OPT-RAMP-C —14 dB
  - OPT-RAMP-CE —11 dB

  The APC automatically calculates the gain tilt. The difference between the $G^{OPTIMUM}$ and G^{EDFA} values of every 1 dB causes a gain tilt of 0.7 dB. Setting an appropriate counter-tilt setpoint on the first amplifier card that is present downstream of the embedded EDFA, compensates the gain tilt.
- Power (COM-TX port)—It is the per channel power level that is allowed on the COM-TX port of the OPT-RAMP-C or OPT-RAMP-CE card. The Power (COM-TX port) setpoint and the DCU insertion loss is used to calculate the attenuation value of the internal VOA of the OPT-RAMP-C or OPT-RAMP-CE card when the first circuit is provisioned. The Power (COM-TX port) setpoint ensures that the power levels at the input port of the amplifier cards (configured in the OPT-PRE or the OPT-LINE mode) downstream are stable. CTP generates the setpoint to suit the optimum Gain range of the amplifier card used.

- Power (LINE-TX port)—It is the per channel power setpoint that is allowed on the LINE-TX output port. The amplifiers that are present downstream of the OPT-RAMP-C card can be configured as OPT-PRE in ROADM nodes or as OPT-LINE in optical line amplifier (OLA) nodes. When the first circuit is provisioned, the Power (LINE-TX port) setpoint is used to automatically calculate the Gain.
- Amplifier Tilt (LINE-TX port)—It is the gain tilt (TILT ^{CTP}) that CTP calculates based on the output power of the amplifier configured as OPT-PRE in ROADM nodes or as OPT-LINE in OLA nodes. This is the target value to be reached after circuit creation. The APC dynamically adjusts the tilt reference (TILT ^{REFERENCE}) value to meet the target taking into consideration the Raman tilt (TILT ^{RAMAN}) that the Raman installation wizard calculates and the EDFA tilt (TILT ^{EDFA}) that is calculated by the OPT-RAMP-C or OPT-RAMP-CE card based on its G^{EDFA} value:

  TILT ^{CTP} setpoint = TILT ^{RAMAN} + TILT ^{EDFA} + TILT ^{REFERENCE}

12.9.2 ANS Parameters in a Raman Node Without Post-Amplifiers

The TCC automatically identifies the node layout as “Raman Only” and regulates the amplifiers and VOA.

The following ANS parameters drive the node regulations in the Raman node without post-amplifiers:

- Amplifier Tilt (DC-TX port)—CTP configures a predefined tilt value in the range of +/- 1.5 dB on the embedded EDFA, based on the optical characteristics of the fiber downstream of the OPT-RAMP-C or OPT-RAMP-CE card. The embedded EDFA amplifier in OPT-RAMP-C or OPT-RAMP-CE cards work in the fixed gain mode. The G^{EDFA} is equal to the G ^{OPTIMUM} setpoint by default and ensures a flat output spectrum.

  The G ^{OPTIMUM} setpoints of the OPT-RAMP-C or OPT-RAMP-CE cards are:

  - OPT-RAMP-C—14 dB
  - OPT-RAMP-CE—11 dB

  If the tilt reference value is not equal to zero, it has a direct impact on the G^{EDFA}. The APC changes the tilt reference value and consequently the G^{EDFA} by taking the system tilt contribution accumulated along the transmission line.
- POWER (LINE-TX port)—It is the maximum per channel power level that is allowed on the LINE-TX port of the OPT-RAMP-C, OPT-RAMP-CE, or OSC-CSM card in accordance to the node layout. CTP calculates this setpoint to ensure that the system does not suffer from non-linear effects. The APC can change the power levels based on the traffic pattern and fiber type but never exceeds the setpoint value.

12.9.3 Raman Setup and Tuning

Raman amplification occurs in the optical fiber and the consequent Raman gain depends on the characteristics of the span (attenuator presence, fiber type, junctions, etc.). As two Raman pumps at two different wavelengths are used to stimulate the Raman effect, not only is the total signal power calculation significant, but the right mix of power to ensure gain flatness is crucial. These set points of the total Raman power and Raman ratio can be configured on the OPT-RAMP-C or OPT-RAMP-CE card in three ways:

- Raman installation wizard
- CTP XML file

- CTC/TL1 interface

Raman amplification on OPT-RAMP-C or OPT-RAMP-CE cards depends on the optical fiber installed. Therefore, Raman total power and Raman ratio values calculated using the Raman installation wizard via CTC is more accurate than the values provisioned by loading the CTP XML file. For this reason, the value provisioned using the wizard cannot be overridden by the CTP XML file. However, the values provisioned using the wizard or the CTP XML file can be overriden by manually provisioning the parameters.

When the Raman installation is completed, a report of the status of Raman configuration on a node in the OPT-RAMP-C or OPT-RAMP-CE card can be viewed in the Maintenance > Installation tab when you are in card view.

The Installation tab displays the following fields:

- User—Name of user who configured the Raman pump.
- Date—Date when the Raman pump was configured.
- Status
  - Raman Not Tuned—The OPT-RAMP-C or OPT-RAMP-CE card was provisioned but ANS was not launched.
  - Tuned by ANS—ANS was run successfully and the basic ANS parameters were applied.
  - Tuned by Wizard—The Raman installation wizard was run successfully without errors.
  - Tuned by User Acceptance—The Raman installation wizard was completed with errors and the user accepted the values that the wizard calculated.
  - Raman is Tuning—The Raman installation wizard is running.
- S1Low (dBm)—See Table 12-12.
- S1High (dBm)—See Table 12-12.
- S2Low (dBm)—See Table 12-12.
- S2High (dBm)—See Table 12-12.
- Power (mW)—Total Raman power set points.
- Ratio—Raman pump ratio setpoint.
- Gain—Expected Raman gain that the wizard calculated.
- Actual Tilt—Expected Raman tilt that the wizard calculated.
- Fiber Cut Recovery—Status of the fiber cut restoration.
  - Executed—The restore procedure was completed successfully.
  - Pending—The restore procedure is not complete.
  - Failed—The system failed to execute the procedure.
- Fiber Cut Date—Date when the fiber cut occured.

The Raman pump is equipped with two different Raman pumps transmitting powers (P1 and P2) at two different wavelengths λ 1 and λ 2. During installation, the two pumps alternatively turn ON and OFF at two different power values. $\lambda 1$ and $\lambda 2$ signals are used as probes at the end of spans to measure Raman gain efficiency of the two Raman pumps separately.

The example in Figure 12-82 shows the Raman gain on an OPT-RAMP-C or OPT-RAMP-CE card in Node B that was measured by setting the wavelength and power measurements as follows:

λ 1=1530.33 nm signal probe at Node A λ 2=1560.61 nm signal probe at Node A

P1 = 1425 nm power at Node B

P2 = 1452 nm power at Node B

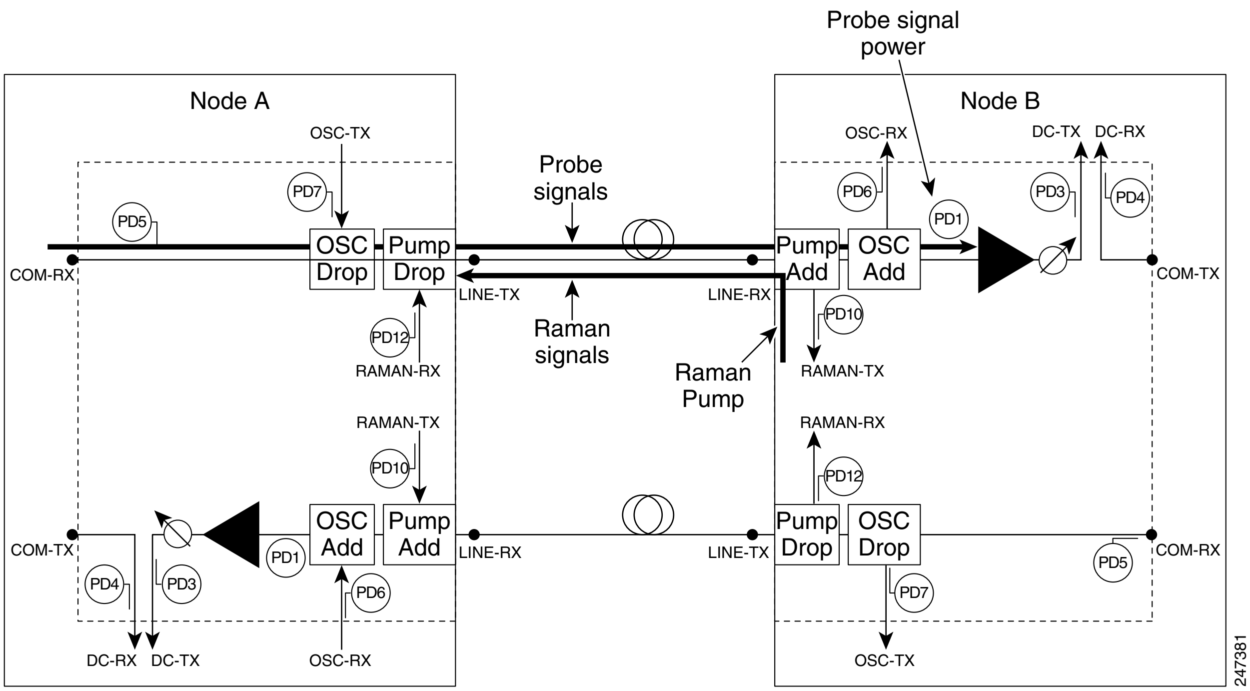
Plow = 100 mW

Phigh = 280 mW

Pmin = 8 mW

Pmax = 450 mW

Figure 12-82 Raman Gain on Node B



The S1low, S1high, S2low, and S2low values in the Maintenance > Installation tab are based on the power values read on the LINE-RX port of Node B.

Table 12-12 Example of Raman Power Measurements

Input	P1	P2	Probe Signal Power Received at Node B
λ 1=1530.33 nm at Node A	Plow = 100 mW	Pmin = 8 mW	S1low
	Phigh = 250 mW	Pmin = 8 mW	S1high
λ 2=1560.61 nm at Node A	Pmin = 8 mW	Plow = 100 mW	S2low
	Pmin = 8 mW	Phigh = 250 mW	S2low

12.9.4 RAMAN-CTP and RAMAN-COP Card Start Up and Fiber Link Turn Up

The local and remote nodes, equipped with RAMAN-CTP and RAMAN-COP cards, must follow this sequence to startup the card and complete the Raman link turn up.

1. The distributed feedback laser must be enabled—The RAMAN-CTP cards are equipped with embedded distributed feedback (DFB) lasers that operate at 1568.77 nm. The DFB RX port is capable of detecting very low power levels (-55 dBm or -60 dBm). By default, the DFB laser is disabled and the DFB ports are in IS-AINS (ANSI)/Unlocked,automaticInService (ETSI) state. The DFB ports are moved to IS (ANSI)/Unlocked (ETSI) state and the laser is enabled in pulse mode, by performing either one of the following:
   a. In a DCN Extension layout, ANS is launched. A side-to-side OTS provisionable patchcord (PPC) is created on the side of the node where the RAMAN-CTP card is installed after the DFB ports are successfully regulated (ports are in service). During the creation of the PPC, the TNC card moves the following ports to the IS (ANSI)/Unlocked (ETSI) state:
      – Ports included in the optical path—LINE ports of the RAMAN-CTP card
      – RAMAN-TX and ASE-RX ports of the RAMAN-CTP card
      – RAMAN-TX port of the RAMAN-COP card (if the card is installed)

   Note At this stage, the RAMAN ports do not emit power pulses even though they are in IS (ANSI)/Unlocked (ETSI) state.

   b. In an OSC based layout, ANS is launched. An OSC termination is created on the side of the node where the RAMAN-CTP card is installed after the DFB ports are successfully regulated. During creation of the OSC termination, the TNC card moves the following ports to the IS (ANSI)/Unlocked (ETSI) state:
      – Ports included in the optical path—LINE and COM ports of the RAMAN-CTP card and the LINE ports of the line amplifier
      – RAMAN-TX and ASE-RX ports of the RAMAN-CTP card
      – RAMAN-TX port of the RAMAN-COP card (if the card is installed)

   Note At this stage, the RAMAN ports do not emit power pulses even though they are in IS (ANSI)/Unlocked (ETSI) state.

   The DFB laser from the local node emits a 5-second pulse every 100 seconds and waits for a similar 5-second pulse in response from the DFB laser on the remote node.

Note For short spans, the DFB optical power level must be regulated by the internal VOA (working in constant power mode) using the provisioned value of the DFB power setpoint. The DFB power setpoint is limited to a maximum of +3 dBm.

2. The DFB laser link continuity is checked—The acknowledgement mechanism between the peer DFB modules works in the following manner:
   – The DFB laser on the local node emits a 5-second pulse.
   – The remote node detects a valid signal (value above the DFB LOS Optical Threshold) on the DFB-RX port and responds with a 9-second DFB laser pulse.

- The local node detects a signal from the remote DFB laser on the DFB-RX port and starts a counter to check the duration of the remote pulse.
- If the signal is detected for at least 9 seconds, link continuity is verified and the local node moves the DFB laser to steady (active) state.
- The remote node performs a similar signal validation and eventually the DFB link is active.

Note If the DFB-RX port detects a drop in the power below the threshold value before 9 seconds have elapsed, the procedure to check DFB link continuity is restarted.

Note If one of the fibers is down, the DFB signal must be in OFF state in the opposite fiber too. The acknowledgement mechanism automatically performs this action.

3. A check for short spans is performed—When the DFB signal is active, a point-to-point measurement of the span loss is done. The node measures the loss on the incoming span because the DFB signal is co-propagating. The insertion loss is the difference between the power value on the DFB-TX port of the remote node and the power value on the DFB-RX port of the local node. If the span loss is less than 20 dB, the RAMAN-CTP card raises the PWR-PROT-ON alarm on the RAMAN-TX port and the Raman pumps stop the startup procedure.
4. Excessive back reflection on RAMAN-CTP cards is checked—After the span loss check is complete, the Raman pumps on the RAMAN-CTP card on the local node are turned on in Automatic Power Reduction (APR) mode at reduced power (10 mW) lasting for 200 ms. The RAMAN-CTP cards perform a back reflection power test using an embedded fail threshold, which is configured during card production. The back reflection test lasts for 500 ms at the maximum. If the back reflection test is successful, the sequence continues with Step 5. If the check fails, the RAMAN-CTP get stuck with the DFB laser in ON state and the Raman pumps do not switch to full power. A Raman Laser Shutdown (RLS) alarm is raised on the RAMAN-TX port, where the failure is detected.
5. Excessive back reflection on RAMAN-COP cards is checked, if the RAMAN-COP cards are installed—The Raman pumps on the RAMAN-CTP card on the local node must shut down after the back reflection test is successful. This allows the same check to be executed by the RAMAN-COP card on the local node without any interference from the RAMAN-CTP card remnant signal.

   When the Raman pumps on the RAMAN-CTP card shut down, a specific command is sent through the backplane lines to the RAMAN-COP card on the local node to turn on the Raman pumps on the RAMAN-COP card to APR mode and perform a back reflection test on the internal connection (RAMAN-TX port of the RAMAN-COP card to the RAMAN-RX port of the RAMAN-CTP card). The back reflection test lasts for a maximum of 500 ms. If the back reflection test is successful, the Raman pumps on RAMAN-COP cards are immediately moved from the APR state to full power using the Total Power setpoint. If the back reflection check fails, the RAMAN-COP pumps get stuck in APR state and a RLS alarm is raised on the RAMAN-TX port, where the failure is detected.
6. The Raman pumps of the RAMAN-CTP card on the local node are moved to full power after the waiting time elapses—When the local RAMAN-CTP card, in Step 5 shuts down its Raman pumps to initiate Raman pump startup of the RAMAN-COP card, it transitions to a waiting mode. After the expiry of 12 seconds, the RAMAN-CTP card must turn up its Raman pumps and move them to full power using the Total Power setpoint irrespective of any alarm that is raised by the RAMAN-COP card in Step 5.
7. The Raman link is tuned—A manual Raman Day 0 tuning procedure must be executed before creating the OCH circuits. The Raman link can also be tuned by the ANS parameters. The Raman amplified span is now ready for traffic provisioning.

8. The OSC link is turned up and the ALS condition is removed on the line amplifiers—When the RAMAN-CTP (and RAMAN-COP, if present) Raman pumps are tuned, the amplification provided in the fiber is sufficient to detect a valid OSC signal, even in very long spans. The OSC detection clears the LOS-O alarm and results in the removal of the ALS condition on the line amplifiers. If an OSC signal is not available, the amplified spontaneous emission (ASE) Raman noise power received at the LINE-RX port of the line amplifier is sufficient to remove the LOS-O alarm and enable the line amplifier startup.

The RAMAN-CTP and RAMAN-COP (if installed) cards on the remote node must perform the same start up sequence (Steps 4 through 8) in asynchronous mode with respect to the local node.

12.10 DWDM Network Functional View

The DWDM network functional view displays a graphical representation of the DWDM cards, internal connections, circuits, optical power, and alarms in the DWDM network. The DWDM network functional view is similar to the DWDM functional view in its graphical layout and behavior at the node level.

The DWDM network functional view consists of two views:

- NFV view—Enables you to view the circuit connections and the flow of signals at the network level.
- GMPLS view—Enables you to create Generalized Multiprotocol Label Switching (GMPLS) circuits that are optically feasible. These circuit connections can be viewed at the network level. The GMPLS view also helps to reroute a circuit on an alternate path. For more information about GMPLS circuits, see the "12.10.1 GMPLS Control Plane" section on page 12-108.

The DWDM network functional view offers dual options to view the network:

- Graphical view—Displays the circuit connections, optical power, and alarms on a circuit through a graphical representation. To view the graphical display of the circuit connections, select the circuit in the Circuits tab in the Network Data pane. In the toolbar, click the **dB**, **SL**, or **PV** tool to view the optical power in the nodes, span loss values of the spans, or insertion loss of the patchcords, respectively. For more information about the use of the graphical view, see the "12.10.2.1 Graphical View Pane" section on page 12-111.
- Tabular format—Displays the circuit connections, optical power, and alarms of a circuit in a tabular format in the Network Data pane. For more information about the Network Data pane, see the "12.10.2.3 Network Data Pane" section on page 12-113.

  For information on how to view optical power values and alarms of the circuit selected in the Circuits tab of the Network Data pane, see the "NTP-G231 View Optical Power Values and Alarms Using Network Functional View" task on page 12-120.

You can export the DWDM network functional view reports to .html, .csv, or .tsv format. For more information on exporting the reports, see the "DLP-G529 Export Network Functional View Reports" task on page 12-121.

12.10.1 GMPLS Control Plane

This section describes the GMPLS-based control plane. The GMPLS control plane can be used to provision optical channels for the ONS 15454 DWDM platform.

When a circuit is created using the Circuit Creation wizard in CTC, the circuit gets provisioned but might not be able to carry traffic due to optical signal degradation caused by optical impairments such as:

- Optical Signal-to-Noise Ratio (OSNR)

- Chromatic Mode Dispersion (CMD)
- Polarization Mode Dispersion (PMD)
- Four-Wave Mixing (FWM)
- Self-Phase Modulation (SPM)
- Polarization Dependent Loss (PDL)
- Xtalk

To overcome this problem, a GMPLS-based control plane is now supported that has the capability to validate the optical channel feasibility before a circuit is provisioned. The GMPLS control plane is available with the Cisco ONS 15454 DWDM WSON package and is supported on the Cisco ONS 15454, Cisco ONS 15454 M6, and Cisco ONS 15454 M2 platforms. A GMPLS circuit is provisioned only if the optical feasibility is established ensuring transmission of client traffic on the network.

The optical plane uses the GMPLS routing and signalling protocols, such as Open Shortest Path First - Traffic Engineering (OSPF-TE) and Resource Reservation Protocol - Traffic Engineering (RSVP-TE) to determine available optical routes.

Bandwidth, network protection, traffic engineering, and optimal utilization of network resources are taken into consideration during path computation, validation, and provisioning.

The functions of the GMPLS control plane are:

- Identifying network topology
- Discovering automatically resources, such as Network Elements (NEs), links, paths, wavelengths, and OCH ports
- Calculating optical paths
- Validating optical circuits taking into account the optical impairments
- Provisioning optical channels (OCHCC, OCHNC, and OCH Trail)
- Rerouting wavelength for traffic restoration

In mesh networks consisting of omnidirectional and colorless ROADM nodes, it is possible to provision a circuit using any path and wavelength, without recabling or physical intervention on the site. The GMPLS control plane controls and provisions the DWDM optical interfaces installed on routers by defining the appropriate wavelength.

When resources are added to or removed from the network, the control plane can reroute existing connections through an alternate path having optical feasibility to make the best use of the newly available resources.

These topics provide additional information on the usage of GMPLS control plane:

- 12.10.1.1 Card Support
- 12.10.1.2 Acceptance Thresholds
- 12.10.1.3 Validation Modes

12.10.1.1 Card Support

Table 12-13 lists the card supported by the GMPLS control plane.

Table 12-13 Cards Supported by the GMPLS Control Plane

Unit Type	Card Name
TXP/MXPs	All the TXP/MXP cards except AR-MXP and AR-XP cards.
Amplifiers	OPT_BST, OPT_BST_E, OPT_AMP_17_C, OPT_PRE, OPT_AMP_C, OPT_RAMP_C, OPT_RAMP_E, OPT_EDFA_17, and OPT_EDFA_24
Filters	DMX40, DMX32, MUX40, 15216-MD_40_ODD, and 15216-MD_40_EVEN
Deinterleavers	MD_ID_50 and 15216_ID_50
ROADMs	32WSS, 40WSS-C, 40-WXC-C, 80-WXC-C, 40-SMR1-C, and 40-SMR2-C
Patch panels	15454-PP-4-SMR, PP-MESH-4, PP-MESH-8

12.10.1.2 Acceptance Thresholds

The GMPLS control plane validates the optical feasibility of an OCH circuit to ensure that the circuit is operational after provisioning. The optical feasibility is determined based on the optical impairments. The optical feasibility is represented by the following colors:

- Green—Indicates that the channel failure risk is 0%.
- Yellow—Indicates that the channel failure risk is between 0% and 16%.
- Orange—Indicates that the channel failure risk is between 16% and 50%.
- Red—Indicates that the channel failure risk is greater that 50%.

During circuit creation, you can define the acceptance threshold value in the Circuit Parameters pane of the GMPLS view in CTC. The circuit is provisioned only if the evaluated feasibility is greater than or equal to the user-defined threshold.

After the circuit is created, its acceptance threshold and optical feasibility is displayed in the Acpt Threshold and the Opt Valid columns in the Circuits tab in CTC.

12.10.1.3 Validation Modes

In GMPLS view, the validation mode can be set during circuit creation. The validation modes are:

- Full—The circuit gets created when the circuit validation result is greater than or equal to the acceptance threshold value.
- None—The circuit is created without considering the acceptance threshold value. The Opt Valid column in the Circuits tab displays the value, “No Valid”.

12.10.2 DWDM Network Functional View (NFV)

This section describes the NFV view.

To navigate to the NFV view, go to the network view in CTC and click the **FV** icon in the toolbar. The NFV view opens.

The NFV view has the following panes:

12.10.2.1 Graphical View Pane

The graphical view displays all the nodes and devices in the network. Use the graphical view to gather information on circuits, optical power, and alarms for nodes.

To expand a node, double-click the node in the network functional view map or right-click the node and choose **Open Node FV**. The node opens and the sides of the nodes are displayed showing the various cards and patch panels present on each side. To open only one side of a node, right-click the node and choose **Open Side > Side:*x*** from the context menu.

Place the mouse over a card to view the card information. For example, when the mouse is placed over the OPT-BST card of a side, the tooltip text displays OPT-BST: shelf1/s1, indicating that the OPT-BST card is located in Shelf 1, Slot 1. Double-click a card to bring up the CTC card view.

To view the port information, place the mouse over a card port. For example, when the mouse is placed over the first port of the 40-MUX card, the tooltip text displays CARD_PORT-BAND-1-RX, indicating that the port is for the first band of wavelengths (wavelengths 1 to 8) to be added into the optical path on the 40-MUX card. These wavelengths come into the 40-MUX card from a transponder (TXP) or muxponder (MXP) on the patch panel.

Place the mouse over a patchcord to see the state of the output and input port associated with that patchcord.

When you right-click inside a side view, a context menu appears with the options listed in Table 12-14.

Table 12-14 Side View Context Menu Options

Option	Description
Close Node FV	Closes the node functional view.
Node DoubleZoomIN	Magnifies the node view to double its size.
Node DoubleZoomOUT	Reduces the node view to half of its size.
Node Select all	Selects the complete node.
Rotate Left	Rotates the side 90 degrees counterclockwise (all connections are maintained).
Rotate Right	Rotates the side 90 degrees clockwise (all connections are maintained).
Close Side	Closes the side view.
Open Side	Opens the side view.

Additionally, to zoom-in and zoom-out of the map, press **Ctrl** and scroll up and down with the scroll wheel on your mouse. The keystroke commands provide the keyboard shortcuts for graphical control of the NFV. To access the keystroke commands, click **Help** > **Keystroke commands**.

When you have multiple node functional views opened, you cannot view the graphical details of the individual nodes due to overlapping. To avoid overlapping of the nodes:

1. Select the entire node by clicking on the title bar of the node and pressing **Ctrl+A**. Drag the node away from other nodes.
2. Select the individual side of the node and drag it away from other sides.

12.10.2.1.1 DWDM NFV Toolbar Options

Table 12-15 lists the tools available in the DWDM NFV toolbar.

Table 12-15 DWDM NFV Toolbar Options

Tool	Description
Pan	Enables you to select and move the whole network view.
Select	Enables you to select entities by clicking on them or by dragging a rectangular area around them.
Zoom in rect	Enables you to zoom in the area defined by drawing a rectangle.
Zoom in	Zooms in the circuit map.
Zoom out	Zooms out the circuit map.
Reset Nodes Zoom	Resets the graphical view to the default zoom size.
Fit to View	Resizes the view to fit all the nodes in the graphical view.
Print	Prints the functional view data.
Magnifier	Displays a virtual magnifying glass which zooms in the area underneath. Hold the left mouse button to see the magnifying glass.
dB (Show Power)	Displays the optical power (dBm) for the card ports in the form of power balloons. This information is available for the nodes that have the functional view open. You can view the aggregated power only for those nodes that have the FV open. To open the node FV, right-click the node and choose **Open Node FV**. Right-click the internal patchcord link and select the **Flip Power Balloons** option to change the position of power balloon on the selected patchcord. The power balloon is flipped and you can see the power details of the selected patchcord without the power balloons overlapping with each other.
SL (Show Spanloss)	Displays the span loss value on the spans.
PV (Verify Patchcords)	• Displays the insertion loss of the patchcord. The PV calculates the input and output power of the patchcord. You can view the insertion loss of the patchchord only for those nodes that have the FV open. To open the node FV, right-click the node and choose **Open Node FV**. The insertion loss should not exceed 2 dBm. The patchcord lines are colored to indicate the insertion loss: – Red—Indicates that the insertion loss of the patchcords exceeded 2 dBm. – White—Indicates that the system was not able to calculate the insertion loss of the patchcord. – Black—Indicates that the insertion loss of the patchcords is within the limit and not more than 2 dBm.
Refresh Power Info	Refreshes the optical power and span loss information. The optical power and span loss information is calculated and is refreshed in the graphical display and optical power table.
Close Expanded Nodes	Closes all the opened nodes in the functional view.

Tool	Description
Make node invisible	Hides the nodes that are not part of the selected circuit.
Reset To Default	Restores the panes in the network functional view to its default locations.

12.10.2.2 Overview Pane

The Overview pane displays the complete network. A rectangle is displayed in the Overview pane. The area enclosed by the rectangle is enlarged and displayed in the graphical view. To view a specific area of the network in the graphical view, move the rectangle to that location in the Overview pane. To zoom in or zoom out the network in the graphical view, resize the rectangle by dragging its corners in the Overview pane.

12.10.2.3 Network Data Pane

The Network Data pane displays the following three tabs that provide information about circuits:

- **Circuits**—Displays the list of circuits in the network. Choose the circuit from the list to view the circuit information. A graphical display of the selected circuit and the associated span is visible in the map. Additionally, you can view the general information (type, source, and destination), state (IS,OOS [ANSI] or unlocked, locked [ETSI]), and physical connection details (wavelength, direction, and span) of the selected circuit.

  The circuit can be in any one of the following states:
  - DISCOVERED
  - PARTIAL
  - DISCOVERED_TL1
  - PARTIAL_TL1
  - TO_BE_UPGRADED

  When you upgrade from Release 9.21 to Release 9.3 and later releases, some OCHNC circuits do not automatically upgrade during the software activation process. To manually upgrade these circuits, select the **Reconfigure Circuits** option in the CTC **Tools > Circuits** menu. During reconfiguration, CTC reassembles all connections of the selected circuits based on path size, direction, and alignment.

  When you switch the selection between the circuits, and if both the circuits are in DISCOVERED_TL1 status, the circuit details of the new selection may not be displayed as the previously selected circuit details are not refreshed.

  If you find that the current selection is not refreshed, do either of the following:
  - Deselect the selected circuit before selecting the another circuit.
  - Update all the selected circuits using the **Reconfigure Circuits** option.
- **Optical Power**—Displays the optical link and span loss of the circuits. This tab lists the aggregated power-in and power-out of all the internal patchcords for the nodes that have the functional view open.

- **Alarms**—Displays all the alarms present on the network. If a card has one or more alarms (that is part of the selected circuit), the node turns either yellow or red, depending on the severity of the alarm. The alarm in red indicates a major alarm and yellow indicates a minor alarm. If there is an alarm present in the card that is not part of the selected circuit, then the node appears gray.

  If a node has alarms that is not part of the selected circuits, then the alarms are not listed in the table, but the node is colored in the map.

12.10.3 DWDM Network Functional View (GMPLS)

This section explains the GMPLS view.

The GMPLS view uses the GMPLS control plane to provision circuits. For more information about the GMPLS control plane, see the "12.10.1 GMPLS Control Plane" section on page 12-108.

To navigate to the GMPLS view, go to the network view in the CTC and click the **FV** icon in the toolbar. Choose **GMPLS** from the Perspective View drop-down list. The GMPLS view opens.

The GMPLS view has the following panes:

- 12.10.2.1 Graphical View Pane
- 12.10.2.2 Overview Pane
- 12.10.2.3 Network Data Pane
- **Circuit Parameters Pane**—Options in this pane are used to provision a GMPLS circuit.
- **Working/Protect Port Parameters Pane**—Options in this pane are used to provision working and protect port parameters for the GMPLS circuit.
- **Alien Wavelength Selection Pane**—Options in this pane are used to provision the alien class wavelength.
- **Wavelength Re-route Pane**—Options in this pane are used to reroute a GMPLS circuit on an alternate path. For more information about wavelength rerouting, see the "12.10.3.4 Wavelength Rerouting" section on page 12-118.

12.10.3.1 GMPLS View Toolbar Options

The GMPLS view has the same set of tools as the NFV view as listed in Table 12-15. The additional toolbar options are described in Table 12-16.

Table 12-16 GMPLS View Toolbar Options

Tools	Description
W&P Constraints Config	Displays the list of constraints to be applied on the nodes or links. For information about path constraints, see the "12.10.3.2 GMPLS Path Constraints" section on page 12-115.

Tools	Description
S/D Configuration	Displays the options to define the source or destination port during GMPLS circuit creation. For more information about configuring the source and destination ports, see the "12.10.3.3 Source and Destination Port Configuration" section on page 12-116.
Wavelength re-routing	Displays the Wavelength re-routing view that can be used to reroute a GMPLS circuit on an alternate path. For more information about wavelength rerouting, see the "12.10.3.4 Wavelength Rerouting" section on page 12-118

12.10.3.2 GMPLS Path Constraints

During GMPLS circuit creation or wavelength rerouting, it is possible to force specific nodes and links to be included or excluded in the circuit path by applying specific constraints. The GMPLS circuit is created if a feasible path is found that complies with the specified constraints.

In the GMPLS view, the W&P Constraints Config drop-down list in the toolbar provides the constraint options listed in Table 12-17 during circuit creation. Choose the required option and select the node or span in the graphical view to which the constraint must be applied.

Table 12-17 Working and Protect Path Constraint Options

Option	Description
exclude W Node	The working path does not pass through the selected node.
exclude P Node	The protect path does not pass through the selected node.
exclude W&P Node	The working and protected path do not pass through the selected node.
include W Node	The working path passes through the selected node.
include P Node	The protect path passes through the selected node.
exclude W Link	The working path does not use the selected span.
exclude P Link	The protect path does not use the selected span.
exclude W&P Link	The working and protected path do not use the selected span.
include W Link	The working path uses the selected span.
include P Link	The protect path uses the selected span.

In the Wavelength re-routing view, the Constraints Config drop-down list provides constraint options listed in Table 12-18. Choose the required option and select the node or span in the graphical view to which the constraint must be applied.

Table 12-18 Reroute Path Constraint Options

Option	Description
exclude Node	The rerouted path does not pass through the selected node.
include Node	The rerouted path passes through the selected node.
exclude Link	The rerouted path does not use the selected span.
include Link	The rerouted path uses the selected span.

> **Note** The constraint options can also be accessed by right-clicking the node or span.

12.10.3.3 Source and Destination Port Configuration

During GMPLS circuit creation, the source and destination ports at the circuit endpoints must be defined in the map. The circuit endpoints can be channel ports (on line cards) or TXP/MXP ports depending on the circuit type being created.

Use either of the following methods to define the source and destination ports:

Method 1:

1. From the S/D Configuration drop-down list, choose either of the following:
   - Working S/D—The selected ports are defined as the source and destination ports on the working path.
   - Protected S/D—The selected ports are defined as the source and destination ports on the protect path.
2. Click a node in the map to open the node functional view. The sides of the nodes are displayed showing the various cards and patch panel present on each side. To open only one side of the node, right-click the node and choose **Open Side > Side:*x*** from the context menu.
3. Click the patch panel to open it. All the patchcords and cards connected to the patch panel are displayed.
4. Use the zoom tools in the toolbar to manage the graphical view.
5. Click the card port that is associated with the wavelength for which the circuit is being created. A pop-up menu displays the available options:
   - If the port is on a TXP/MXP card, available client and trunk interfaces are displayed. Select the required interface.
   - If the port is an add/drop port, a list of supported wavelengths is displayed. Select the required wavelength.

Method 2:

1. Open the node functional view on the map by using either one of the following:
   - Double-click the node.
   - Right-click the node and select **Open Node FV** from the context menu.
   - The various cards and patch panel connected to each side are displayed.
2. Use the zoom tools in the toolbar to manage the graphical view.
3. Double-click the patch panel. The patch panel opens displaying all the patchcords and cards connected to it.
4. Click the card port that is associated with the wavelength for which the circuit is being created. A pop-up menu displays the available options:
   - If the port is on a TXP/MXP card, available client and trunk interfaces are displayed. Select the required interface.
   - If the port is an add/drop port, a list of supported wavelengths is displayed. Select the required wavelength.
5. A pop-up menu appears that displays one of the following pair of options:

- Work. Bid Src/Dst Port—The selected port is the bidirectional source and destination port on the working path.
- Prot. Bid Src/Dst Port—The selected port is the bidirectional source and destination port on the protect path.

- Work. Source Port—The selected port is the source port on the working path.
- Prot. Source Port—The selected port is the source port on the protect path.

- Work. Destination Port—The selected port is the destination port on the working path.
- Prot. Destination Port—The selected port is the destination port on the protect path.
- Select the required option.

After the port is defined as the source or destination, a balloon is displayed on the map. The balloon indicates that the port is the source (S), destination (D), or both (S/D) for the circuit endpoint along with the associated wavelength. If the port is on the working path, the balloon is light blue in color; if the port is on the protect path, the balloon is deep blue in color.

Note During the creation of a Y-cable protected OCHCC circuit, the protected port gets selected automatically when the working port is selected because both the ports are in the same protection group.

12.10.3.3.1 Working and Protect Port Parameters

After a port is selected in the map as the source or destination endpoint, the Working Port Parameters pane, or Protected Port Parameters pane, or both are displayed depending on whether the selected ports are on the working or protect path. Table 12-19 lists the port parameters relevant to the selected port that are displayed in these panes.

Table 12-19 Working and Protect Port Parameters

Item	Description
Client Port	Displays the client port information.
ITU-T G709	Sets the ITU-T G.709 monitoring setting on the optical transport network. The available options are Enable or Disable.
FEC Mode (OCHCC and OCH trail only)	Sets the FEC mode for OTN lines. FEC mode can be Disabled, Standard, or Enhanced (provides greater range and lower bit error rate).
Mapping Type	Sets the mapping for the card. The options available are Not used, Asynchronous, Synchronous, ODU Multiplex (client SONET/SDH payload), or No Fixed Stuff. The choices available depend on the card.

Item	Description
MLSE Setting	If checked, sets the maximum likelihood sequence estimation (MLSE) parameter on the trunk port of the MXP_MR_10DME, MXP_MR_10DMEX, TXP_MR_10E, TXP_MR_10EX, MXP_2.5G_10E, and MXP_2.5G_10EX cards. The options available are Enable and Disable.
Overclock Setting	Enables or disables overclock mode on the trunk port.

The working and protect port parameters on the source and destination endpoints must match with each other. Otherwise, the mismatched parameters are displayed in red in the port parameters pane. If feasible, align the parameters by using the various drop-down lists available in this pane. Choose **Apply** to confirm selection.

12.10.3.4 Wavelength Rerouting

A GMPLS circuit can be rerouted through an alternate path that adheres to all the parameters that were defined during the circuit creation. Additional path constraints also must be specified based on which alternate route is computed. For more information about reroute path constraints, see Table 12-18. The wavelength re-routing feature provides an efficient solution for circuit restoration during path failure. For more information on wavelength rerouting, see the "DLP-G710 Reroute Wavelength of GMPLS Circuits" task on page 16-48.

12.10.3.5 Fiber Attributes and Alien Wavelength Provisioning

Choose the **Provisioning > WDM-ANS > GMPLS/WSON** tab to define and view fiber and alien wavelength parameters to be used during GMPLS circuit creation or upgrade of a a non-GMPLS Circuit to a GMPLS circuit. The GMPLS/WSON tab contains three subtabs, namely Fiber Attributes, Alien Wavelength, and Alien Ports.

The parameters available in the Fiber Attributes, Alien Wavelength, and Alien Ports tabs are populated in CTC after importing the Cisco Transport Planner NE Update configuration file. See "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" task on page 14-47 for more information. If required, additional changes can be made to these parameters in the Fiber Attributes and Alien Wavelength tabs.

The Fiber Attributes tab is used to view and define the fiber parameters, which are displayed in a tabular format. Table 12-20 lists the fiber parameters available in the Fiber Attributes tab.

Table 12-20 Fiber Attributes Tab Parameters

Option	Description
Side	Displays the optical side to which the fiber is connected.
Fiber Type	Choose the fiber type from the drop-down list.
Topology direction	Displays whether the link is entering or exiting the node.
Fiber number	Displays the fiber sequence number. Useful when different types of fiber are present on the span.
Length	Allows to edit the fiber length.

Use the Side drop-down list to choose a side; the attributes of the fibers that are connected to that side are displayed in the table. The Unit drop-down list enables you to choose the measurement unit for the fiber length. If required, the fiber type and the fiber length can be modified in the table. Choose **Apply** to apply the changes.

The Alien Wavelength tab is used to view and define the port and wavelength parameters for the alien wavelength. Table 12-21 lists the options available in the Alien Wavelength tab. After making the necessary settings, choose **Apply** to apply the changes.

Table 12-21 Alien Wavelength Tab Options

Option	Description
Type	Select the type of card on which the alien wavelength is configured. The available options are optical card and passive card. The Passive Card option is available only if there are passive cards available on the network.
Shelf	Choose the shelf in which the card resides.
Slot	Choose the slot in which the card resides.
Port	Choose the card port on which the alien wavelength is configured.
Alien Wavelength	Choose the alien wavelength class.
Lambda	Displays the alien wavelength value.
FEC	Sets the FEC mode on the alien wavelength channel. The available modes are: • Disabled • Standard • Enhanced • Enhanced I.4 • Enhanced I.7

The Alien Ports tab is used to view the port and wavelength parameters for the alien wavelength, which is displayed in a tabular format. Table 12-22 lists the details displayed in the Alien Ports tab. Choose the **Refresh** button to refresh the tab fields.

Table 12-22 Alien Ports Tab Parameters

Option	Description
Position	Displays the shelf, slot, port information on which the alien wavelength is configured.
Alien Wavelength	Displays the alien wavelength class.
Lambda	Displays the alien wavelength value.
FEC	Displays the FEC mode.

12.10.4 Related Procedures

NTP-G151 Create, Delete, and Manage Optical Channel Client Connections, page 16-15

NTP-G178 Create, Delete, and Manage Optical Channel Trails, page 16-33

NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40

NTP-G58 Locate and View Optical Channel Circuits, page 16-65
NTP-G231 View Optical Power Values and Alarms Using Network Functional View, page 12-120

NTP-G231 View Optical Power Values and Alarms Using Network Functional View

Purpose	This procedure enables you to view optical power values and alarms of the circuit selected in the Network Functional View.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superusers only

Step 1 From the View menu, choose **Go to Network View** and click the **FV** icon in the toolbar.

Step 2 Click the **Circuits** tab to view the list of circuits present in the network.

Step 3 Select the circuit from the list. A new pane with the Circuit:*circuit name* appears.

Step 4 View the following information in the Circuit:*circuit name* pane.

- General info—Displays circuit type, source, and destination information.
- Status—Displays the circuit protection type, administrative state, and circuit status.
- Physical—Displays the wavelength, number of spans, and circuit direction.
- Span and Power Level tab—Displays the span loss and node power level.
- Circuit Alarms tab—Displays alarms.

Step 5 To view the power, span loss, and insertion loss of a circuit in the map, click the following icons on the toolbar:

- **dB**—Displays the power of the circuit.
- **SL**—Displays the loss of signal of the desired span.
- **PV**—Displays the insertion loss of the patch cord.

Step 6 Complete the "DLP-G529 Export Network Functional View Reports" task on page 12-121, as needed.

Stop. You have completed this procedure.

DLP-G529 Export Network Functional View Reports

Purpose	This task exports the Network Functional View report in .html, .csv, and .tsv formats.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superusers only

Step 1 From the View menu, choose **Go to Network View** and click the **FV** icon in the toolbar.

Step 2 Click **File > Export** to open the Export dialog.

Step 3 You can export the files in any of the following formats:

- As HTML —The exported file is saved as an HTML file. Also, a .png file is saved that provides graphical representation of the site layout.
- AS CSV—The file is saved in the Comma Separated Values (.csv) format. The circuit information is saved in a text file where the data is separated with a comma.
- TSV—The file is saved in a Tab Separated Values (.tsv) file. The circuit information is saved in a file where the data is separated by tabs.

  The exported file contains details about the aggregated power and alarms at the network level. If specific circuits are selected in the network before exporting the file, the alarms and power of these circuits are also exported.

Step 4 Click **OK**.

Step 5 Specify the file name and the folder to save the export data and click **Save**.

Stop. You have completed this procedure.

NTP-G319 Connect a Passive Module to the Cisco ONS 15454 M2 or Cisco ONS 15454 M6 Node

Purpose	This procedure connects the passive module to the USB port of the Cisco ONS 15454 M2 or Cisco ONS 15454 M6 node.
Tools/Equipment	Either 15216-FLD-4, 15216-MD-40-EVEN, 15216-MD-40-ODD, 15216-EF-40-ODD, 15216-MD-48-ODD, 15216-MD-40-EVEN, 15216-EF-40-EVEN, 15216-MD-48-EVEN, 15216-MD-ID-50, or 15216-MD-48-CM.
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at the Cisco ONS 15454 M2 or Cisco ONS 15454 M6 node where you want to connect the passive module. If you are already logged in, continue with Step 2.

Step 2 In the multishelf view (multishelf mode), click **Provisioning** > **WDM-ANS** tabs.

Step 3 Click the **Passive Cards** subtab.

Step 4 Click **Create** button. The Create Passive Card dialogue box appears.

Step 5 From the Card Type drop-down list, select the passive module that you want to connect to the USB port of the ONS 15454 M2 or ONS 15454 M6 node. For each passive module, CTC displays a table listing with Passive, Equipment Type, and Locations columns. Selecting the passive module from the Equipment Type column displays the port list of the passive module and its associated wavelength, and MPO.

Note Perform the above step (Step 5) only if the passive module has not been already provisioned by the CTP xml files).

The available passive modules that can be connected to the USB port are:

- PASSIVE MD 40 ODD
- PASSIVE MD 40 EVEN
- PASSIVE EF 40 ODD
- PASSIVE EF 40 EVEN
- PASSIVE MD 48 ODD
- PASSIVE MD 48 EVEN
- PASSIVE MD ID 50
- PASSIVE 15216 48 CM
- MESH-PPR-SMR
- PASSIVE 15126 ID 50
- PASSIVE FLD4 30 3
- PASSIVE FLD4 33 4

- PASSIVE FLD4 36 6
- PASSIVE FLD4 39 7
- PASSIVE FLD4 42 9
- PASSIVE FLD4 46 1
- PASSIVE FLD4 49 3
- PASSIVE FLD4 52 5
- PASSIVE FLD4 55 5
- PASSIVE FLD4 58 9

Step 6 Click **OK**.

Step 7 In the Equipment Type column, select the passive module that you want to connect to the USB port and click **Associate to USB Port**. The Associate USB Port dialogue box appears.

Step 8 From the USB Port drop-down list, select the USB port that is connected to the passive module and click **OK**.

The USB is connected to the selected passive module. The insertion loss (IL) attribute, value, and units values are displayed in a table.

Stop. You have completed this procedure.

12.11 Not-DWDM Networks (Enhancements)

Not-DWDM (TDM) Networks take synchronous and asynchronous signals and multiplexes them to a single higher bit rate for transmission at a single wavelength over fiber. When the node is configured as a Not-DWDM Network, the supported MSTP cards are used in the standalone mode. MSTP applications like Circuit Provisioning, NLAC and APC are not supported in amplified TDM networks. For more information on how to configure a node as a Non-DWDM network, see the "NTP-G320 Configure the Node as a Non-DWDM Network" procedure on page 14-57.

All DWDM cards can be installed in a network element configured as Not-DWDM. The cards must complete the Software Boot and Default Provisioning operations successfully. In NOT-DWDM mode, you must configure significant optical parameters and thresholds before launching the ANS application. For information on how to configure the amplifier, see the "DLP-G693 Configure the Amplifier" procedure on page 14-57. For information on how to configure the PSM behavior, see the "DLP-G694 Configure the PSM" procedure on page 14-58.

When the ANS application is launched, the supported cards become optically operative during service and report all the proper alarms. The list of supported cards are:

- OPT-PSM
- All optical amplifiers
- All transponder and muxponder Cards

You can import a standard xml configuration file when the network type is Not-DWDM. Node Layout and Card Parameters list must be populated. Software Patchcords and Optical Sides must not be configured.

Note You cannot transition a node from Metro-Core network type to Not-DWDM, if the Software Patchcords and Optical Sides have already been provisioned on the node.

ANS with ports in IS feature is not applicable to NOT-DWDM networks. For information on how to add, modify, or delete the ANS Parameters, see the "NTP-G328 Add, Modify, or Delete ANS Parameters" procedure on page 14-59. The available procedures in Not-DWDM networks for physical shutdown of an active device (like Lasers and VOAs) inside a WDM card are:

- Removing the incoming signal
- Configuring optical thresholds (usually Input Power Fail) values suitable to keep the device off
- Forcing disable conditions (OSRI) via software commands.

For information on the procedure to erase the current card provisioning and to change port state to the default state (IS-AINS), see the "DLP-G351 Delete a Card in CTC" procedure on page 14-51. Once deleted, the card can be removed or re-provisioned.

Note PSM Card must be moved to NORMAL state before deleting.

Note OPT-EDFA-17, OPT-EDFA-24, 40-SMR-1C, 40-SMR-2C cards have a different behavior associated to IS-AINS state on input ports (COM-RX, LINE-RX). When the port is in IS-AINS, the amplifier is forced to the OFF state despite the input power level (physical card shutdown).

If you revert the Network Type from NOT-DWDM to METRO-CORE with ports in IS state, TCC recognizes the transition and sets all the ports (of Amplifiers and PSM) to IS-AINS state.

CHAPTER 13

Network Reference

This chapter explains the Cisco ONS 15454 dense wavelength division multiplexing (DWDM) network applications and topologies. The chapter also provides network-level optical performance references.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Note In this chapter, "OPT-BST" refers to the OPT-BST, OPT-BST-E, OPT-BST-L cards, and to the OPT-AMP-L, OPT-AMP-C, and OPT-AMP-17-C cards when they are provisioned in OPT-LINE (optical booster) mode. "OPT-PRE" refers to the OPT-PRE card and to the OPT-AMP-L, OPT-AMP-C, and OPT-AMP-17-C cards provisioned in OPT-PRE (preamplifier) mode.

Note OPT-BST-L, 32WSS-L, 32DMX-L, and OPT-AMP-L cards can be installed only in L-band compatible nodes and networks. OPT-BST, OPT-BST-E, 32WSS, 32DMX, 40-DMX-C, 40-DMX-CE, 40-MUX-C, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-SMR1-C, 40-SMR2-C, OPT-AMP-C, OPT-AMP-17-C, OPT-RAMP-C and OPT-RAMP-CE cards can be installed only in C-band compatible nodes and networks.

Note In this chapter, "RAMAN-CTP" refers to the 15454-M-RAMAN-CTP card. "RAMAN-COP" refers to the 15454-M-RAMAN-COP card.

Chapter topics include:

13.1 Network Applications

Cisco ONS 15454 nodes can be provisioned for metro core DWDM network applications. Metro core networks often include multiple spans and amplifiers, so the optical signal-to-noise ratio (OSNR) is the limiting factor for channel performance.

Within DWDM networks, the ONS 15454 uses a communications protocol, called Node Services Protocol (NSP), to communicate with other nodes. NSP automatically updates nodes whenever a change in the network occurs. Each ONS 15454 DWDM node can:

- Identify other ONS 15454 DWDM nodes in the network.
- Identify the different types of DWDM networks.
- Identify when the DWDM network is complete and when it is incomplete.

13.2 Network Topologies

The ONS 15454 DWDM network topologies include ring networks, linear networks, mesh networks, interconnected rings and spurs.

13.2.1 Ring Networks

Ring networks support hubbed, multi-hubbed, any-to-any, and mesh traffic topologies.

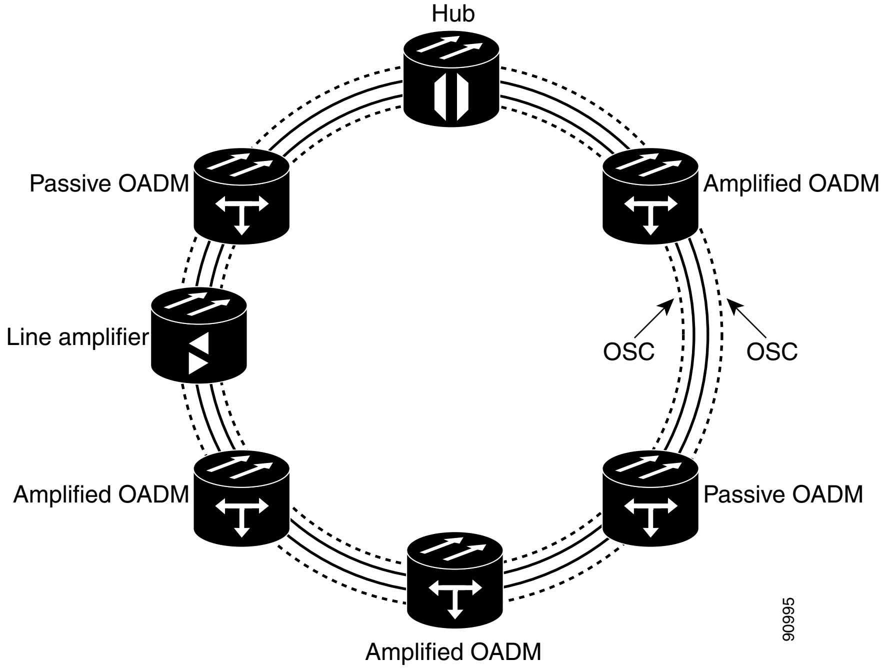
13.2.1.1 Hubbed Traffic Topology

In the hubbed traffic topology (Figure 13-1), a hub node terminates all the DWDM channels. A channel can be provisioned to support protected traffic between the hub node and any node in the ring. Both working and protected traffic use the same wavelength on both sides of the ring. Protected traffic can also be provisioned between any pair of optical add/drop multiplexing (OADM) nodes, except that either the working or the protected path must be regenerated in the hub node.

Protected traffic saturates a channel in a hubbed topology, that is, no channel reuse is possible. However, the same channel can be reused in different sections of the ring by provisioning unprotected multihop traffic. From a transmission point of view, this network topology is similar to two bidirectional point-to-point links with OADM nodes.

For more information about hub nodes, see the "12.1.4 Hub Node" section on page 12-31.

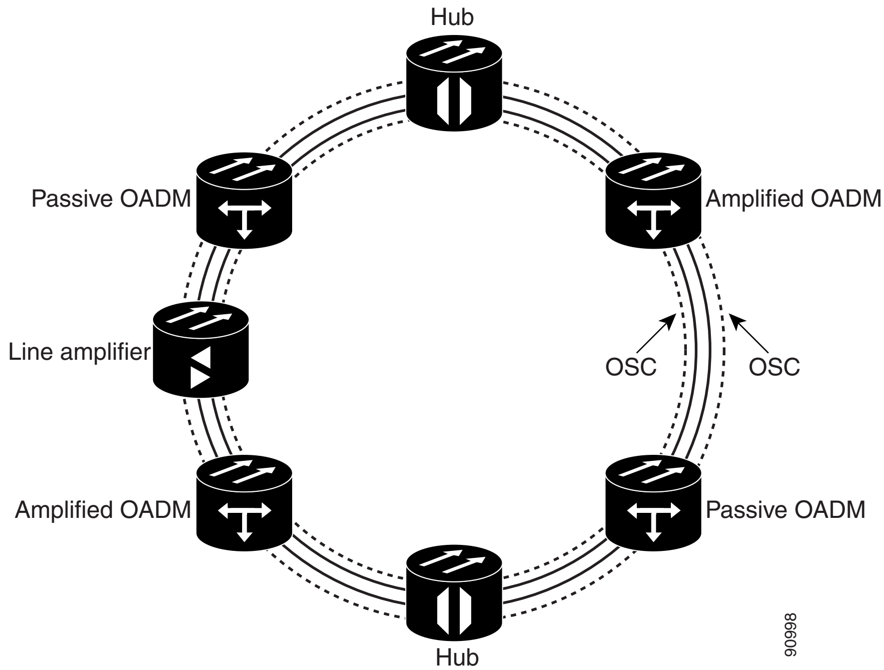
Figure 13-1 Hubbed Traffic Topology



13.2.1.2 Multihubbed Traffic Topology

A multihubbed traffic topology (Figure 13-2) is based on the hubbed traffic topology, except that two or more hub nodes are added. Protected traffic can only be established between the two hub nodes. Protected traffic can be provisioned between a hub node and any OADM node only if the allocated wavelength channel is regenerated through the other hub node. Multihop traffic can be provisioned on this ring. From a transmission point of view, this network topology is similar to two or more point-to-point links with OADM nodes.

Figure 13-2 Multihubbed Traffic Topology

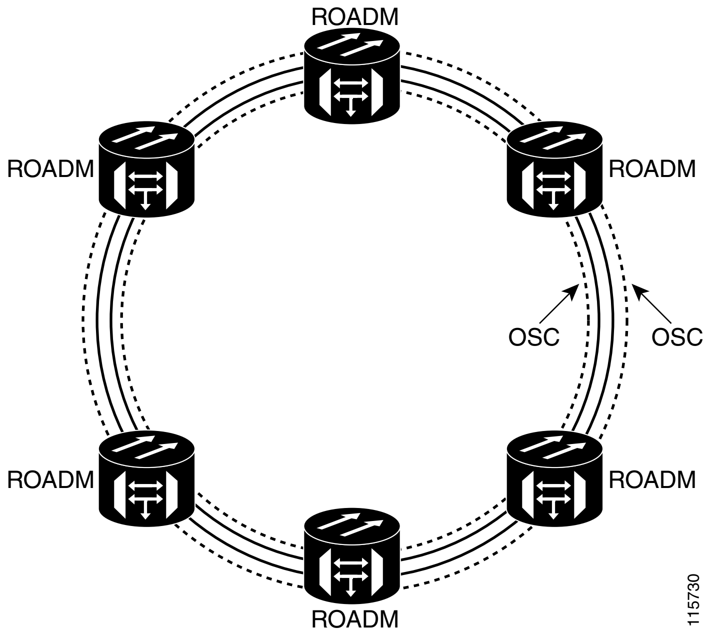


13.2.1.3 Any-to-Any Traffic Topology

The any-to-any traffic topology (Figure 13-3) contains only reconfigurable OADM (ROADM) nodes (with or without optical service channel [OSC] regeneration) or optical amplifier nodes. This topology potentially allows you to route every wavelength from any source to any destination node inside the network.

See the "12.1.3 ROADM Node" section on page 12-11 for more information.

Figure 13-3 Any-to-Any Traffic Topology



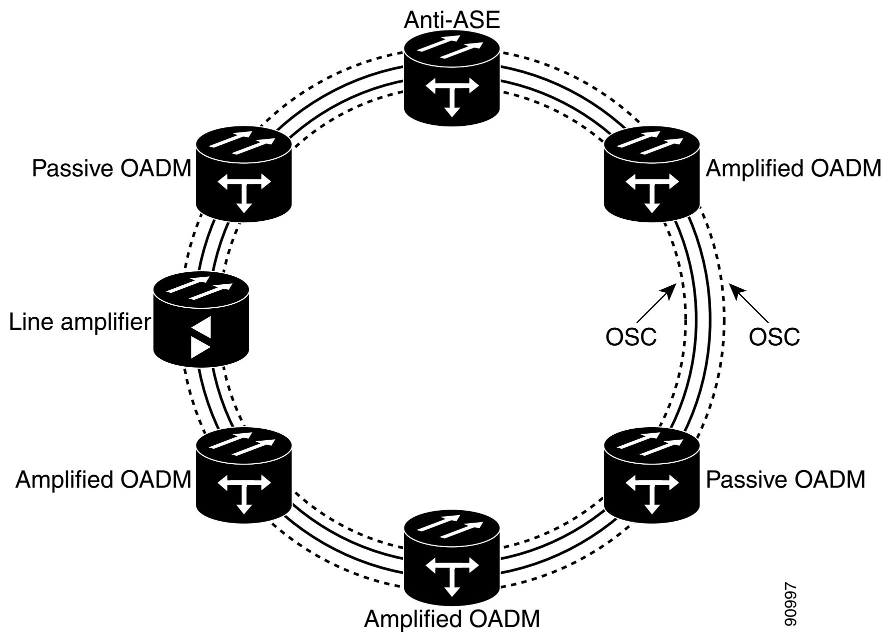
13.2.1.4 Meshed Traffic Topology

The meshed traffic topology (Figure 13-4) does not use hubbed nodes; only amplified and passive OADM nodes are present. Protected traffic can be provisioned between any two nodes; however, the selected channel cannot be reused in the ring. Unprotected multihop traffic can be provisioned in the ring. A meshed ring must be designed to prevent amplified spontaneous emission (ASE) lasing. This is done by configuring a particular node as an anti-ASE node. An anti-ASE node can be created in two ways:

- Equip an OADM node with 32MUX-O cards and 32DMX-O cards. This solution is adopted when the total number of wavelengths deployed in the ring is higher than ten. OADM nodes equipped with 32MUX-O cards and 32DMX-O cards are called full OADM nodes.
- When the total number of wavelengths deployed in the ring is lower than ten, the anti-ASE node is configured by using an OADM node where all the channels that are not terminated in the node are configured as “optical pass-through.” In other words, no channels in the anti-ASE node can travel through the express path of the OADM node.

For more information about OADM nodes, see the “12.1.2 OADM Node” section on page 12-9. For more information about anti-ASE nodes, see the “12.1.5 Anti-ASE Node” section on page 12-35.

Figure 13-4 Meshed Traffic Topology



13.2.2 Linear Networks

Linear configurations are characterized by the use of two terminal nodes, east and west. The 32-channel terminal nodes can be equipped with a 32MUX-O card and a 32DMX-O card, or with a 32WSS card and a 32DMX or 32DMX-O card. The 40-channel terminal nodes can be equipped with a 40-MUX-C card and a 40-DMX-C/40-DMX-CE card, a 40-WSS-C/40-WSS-CE card with a 40-DMX-C/40-DMX-CE card, or a 40-SMR1-C/40-SMR2-C card with a 15216-MD-40-ODD card. OADM or line amplifier nodes can be installed between the two terminal nodes. Only unprotected traffic can be provisioned in a linear configuration. Figure 13-5 shows five ONS 15454 nodes in a linear configuration with an amplified and a passive OADM node.

Figure 13-5 Linear Configuration with an OADM Node

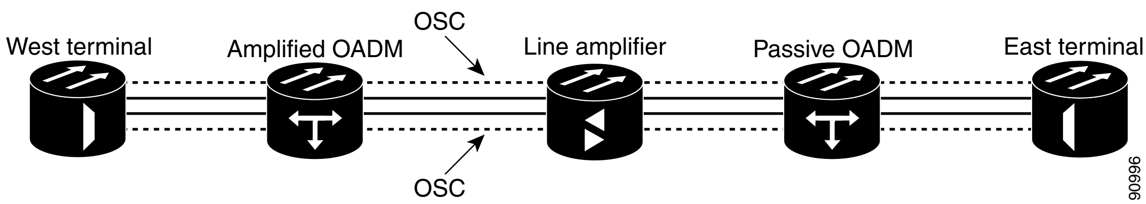
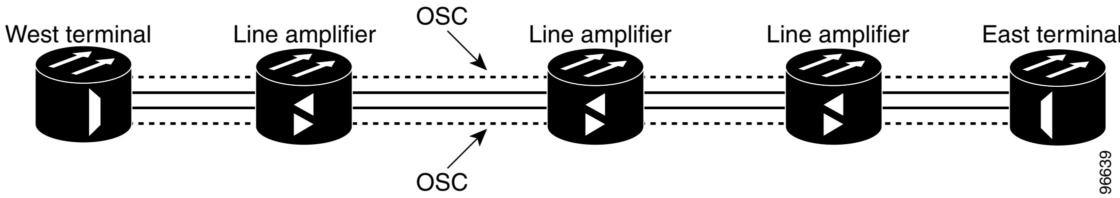


Figure 13-6 shows five ONS 15454 nodes in a linear configuration without an OADM node. See the "12.1.1 Terminal Node" section on page 12-2 for more information.

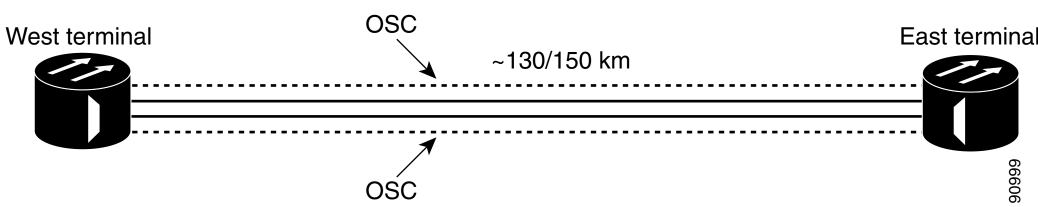
Figure 13-6 Linear Configuration without an OADM Node



A single-span link is a type of linear configuration characterized by a single-span link with preamplification and post-amplification. A single-span link is also characterized by the use of two terminal nodes, east and west. Only unprotected traffic can be provisioned on a single-span link.

Figure 13-7 shows two ONS 15454s in a single-span link. Eight channels are carried on one span. Single-span link losses apply to OC-192/STM-64 LR ITU cards. The optical performance values are valid assuming that the sum of the OADM passive node insertion losses and the span losses does not exceed 35 dB.

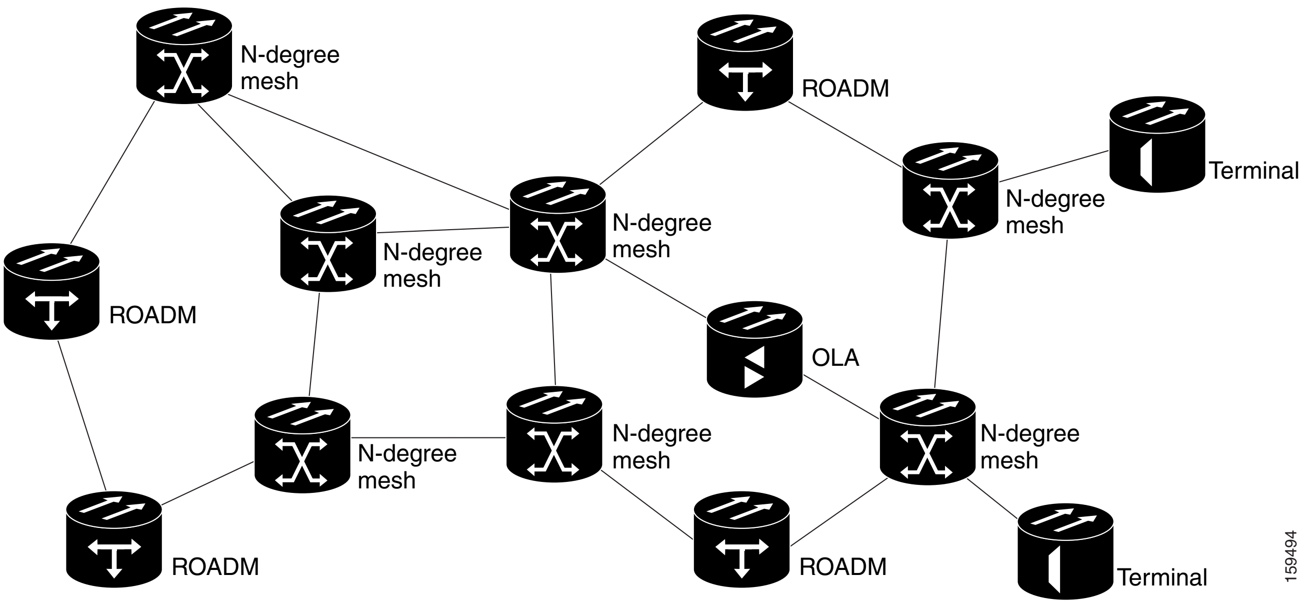
Figure 13-7 Single-Span Link



13.2.3 Mesh Networks

A mesh network can be native or multiring. In a native mesh network (Figure 13-8), any combination of four-degree and eight-degree mesh nodes can work together. Four-degree mesh nodes transmit an optical signal in four directions, while an eight-degree mesh node transmits an optical signal in eight directions. For additional information about mesh nodes, see the "12.7 Configuring Mesh DWDM Networks" section on page 12-61. The intermediate nodes are ROADM nodes. In a mesh node, all wavelengths can be routed through four (four-degree mesh node) to eight (eight-degree mesh node) different optical line termination ports using a 40-WXC-C, 80-WXC-C, or 40-SMR2-C card without any optical-electrical-optical (OEO) regeneration. It is possible to combine 40-WSS-C/40-WSS-CE, 40-WXC-C, 40-SMR2-C, and 32WSS cards in the same mesh network without impacting system performance. For nodes equipped with 32WSS cards, the maximum system capacity is 32 channels. Terminal sites are connected to the mesh network as a spur.

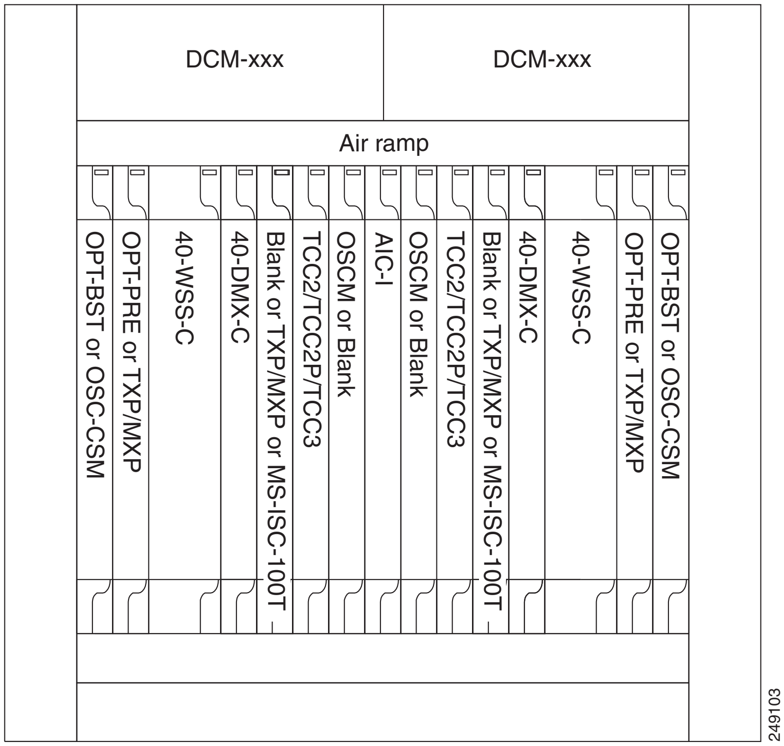
Figure 13-8 Mesh Network



In a multiring mesh network (Figure 13-9), several rings are connected with four-degree or eight-degree mesh nodes. The intermediate ROADM nodes are equipped with MMU cards. All wavelengths can be routed among two or more rings using a 40-WXC-C or 40-SMR2-C card without any optical-electrical-optical (OEO) regeneration. As in a native mesh network, it is possible to combine 40-WSS-C/40-WSS-CE, 40-WXC-C, 40-SMR2-C, and 32WSS cards in the same multiring network without impacting system performance. For nodes equipped with 32WSS cards, maximum system capacity is limited to 32 channels. A terminal node is connected to a multiring node as a spur.

For information on node configurations for both native mesh and multiring networks, see the "12.7 Configuring Mesh DWDM Networks" section on page 12-61.

Figure 13-9 Multiring Network



13.3 Interconnected Rings

The interconnected ring configuration allows you to connect two different nodes using external ports to allow traffic flow between different subnets. In Figure 13-10, the main ring consists of nodes R, R1, and R2 and the tributary ring consists of nodes r, r1, and r2. It is possible to connect more than one tributary ring to the main ring at the same point. Node R of the main ring can forward wavelengths to the node r of the tributary ring and vice-versa.

Node R is either a colorless and omni-directional n-degree ROADM node (Figure 13-11) or a two-degree colorless ROADM node (Figure 13-12) equipped with 80-WXC-C cards. See the "12.7 Configuring Mesh DWDM Networks" section on page 12-61 for more information about colorless and omni-directional n-degree ROADM nodes and two-degree colorless ROADM nodes.

Node r of the tributary ring is a two-degree ROADM node equipped with 40-SMR1-C, 40-SMR2-C, 40-WSS-C, or 40-WSS-CE cards. OTS PPCs are provisioned between the EAD ports of the 80-WXC-C card on node R and the EXP or ADD/DROP ports of the 40-SMR1-C, 40-SMR2-C, 40-WSS-C, or 40-WSS-CE cards on node r. All the nodes are managed by different IP addresses.

Figure 13-10 Interconnected Rings

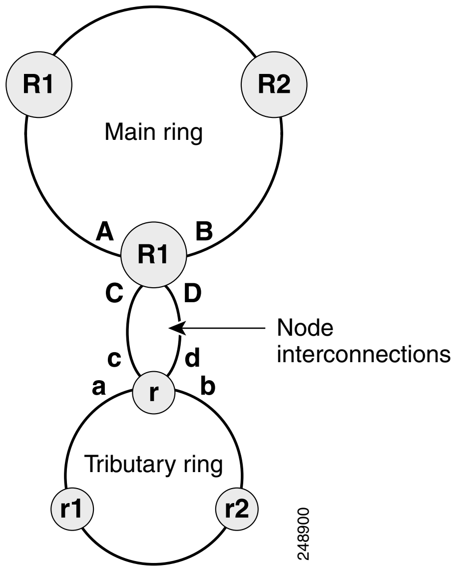


Figure 13-11 Colorless and Omni-directional n- Degree ROADM Node

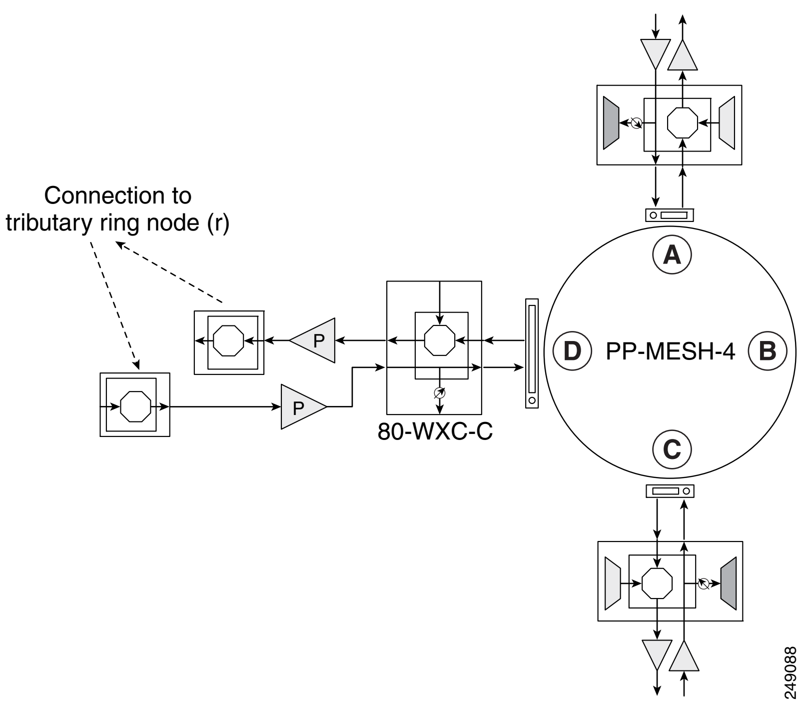
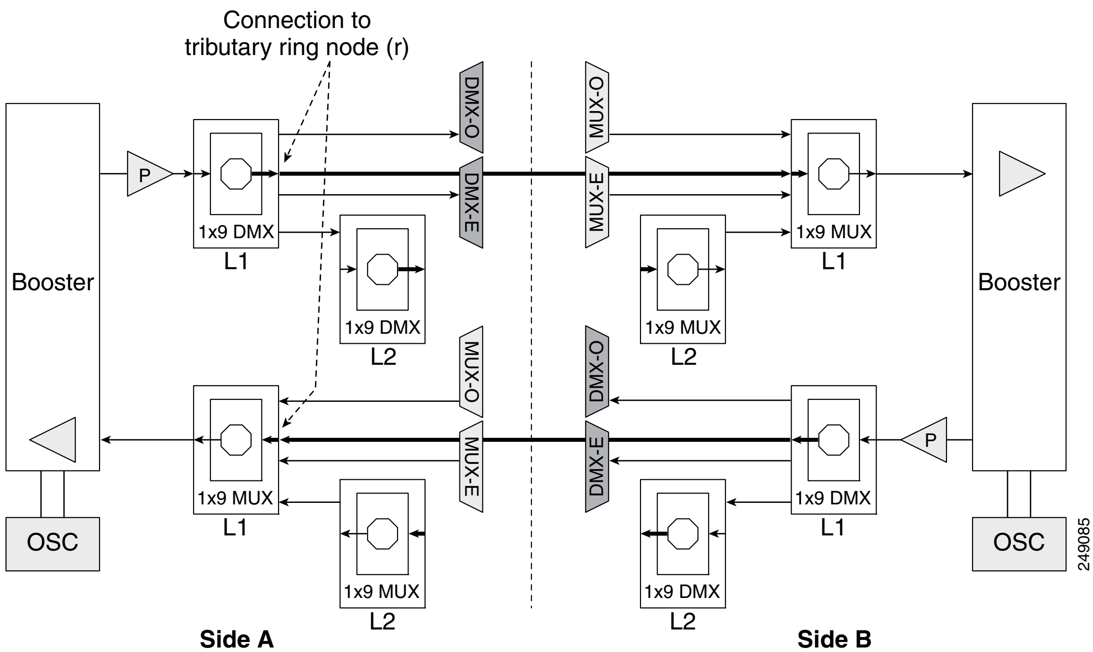


Figure 13-12 Colorless Two-Degree ROADM Node



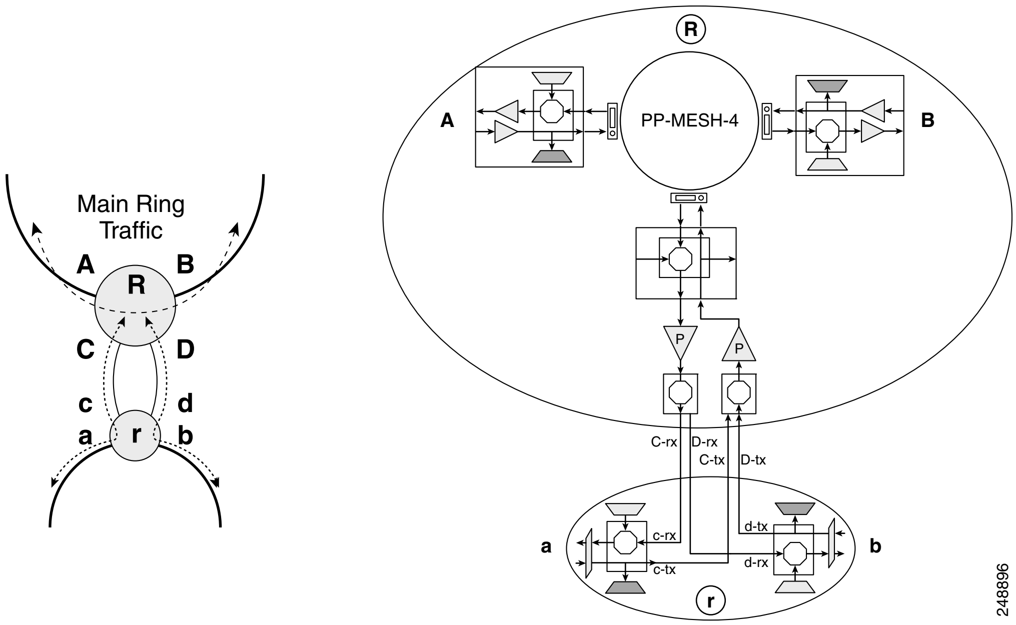
13.3.1 Interconnected Ring Scenarios

In the following sections, three interconnected ring scenarios are given:

13.3.1.1 Scenario A: Interconnect Traffic from Tributary Ring to Main Ring without Local Add/Drop in the Tributary Ring

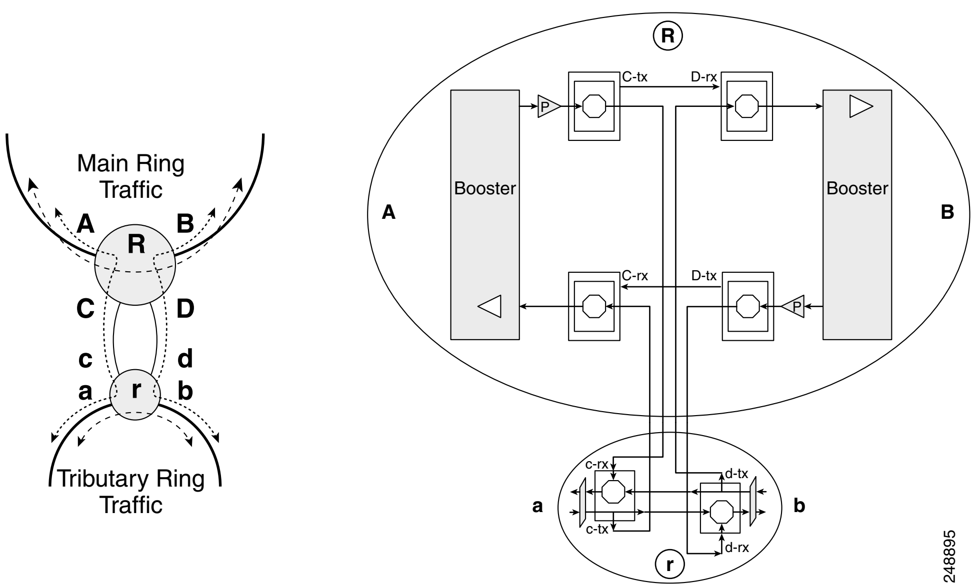
In scenario A-1(Figure 13-13), node R is a three-degree colorless and omni-directional ROADM node and node r is a two-degree 40-SMR1-c based ROADM node. The EAD ports of the 80-WXC-C cards on node R are connected to the ADD/DROP ports of the 40-SMR1-C card on node r. Traffic from node r can be routed to side A or B of node R. Traffic from side a cannot be added or dropped at node r but can be routed to side b using the express path.

Figure 13-13 Interconnected Ring - Scenario A-1



In scenario A-2 (Figure 13-14), node R is a two-degree colorless ROADM node and node r is a two-degree 40-SMR1-C based ROADM node. The EAD ports of the 80-WXC-C cards on node R are connected to the ADD/DROP ports of the 40-SMR1-C card on node r. Traffic from node r can be routed to one side of node R. For example, traffic can be routed from side a to side A or from side b to side B. Traffic from side a cannot be added or dropped at node r but can be routed to side b using the express path.

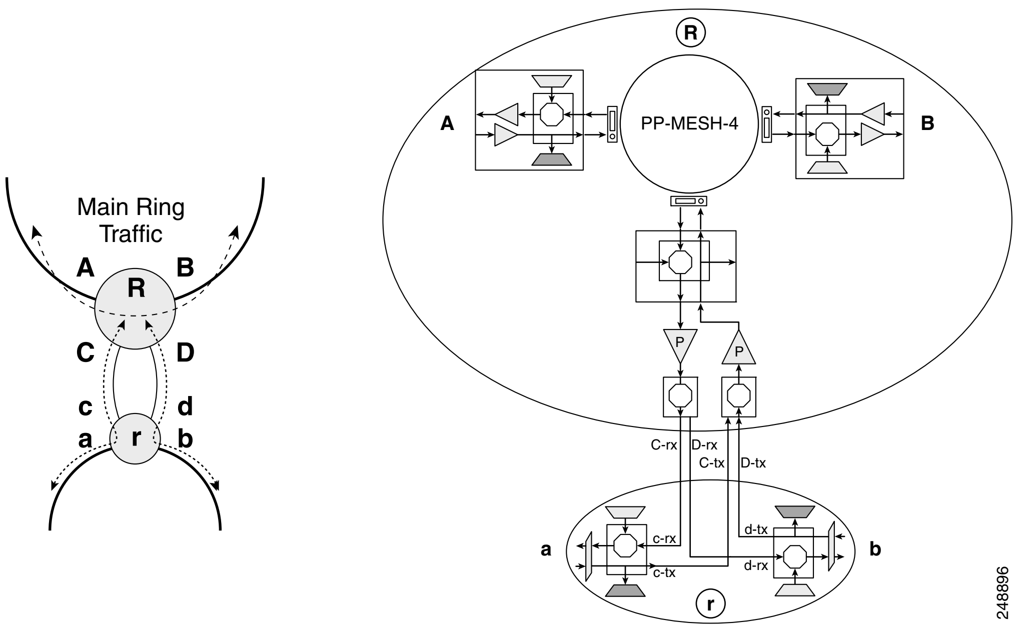
Figure 13-14 Interconnected Ring - Scenario A-2



13.3.1.2 Scenario B: Interconnect Traffic from Tributary Ring to Main Ring with Local Add/Drop in the Tributary Ring

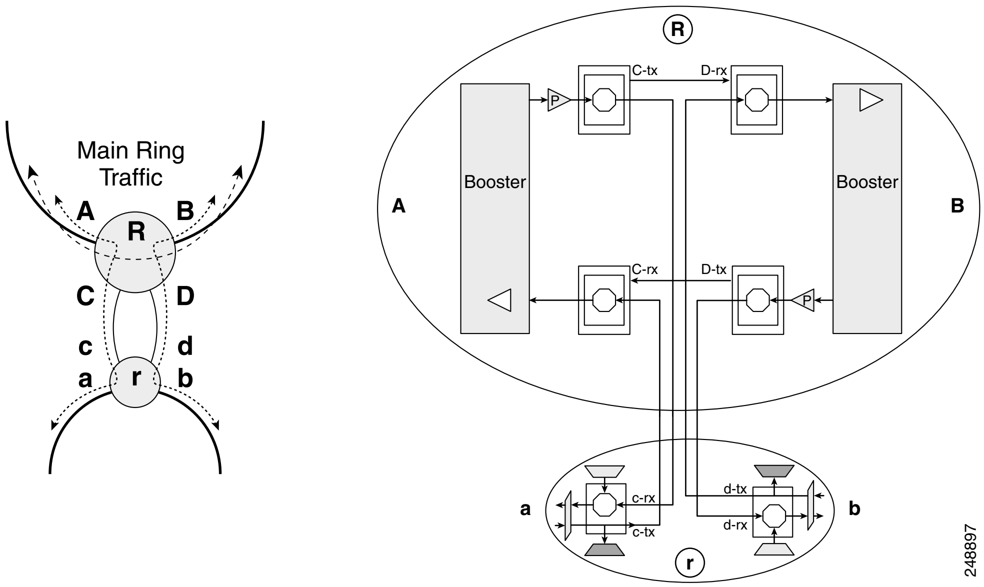
In scenario B-1(Figure 13-15), node R is a three-degree colorless and omni-directional ROADM node and node r is a hub node with two terminal sides equipped with 40-SMR1-C or 40-WSS-C cards. The EAD ports of the 80-WXC-C cards on node R are connected to the EXP ports of the 40-SMR1-C or40-WSS-C card on node r. Traffic from node r can be routed to side A or B of node R. Traffic local to the tributary ring can be added or dropped at node r. For example, traffic from side a can be dropped at node r but cannot be routed to side b since the EXP ports are not available.

Figure 13-15 Interconnected Ring - Scenario B-1



In scenario B-2 (Figure 13-16), node R is a two-degree colorless ROADM node and node r is a hub node with two terminal sides equipped with 40-SMR1-C or 40-WSS-C cards. The EAD ports of the 80-WXC-C cards on node R are connected to the EXP ports of the 40-WSS-C card on node r. Traffic from node r can be routed to one side of node R. For example, traffic can be routed from side a to side A or from side b to side B. Traffic local to the tributary ring can be added or dropped at node r. For example, traffic from side a can be dropped at node r but cannot be routed to side b since the EXP ports are not available.

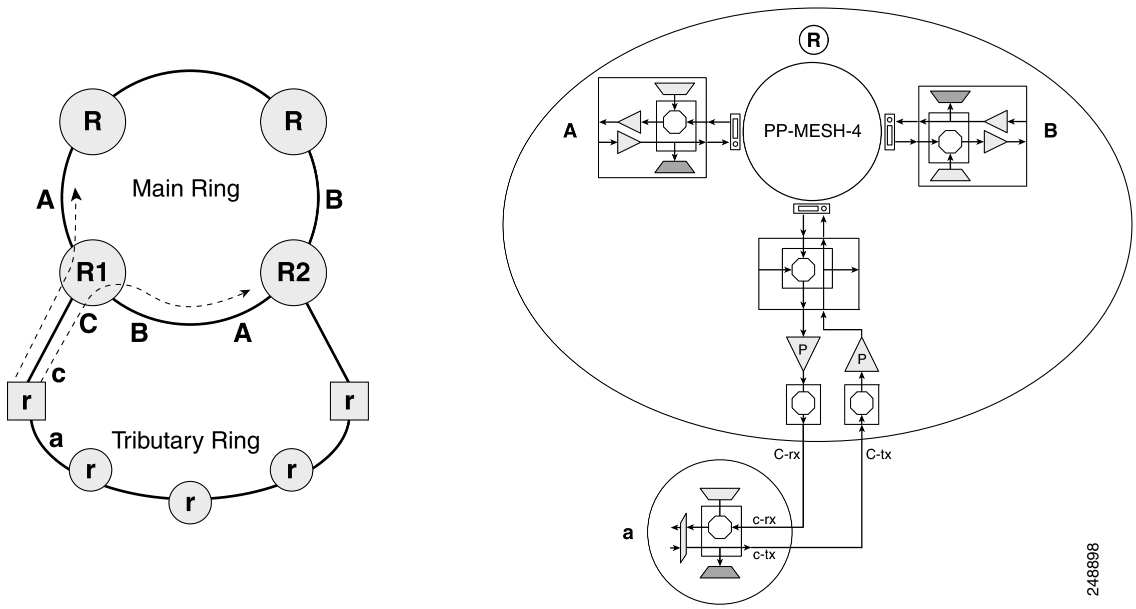
Figure 13-16 Interconnected Ring - Scenario B-2



13.3.1.3 Scenario C: Interconnect Traffic Between Tributary Rings Using the Main Ring

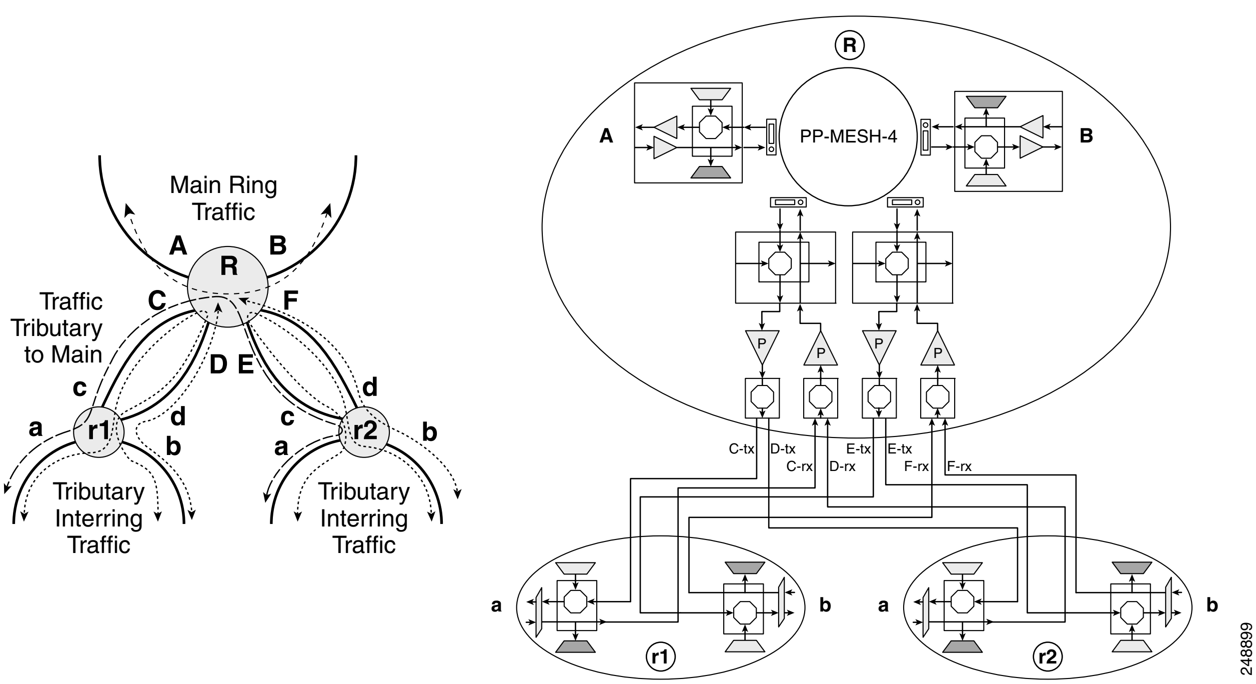
In scenario C-1(Figure 13-17), nodes R1 and R2 are n-degree colorless and omni-directional ROADM nodes. Node r is a terminal site. The EXP ports of the 40-SMR-1C card in node r are connected to the EAD ports of the 80-WXC-C card in nodes R1 and R2. Traffic from node r is routed to side A and B of nodes R1 and R2. Traffic local to the tributary ring can be added or dropped at node r.

Figure 13-17 Interconnected Ring - Scenario C-1



In scenario C-2(Figure 13-18), node R is an n-degree colorless and omni-directional ROADM node with 2 omni-directional sides. Nodes r1 and r2 are hub sites. The ADD/DROP ports of 40-SMR-1-C cards in node r1 and r2 are connected to the EAD ports of 80-WXC-C cards in node R. Traffic can be routed from node r1 to node r2 through node R. Traffic local to the tributary ring can be added or dropped at node r1 and r2.

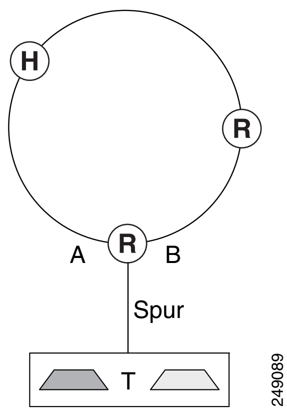
Figure 13-18 Interconnected Ring - Scenario C-2



13.4 Spur Configuration

Remote terminal sites can be connected to the main network using a spur. In a spur configuration, the multiplexer (MUX) and demultiplexer (DMX) units associated with one of the sides of node R in the main network (Figure 13-19) are moved to the remote terminal site T. This helps to aggregate traffic from the terminal site. The MUX and DMX units in terminal site T are connected to node R with a single fibre couple. Node R is a n-degree ROADM node equipped with 40-SMR1-C, 40-SMR2-C, or 80-WXC-C cards. Traffic from terminal site T can be routed to side A or side B on node R. Amplification on the spur link is not allowed. PSM is not supported on terminal site T.

Figure 13-19 Spur



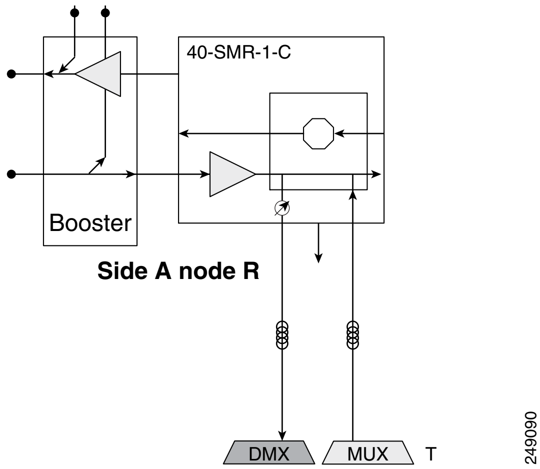
13.4.1 Spur Configuration Scenarios

In the following sections, three spur scenarios are provided:

13.4.1.1 Scenario A: Spur Configuration without 15454 Chassis in Remote Terminal T

In Figure 13-20, node R is a two-degree ROADM node equipped with 40-SMR1-C card. The remote terminal site T does not have a 15454 chassis and is not shown in the network map in CTC. The terminal site is built using passive MUX and DMX units. All OCHNC circuits originating from 40-SMR1-C on Side A of node R to the remote terminal site are terminated on 40-SMR1-C ADD/DROP ports.

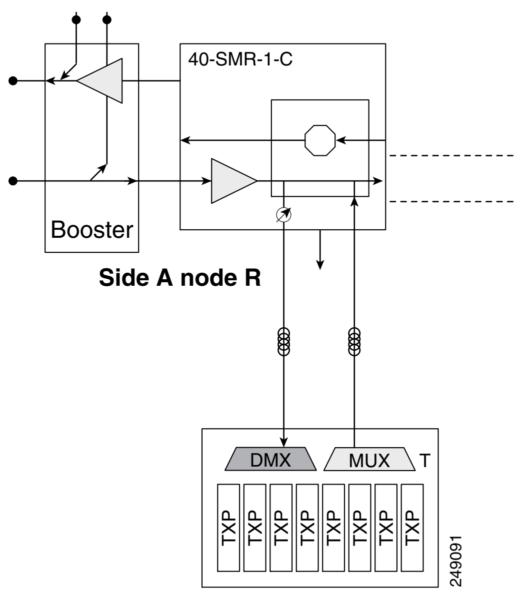
Figure 13-20 Scenario A: Spur Without 15454 Chassis in Remote Terminal T



13.4.1.2 Scenario B: Spur Configuration with Passive MUX and DMX Units in Remote Terminal T

In Figure 13-21, node R is a two-degree ROADM node equipped with 40-SMR1-C card. The terminal site T is built with a 15454 chassis equipped with TXP units and passive MUX and DMX units. Terminal site T is connected to node R on the network map in CTC. All OCHNC circuits originating from 40-SMR1-C on Side A of node R to the remote site are terminated on 40-SMR1-C ADD/DROP ports. OCHCC and OCHTRAIL circuits are supported on the TXP units in terminal site T.

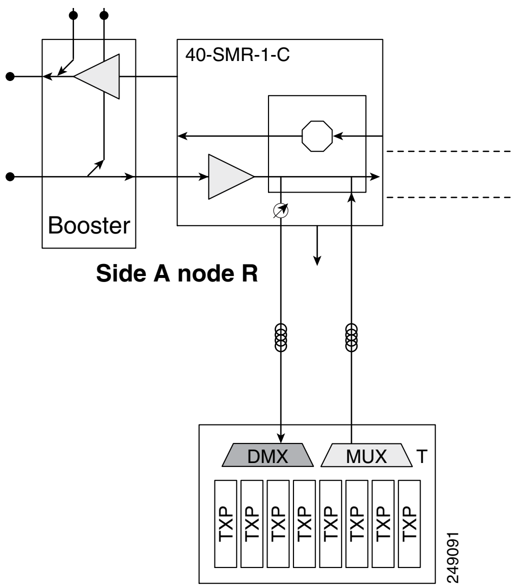
Figure 13-21 Scenario B: Spur With Passive MUX and DMX Units in Remote Terminal T



13.4.1.3 Scenario C: Spur Configuration with Active MUX and DMX Units in Remote Terminal T

In Figure 13-22, node R is a two-degree ROADM node equipped with 40-SMR1-C card. The terminal site T is built with a 15454 chassis equipped with TXP units and active MUX and DMX units. Terminal site T is connected to node R on the network map in CTC. DCN extension is supported between the ADD/DROP ports of 40-SMR1-C and the COM ports of the active MUX and DMX units. OCHNC circuits are terminated on the CHAN ports of the MUX and DMX units of terminal site T. OCHCC and OCHTRAIL circuits are supported on the TXP units in terminal site T.

Figure 13-22 Scenario C: Spur with Active MUX and DMX Units in Remote Terminal T



13.5 Network Topologies for the OPT-RAMP-C and OPT-RAMP-CE Cards

The OPT-RAMP-C or OPT-RAMP-CE card can be equipped in any of the following network topologies:

- Open (hubbed) ring network
- Multi-hubbed ring network
- Closed (meshed) ring network
- Any-to-any ring network
- Linear network topology
- Point-to-point linear network topology
- Multi-ring network
- Mesh network
- Hybrid network

For more information about the OPT-RAMP-C or OPT-RAMP-CE card, see Chapter 5, "Provision Optical Amplifier Cards.".

13.6 Network Topologies for the PSM Card

The PSM card is supported in the following network topologies:

- The PSM card in a channel protection configuration is supported in all network topologies except linear networks as it is not possible to configure a working and protect path.
- The PSM card in a multiplex section protection configuration is supported in linear point-to-point network topologies.
- The PSM card in a line protection configuration is supported in the following network topologies:
  - Linear point-to-point in a single span network (if the OSC card is used).
  - Linear point-to-point multispan network when a DCN extension is used (on all spans). In this case, the maximum number of span links can be divided into three according to the DCN extension optical safety requirements.
- The PSM card in a standalone configuration is supported in all network topologies.

13.7 Optical Performance

This section provides optical performance information for ONS 15454 DWDM networks. The performance data is a general guideline based upon the network topology, node type, client cards, fiber type, number of spans, and number of channels. The maximum number of nodes that can be in an ONS 15454 DWDM network is 16. The DWDM topologies and node types that are supported are shown in Table 13-1.

Table 13-1 Supported Topologies and Node Types

Number of Channels	Fiber	Topologies	Node Types
32 channels	SMF-28[1] E-LEAF[2] TW-RS[3]	Ring Linear Linear without OADM	Hub Active OADM Passive OADM Terminal Line OSC regeneration
16 channels	SMF-28	Ring Linear Linear without OADM	Hub Active OADM Passive OADM Terminal Line OSC regeneration
8 channels	SMF-28	Linear without OADM	Terminal Line

1. SMF-28 = single-mode fiber 28.
2. E-LEAF = enhanced large effective area fiber.
3. TW-RS = TrueWave reduced slope fiber.

13.8 Automatic Power Control

The ONS 15454 automatic power control (APC) feature performs the following functions:

- Maintains constant per channel power when desired or accidental changes to the number of channels occur. Constant per channel power increases optical network resilience.
- Compensates for optical network degradation (aging effects).
- Simplifies the installation and upgrade of DWDM optical networks by automatically calculating the amplifier setpoints.

Note APC algorithms manage the optical parameters of the OPT-BST, OPT-PRE, OPT-AMP-17-C, 32DMX, 40-DMX-C, 40-DMX-CE, 40-SMR1-C, 40-SMR2-C, OPT-BST-L, OPT-AMP-L, OPT-AMP-C, and 32DMX-L cards.

Amplifier software uses a control gain loop with fast transient suppression to keep the channel power constant regardless of any changes in the number of channels. Amplifiers monitor the changes to the input power and change the output power proportionately according to the calculated gain setpoint. The shelf controller software emulates the control output power loop to adjust for fiber degradation. To perform this function, the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE needs to know the channel distribution, which is provided by a signaling protocol, and the expected per channel power, which you can provision. The TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card compares the actual amplifier output power with the expected amplifier output power and modifies the setpoints if any discrepancies occur.

13.8.1 APC at the Amplifier Card Level

In constant gain mode, the amplifier power out control loop performs the following input and output power calculations, where G represents the gain and t represents time.

Pout (t) = G * Pin (t) (mW)

Pout (t) = G + Pin (t) (dB)

In a power-equalized optical system, the total input power is proportional to the number of channels. The amplifier software compensates for any variation of the input power due to changes in the number of channels carried by the incoming signal.

Amplifier software identifies changes in the read input power in two different instances, t1 and t2, as a change in the traffic being carried. The letters m and n in the following formula represent two different channel numbers. Pin/ch represents the input power per channel.

Pin (t1)= nPin/ch

Pin (t2) = mPin/ch

Amplifier software applies the variation in the input power to the output power with a reaction time that is a fraction of a millisecond. This keeps the power constant on each channel at the output amplifier, even during a channel upgrade or a fiber cut.

The per channel power and working mode (gain or power) are set by automatic node setup (ANS). The provisioning is conducted on a per-side basis. A preamplifier or a booster amplifier facing Side *i* is provisioned using the Side *i* parameters present in the node database, where *i* - A, B, C, D, E, F, G, or H.

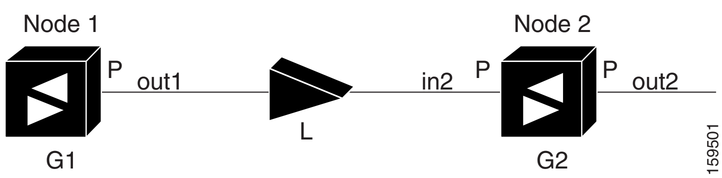
Starting from the expected per channel power, the amplifiers automatically calculate the gain setpoint after the first channel is provisioned. An amplifier gain setpoint is calculated in order to make it equal to the loss of the span preceding the amplifier itself. After the gain is calculated, the setpoint is no longer changed by the amplifier. Amplifier gain is recalculated every time the number of provisioned channels returns to zero. If you need to force a recalculation of the gain, move the number of channels back to zero.

13.8.2 APC at the Shelf Controller Layer

Amplifiers are managed through software to control changes in the input power caused by changes in the number of channels. The software adjusts the output total power to maintain a constant per channel power value when the number of input channel changes.

Changes in the network characteristics have an impact on the amplifier input power. Changes in the input power are compensated for only by modifying the original calculated gain, because input power changes imply changes in the span loss. As a consequence, the gain to span loss established at amplifier start-up is no longer satisfied, as shown in Figure 13-23.

Figure 13-23 Using Amplifier Gain Adjustment to Compensate for System Degradation



In Figure 13-23, Node 1 and Node 2 are equipped with booster amplifiers and preamplifiers. The input power received at the preamplifier on Node 2 (Pin2) depends on the total power launched by the booster amplifier on Node1, Pout1(n) (where n is the number of channels), and the effect of the span attenuation (L) between the two nodes. Span loss changes due to aging fiber and components or changes in operating conditions. The power into Node 2 is given by the following formula:

Pin2 = LPout1(n)

The phase gain of the preamplifier on Node 2 (GPre-2) is set during provisioning in order to compensate for the span loss so that the Node 2 preamplifier output power (Pout-Pre-2) is equal to the original transmitted power, as represented in the following formula:

Pout-Pre-2 = L x GPre-2 x Pout1(n)

In cases of system degradation, the power received at Node 2 decreases due to the change of span insertion loss (from L to L'). As a consequence of the preamplifier gain control working mode, the Node 2 preamplifier output power (Pout-Pre-2) also decreases. The goal of APC at the shelf controller layer is simply to detect if an amplifier output change is needed because of changes in the number of channels or to other factors. If factors other than changes in the number of channels occur, APC provisions a new gain at the Node 2 preamplifier (GPre-2') to compensate for the new span loss, as shown in the formula:

GPre-2' = GPre-2 (L/ L') = GPre-2 + [Pout-Pre-2 –Exp(Pout-Pre-2)]

Generalizing on the above relationship, APC is able to compensate for system degradation by adjusting working amplifier gain or variable optical attenuation (VOA) and to eliminate the difference between the power value read by the photodiodes and the expected power value. The expected power values are calculated using:

- Provisioned per channel power value

- Channel distribution (the number of express, add, and drop channels in the node)
- ASE estimation

Channel distribution is determined by the sum of the provisioned and failed channels. Information about provisioned wavelengths is sent to APC on the applicable nodes during circuit creation. Information about failed channels is collected through a signaling protocol that monitors alarms on ports in the applicable nodes and distributes that information to all the other nodes in the network.

ASE calculations purify the noise from the power level reported from the photodiode. Each amplifier can compensate for its own noise, but cascaded amplifiers cannot compensate for ASE generated by preceding nodes. The ASE effect increases when the number of channels decreases; therefore, a correction factor must be calculated in each amplifier of the ring to compensate for ASE build-up.

APC is a network-level feature that is distributed among different nodes. An APC domain is a set of nodes that is controlled by the same instance of APC at the network level. An APC domain optically identifies a portion of the network that can be independently regulated. An optical network can be divided into several different domains, with the following characteristics:

- Every domain is terminated by two node sides. The node sides terminating domains are:
  - Terminal node (any type)
  - ROADM node
  - Hub node
  - Cross-connect (XC) termination mesh node
  - Line termination mesh node
- APC domains are shown in both Cisco Transport Controller (CTC) and Transaction Language One (TL1).
- In CTC, domains are shown in the network view and reported as a list of spans. Each span is identified by a node/side pair, for example:

  APC Domain Node_1 Side A, Node_4 Side B
  + Span 1: Node_1 Side A, Node_2 Side B
  + Span 2: Node_2 Side A, Node_3 Side B
  + Span 3: Node_3 Side A, Node_4 Side B
- APC domains are not refreshed automatically; instead, they are refreshed using a Refresh button.

Inside a domain, the APC algorithm designates a master node that is responsible for starting APC hourly or every time a new circuit is provisioned or removed. Every time the master node signals APC to start, gain and VOA setpoints are evaluated on all nodes in the network. If corrections are needed in different nodes, they are always performed sequentially following the optical paths starting from the master node.

APC corrects the power level only if the variation exceeds the hysteresis thresholds of +/– 0.5 dB. Any power level fluctuation within the threshold range is skipped since it is considered negligible. Because APC is designed to follow slow time events, it skips corrections greater than 3 dB. This is the typical total aging margin that is provisioned during the network design phase. After you provision the first channel or the amplifiers are turned up for the first time, APC does not apply the 3 dB rule. In this case, APC corrects all the power differences to turn up the node.

To avoid large power fluctuations, APC adjusts power levels incrementally. The maximum power correction is +/– 0.5 dB. This is applied to each iteration until the optimal power level is reached. For example, a gain deviation of 2 dB is corrected in four steps. Each of the four steps requires a complete APC check on every node in the network. APC can correct up to a maximum of 3 dB on an hourly basis. If degradation occurs over a longer time period, APC compensates for it by using all margins that you provision during installation.

If no margin is available, adjustments cannot be made because setpoints exceed the ranges. APC communicates the event to CTC, Cisco Transport Manager (CTM), and TL1 through an APC Fail condition. APC clears the APC fail condition when the setpoints return to the allowed ranges.

APC can be manually disabled. In addition, APC automatically disables itself when:

- An Hardware Fail (HF) alarm is raised by any card in any of the domain nodes.
- A Mismatch Equipment Alarm (MEA) is raised by any card in any of the domain nodes.
- An Improper Removal (IMPROPRMVL) alarm is raised by any card in any of the domain nodes.
- Gain Degrade (GAIN-HDEG), Power Degrade (OPWR-HDEG), and Power Fail (PWR-FAIL) alarms are raised by the output port of any amplifier card in any of the domain nodes.
- A VOA degrade or fail alarm is raised by any of the cards in any of the domain nodes.
- The signaling protocol detects that one of the APC instances in any of the domain nodes is no longer reachable.

The APC state (Enable/Disable) is located on every node and can be retrieved by the CTC or TL1 interface. If an event that disables APC occurs in one of the network nodes, APC is disabled on all the other nodes and the APC state changes to DISABLE - INTERNAL. The disabled state is raised only by the node where the problem occurred to simplify troubleshooting.

APC raises the following minor, non-service-affecting alarms at the port level in CTC, TL1, and Simple Network Management Protocol (SNMP):

- APC Out of Range—APC cannot assign a new setpoint for a parameter that is allocated to a port because the new setpoint exceeds the parameter range.
- APC Correction Skipped—APC skipped a correction to one parameter allocated to a port because the difference between the expected and current values exceeds the +/– 3 dB security range.
- APC Disabled—APC is disabled, either by a user or internal action.

After the error condition is cleared, the signaling protocol enables APC on the network and the APC DISABLE - INTERNAL condition is cleared. Because APC is required after channel provisioning to compensate for ASE effects, all optical channel network connection (OCHNC) and optical channel client connection (OCHCC) circuits that you provision during the disabled APC state are kept in the Out-of-Service and Autonomous, Automatic In-Service (OOS-AU,AINS) (ANSI) or Unlocked-disabled,automaticInService (ETSI) service state until APC is enabled. OCHNCs and OCHCCs automatically go into the In-Service and Normal (IS-NR) (ANSI) or Unlocked-enabled (ETSI) service state only after APC is enabled.

13.8.3 APC in a Raman Node with Post-Amplifiers

After the Raman gain is calculated and the Raman and OSC links are turned up, APC performs the following sequence of events:

1. The line amplifier that is downstream of the OPT-RAMP-C or OPT-RAMP-CE card is the first card that the APC regulates. The line amplifier is configured as OPT-PRE in ROADM nodes or as OPT-LINE in OLA nodes.

   After Automatic Power Reduction (APR) is implemented, the working mode of the line amplifier is forced to Control Power and remains in the same mode until all the node regulations are complete. This ensures that the calculation of the Gain setpoint is accurate during Raman node internal regulations. The amplifier signal output power is regulated using the Power (LINE-TX port) setpoint.

2. The APC changes the Gain setpoint of the embedded EDFA to reach the value that is equal to Power (DC-TX port) value multiplied by the number of active channels.

   The APC can set the Gain setpoint of the embedded EDFA ($G^{EDFA)}$ in the following ranges:
   - OPT-RAMP-C 10 dB < G^{EDFA} < 18 dB
   - OPT-RAMP-CE 7 dB < G^{EDFA} < 13 dB

   The internal VOA is set to 0 dB on the DC-TX port. The VOA attenuation is set to zero because the actual DCU insertion loss is unknown until the optical payload is transmitted to the card. Therefore a proper attenuation setpoint cannot be estimated. When the attenuation value is set to 0 dB, it ensures that the system turns up in any circumstance.
3. After the G^{EDFA} is set, APC regulates the power on the VOA (DC-TX port) of the OPT-RAMP-C or OPT-RAMP-CE card to match the target Power (COM-TX port) value, and accounts for the actual DCU loss.
4. After Steps 2 and 3 are completed, the optical power received on the line amplifier that is downstream of the OPT-RAMP-C or OPT-RAMP-CE card becomes fully regulated and stable. The Raman tilt and G^{EDFA} tilt are fixed. The APC regulates the value of the Total Power on the LINE-TX port of the line amplifier and accounts for the ASE noise contribution.
5. After the value of the total power on the line amplifier becomes a stable value, APC stops the regulations and the automatic gain calculation procedure is completed on the line amplifier card. The TCC checks if the gain setpoint is within range and eventually changes the working mode of the OPT-RAMP-C or OPT-RAMP-CE card to Gain Control mode.

Note If the value of the Raman Total Power was manually provisioned or set by ANS instead of the Raman installation wizard, a fiber cut recovery procedure is automatically performed, before APC regulation.

13.8.4 APC in a Raman Node without Post-Amplifiers

After the Raman gain is calculated and the Raman and OSC links are turned up, APC performs the following sequence of events:

1. The APC adjusts the VOA attenuation of the OPT-RAMP-C or OPT-RAMP-CE card if the Total Power (LINE-TX port) does not match the expected value that is equal to the maximum power multiplied by the number of active channels. The VOA attenuation value on the OPT-RAMP-C or OPT-RAMP-CE cards is set to 15 dB. This value ensures that the system turns up in any circumstance.
2. If a short span is used, the embedded EDFA in the downstream node receives excessive input power and is unable to maintain proper per channel power value on its output port as the number of channels increase. The APC detects output power saturation on the EDFA of the downstream node and increases the value of the VOA attenuation on the upstream node thereby reducing the Power (LINE-TX port) value.

13.8.5 Managing APC

The APC status is indicated by four APC states shown in the node view status area:

- Enabled—APC is enabled.
- Disabled—APC was disabled manually by a user.

- Disable - Internal—APC has been automatically disabled for an internal cause.
- Not Applicable—The node is provisioned to Not DWDM, which does not support APC.

You can view the APC information and disable and enable APC manually on the Maintenance > DWDM > APC tab.

Caution When APC is disabled, aging compensation is not applied and circuits cannot be activated. Do not disable APC unless it is required for specific maintenance or troubleshooting tasks. Always enable APC as soon as the tasks are completed.

The APC subtab provides the following information:

- Position—The slot number, card, and port for which APC information is shown.
- Last Modification—Date and time APC parameter setpoints were last modified.
- Parameter—The parameter that APC last modified.
- Last Check—Date and time APC parameter setpoints were last verified.
- Side—The side where the APC information for the card and port is shown.
- State—The APC state.

A wrong use of maintenance procedures (for example, the procedures to be applied in case of fiber cut repair) can lead the system to raise the APC Correction Skipped alarm. The APC Correction Skipped alarm strongly limits network management (for example, a new circuit cannot be turned into IS). The Force APC Correction button helps to restore normal conditions by clearing the APC Correction Skipped alarm.

The Force APC Correction button must be used under the Cisco TAC surveillance since its misuse can lead to traffic loss.

The Force APC Correction button is available in the **Card View** > **Maintenance** > **APC** tab pane in CTC for the following cards:

- OPT-PRE
- OPT-BST-E
- OPT-BST
- OPT-AMP-C
- OPT-AMP-17C
- AD-xB
- AD-xC
- 40-SMR1-C
- 40-SMR2-C

This feature is not available for the TL1 interface.

13.9 Power Side Monitoring

DWDM nodes allow you to view bar graphs of the input and output spectrum on each optical side of the node in the Maintenance > DWDM > Side Power Monitoring tab. When you place the mouse over each wavelength in the bar chart, the power level and wavelength type are displayed. This feature is available on nodes that are installed with cards with Optical Channel Monitoring (OCM) capability.

The Side Power Monitoring panel is divided into Optical Side *X* subtabs, where *X* is the optical side. The number of subtabs is equal to the number of optical sides in the node. Each subtab displays two bar graphs.

The IN bar graph displays the optical spectrum at the input port (LINE-RX) of the side in the direction from the fiber to the node provided the OCM functionality is available on this port else the graph displays the aggregate signal spectral distribution on the first port in the signal flow (indicated in the title of the bar chart) that is downstream of the LINE-RX port where an OCM measurement is available (For example, in node using a booster and a 40-SMR1-C card, the measurement is done on the EXP port of the 40-SMR1-C card).

The OUT bar graph displays the optical spectrum at the output port (LINE-TX) of the side in the direction from the node to the fiber provided the OCM functionality is available on this port else the graph displays the aggregate signal spectral distribution on the first port (indicated in the title of the bar chart) that is upstream of the LINE-TX port where an OCM measurement is available.

Note Depending on the side layout, the LINE-TX port (output) and the LINE-RX port (input) of the card facing the fiber cannot measure the optical spectrum in a reliable manner if the OCM functionality is not available on these ports.

When you place the mouse over each wavelength in the bar chart, the power level and the wavelength type (local ADD/DROP or EXPRESS) are displayed as a ScreenTip.

- IN graph: The Screen Tip displays the destination side of each wavelength. The wavelength is either dropped locally or expressed to another side (see Figure 13-24).
- OUT graph: The Screen Tip displays the source side of each wavelength. The wavelength is either added locally or expressed from another side (see Figure 13-25).

Figure 13-24 Side Power Monitoring Subtab

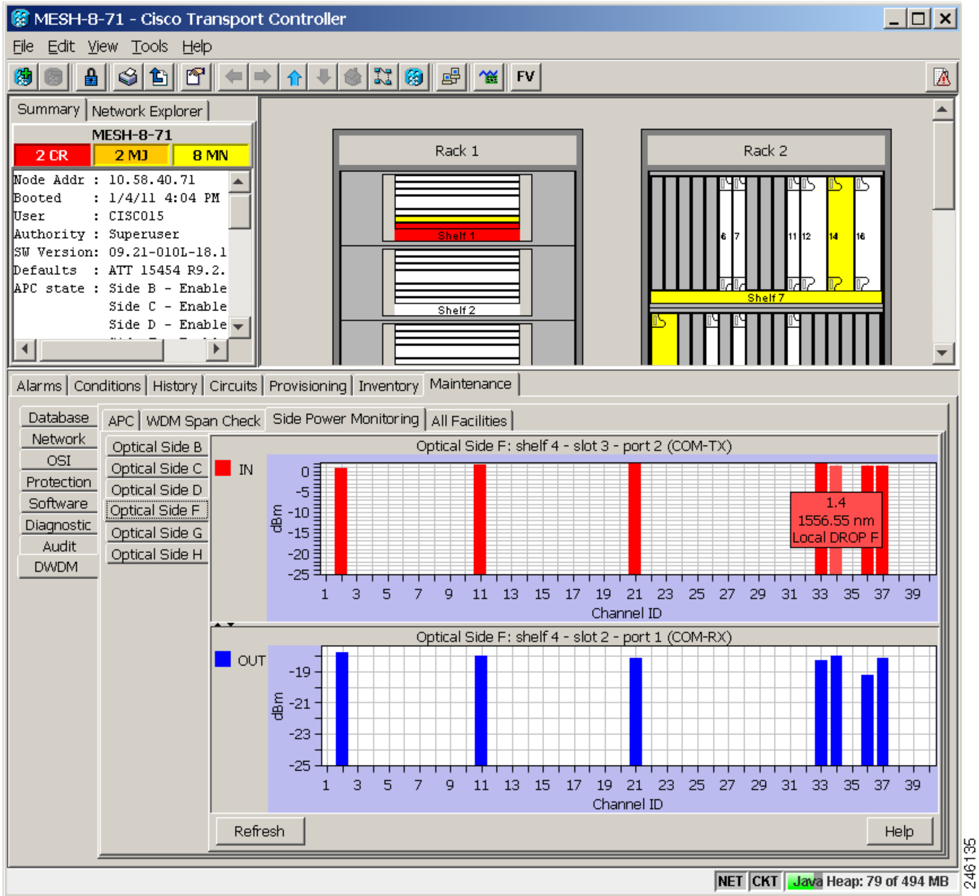
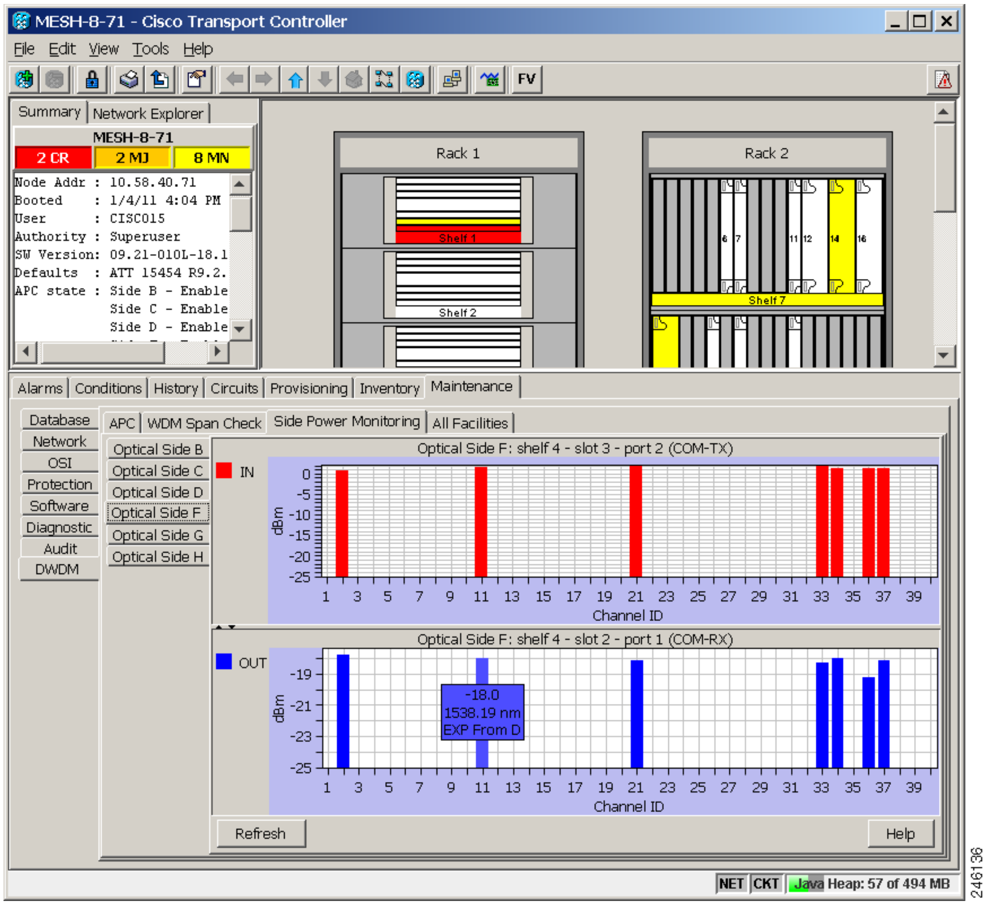


Figure 13-25 Side Power Monitoring Subtab



13.10 Span Loss Verification

Span loss measurements can be performed from the Maintenance > DWDM > WDM Span Check tab. The CTC span check compares the far-end OSC power with the near-end OSC power. A Span Loss Out of Range condition is raised when the measured span loss is higher than the maximum expected span loss. It is also raised when the measured span loss is lower than the minimum expected span loss and the difference between the minimum and maximum span loss values is greater than 1 dB. The minimum and maximum expected span loss values are calculated by Cisco TransportPlanner for the network and imported into CTC. However, you can manually change the minimum and expected span loss values.

CTC span loss measurements provide a quick span loss check and are useful whenever changes to the network occur, for example after you install equipment or repair a broken fiber. CTC span loss measurement resolutions are:

- +/– 1.5 dB for measured span losses between 0 and 25 dB
- +/– 2.5 dB for measured span losses between 25 and 38 dB

For ONS 15454 span loss measurements with higher resolutions, an optical time domain reflectometer (OTDR) must be used.

> **Note** From Software Release 9.0 onwards, span loss measurement is performed using C-band channels (whenever available), instead of OSC signals. Software Release 9.0 is not interoperable with earlier releases that are only OSC-based. Therefore, span loss measurement cannot be done on a span if the adjacent nodes are running different software releases; for example one node running Software Release 8.0 or an earlier release and the second node running Software Release 9.0 or a later release.

13.10.1 Span Loss Measurements on Raman Links

Span loss measurement when Raman amplification is active is less accurate than a standard link as it is based on a mathematical formula that uses the Raman noise and Raman gain.

Span loss on a Raman link is measured in the following states:

- Automatically during Raman link setup (without Raman amplification)
- Automatically during fiber cut restore (without Raman amplification)
- Periodically or upon request (with Raman amplification)

CTC reports three values in the Maintenance > DWDM > WDM Span Check tab:

- Current Span Measure with Raman—Estimated span loss with Raman pump turned ON.
- Wizard Span Measure with Raman Off—Span loss with Raman pump turned OFF, during Raman installation.
- Last Span Measure with Raman—Span loss after a fiber cut restoration procedure.

Measurements are performed automatically on an hourly basis.

A Span Loss Out of Range condition is raised under the following conditions:

- Span loss is greater than the maximum expected span loss + resolution
- Span loss is less than the minimum expected span loss – resolution

The minimum and maximum expected span loss values are calculated by Cisco Transport Planner for the network and imported into CTC. However, you can manually change the minimum and maximum expected span loss values.

> **Note** During Raman installation using a wizard, the Span Loss Out of Range alarm is not raised when the out of range condition is raised. In such a case, the wizard fails and an error message is displayed, and the span is not tuned.

CTC span loss measurements provide a quick span loss check and are useful whenever changes to the network occur, for example after you install equipment or repair a broken fiber. CTC span loss measurement resolutions are:

- +/– 1.5 dB for span loss measurements between 0 and 26 dB
- +/– 2.0 dB for span loss measurements between 26 and 31 dB
- +/– 3.0 dB for span loss measurements between 31 and 34 dB
- +/– 4.0 dB for span loss measurements between 34 and 36 dB

13.11 Network Optical Safety

If a fiber break occurs on the network, automatic laser shutdown (ALS) automatically shuts down the OSCM and OSC-CSM OSC laser output power and the optical amplifiers contained in the OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C, OPT-RAMP-C, OPT-RAMP-CE, 40-SMR1-C, and 40-SMR2-C cards, and the TX VOA in the protect path of the PSM card (in line protection configuration only). (Instead, the PSM active path will use optical safety mechanism implemented by the booster amplifier or OSC-CSM card that are mandatory in the line protection configuration.)

The Maintenance > ALS tab in CTC card view provide the following ALS management options for OSCM, OSC-CSM, OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C, OPT-RAMP-C, OPT-RAMP-CE, 40-SMR1-C, 40-SMR2-C, and PSM (on the protect path, only in line protection configuration) cards:

- Disable—ALS is off. The OSC laser transmitter and optical amplifiers are not automatically shut down when a traffic outage loss of signal (LOS) occurs.
- Auto Restart—ALS is on. The OSC laser transmitter and optical amplifiers automatically shut down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. Auto Restart is the default ALS provisioning for OSCM, OSC-CSM, OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C, OPT-RAMP-C, OPT-RAMP-CE, 40-SMR1-C, 40-SMR2-C, and PSM (on the protect path, only in line protection configuration) cards.
- Manual Restart—ALS is on. The OSC laser transmitter and optical amplifiers automatically shut down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved.
- Manual Restart for Test—Manually restarts the OSC laser transmitter and optical amplifiers for testing.

13.11.1 Automatic Laser Shutdown

When ALS is enabled on OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C, OPT-RAMP-C, OPT-RAMP-CE, 40-SMR1-C, 40-SMR2-C, PSM (on the protect path, only in line protection configuration), OSCM, OSC-CSM, TNC, and TNCE cards, a network safety mechanism will occur in the event of a system failure. ALS provisioning is also provided on the transponder (TXP) and muxponder (MXP) cards. However, if a network uses ALS-enabled OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C, OPT-RAMP-C, OPT-RAMP-CE, 40-SMR1-C, 40-SMR2-C, PSM (on the protect path, only in line protection configuration), OSCM, and OSC-CSM cards, ALS does not need to be enabled on the TXP cards or MXP cards. ALS is disabled on TXP and MXP cards by default and the network optical safety is not impacted.

If TXP and MXP cards are connected directly to each other without passing through a DWDM layer, ALS should be enabled on them. The ALS protocol goes into effect when a fiber is cut, enabling some degree of network point-to-point bidirectional traffic management between the cards.

If ALS is disabled on the OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C, OPT-RAMP-C, OPT-RAMP-CE, 40-SMR1-C, 40-SMR2-C, PSM (on the protect path, only in line protection configuration), OSCM, and OSC-CSM cards (the DWDM network), ALS can be enabled on the TXP and MXP cards to provide laser management in the event of a fiber break in the network between the cards.

13.11.2 Automatic Power Reduction

Automatic power reduction (APR) is controlled by the software and is not user configurable. During amplifier restart after a system failure, the amplifier (OPT-BST, for example) operates in pulse mode and an APR level is activated so that the Hazard Level 1 power limit is not exceeded. This is done to ensure personnel safety.

When a system failure occurs (cut fiber or equipment failure, for example) and ALS Auto Restart is enabled, a sequence of events is placed in motion to shut down the amplifier laser power, then automatically restart the amplifier after the system problem is corrected. As soon as a loss of optical payload and OSC is detected at the far end, the far-end amplifier shuts down. The near-end amplifier then shuts down because it detects a loss of payload and the OSC shuts down due to the far-end amplifier shutdown. At this point, the near end attempts to establish communication to the far end using the OSC laser transmitter. To do this, the OSC emits a two-second pulse at very low power (maximum of 0 dBm) and waits for a similar two-second pulse in response from the far-end OSC laser transmitter. If no response is received within 100 seconds, the near end tries again. This process continues until the near end receives a two-second response pulse from the far end, indicating the system failure is corrected and full continuity in the fiber between the two ends exists.

After the OSC communication is established, the near-end amplifier is configured by the software to operate in pulse mode at a reduced power level. It emits a nine-second laser pulse with an automatic power reduction to +8 dBm. (For 40-SMR1-C and 40-SMR2-C cards, the pulse is not +8 dBm but it is the per channel power setpoint.) This level assures that Hazard Level 1 is not exceeded, for personnel safety, even though the establishment of successful OSC communication is assurance that any broken fiber is fixed. If the far-end amplifier responds with a nine-second pulse within 100 seconds, both amplifiers are changed from pulse mode at reduced power to normal operating power mode.

For a direct connection between TXP or MXP cards, when ALS Auto Restart is enabled and the connections do not pass through a DWDM layer, a similar process takes place. However, because the connections do not go through any amplifier or OSC cards, the TXP or MXP cards attempt to establish communication directly between themselves after a system failure. This is done using a two-second restart pulse, in a manner similar to that previously described between OSCs at the DWDM layer. The power emitted during the pulse is below Hazard Level 1.

APR is also implemented on the PSM card (on the protect path, only in line protection configuration). In the PSM line protection configuration, when a system failure occurs on the working path (cut fiber or equipment failure, for example), the ALS and APR mechanisms are implemented by the booster amplifier or the OSC-CSM card. Alternately, when a system failure occurs on the protect path, and ALS Auto Restart is enabled on the PSM card, a sequence of events is placed in motion to shut down the TX VOA on the protect path, and then automatically restart it after the system failure is corrected. During protect path restart, the TX VOA on the protect path operates in pulse mode and limits the power to maximum +8 dBm so that the Hazard Level 1 power limit is not exceeded on protect TX path.

When ALS is disabled, the warning Statement 1056 is applicable.

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Note If you must disable ALS, verify that all fibers are installed in a restricted location. Enable ALS immediately after finishing the maintenance or installation process.

> **Note** For the line amplifier to start up automatically, disable the ALS on the terminal node that is unidirectional.

13.11.3 Network Optical Safety on OPT-RAMP-C and OPT-RAMP-CE Cards

Optical safety on the OPT-RAMP-C and OPT-RAMP-CE cards is implemented in the RAMAN-TX and COM-TX ports. RAMAN-TX will report safety settings associated to the Raman pump while the COM-TX port will report safety settings associated with the embedded EDFA.

13.11.3.1 RAMAN-TX Settings on Raman Pump

The Raman pump is automatically turned off as soon as the LOS alarm is detected on the LINE-RX port. The Raman pump is automatically turned on at APR power every 100 secs for a duration of 9 seconds at a pulse power of at 8 dBm, as soon as the LINE-RX port is set to IS-NR/unlocked-enabled.

> **Note** Optical safety cannot be disabled on the OPT-RAMP-C and OPT-RAMP-CE cards and cannot be disabled on OSCM cards when connected to a OPT-RAMP-C or OPT-RAMP-CE card.

The system periodically verifies if the signal power is present on the LINE-RX port. If signal power is present, the following occurs:

- Pulse duration is extended.
- Raman pumps are turned on at APR power, if the laser was shut down.

The Raman power is then moved to setpoint if power is detected for more than 10 seconds. During Automatic Laser Restart (ALR) the safety is enabled. The laser is automatically shut down if LOS is detected on the receiving fiber. In general Raman pump turns on only when Raman signals are detected. However, the Raman pump can be configured to turn on to full power even when OSC power is detected for more than 9 seconds on OSC-RX port.

13.11.3.2 COM-TX Safety Setting on EDFA

EDFA is shutdown automatically under the following conditions:

- The Raman pumps shut down.
- An LOS-P alarm is detected on the COM-RX port.

If EDFA was shut down because of Raman pump shut down, the EDFA restarts by automatically turning on the EDFA lasers as soon as the Raman loop is closed.

- Pulse duration: 9 seconds
- Pulse power: 8 dB (maximum APR power foreseen by safety regulation)
- Exit condition: Received power detected on the DC-RX port at the end of APR pulse. If power is detected on DC-RX (so DCU is connected) EDFA moves to set-point; otherwise, it keeps 9 dB as the output power at restart
- EDFA moves to the power setpoint when power is detected on the DC-RX port.

If EDFA was shutdown because of an LOS-P alarm. The EDFA restarts by automatically turning on the EDFA laser as soon as an LOS-P alarm on the COM-RX port is cleared, and the Raman loop is closed.

- Pulse duration: 9 seconds
- Pulse power: 8 dB (maximum APR power foreseen by safety regulation)
- Exit condition: Received power detected on the LINE-RX port at the end of the APR pulse

Warning **All ONS 15454 users must be properly trained on laser safety hazards in accordance with IEC 60825-2, or ANSI Z136.1.**

13.11.4 Fiber Cut Scenarios

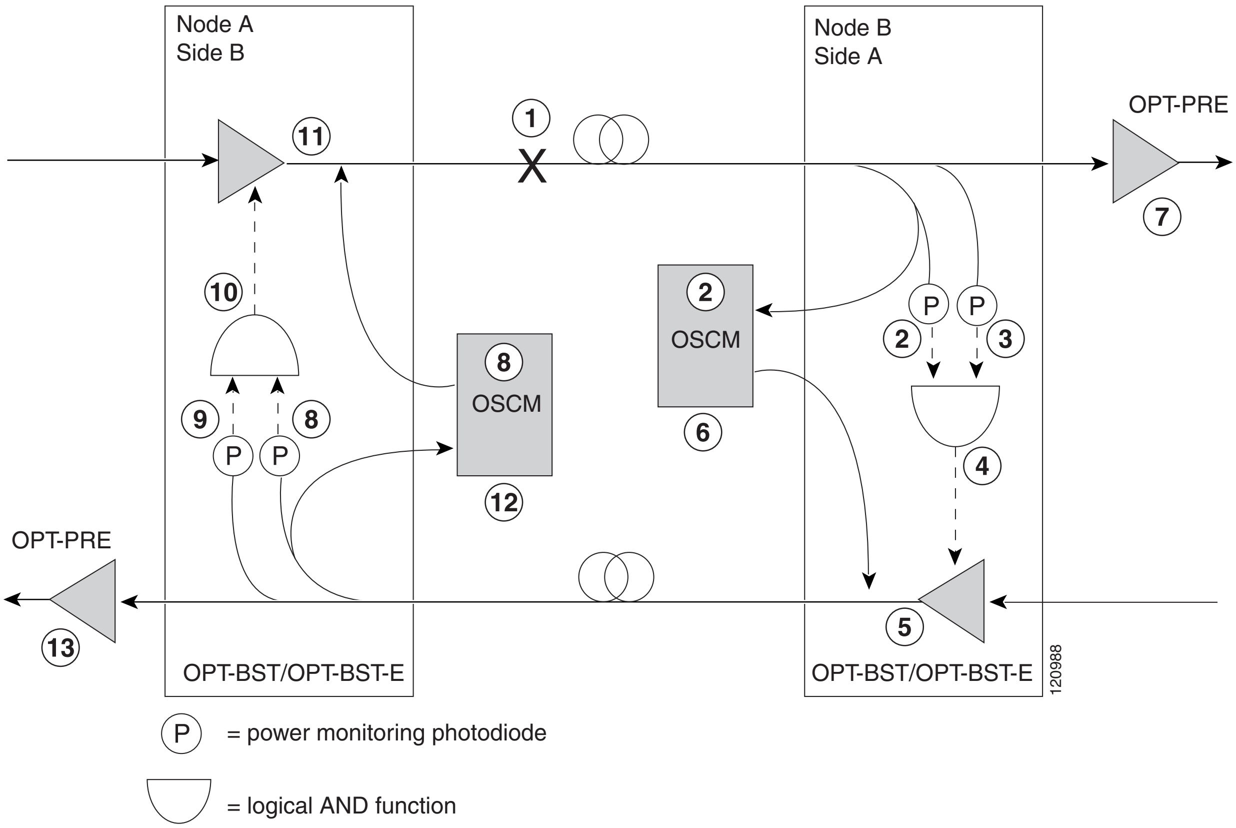
In the following paragraphs, four ALS scenarios are given:

- 13.11.4.1 Scenario 1: Fiber Cut in Nodes Using OPT-BST/OPT-BST-E Cards, page 13-33
- 13.11.4.2 Scenario 2: Fiber Cut in Nodes Using OSC-CSM Cards, page 13-35
- 13.11.4.3 Scenario 3: Fiber Cut in Nodes Using OPT-BST-L Cards, page 13-37
- 13.11.4.4 Scenario 4: Fiber Cut in Nodes Using OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C (OPT-LINE Mode), 40-SMR1-C, or 40-SMR2-C Cards, page 13-38
- 13.11.4.5 Scenario 5: Fiber Cut in Nodes Using DCN Extension, page 13-40
- 13.11.4.6 Scenario 6: Fiber Cut in Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards, page 13-41
- 13.11.4.7 Scenario 7: Fiber Cut in Optical Line Amplifier Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards, page 13-44

13.11.4.1 Scenario 1: Fiber Cut in Nodes Using OPT-BST/OPT-BST-E Cards

Figure 13-26 shows nodes using OPT-BST/OPT-BST-E cards with a fiber cut between them.

Figure 13-26 Nodes Using OPT-BST/OPT-BST-E Cards



Two photodiodes at Node B monitor the received signal strength for the optical payload and OSC signals. When the fiber is cut, an LOS is detected at both of the photodiodes. The AND function then indicates an overall LOS condition, which causes the OPT-BST/OPT-BST-E transmitter, OPT-PRE transmitter, and OSCM lasers to shut down. This in turn leads to an LOS for both the optical payload and OSC at Node A, which causes Node A to turn off the OSCM, OPT-PRE transmitter, and OPT-BST/OPT-BST-E transmitter lasers. The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-26):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects a Loss of Incoming Payload (LOS-P) on the OPT-BST/OPT-BST-E card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-BST/OPT-BST-E card, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. The OPT-BST/OPT-BST-E card amplifier is shut down within one second.
5. The OSCM laser is shut down.
6. The OPT-PRE card automatically shuts down due to a loss of incoming optical power.
7. The Node A power monitoring photodiode detects a LOS-O on the OPT-BST/OPT-BST-E card and the OSCM card detects a LOS (OC3) at the SONET layer. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
8. The Node A power monitoring photodiode detects a LOS-P on the OPT-BST/OPT-BST-E card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

9. On the OPT-BST/OPT-BST-E, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
10. The OPT-BST/OPT-BST-E card amplifier is shut down within one second.
11. The OSCM laser is shut down.
12. The Node A OPT-PRE card automatically shuts down due to a loss of incoming optical power.

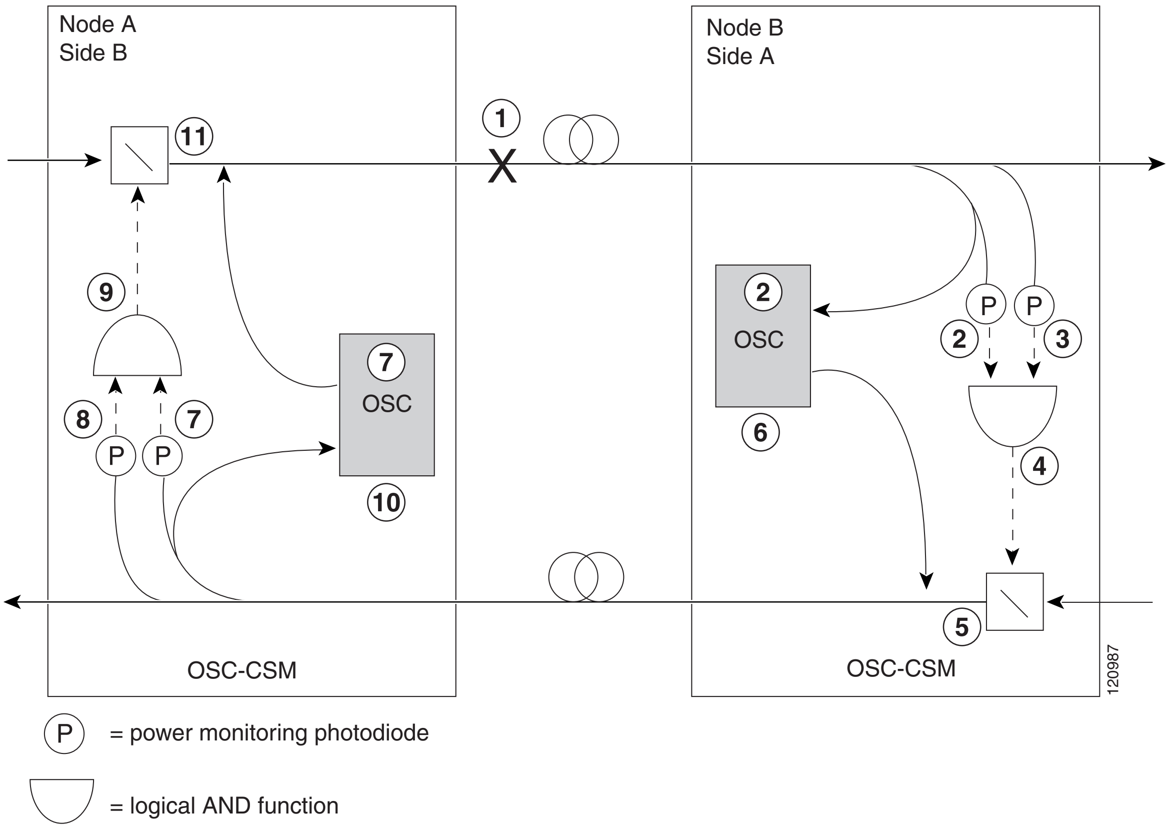
When the fiber is repaired, either an automatic or manual restart at the Node A OPT-BST/OPT-BST-E transmitter or at the Node B OPT-BST/OPT-BST-E transmitter is required. A system that has been shut down is reactivated through the use of a restart pulse. The pulse is used to signal that the optical path has been restored and transmission can begin. For example, when the far end, Node B, receives a pulse, it signals to the Node B OPT-BST/OPT-BST-E transmitter to begin transmitting an optical signal. The OPT-BST/OPT-BST-E receiver at Node A receives that signal and signals the Node A OPT-BST/OPT-BST-E transmitter to resume transmitting.

Note During a laser restart pulse, APR ensures that the laser power does not exceed Class 1 limits. See the "13.11.2 Automatic Power Reduction" section on page 13-31 for more information about APR.

13.11.4.2 Scenario 2: Fiber Cut in Nodes Using OSC-CSM Cards

Figure 13-27 shows nodes using OSC-CSM cards with a fiber cut between them.

Figure 13-27 Nodes Using OSC-CSM Cards



Two photodiodes at the Node B OSC-CSM card monitor the received signal strength for the received optical payload and OSC signals. When the fiber is cut, LOS is detected at both of the photodiodes. The AND function then indicates an overall LOS condition, which causes the Node B OSC laser to shut down and the optical switch to block traffic. This in turn leads to LOS for both the optical payload and OSC signals at Node A, which causes Node A to turn off the OSC laser and the optical switch to block outgoing traffic. The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-27):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects a LOS-P on the OSC-CSM card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OSC-CSM, the simultaneous LOS-O and LOS-P detection triggers a change in the position of the optical switch. CTC reports a LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. The optical switch blocks outgoing traffic.
5. The OSC laser is shut down.
6. The Node A power monitoring photodiode detects a LOS-O on the OSC-CSM card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
7. The Node A power monitoring photodiode detects a LOS-P on the OSC-CSM card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

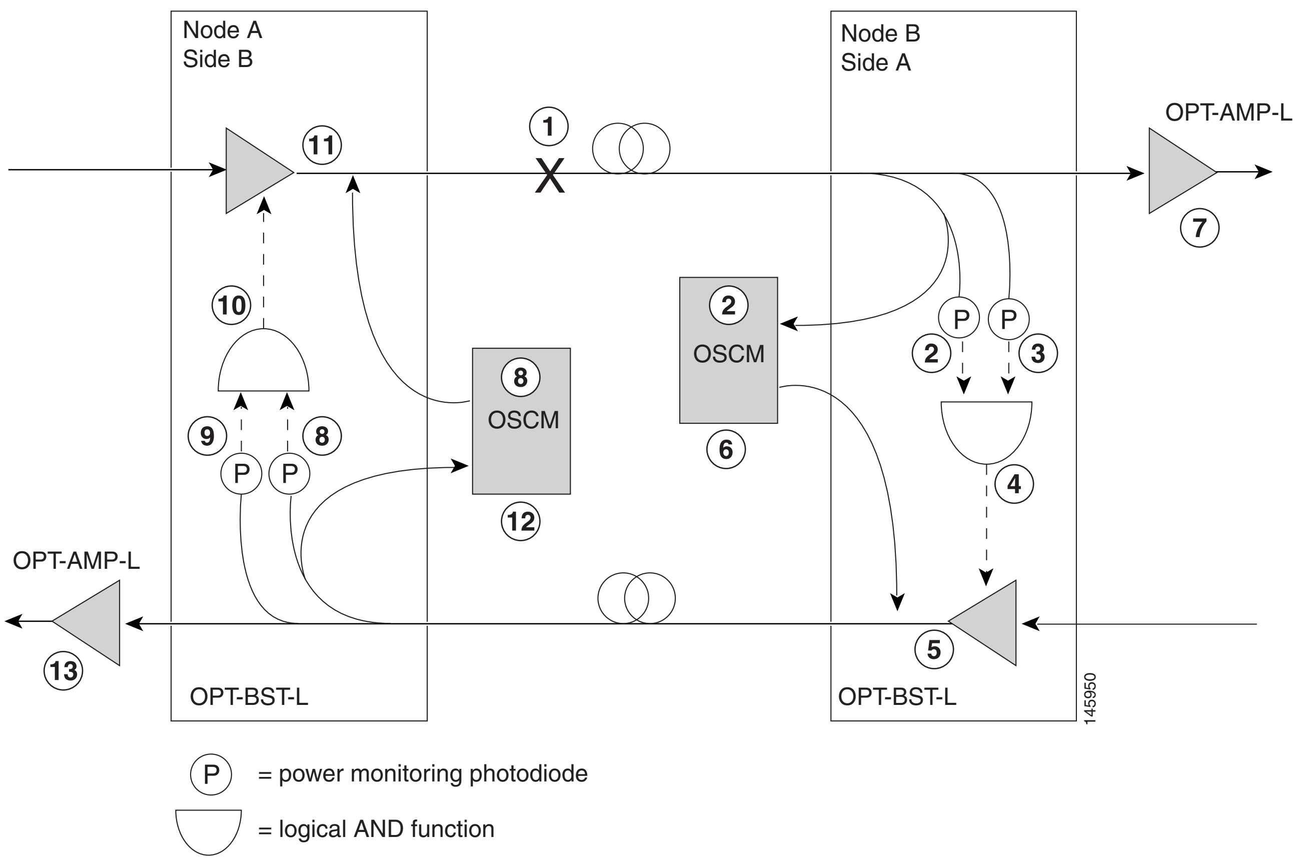
8. On the OSC-CSM, the simultaneous LOS-O and LOS-P detection triggers a change in the position of the optical switch. CTC reports a LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
9. The OSC laser is shut down.
10. The optical switch blocks outgoing traffic.

When the fiber is repaired, either an automatic or manual restart at the Node A OSC-CSM card OSC or at the Node B OSC-CSM card OSC is required. A system that has been shut down is reactivated through the use of a restart pulse. The pulse indicates the optical path is restored and transmission can begin. For example, when the far-end Node B receives a pulse, it signals to the Node B OSC to begin transmitting its optical signal and for the optical switch to pass incoming traffic. The OSC-CSM at Node A then receives the signal and tells the Node A OSC to resume transmitting and for the optical switch to pass incoming traffic.

13.11.4.3 Scenario 3: Fiber Cut in Nodes Using OPT-BST-L Cards

Figure 13-28 shows nodes using OPT-BST-L cards with a fiber cut between them.

Figure 13-28 Nodes Using OPT-BST-L Cards



Two photodiodes at Node B monitor the received signal strength for the optical payload and OSC signals. When the fiber is cut, an LOS is detected at both of the photodiodes. The AND function then indicates an overall LOS condition, which causes the OPT-BST-L transmitter and OSCM lasers to shut down. This in turn leads to an LOS for both the optical payload and the OSC at Node A, which causes Node A to turn off the OSCM OSC transmitter and OPT-BST-L amplifier lasers. The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-28):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects an LOS-P on the OPT-BST-L card. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-BST-L card, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. The OPT-BST-L card amplifier is shut down within one second.
5. The OSCM laser is shut down.
6. The OPT-AMP-L, OPT-AMP-C, or OPT-AMP-17-C card automatically shuts down due to a loss of incoming optical power.
7. The Node A power monitoring photodiode detects an LOS-O on the OPT-BST-L card and the OSCM card detects an LOS (OC3) at the SONET layer. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
8. The Node A power monitoring photodiode detects an LOS-P on the OPT-BST-L card. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
9. On the OPT-BST-L, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while the LOS-O and LOS-P are demoted. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
10. The OPT-BST-L card amplifier is shut down within one second.
11. The OSCM laser is shut down.
12. The Node A OPT-AMP-L, OPT-AMP-C, or OPT-AMP-17-C card automatically shuts down due to an LOS for the incoming optical power.

When the fiber is repaired, either an automatic or manual restart at the Node A OPT-BST-L transmitter or at the Node B OPT-BST-L transmitter is required. A system that has been shut down is reactivated through the use of a restart pulse. The pulse indicates the optical path is restored and transmission can begin. For example, when the far end, Node B, receives a pulse, it signals to the Node B OPT-BST-L transmitter to begin transmitting an optical signal. The OPT-BST-L receiver at Node A receives that signal and signals the Node A OPT-BST-L transmitter to resume transmitting.

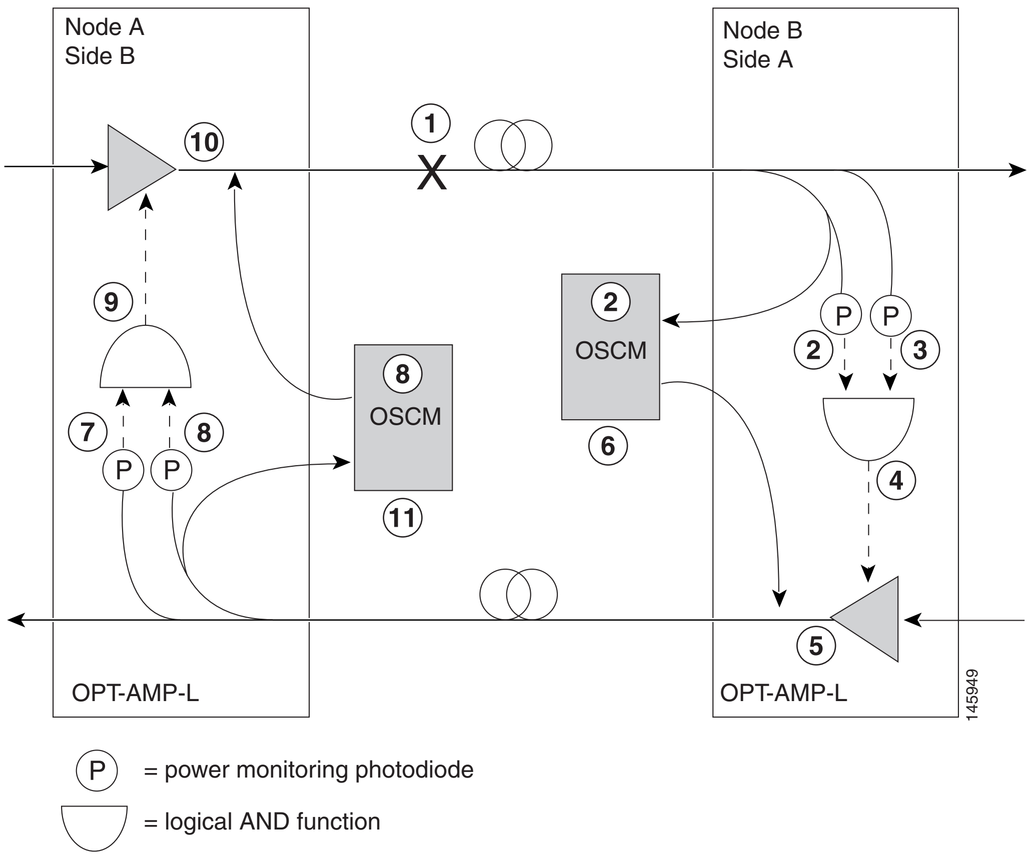
Note During a laser restart pulse, APR ensures that the laser power does not exceed Class 1 limits. See the "13.11.2 Automatic Power Reduction" section on page 13-31 for more information about APR.

13.11.4.4 Scenario 4: Fiber Cut in Nodes Using OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C (OPT-LINE Mode), 40-SMR1-C, or 40-SMR2-C Cards

Figure 13-29 shows nodes using OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C (in OPT-LINE mode), 40-SMR1-C, or 40-SMR2-C cards with a fiber cut between them.

Note A generic reference to the OPT-AMP card refers to the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, 40-SMR1-C, or 40-SMR2-C cards.

Figure 13-29 Nodes Using OPT-AMP Cards



Two photodiodes at Node B monitor the received signal strength for the optical payload and OSC signals. When the fiber is cut, an LOS is detected at both of the photodiodes. The AND function then indicates an overall LOS condition, which causes the OPT-AMP card amplifier transmitter and OSCM card OSC lasers to shut down. This in turn leads to an LOS for both the optical payload and OSC at Node A, which causes Node A to turn off the OSCM card OSC and OPT-AMP card amplifier lasers. The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-29):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects an LOS-P on the OPT-AMP card. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-AMP card, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. The OPT-AMP card amplifier is shut down within one second.
5. The OSCM card laser is shut down.
6. The Node A power monitoring photodiode detects an LOS-O on the OPT-AMP card and the OSCM card detects an LOS (OC3) at the SONET layer. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
7. The Node A power monitoring photodiode detects an LOS-P on the OPT-AMP card. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

8. On the OPT-AMP card, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. For more information on alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
9. The OPT-AMP card amplifier is shut down within one second.
10. The OSCM card laser is shut down.

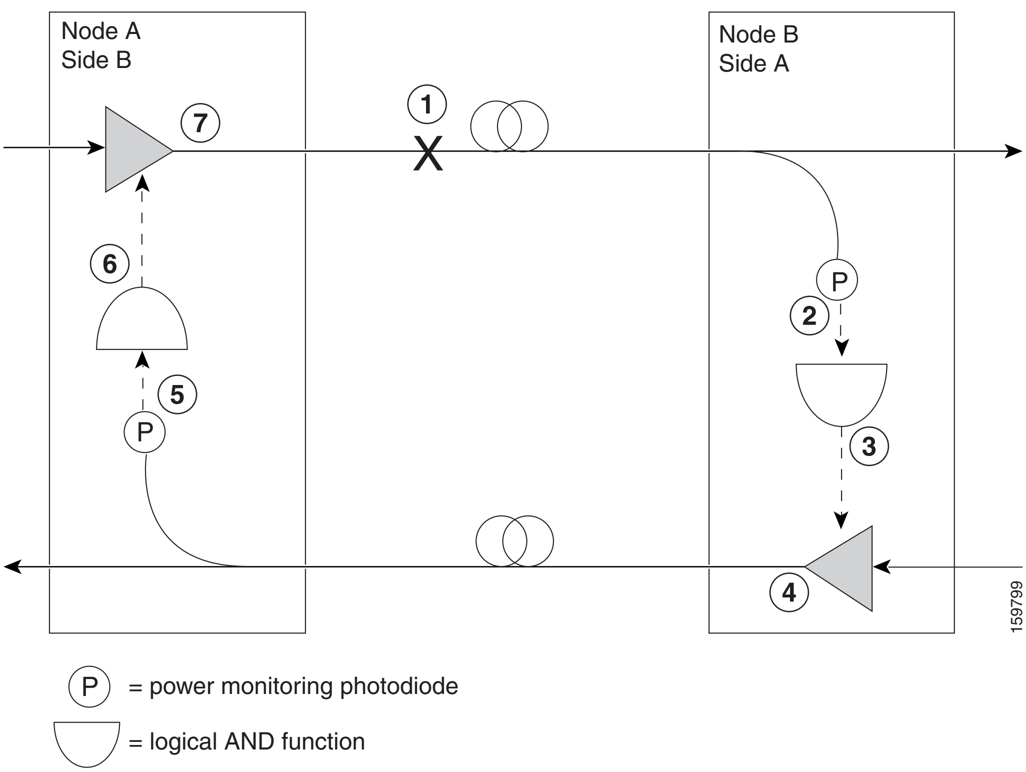
When the fiber is repaired, either an automatic or manual restart at the Node A OPT-AMP card transmitter or at the Node B OPT-AMP card transmitter is required. A system that has been shut down is reactivated through the use of a restart pulse. The pulse indicates that the optical path is restored and transmission can begin. For example, when the far end, Node B, receives a pulse, it signals to the Node B OPT-AMP card transmitter to begin transmitting an optical signal. The OPT-AMP card receiver at Node A receives that signal and signals the Node A OPT-AMP card transmitter to resume transmitting.

Note During a laser restart pulse, APR ensures that the laser power does not exceed Class 1 limits. See the "13.11.2 Automatic Power Reduction" section on page 13-31 for more information about APR.

13.11.4.5 Scenario 5: Fiber Cut in Nodes Using DCN Extension

Figure 13-30 shows a fiber cut scenario for nodes that do not have OSC connectivity. In the scenario, references to the OPT-BST cards refers to the OPT-BST, OPT-BST-L, OPT-BST-E, OPT-AMP-L, OPT-AMP-C, OPT-AMP-17-C, 40-SMR1-C, and 40-SMR2-C cards when provisioned in OPT-LINE mode.

Figure 13-30 Fiber Cut With DCN Extension



Two photodiodes at Node B monitor the received signal strength for the optical payload. When the fiber is cut, an LOS is detected on the channel photodiode while the other one never gets a signal because the OSC is not present. The AND function then indicates an overall LOS condition, which causes the OPT-BST amplifier transmitter to shut down. This in turn leads to a LOS for the optical payload at Node A, which causes Node A to turn off the OPT-BST amplifier lasers.

The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-30):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects an LOS on the OPT-BST card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for LOS troubleshooting procedures.
3. On the OPT-BST card, the LOS detection triggers a command to shut down the amplifier. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for alarm troubleshooting procedures.
4. The OPT-BST card amplifier is shut down within one second.
5. The Node A power monitoring photodiode detects a LOS on the OPT-BST card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for alarm troubleshooting procedures.
6. On the OPT-BST, the LOS detection triggers a command to shut down the amplifier. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
7. The OPT-BST card amplifier is shut down within one second.

When the fiber is repaired, a manual restart with 9 sec restart pulse time (MANUAL RESTART) is required at the Node A OPT-BST transmitter and at the Node B OPT-BST transmitter. A system that has been shut down is reactivated through the use of a 9 sec restart pulse. The pulse indicates that the optical path is restored and transmission can begin.

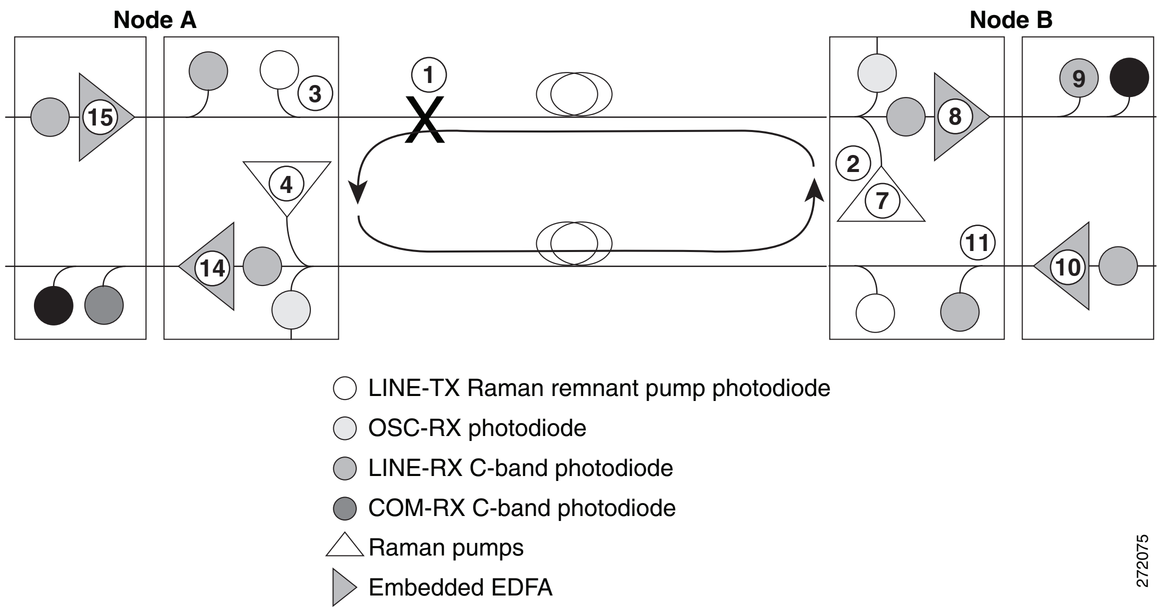
For example, when the far end, Node B, receives a pulse, it signals to the Node B OPT-BST transmitter to begin transmitting an optical signal. The OPT-BST receiver at Node A receives that signal and signals the Node A OPT-BST transmitter to resume transmitting.

Note During a laser restart pulse, APR ensures that the laser power does not exceed Class 1 limits. See the "13.11.2 Automatic Power Reduction" section on page 13-31 for more information about APR.

13.11.4.6 Scenario 6: Fiber Cut in Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards

Figure 13-31 shows a fiber cut scenario for nodes using OPT-RAMP-C or OPT-RAMP-CE cards.

Figure 13-31 Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards



The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-31):

1. Fiber is cut in the direction of Node A to Node B.
2. No alarms are initially detected on Node B. The Raman pumps are still in ON state and continue to pump power on to the broken fiber. The residual Raman noise propagated towards the LINE-RX port keeps the embedded EDFA active. The LOS alarm is not raised on the DC-TX port because the EDFA continues to transmit minimum output power to the line amplifier that it is connected to.
3. On Node A, the OPT-RAMP-C card no longer receives the Raman remnant pump signal on the LINE-TX port. The RAMAN-RX port detects an LOS-R alarm on the OPT-RAMP-C or OPT-RAMP-CE card. The OSCM card that is connected to the OPT-RAMP-C card detects OSC failure and raises a LOS alarm at the OC-3 level. For the LOS-R troubleshooting procedures, see the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. On the OPT-RAMP-C or OPT-RAMP-CE card, the LOS-R alarm triggers a command to shut down the Raman pump on Node A.
5. On Node A, the LOS alarm on the OSCM card causes a laser TX shutdown because ALS is always enabled on the OSCM card. This results in the OPT-RAMP-C or OPT-RAMP-CE card raising the LOS-O alarm on the OSC-RX port.
6. Because the Raman pump on Node A is shutdown, the RAMAN-RX port detects an LOS-R alarm on Node B.
7. The LOS-R alarm triggers a command to shut down the Raman pump on Node B.
8. The embedded EDFA on Node B no longer receives residual power Raman noise. An LOS alarm is detected on the input port of the EDFA that causes the embedded EDFA to shut down.
9. The LINE-RX port of the line amplifier on Node B that receives the payload signal from the embedded EDFA of the OPT-RAMP-C card detects an LOS alarm.
10. The LOS alarm triggers an ALS and causes the line amplifier to shut down.
11. The COM-RX port of the OPT-RAMP-C card on Node B and consequently the LINE-TX port that is connected to Node A through the safe fiber, no longer receive power.

12. Because the OSCM card on Node A is in the ALS condition, there is no OSC signal on the LINE-TX port of the OSCM card on Node B that raises an LOS alarm.
13. The LOS alarm on the OSCM card causes a laser TX shutdown that raises an LOS-O alarm on the OSC-RX port of the OPT-RAMP-C card on Node B. The simultaneous presence of an LOS-O alarm on the OSC-RX port and an LOS-R alarm on the RAMAN-RX port of the OPT-RAMP-C card can be interpreted as a fiber cut and an LOS alarm is generated on the LINE-RX port.
14. On Node A, the LINE-RX port of the OPT-RAMP-C card detects an LOS alarm because the C-band payload is absent and triggers a command to shut down the embedded EDFA.
15. The line amplifier that receives the payload signal from the embedded EDFA of the OPT-RAMP-C card detects an LOS alarm on its LINE-RX port and causes the line amplifier to shut down. The C-band power is no longer transmitted to the COM-RX port of the OPT-RAMP-C card and subsequently to the LINE-TX port that connected to the broken fiber.

An Automatic Laser Restart (ALR) on the Raman pump is detected when the fiber is restored. This turns both the Raman pumps to ON state, on both the nodes. When the power on the Raman pump is restored, it turns on the embedded EDFA also. The booster amplifiers on both Node A and Node B detect power on the LINE-RX port. This restarts the booster amplifier.

Once the active TCC of the Raman node detects a stable condition, the link is automatically revaluated. The TCC initiates a fiber restoration procedure as described in 13.11.4.8 Fiber Cut Recovery in Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards, page 13-49. The procedure takes a maximum of one or two minutes and causes a temporary transient condition on C-band signals.

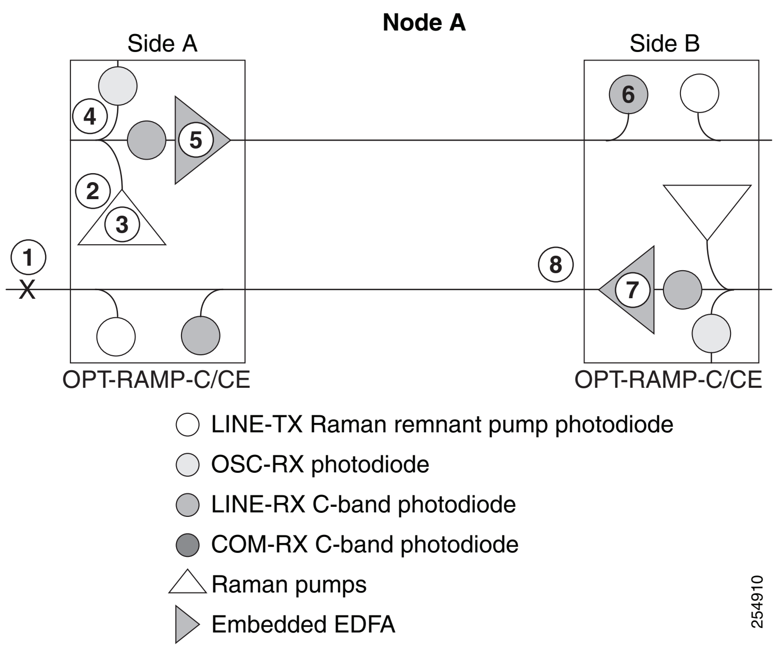
13.11.4.7 Scenario 7: Fiber Cut in Optical Line Amplifier Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards

In the following sections, fiber cut scenarios for three node layouts are given:

13.11.4.7.1 Scenario 7A—Node Equipped With OPT-RAMP-C or OPT-RAMP-CE Cards on Side A and Side B.

Figure 13-32 shows a fiber cut scenario for a node equipped with OPT-RAMP-C or OPT-RAMP-CE cards on Side A and Side B.

Figure 13-32 Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards on Side A and B



The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-32):

1. The fiber that is connected to the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A of Node A is cut. The Raman link goes down.
2. The RAMAN-RX port detects an LOS-R alarm on the OPT-RAMP-C or OPT-RAMP-CE card on Side A. For LOS-R troubleshooting procedures, see the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-RAMP-C or OPT-RAMP-CE card, the LOS-R alarm triggers a command to shut down the Raman pump on Side A.
4. No power is detected by the embedded EDFA on the LINE-RX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A.
5. The embedded EDFA of the OPT-RAMP-C or OPT-RAMP-CE card on Side A is automatically shutdown.
6. An LOS-P alarm is detected on the COM-RX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side B of Node A.
7. The LOS-P alarm triggers an ALS of the embedded EDFA of the OPT-RAMP-C or OPT-RAMP-CE card on Side B.

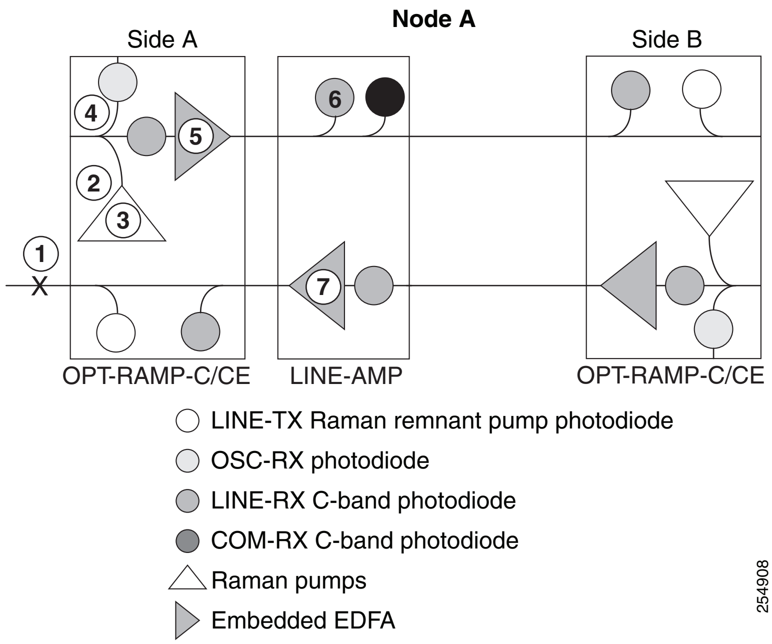
8. No C-band power is transmitted out of the COM-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side B, to the COM-RX port and subsequently to the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A that is connected to the broken fiber.

For information about fiber cut recovery, see the "13.11.4.8 Fiber Cut Recovery in Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards" section on page 13-49.

13.11.4.7.2 Scenario 7B—Node Equipped With OPT-RAMP-C or OPT-RAMP-CE and Booster Cards on Side A and OPT-RAMP-C or OPT-RAMP-CE Cards on Side B.

Scenario 1—Fiber cut on the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A (Figure 13-33).

Figure 13-33 Nodes Using OPT-RAMP-C or OPT-RAMP-CE and Booster Cards on Side A and OPT-RAMP-CE Cards on Side B - Scenario 1



The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-33):

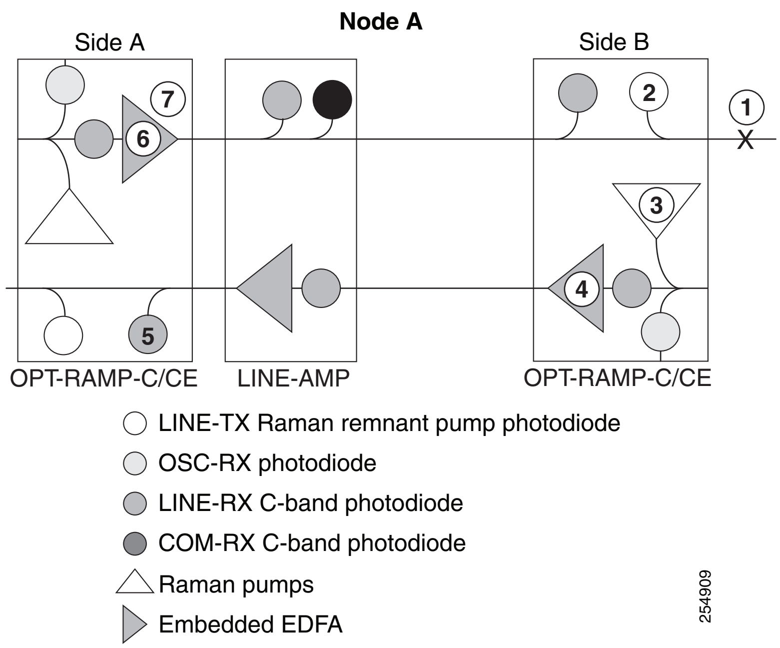
1. The fiber that is connected to the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A of Node A is cut.The Raman link goes down.
2. The RAMAN-RX port detects an LOS-R alarm on the OPT-RAMP-C or OPT-RAMP-CE card. For LOS-R troubleshooting procedures, see the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-RAMP-C or OPT-RAMP-CE card, the LOS-R alarm triggers a command to shut down the Raman pump on Side A.
4. No power is detected by the embedded EDFA on the LINE-RX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A.
5. The embedded EDFA of the OPT-RAMP-C or OPT-RAMP-CE card on Side A is automatically shutdown.
6. An LOS alarm is detected on the downstream line amplifier on Side A of Node A since it no longer receives the optical payload from the embedded EDFA of the OPT-RAMP-C or OPT-RAMP-CE card.

7. The ALS mechanism causes the line amplifier to shut down.
8. The C-band power is no longer transmitted out of the line amplifier to the COM-RX port and subsequently to the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card that is connected to the broken fiber.

For information about fiber cut recovery, see the "13.11.4.8 Fiber Cut Recovery in Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards" section on page 13-49.

Scenario 2—Fiber cut on the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side B (Figure 13-34).

Figure 13-34 Nodes Using OPT-RAMP-C or OPT-RAMP-CE and Booster Cards on Side A and OPT-RAMP-CE Cards on Side B - Scenario 2



The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-34):

1. The fiber that is connected to the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side B of Node A is cut.
2. An LOS-R alarm is detected on the OPT-RAMP-C or OPT-RAMP-CE card on Side B because it no longer receives the Raman remnant signal from Node B.
3. On the OPT-RAMP-C or OPT-RAMP-CE card, the LOS-R alarm triggers a command to shut down the Raman pump on Side B.
4. The embedded EDFA of the OPT-RAMP-C or OPT-RAMP-CE card on Side B no longer receives residual Raman power and causes it to shut down.
5. A very low C-band signal reaches the OPT-RAMP-C or OPT-RAMP-CE card on Side A. An LOS-P alarm is detected on the COM-RX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A.
6. The embedded EDFA of the OPT-RAMP-C or OPT-RAMP-CE card on Side A is automatically shutdown.

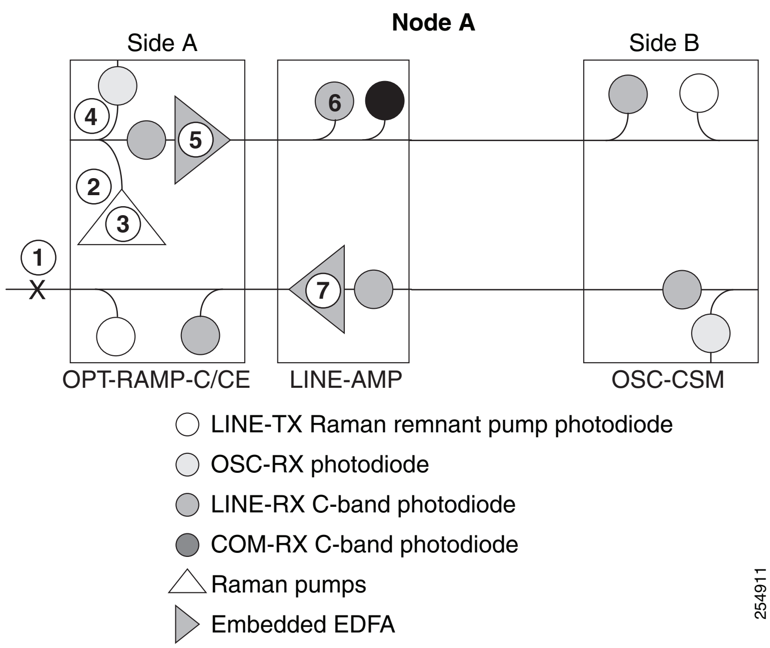
7. The C-band power is no longer transmitted to the line amplifier through the DC-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A, to the COM-RX port and subsequently to the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side B that is connected to the broken fiber.

For information about fiber cut recovery, see the "13.11.4.8 Fiber Cut Recovery in Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards" section on page 13-49.

13.11.4.7.3 Scenario 7C—Node Equipped With OPT-RAMP-C or OPT-RAMP-CE and Booster Cards on Side A and OSC-CSM Cards on Side B.

Scenario 1—Fiber cut on the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A (Figure 13-35).

Figure 13-35 Nodes Using OPT-RAMP-C or OPT-RAMP-CE and Booster Cards on Side A and OSC-CSM Cards on Side B - Scenario 1



The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-35):

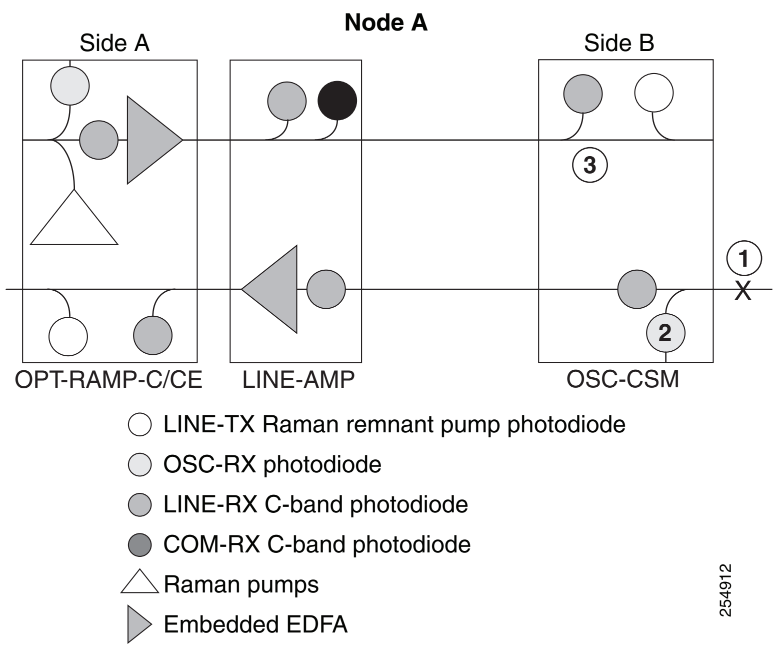
1. The fiber that is connected to the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A of Node A is cut. The Raman link goes down.
2. The RAMAN-RX port detects an LOS-R alarm on the OPT-RAMP-C or OPT-RAMP-CE card. For LOS-R troubleshooting procedures, see the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-RAMP-C or OPT-RAMP-CE card, the LOS-R alarm triggers a command to shut down the Raman pump on Side A.
4. No power is detected by the embedded EDFA on the LINE-RX port of the OPT-RAMP-C or OPT-RAMP-CE card on Side A.
5. The embedded EDFA of the OPT-RAMP-C or OPT-RAMP-CE card on Side A is automatically shutdown.

6. An LOS alarm is detected on the downstream line amplifier on Side A of Node A because it no longer receives the optical payload from the embedded EDFA of the OPT-RAMP-C or OPT-RAMP-CE card.
7. The ALS mechanism causes the line amplifier to shut down.
8. The C-band power is no longer transmitted out of the line amplifier to the COM-RX port and subsequently to the LINE-TX port of the OPT-RAMP-C or OPT-RAMP-CE card that is connected to the broken fiber on Side A.

For information about fiber cut recovery, see the "13.11.4.8 Fiber Cut Recovery in Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards" section on page 13-49.

Scenario 2—Fiber cut on the LINE-RX port of the OSC-CSM card on Side B (Figure 13-36).

Figure 13-36 Nodes Using OPT-RAMP-C or OPT-RAMP-CE and Booster Cards on Side A and OSC-CSM Cards on Side B - Scenario 2



The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 13-36):

1. The fiber that is connected to the LINE-RX port of the OSC-CSM card on Side B of Node A is cut.
2. An LOS alarm is detected on the OSC-CSM card on Side B because it no longer receives the OSC signal.
3. The power is shut down by means of a 1x1 optical switch in the OSC-CSM card.

Note During a laser restart pulse, APR ensures that the laser power does not exceed Class 1 limits. For more information about APR, see the "13.11.2 Automatic Power Reduction" section on page 13-31.

13.11.4.8 Fiber Cut Recovery in Nodes Using OPT-RAMP-C or OPT-RAMP-CE Cards

A fiber cut recovery procedure is automatically performed after the OCH channels are restored to measure the actual Raman gain on the span.

1. Node A sends a message through OSC or DCN to Node B to be ready for Raman Gain measurement.
2. The TCC configures the Raman pumps on Node A to operate at APR power (+8 dBm). In this state, no Raman amplification is generated on the input fiber of Node A and a reliable span loss measurement is performed. The Raman pumps must not be shut down completely to avoid an improper fiber cut event.
3. Node B acknowledges the message and reports the value of the Raman power received on the channel to Node A.
4. On Node A, the TCC configures the line amplifiers in power control mode and APR state (+8 dBm). The C-band power received with Raman pumps in OFF state is recorded.
5. The TCC turns the Raman pumps to full power maintaining the Raman ratio calculated by the Raman installation wizard. The Raman total power is adjusted, so that the Raman gain setpoint is reached. The actual Raman gain is calculated using the C-band power values.
6. When the Raman gain setpoint is reached, the value of the Power field gets updated and the status of the Fiber Cut Recovery field changes to “Executed” in CTC.

If the provisioned Raman gain setpoint is not reached by setting the Raman total power to the maximum value of 450 mW, the procedure stops and the RAMAN-G-NOT-REACHED alarm is raised on the OPT-RAMP-C or OPT-RAMP-CE card.

13.11.5 Network Optical Safety on RAMAN-CTP and RAMAN-COP Cards

Bidirectional optical safety mechanisms for Raman and C-band signals have been independently implemented. The Raman pump laser shutdown and restart is managed by the RAMAN-CTP card. The RAMAN-COP card is controlled by the RAMAN-CTP card using two backplane wires. The RAMAN-COP card can be absent in some node configurations.

The C-band signal shutdown and restart is managed by an MSTP card, such as 40-SMR1-C, 40-SMR-2C, OPT-EDFA-17, or OPT-EDFA-24.

The optical safety mechanism on the RAMAN-CTP and RAMAN-COP cards is managed by:

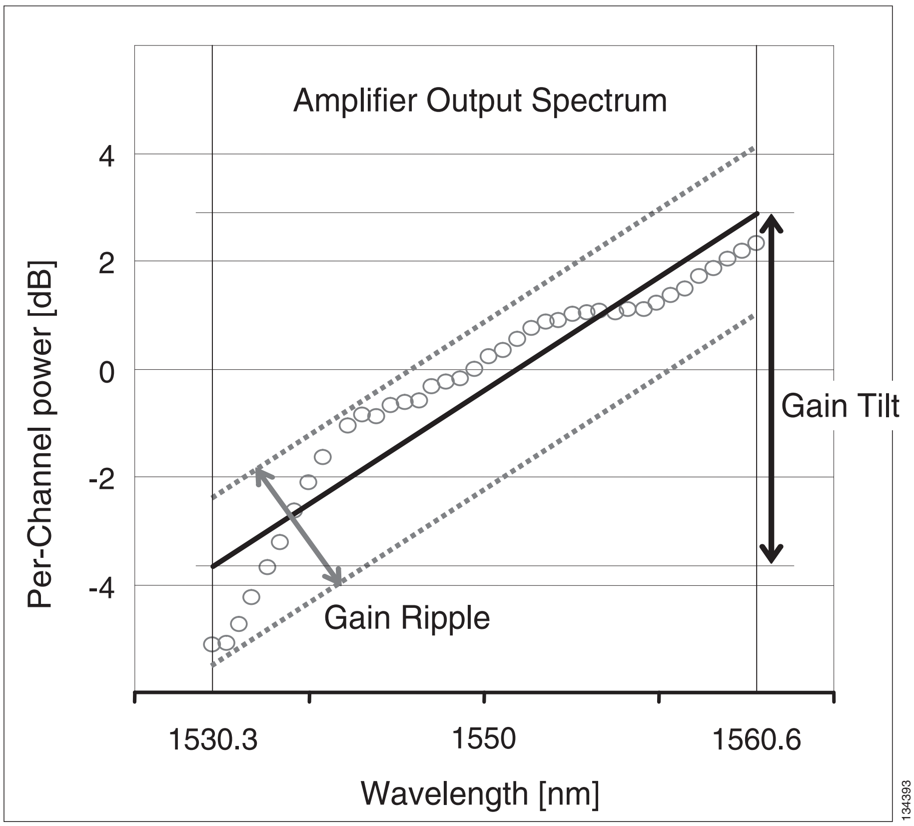
- DFB signal (1568.77 nm) and detection of DFB related signals—The RAMAN-CTP card on the local node transmits a DFB signal and waits for a similar response from the remote side. If a valid DFB signal is not detected, the RAMAN-CTP card switches off its transmitting DFB laser that causes a loss of DFB signal on the remote RAMAN-CTP card which in turn switches off its DFB laser. Both the RAMAN-CTP cards must turn off the DFB signals, when a fiber cut occurs.
- Raman pump laser back reflection mechanism on the RAMAN-CTP and RAMAN-COP cards—This mechanism uses the ratio between the back-reflected optical power and the total output Raman pump power to reduce the output power when patchcords are removed. If excessive back-reflection occurs, a Raman Laser Shutdown (RLS) alarm is raised on the RAMAN port where the failure is detected.
- Photodiode (P8) on the RAMAN-CTP card—The photodiode (P8) detects the Raman pump power transmitted by the RAMAN-COP card and is used to check for optical continuity between the RAMAN-CTP and RAMAN-COP cards. The RAMAN-COP card is shut down if the cards get disconnected.

13.12 Network-Level Gain—Tilt Management of Optical Amplifiers

The ability to control and adjust per channel optical power equalization is a principal feature of ONS 15454 DWDM metro core network applications. A critical parameter to assure optical spectrum equalization throughout the DWDM system is the gain flatness of erbium-doped fiber amplifiers (EDFAs).

Two items, gain tilt and gain ripple, are factors in the power equalization of optical amplifier cards such as the OPT-BST and OPT-PRE. Figure 13-37 shows a graph of the amplifier output power spectrum and how it is affected by gain tilt and gain ripple.

Figure 13-37 Effect of Gain Ripple and Gain Tilt on Amplifier Output Power



Gain ripple and gain tilt are defined as follows:

- Gain ripple is random and depends on the spectral shape of the amplifier optical components.
- Gain tilt is systematic and depends on the gain setpoint (Gstp) of the optical amplifier, which is a mathematical function F(Gstp) that relates to the internal amplifier design.

Gain tilt is the only contribution to the power spectrum disequalization that can be compensated at the card level. A VOA internal to the amplifier can be used to compensate for gain tilt.

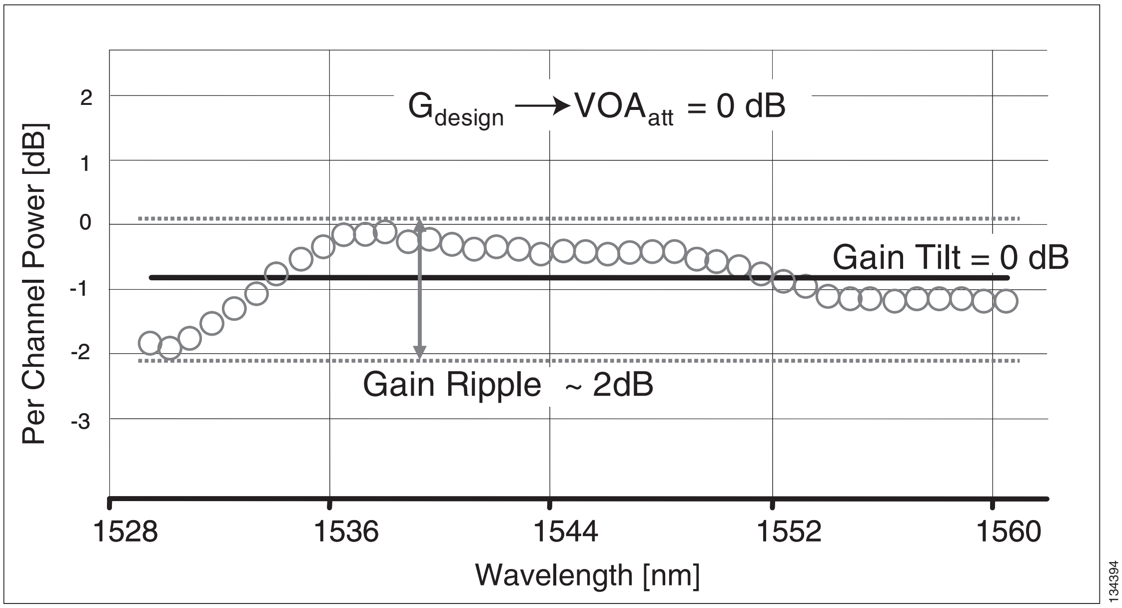
An optical spectrum analyzer (OSA) is used to acquire the output power spectrum of an amplifier. The OSA shows the peak-to-peak difference between the maximum and minimum power levels, and takes into account the contributions of both gain tilt and gain ripple.

Note Peak-to-peak power acquisition using an OSA cannot be used to measure the gain tilt, because gain ripple itself is a component of the actual measurement.

13.12.1 Gain Tilt Control at the Card Level

The OPT-BST and OPT-PRE amplifier cards have a flat output (gain tilt = 0 dB) for only a specific gain value (Gdesign), based on the internal optical design (see Figure 13-38).

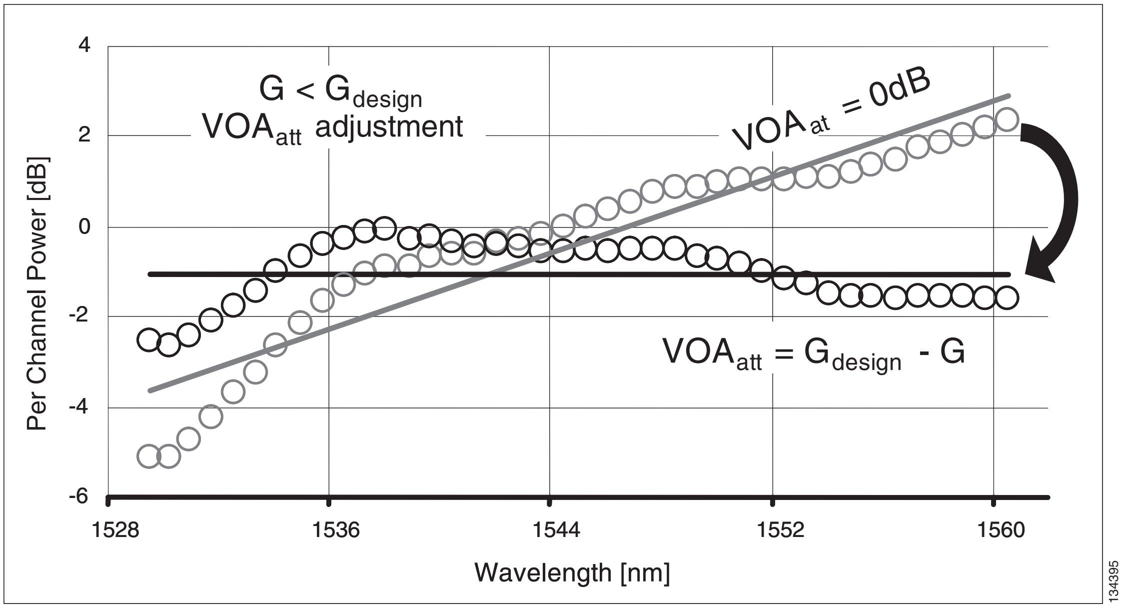
Figure 13-38 Flat Gain (Gain Tilt = 0 dB)



If the working gain setpoint of the amplifier is different from Gdesign, the output spectrum begins to suffer a gain tilt variation.

In order to compensate for the absolute value of the increase of the spectrum tilt, the OPT-BST and OPT-PRE cards automatically adjust the attenuation of the VOA to maintain a flat power profile at the output, as shown in Figure 13-39.

Figure 13-39 Effect of VOA Attenuation on Gain Tilt



The VOA attenuator automatic regulation guarantees (within limits) a zero tilt condition in the EDFA for a wide range of possible gain setpoint values.

Table 13-2 shows the flat output gain range limits for the OPT-BST and OPT-PRE cards, as well as the maximum (worst case) values of gain tilt and gain ripple expected in the specific gain range.

Table 13-2 Flat Output Gain Range Limits

Amplifier Card Type	Flat Output Gain Range	Gain Tilt (Maximum)	Gain Ripple (Maximum)
OPT-BST	G < 20 dB	0.5 dB	1.5 dB
OPT-PRE	G < 21 dB	0.5 dB	1.5 dB

If the operating gain value is outside of the range shown in Table 13-2, the EDFA introduces a tilt contribution for which the card itself cannot directly compensate. This condition is managed in different ways, depending the amplifier card type:

- OPT-BST—The OPT-BST amplifier is, by design, not allowed to work outside the zero tilt range. Cisco TransportPlanner network designs use the OPT-BST amplifier card only when the gain is less than or equal to 20 dB.
- OPT-PRE—Cisco TransportPlanner allows network designs even if the operating gain value is equal to or greater than 21 dB. In this case, a system-level tilt compensation strategy is adopted by the DWDM system. A more detailed explanation is given in 13.12.2 System Level Gain Tilt Control, page 13-52.

13.12.2 System Level Gain Tilt Control

System level gain tilt control for OPT-PRE cards is achievable with two main scenarios:

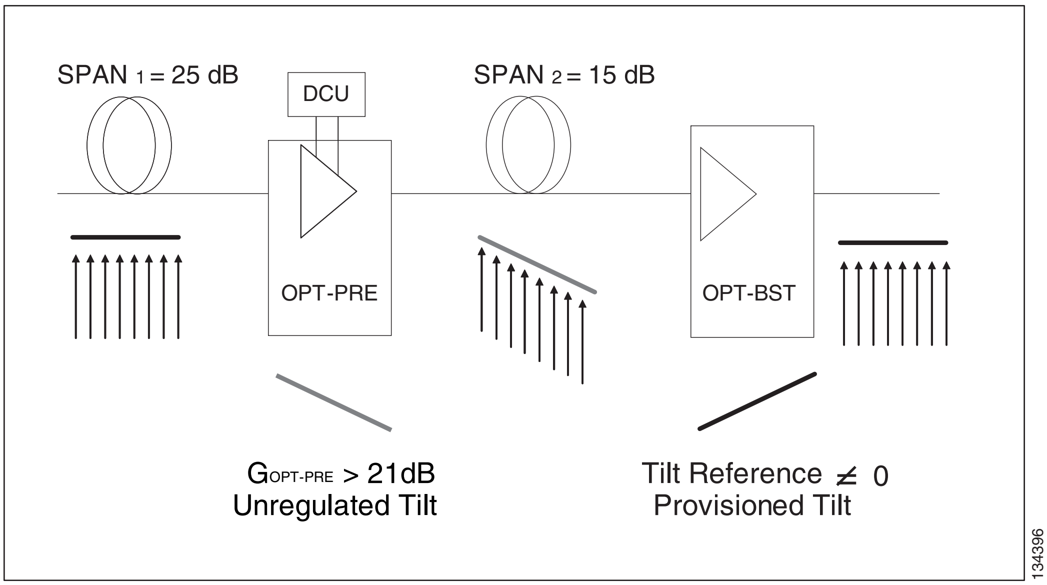
- Without an ROADM node

- With an ROADM node

13.12.2.1 System Gain Tilt Compensation Without ROADM Nodes

When an OPT-PRE card along a specific line direction (Side A-to-Side B or Side B-to-Side A) is working outside the flat output gain range (G > 21 dB), the unregulated tilt is compensated for in spans that are not connected to ROADM nodes by configuring an equal but opposite tilt on one or more of the amplifiers in the downstream direction. The number of downstream amplifiers involved depends on the amount of tilt compensation needed and the gain setpoint of the amplifiers that are involved. See Figure 13-40.

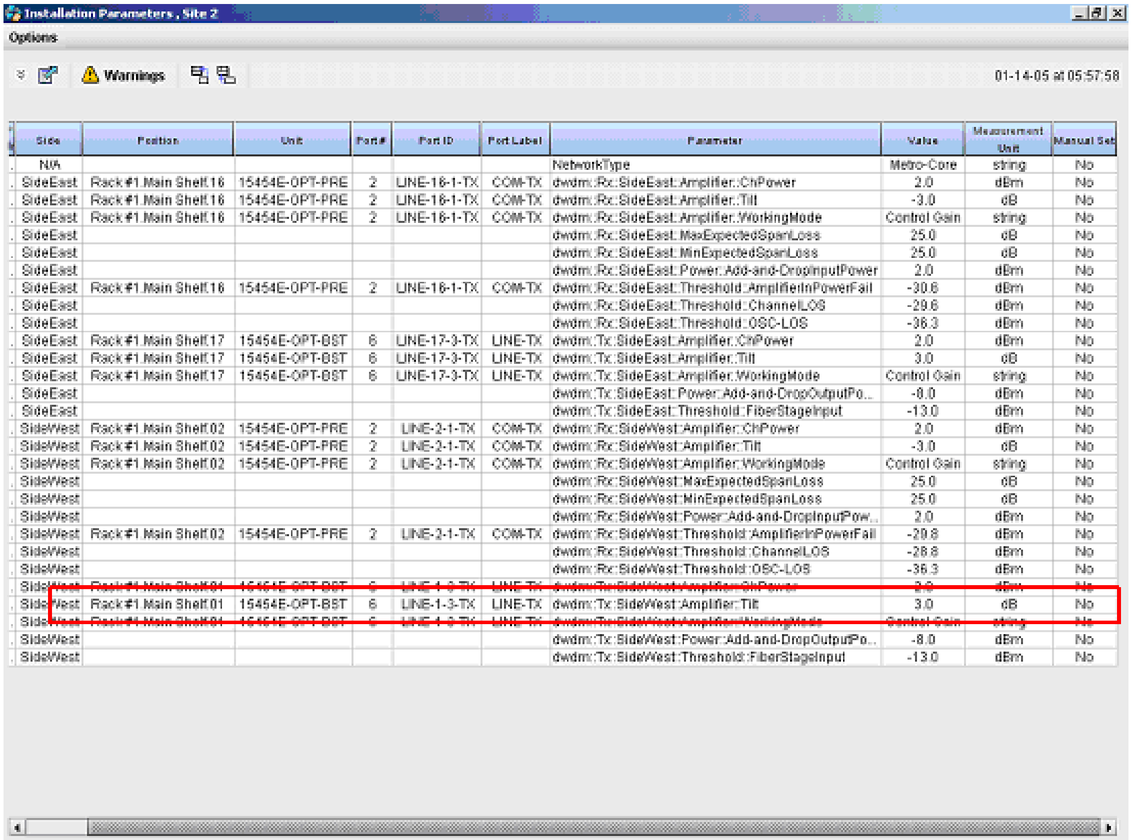
Figure 13-40 System Tilt Compensation Without an ROADM Node



The proper Tilt Reference value is calculated by Cisco TransportPlanner and inserted in the Installation Parameter List imported during the node turn-up process (see Chapter 14, “Turn Up a Node”). For both OPT-PRE and OPT-BST cards, the provisionable Gain Tilt Reference range is between –3 dB and +3 dB.

During the ANS procedure, the Tilt value for the OPT-BST or OPT-PRE card is provisioned by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card (see Figure 13-41). The provisioned Tilt Reference Value is reported in the CTC OPT-PRE or OPT-BST card view (in the Provisioning > Opt. Ampli. Line > Parameters > Tilt Reference tab).

Figure 13-41 Cisco TransportPlanner Installation Parameters



Side	Position	Unit	Port#	Port ID	Port Label	Parameter	Value	Measurement Unit	Manual Set
N/A						NetworkType	Metro-Core	string	No
SideEast	Rack#1.Main Shelf.16	15454E-OPT-PRE	2	LINE-16-1-TX	COM-TX	dwdm::Rx::SideEast::Amplifier::ChPower	2.0	dBm	No
SideEast	Rack#1.Main Shelf.16	15454E-OPT-PRE	2	LINE-16-1-TX	COM-TX	dwdm::Rx::SideEast::Amplifier::Tilt	-3.0	dB	No
SideEast	Rack#1.Main Shelf.16	15454E-OPT-PRE	2	LINE-16-1-TX	COM-TX	dwdm::Rx::SideEast::Amplifier::WorkingMode	Control Gain	string	No
SideEast						dwdm::Rx::SideEast::MaxExpectedSpanLoss	25.0	dB	No
SideEast						dwdm::Rx::SideEast::MinExpectedSpanLoss	25.0	dB	No
SideEast						dwdm::Rx::SideEast::Power::Add-and-DropInputPower	2.0	dBm	No
SideEast	Rack#1.Main Shelf.16	15454E-OPT-PRE	2	LINE-16-1-TX	COM-TX	dwdm::Rx::SideEast::Threshold::AmplifierInPowerFail	-30.6	dBm	No
SideEast						dwdm::Rx::SideEast::Threshold::ChannelLOS	-29.6	dBm	No
SideEast						dwdm::Rx::SideEast::Threshold::OSC-LOS	-36.3	dBm	No
SideEast	Rack#1.Main Shelf.17	15454E-OPT-BST	6	LINE-17-3-TX	LINE-TX	dwdm::Tx::SideEast::Amplifier::ChPower	2.0	dBm	No
SideEast	Rack#1.Main Shelf.17	15454E-OPT-BST	6	LINE-17-3-TX	LINE-TX	dwdm::Tx::SideEast::Amplifier::Tilt	3.0	dB	No
SideEast	Rack#1.Main Shelf.17	15454E-OPT-BST	6	LINE-17-3-TX	LINE-TX	dwdm::Tx::SideEast::Amplifier::WorkingMode	Control Gain	string	No
SideEast						dwdm::Tx::SideEast::Power::Add-and-DropOutputPo...	-8.0	dBm	No
SideEast						dwdm::Tx::SideEast::Threshold::FiberStageInput	-13.0	dBm	No
SideWest	Rack#1.Main Shelf.02	15454E-OPT-PRE	2	LINE-2-1-TX	COM-TX	dwdm::Rx::SideWest::Amplifier::ChPower	2.0	dBm	No
SideWest	Rack#1.Main Shelf.02	15454E-OPT-PRE	2	LINE-2-1-TX	COM-TX	dwdm::Rx::SideWest::Amplifier::Tilt	-3.0	dB	No
SideWest	Rack#1.Main Shelf.02	15454E-OPT-PRE	2	LINE-2-1-TX	COM-TX	dwdm::Rx::SideWest::Amplifier::WorkingMode	Control Gain	string	No
SideWest						dwdm::Rx::SideWest::MaxExpectedSpanLoss	25.0	dB	No
SideWest						dwdm::Rx::SideWest::MinExpectedSpanLoss	25.0	dB	No
SideWest						dwdm::Rx::SideWest::Power::Add-and-DropInputPow...	2.0	dBm	No
SideWest	Rack#1.Main Shelf.02	15454E-OPT-PRE	2	LINE-2-1-TX	COM-TX	dwdm::Rx::SideWest::Threshold::AmplifierInPowerFail	-29.8	dBm	No
SideWest						dwdm::Rx::SideWest::Threshold::ChannelLOS	-28.8	dBm	No
SideWest						dwdm::Rx::SideWest::Threshold::OSC-LOS	-36.3	dBm	No
SideWest	Rack#1.Main Shelf.01	15454E-OPT-BST	6	LINE-1-3-TX	LINE-TX	dwdm::Tx::SideWest::Amplifier::ChPower	2.0	dBm	No
SideWest	Rack#1.Main Shelf.01	15454E-OPT-BST	6	LINE-1-3-TX	LINE-TX	dwdm::Tx::SideWest::Amplifier::Tilt	3.0	dB	No
SideWest	Rack#1.Main Shelf.01	15454E-OPT-BST	6	LINE-1-3-TX	LINE-TX	dwdm::Tx::SideWest::Amplifier::WorkingMode	Control Gain	string	No
SideWest						dwdm::Tx::SideWest::Power::Add-and-DropOutputPo...	-8.0	dBm	No
SideWest						dwdm::Tx::SideWest::Threshold::FiberStageInput	-13.0	dBm	No

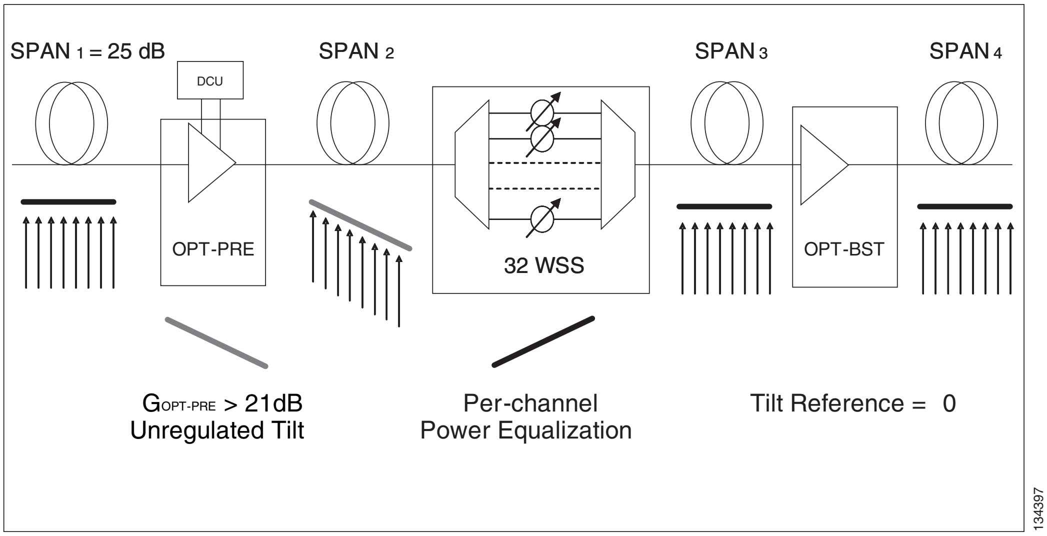
134398

13.12.2.2 System Gain Tilt Compensation With ROADM Nodes

When a ROADM node is present in the network, as shown in Figure 13-42, a per channel dynamic gain equalization can be performed. Both gain tilt and gain ripple are completely compensated using the following techniques:

- Implementing the per channel VOAs present inside the 32WSS card
- Operating in Power Control Mode with the specific power setpoint designed by Cisco TransportPlanner

Figure 13-42 System Tilt Compensation With an ROADM Node



13.13 Optical Data Rate Derivations

This section discusses the derivation of several data rates commonly used in optical networking.

13.13.1 OC-192/STM-64 Data Rate (9.95328 Gbps)

The SONET OC-1 rate is 51.84 Mbps. This rate results from a standard SONET frame, which consists of 9 rows of 90 columns of 8-bit bytes (810 bytes total). The transmission rate is 8000 frames per second (125 microseconds per frame). This works out to 51.84 Mbps, as follows:

(9) x (90 bytes/frame) x (8 bits/byte) x (8000 frames/sec) = 51.84 Mbps

OC-192 is 192 x 51.84 Mbps = 9953.28 Mbps = 9.95328 Gbps

STM-64 is an SDH rate that is equivalent to the SONET OC-192 data rate.

13.13.2 10GE Data Rate (10.3125 Gbps)

10.3125 Gbps is the standard 10 Gbps Ethernet LAN rate. The reason the rate is higher than 10.000 Gbps is due to the 64-bit to 66-bit data encoding. The result is 10 Gbps x 66/64 = 10.3125 Gbps. The reason for 64-bit to 66-bit encoding is to ensure that there are adequate data transitions to ensure proper operation of a clock and data recovery circuit at the far end. Additionally, the encoding assures a data stream that is DC balanced.

13.13.3 10G FC Data Rate (10.51875 Gbps)

The Fibre Channel rate is based on the OC-192 rate of 9.95328 Gbps, with the addition of 64-bit to 66-bit encoding and WAN Interconnect Sublayer (WIS) overhead bytes.

The rate is derived from the basic 9.95328 Gbps OC-192 rate. First, it has the 64-bit to 66-bit encoding added, which brings it to the 10.3125 Gbps rate (10 Gbps x 66/64 = 10.3125 Gbps). Beyond that, the WIS overhead is added, which is an additional two percent on top of the 10.3125 Gbps. This yields:

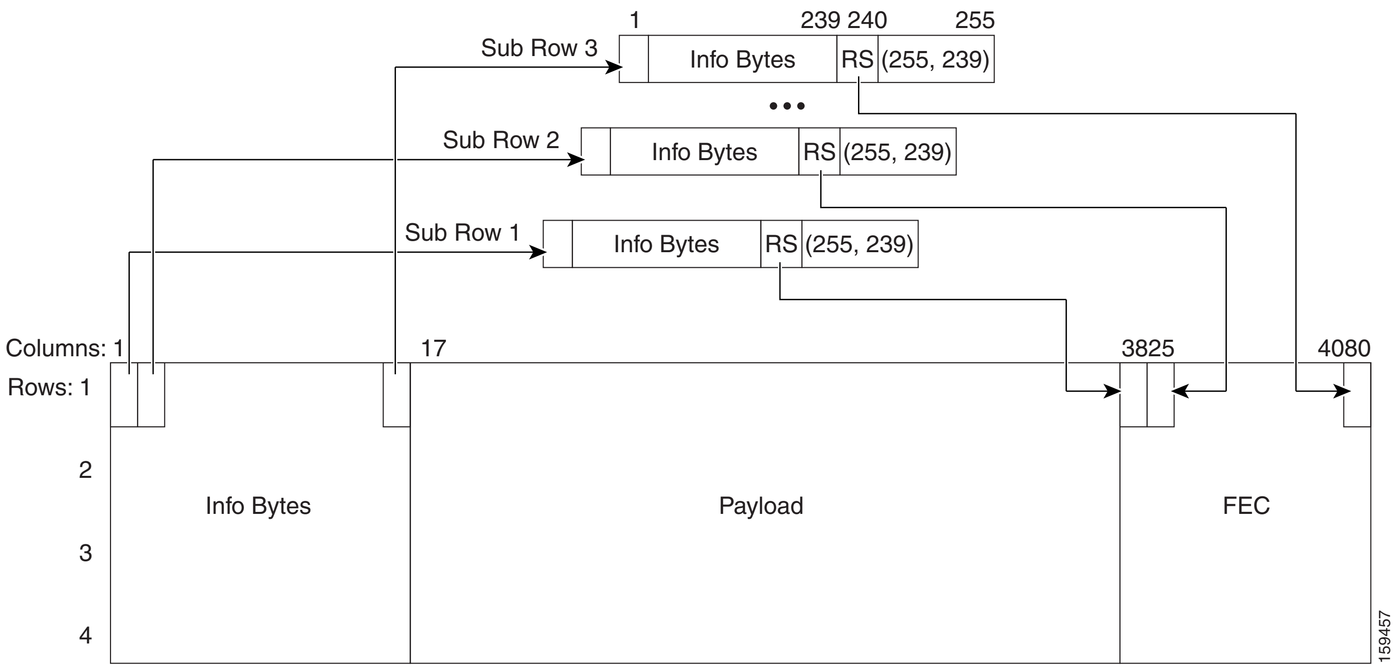
10.3125 Gbps x .02 = 0.20625 Gbps

10.3125 Gbps + 0.20625 Gbps = 10.51875 Gbps

13.13.4 ITU-T G.709 Optical Data Rates

To understand optical networking data rates, an understanding of the ITU-T G.709 frame structure, shown in Figure 13-43, is needed.

Figure 13-43 ITU-T G.709 Frame Structure



Each of the sub-rows in Figure 13-43 contains 255 bytes. Sixteen are interleaved horizontally (16 x 255 = 4080). This is repeated four times to make up the complete ITU-T G.709 frame.

The Reed Solomon (RS) (255,239) designation indicates the forward error correction (FEC) bytes. There are 16 FEC, or parity, bytes. The ITU-T G.709 protocol uses one overhead byte and 238 data bytes to compute 16 parity bytes to form 255 byte blocks—the RS (255,239) algorithm. Interleaving the information provides two key advantages. First, the encoding rate of each stream is reduced relative to the line transmission rate and, second, it reduces the sensitivity to bursts of error. The interleaving combined with the inherent correction strength of the RS (255,239) algorithm enables the correction of transmission bursts of up to 128 consecutive errored bytes. As a result, the ITU-T G.709 contiguous burst error correcting capability is enhanced 16 times above the capacity of the RS(255,239) algorithm by itself.

ITU-T G.709 defines the Optical Transport Unit 2 (OTU2) rate as 10.70923 Gbps. ITU-T G.709 defines three line rates:

1. 2,666,057.143 kbps—Optical Transport Unit 1 (OTU1)

2. 10,709,225.316 kbps—Optical Transport Unit 2 (OTU2)
3. 43,018,413.559 kbps—Optical Transport Unit 3 (OTU3)

The OTU2 rate is higher than OC-192 because the OTU2 has to carry overhead and FEC bytes in its frame; the bits must be sent faster to carry the payload information at the OC-192 rate.

The ITU-T G.709 frame has two parts. Two are similar to a SDH/SONET frame:

1. Overhead area for operation, administration, and maintenance functions
2. Payload area for customer data

In addition, the ITU-T G.709 frame also includes FEC bytes.

13.13.4.1 OC-192 Packaged Into OTU2 G.709 Frame Data Rate (10.70923 Gbps)

In this case, an OC-192 frame is being transported over a OTU2 G.709 frame, which adds the benefit of FEC. The OC-192 data rate (9.95328 Gbps) must increase in order to transport more bytes (OC-192 plus ITU-T G.709 overhead plus ITU-T G.709 FEC bytes) in the same amount of time. In an OTU2 transmission, 237 of the 255 bytes are OC-192 payload. This means the resultant data rate is:

9.95328 x 255/237 = 10.70923 Gbps

13.13.4.2 10GE Packaged Into OTU2 G.709 Frame Data Rate (Nonstandard 11.0957 Gbps)

Encapsulating Ethernet data into an OTU2 G.709 frame is considered nonstandard. The goal is to add the benefit of ITU-T G.709 encapsulation to achieve better burst error performance. However, this means adding overhead and FEC bytes, so more bytes must be transmitted in the same amount of time, so the data rate must increase. The new date rate is:

10.3215 x 255/237 = 11.0957 Gbps

13.13.4.3 10G FC Packaged Into OTU2 G.709 Frame Data Rate (Nonstandard 11.31764 Gbps)

Encapsulating Fibre Channel in an OTU2 frame is considered nonstandard. The rate is higher than the 10.51875 rate because OTU2 includes FEC bytes. The bits must run at a faster rate so that the payload is provided at the standard Fibre Channel rate. The rate is:

10.51875 x 255/237 = 11.31764 Gbps

13.14 Even Band Management

With the introduction of the following cards, it is now possible to transport 72, 80, 104, or 112 wavelength channels in the same network:

- 40-WSS-CE (40-channel Wavelength Selective Switch, C-band, even channels)
- 40-DMX-CE (40-channel Demultiplexer, C-band, even channels)

By using these new cards along with the 40-WSS-C and 40-DMX-C cards (which handle 40 C-band odd channels), the 32WSS and 32DMX cards (which handle 32 C-band odd channels), and the 32WSS-L and 32DMX-L (which handle 32 L-band odd channels), it is possible to cover 80 C-band channels (40 even and 40 odd channels) and 32 L-band odd channels, for a maximum of 112 channels. The following channel coverage combinations are possible:

- 72 C-band channels, using the 32WSS, 32DMX, 40-WSS-CE, and 40-DMX-CE cards

- 80 C-band channels, using the 40-WSS-C, 40-DMX-C, 40-WSS-CE, and 40-DMX-CE cards
- 104 channels (32 L-band odd channels and 72 C-band channels), using the 32WSS-L and 32DMX-L cards as a set to cover 32 L-band odd channels and the 32WSS, 32DMX, 40-WSS-CE, and 40-DMX-CE cards as a set to cover 72 C-band odd and even channels
- 112 channels (32 L-band odd channels and 80 C-band even channels), using the 32WSS-L and 32DMX-L cards as a set to cover 32 L-band odd channels and the 40-WSS-C, 40-DMX-C, 40-WSS-CE, and 40-DMX-CE, cards as a set to cover 80 C-band odd and even channels

The following node topologies are available for even channel management or odd-plus-even channel management:

- Terminal node
- Hub node
- ROADM node
- OSC regeneration and optical line amplification node

The external ONS 15216-ID-50 module is a 50 GHz/100GHz optical interleaver/deinterleaver that is required to combine or separate odd and even C-band channels. This module increases capacity by combining two optical data streams into a single, more densely spaced stream. The module can be used in multiplexer mode to combine two 100-GHz optical signal streams into one 50-GHz stream, and in demultiplexer mode to separate the 50-GHz stream into two 100-GHz streams.

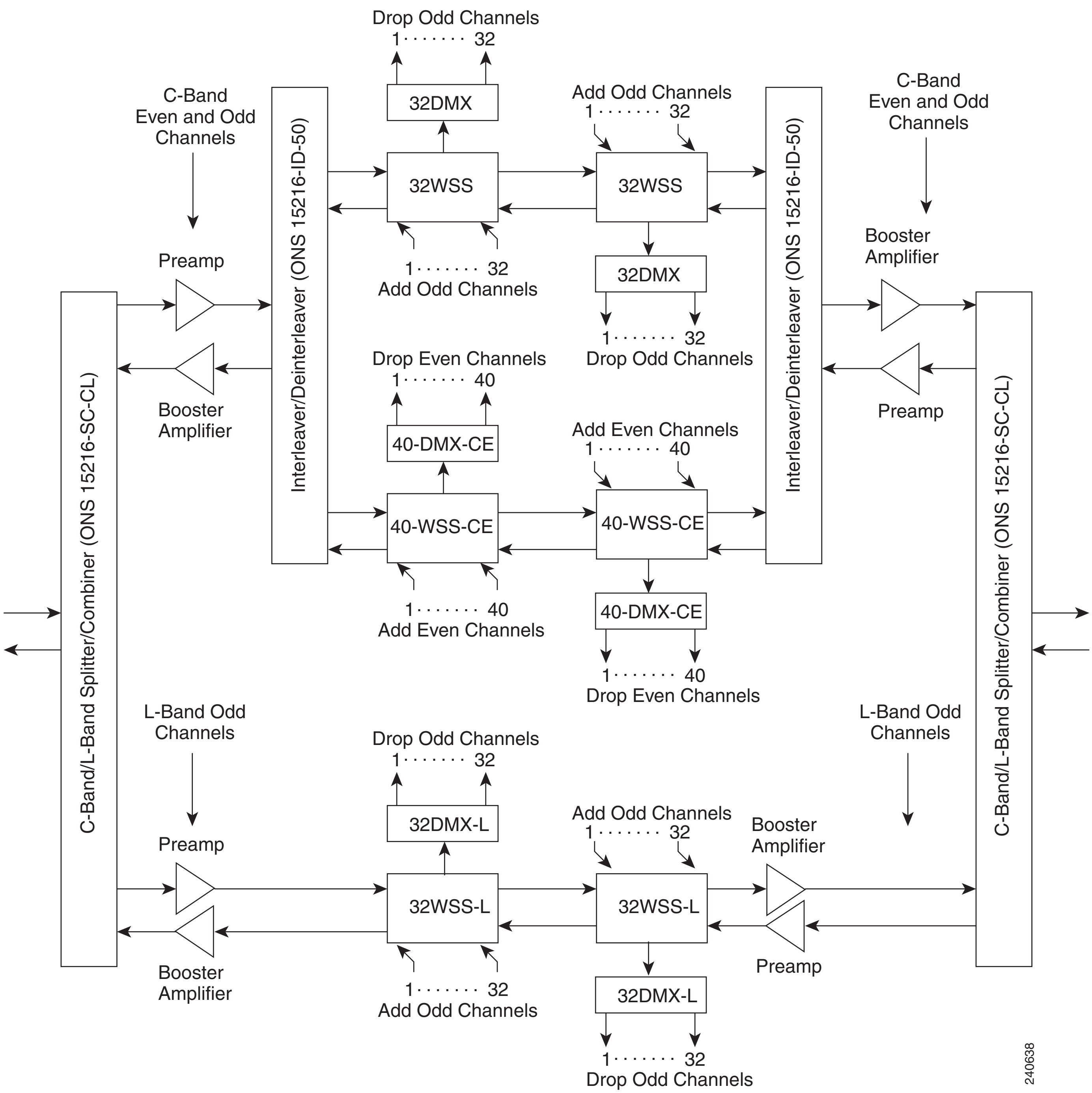
The ONS 15216-SC-CL module is an external C-band and L-band splitter/combiner module that combines and separates the C-band odd/even channels and the L-band odd channels.

An example of a 104-channel C-band plus L-band ROADM node is shown in Figure 13-44 on page 13-59. There are 72 C-band even channels and 32 L-band odd channels. The signal flow from the left side of the diagram to the right side is given in the following steps. The signal flow from the right side to the left is identical.

1. All the C-band and L-band signals enter the ONS 15216-SC-CL.
2. When the signals exit the ONS 15216-SC-CL, the 72 C-band even and odd channel signals are sent to the upper set of blocks and the 32 L-band odd channel signals are sent to the lower set of blocks.
3. The 72 C-band even and odd channel signals pass through a preamplifier, then through an ONS 15261-ID-50 and wavelength selective switch (WSS). Only the channels to be dropped are sent to the demultiplexer (DMX) block. There are two such sets of blocks, one set for the 32 odd C-band channels, and one set for the 40 even C-band channels.
4. The 32 L-band odd channel signals pass through a preamplifier, then through two 32-channel wavelength selective switch (32WSS-L) cards. Only the channels to be dropped are sent to the 32-channel demultiplexer (32DMX-L) card.
5. At the upper set of blocks, the ONS 15261-ID-50 deinterleaves the 32 C-band odd channels from the 40 C-band even channels. The 32 C-band odd channels are routed through the top blocks (two 32WSS cards and one 32DMX card), while the 40 C-band even channels are routed through the lower blocks (two 40-WSS-CE cards and one 40-DMX-CE card).
6. When a signal enters a 32WSS-L or 40-WSS-CE card, it is split. Part of the signal (the channels that are to be dropped) goes to the32 DMX-L card or 40-DMX-CE card so that channels can be dropped for use by the client equipment. The other part of the signal goes to the next 32WSS-L card or 40_DMX-CE card, where the channels can be passed through or blocked, and channels can be added to the stream from the client equipment.

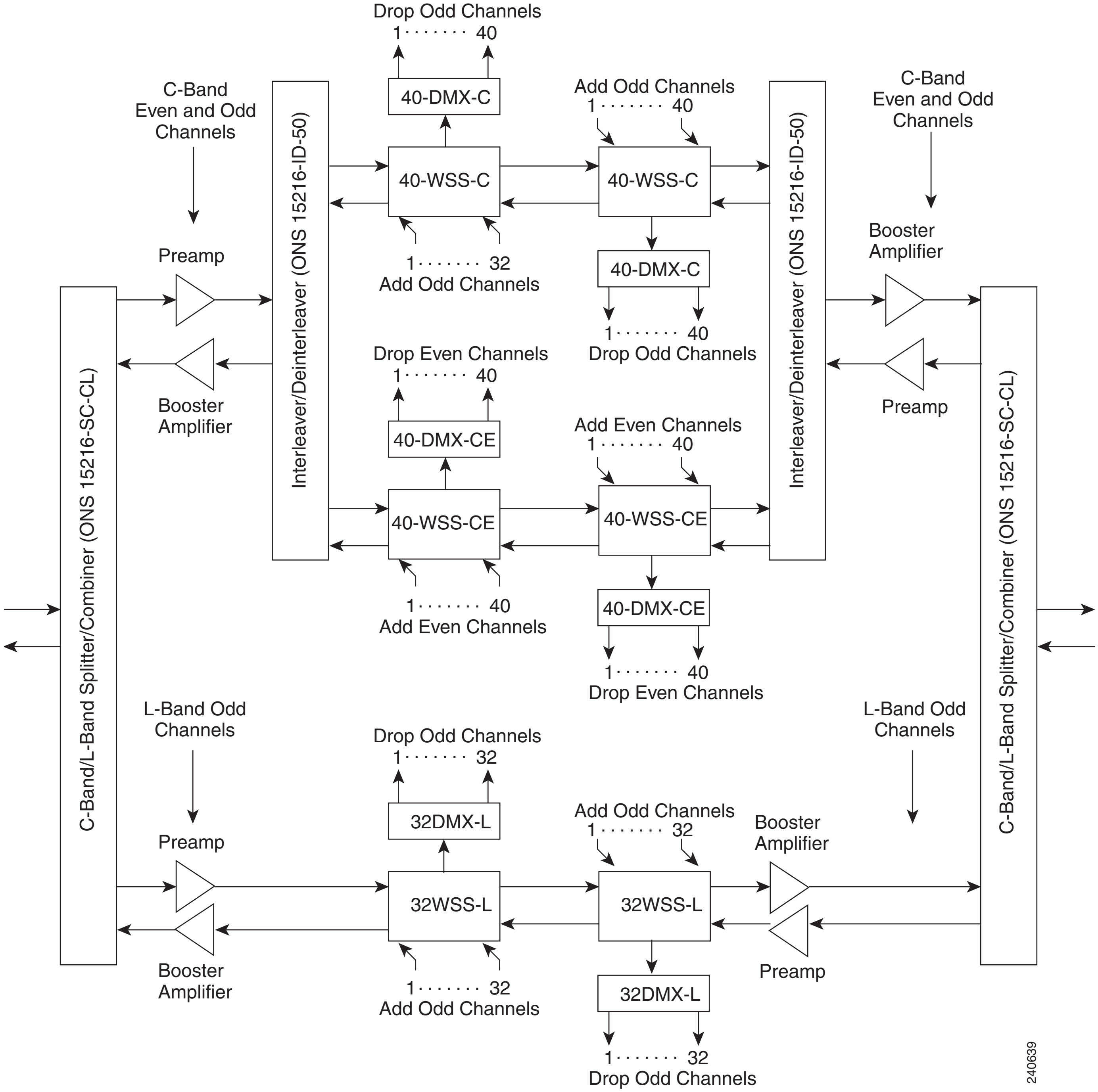
7. After the channels leave the last 32WSS-L card or 40-WSS-CE card, the C-band even and odd channels are interleaved back into a single stream by the ONS 15216-ID-50 module, sent through a booster amplifier, and then they enter the ONS 15216-SC-CL module, where they are combined with the L-band signals from the lower set of blocks and sent out onto the optical fiber.

Figure 13-44 104-Channel C-Band plus L-Band ROADM Node



An example of a 112-channel C-band plus L-band ROADM node is shown in Figure 13-45. It operates in a similar manner to the 104-channel ROADM node shown in Figure 13-44 on page 13-59, except that there are 40 odd C-band channels instead of 32.

Figure 13-45 112-Channel C-Band plus L-Band ROADM Node



13.15 Wavelength Drifted Channel Automatic Shutdown

The wavelength drifted channel automatic shutdown feature detects wavelength instability or wavelength drift on the source port of the card connected to an MSTP multiplexer. The channel photodiode or optical channel monitor (OCM) associated with a variable optical attenuator (VOA) is used to detect the power fluctuation.

The wavelength drifted channel automatic shutdown feature is supported on 40-SMR1-C, 40-SMR2-C, 80-WXC-C, 40-WXC-C, and 40-WSS-C cards. The 40-SMR1-C, 40-SMR2-C, and 80-WXC-C cards have the OCM devices connected to the ADD port, which detect the power fluctuation. The 40-WSS-C and 40-WXC-C cards do not detect the power fluctuation on their ADD ports because the Add photodiode is located before the filtering stage. The different ports on each card detect the power fluctuation. Table 13-3 lists the ports on which the power fluctuation is detected.

Table 13-3 Detection of Power Fluctuation

Card	Port	Circuit
40-SMR1-C 40-SMR2-C	LINE-TX	ADD/DROP EXP/PT
80-WXC-C	COM/EAD/AD	ADD/DROP EXP/PT
40-WXC-C	COM-TX	ADD/DROP EXP/PT
40-WSS-C	CHAN-RX	ADD/DROP
	PT	PT

When the card exceeds the OPT-PWR-DEG-LOW threshold value 16 times in 24 hours, the WVL-DRIFT-CHAN-OFF alarm is raised. When the WVL-DRIFT-CHAN-OFF alarm is raised, the VOA associated to that port is moved to the automatic VOA shutdown (AVS) state, which shuts down the channel.

For more information on the severity level of the conditions and procedure to clear the alarms, see *Cisco ONS 15454 DWDM Troubleshooting Guide*.

For more information on how to enable or disable this feature, see the "NTP-G315 Enable or Disable the Wavelength Drifted Channel Automatic Shutdown Feature" procedure on page 11-453.

CHAPTER 14

Turn Up a Node

This chapter explains how to provision a single Cisco ONS 15454 dense wavelength division multiplexing (DWDM) node and turn it up for service, including assigning the node name, date, and time; provisioning timing references; provisioning network attributes such as IP address and default router; setting up users and user security; installing cards; and creating DWDM connections.

Note The procedures and tasks described in this chapter for the Cisco ONS 15454 platform is applicable to the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, unless noted otherwise.

Note Procedures in this chapter require that you have a network plan calculated for your DWDM network with Cisco Transport Planner, Release 9.2. Cisco Transport Planner is a DWDM planning tool that is available from your Cisco account representative. Cisco Transport Planner prepares a shelf plan for each network node and calculates the power and attenuation levels for the DWDM cards installed in the node. For information about Cisco Transport Planner, contact your Cisco account representative. For instructions on using Cisco Transport Planner, refer to the *Cisco Transport Planner DWDM Operations Guide*.

Note Unless otherwise specified, in this document “ONS 15454” refers to both ANSI (ONS 15454) and ETSI (ONS 15454 SDH) shelf assemblies.

Note Cisco Transport Controller (CTC) views referenced in these procedures depend on the ONS 15454 mode. In single-shelf mode, the views are network, node, and card. In multishelf mode, the views are network, multishelf, shelf, and card. For more information about CTC views, refer to CTC Enhancements, Operations, and Shortcuts.

Before You Begin

This section lists the non-trouble procedures (NTPs) needed to turn up a DWDM node. Turn to an NTP for applicable detail-level procedures (DLPs), known as tasks.

1. NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3—Complete this procedure first.
2. NTP-G22 Verify Common Card Installation, page 14-4—Complete this procedure next.

3. NTP-G250 Verify Digital Image Signing (DIS) Information, page 14-6—Complete this procedure to retrieve the software signature information and version of the digitally signed software. You can also retrieve the public keys installed on the node using this procedure.s
4. NTP-G144 Provision a Multishelf Node, page 14-8—Complete this procedure as needed.
5. NTP-G23 Create Users and Assign Security, page 14-10—Complete this procedure to create CTC users and assign their security levels.
6. NTP-G24 Set Up Name, Date, Time, and Contact Information, page 14-13—Continue with this procedure to set the node name, date, time, location, and contact information.
7. NTP-G25 Set Battery Power Monitor Thresholds, page 14-15—Continue with this procedure to set the node battery power thresholds.
8. NTP-G26 Set Up CTC Network Access, page 14-16—Continue with this procedure to provision the IP address, default router, subnet mask, and other network configuration settings.
9. NTP-G194 Set Up EMS Secure Access to the ONS 15454, page 14-31—Continue with this procedure to connect the CTC in secure mode.
10. NTP-G341 Set Up Secure Access to the ONS 15454 TL1, page 14-31—Continue with this procedure to enable secure access to TL1.
11. NTP-G27 Set Up the ONS 15454 for Firewall Access, page 14-32—Continue with this procedure if the ONS 15454 will be accessed behind firewalls.
12. NTP-G28 Create FTP Host, page 14-33—Continue with this procedure if to create FTP host for ENE database backup.
13. NTP-G132 Provision OSI, page 14-36—Continue with this procedure if the ONS 15454 will be installed in networks with third-party, Open Systems Interconnection (OSI)-based network elements (NEs).
14. NTP-G29 Set Up SNMP, page 14-45—Complete this procedure if Simple Network Management Protocol (SNMP) will be used for network monitoring.
15. "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47—Complete this procedure to preprovision the ONS 15454 slots and install the card and automatic node setup (ANS) parameters.
16. NTP-G328 Add, Modify, or Delete ANS Parameters, page 14-59—Complete this procedure, as needed, to add or delete ANS parameters.
17. NTP-G30 Install the DWDM Cards, page 14-64—Complete this procedure to install the DWDM cards, including the OSCM, OSC-CSM, 32WSS, 32WSS-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-SMR1-C, 40-SMR2-C, OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-PRE, 32MUX-O, 40-MUX-C, 32DMX-O, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 4MD-xx.x, AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-1B-xx.x, AD-4B-xx.x, MMU, PSM, TDC-CC and TDC-FC.
18. NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68—Complete this procedure, as needed, to install a dispersion compensating unit (DCU).
19. NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69—Complete this procedure, as needed, to install transponder (TXP), muxponder (MXP), GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE, ADM-10G, or OTU2_XP cards.
20. NTP-G123 Install the Filler Cards, page 14-75—Complete this procedure, as needed, to install ONS 15454 filler cards.

21. NTP-G239 Add and Delete Passive Units, page 14-76—Complete this procedure, as needed, to add or delete passive units.
22. NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78—Complete this procedure, as needed, to install the fiber-optic cables on the DWDM cards.
23. NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes, page 14-82—Complete this procedure, as needed, to connect TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE, ADM-10G, or OTU2_XP cards to DWDM cards in a terminal, hub, or reconfigurable optical add-drop multiplexer (ROADM) node through the patch panel.
24. NTP-G185 Install Fiber-Optic Cables between Mesh Nodes, page 14-101—Complete this procedure, as needed, to connect 40-WXC-C or 80-WXC-C cards in a mesh node to the 4-degree or 8-degree patch panel.
25. NTP-G141 Install Fiber-Optic Cables for Y-Cable Protection Modules, page 14-108—Complete this procedure, as needed, to connect fiber-optic cables to Y-cable modules from client TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.
26. NTP-G152 Create and Verify Internal Patchcords, page 14-113—Complete this procedure to calculate the DWDM cable connections.
27. NTP-G209 Create, Edit, and Delete Optical Sides, page 14-123—Complete this procedure to create, edit, and delete an optical side.
28. NTP-G38 Provision OSC Terminations, page 14-126—Complete this procedure next.
29. NTP-G37 Run Automatic Node Setup, page 14-128—Complete this procedure next.
30. NTP-G39 Verify OSCM Transmit Power, page 14-129—Complete this procedure next.
31. NTP-G163 Upgrade Nodes in Single-Shelf Mode to Multishelf Mode, page 14-131—Complete this procedure as needed.
32. NTP-G210 Provision Node for SNMPv3, page 14-134 —Complete this procedure if Simple Network Management Protocol version 3(SNMPv3) will be used for network monitoring.

NTP-G139 Verify Cisco Transport Planner Reports and Files

Purpose	This procedure verifies that you have the Cisco Transport Planner reports and files needed to turn up the node.
Tools/Equipment	None
Prerequisite Procedures	Chapter 1, "Install the Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 Shelf" in the *Cisco ONS 15454 Hardware Installation Guide*
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Retrieve or higher

Step 1 Verify that you have the Cisco Transport Planner reports and files shown in Table 14-1 for the node that you will provision. The reports and files can be provided in one of the following ways:

- If you have Cisco Transport Planner, verify that you have the electronic network design plan from which you can generate the reports in Cisco Transport Planner. For information about generating the reports, refer to the *Cisco Transport Planner DWDM Operations Guide*.

- If you do not have Cisco Transport Planner, you must have printouts of all reports listed in Table 14-1 except the Assisted Configuration Setup file. Assisted Configuration Setup is an electronic file that will be imported into CTC. You must be able to access it from the CTC computer used to provision the node
- If you not do not have all the reports and files listed in Table 14-1, do not continue. See your site planner or network planner for the required information and files.

Table 14-1 Cisco Transport Planner Node Setup Information and Files

Source	Format	Description
Shelf layout	JPG file	Cisco Transport Planner provides a shelf layout showing the cards that should be installed in each ONS 15454, ONS 15454 M2, and ONS 15454 M6 slot. Cisco Transport Planner can export each of these cards as a JPG file with a user-defined name.
Installation Parameters	Table	Provides the target reference values for the variable optical attenuators (VOAs), output power, optical thresholds, and amplifier configuration parameters.
Internal Connections	Table	Identifies the patchcords that must be installed within the shelf.
NE Update Configuration file	XML file	The Cisco Transport Planner NE Update configuration file is an electronic file with an XML extension and a name assigned by the network designer for the network you are provisioning. The file is imported into CTC where it preprovisions internal patchcords, optical sides and card parameters for optical cards, transponders, and passive units (DCUs and patch panels). It configures the ANS parameters based on the network calculated by Cisco Transport Planner.
Traffic Matrix	Table	Shows the traffic flow within the node. During node turn-up, this report is used to identify the location of Y-cable protection groups.
Cable list	Table or list	A list of cables needed to provision the node. The list can be derived from the Internal Connections Report or from the Bill of Materials report prepared by Cisco Transport Planner.

Step 2 Print Table 14-1 for reference. You will need information from the reports during node turn-up.

Stop. You have completed this procedure.

NTP-G22 Verify Common Card Installation

Purpose	This procedure verifies that the Cisco ONS 15454 shelf has two TCC2/TCC2P/TCC3 cards installed. This procedure also verifies that the Cisco ONS 15454 M6 and the Cisco ONS 15454 M2 shelves have TNC/TNCE/TSC/TSCE cards installed. It also verifies the installation of the AIC-I and MS-ISC-100T cards, if they are installed.
Tools/Equipment	None

Prerequisite Procedures	Chapter 1, "Install the Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 Shelf" in the *Cisco ONS 15454 Hardware Installation Guide*
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Retrieve or higher

Step 1 Verify the following:

- TCC2/TCC2P/TCC3 cards are installed in Slots 7 and 11 on the ONS 15454 shelf.
- Two TNC/TNCE/TSC/TSCE cards are installed in Slots 1 and 8 on the ONS 15454 M6 shelf.
- A stand-alone TNC/TNCE/TSC/TSCE card is installed in Slot 1 on the ONS 15454 M2 shelf.

Step 2 Verify that the FAIL LED is off on both TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards.

Step 3 Verify that the green ACT (active) LED is illuminated on one TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card and that the amber STBY (standby) LED is illuminated on the other TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card.

Note If the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards are not installed, or if their LEDs are not operating as described, do not continue. Complete the "DLP-G33 Install the TCC2, TCC2P, or TCC3 Card" or "DLP-G604 Install the TNC TNCE, TSC, or TSCE Card" task in the *Cisco ONS 15454 Hardware Installation Guide* or refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* to resolve installation problems before proceeding to Step 4.

Step 4 (On 15454-DWDM shelf) If the AIC-I card is installed, verify that it is installed in Slot 9 and that its ACT (active) LED displays a solid green light.

Note If the AIC-I card is not installed and the card is required by the Cisco Transport Planner shelf layout, or if it is installed and its LEDs are not operating as described, do not continue. Complete the "DLP-G34 Install the AIC-I Card" task in the *Cisco ONS 15454 Hardware Installation Guide* or refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* to resolve installation problems before proceeding to Step 5.

Step 5 Verify that the software release shown on the LCD matches the software release required for your network. On the LCD, the software release is shown under the platform (SONET or SDH) and date/temperature. If the release does not match, perform one of the following procedures:

- Perform a software upgrade using a ONS 15454 software CD or ONS 15454 SDH software CD. Refer to the release-specific software upgrade document.
- On ONS 15454, replace the TCC2/TCC2P/TCC3 cards with cards containing the correct release.
- On ONS 15454 M6, replace the LCD and TNC/TNCE/TSC/TSCE cards with cards containing the correct release.
- On ONS 15454 M2, replace the power module and TNC/TNCE/TSC/TSCE cards with cards containing the correct release.

Step 6 (On ONS 15454 shelf) If the node will be configured as a multishelf node, verify that redundant MS-ISC-100T cards are installed (Slots 6 and 12 are recommended) and that the green ACT (active) LED is illuminated on both cards.

> **Note** If the MS-ISC-100T card is not installed and the card is required by the Cisco Transport Planner shelf layout, or if the card's LEDs are not operating as described, do not continue. Complete the "DLP-G309 Install the MS-ISC-100T Card" task in the *Cisco ONS 15454 Hardware Installation Guide* or refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* to resolve installation problems before proceeding to the next procedure.

Stop. **You have completed this procedure**.

NTP-G250 Verify Digital Image Signing (DIS) Information

Purpose	This procedure retrieves the following information on the ONS 15454 M2 and ONS 15454 M6 platforms: • Software signature information • Version of the digitally signed software • Public keys installed **Note** In a hybrid multi-shelf configuration involving ONS 15454 and ONS 15454 M6 shelf assemblies, DIS information is available for the ONS 15454 M6 shelf only.
Tools/Equipment	None
Prerequisite Procedures	"NTP-G22 Verify Common Card Installation" task on page 14-4
Required/As Needed	As Needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve user

> **Note** The DIS information is applicable for TNC/TNCE/TSC/TSCE cards in the ONS 15454 M2 and ONS 15454 M6 platforms.

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to verify the DIS information.

Step 2 Do the following as applicable:

a. To retrieve the digitally signed software version, go to Step 3.

b. To retrieve the software signature information, go to Step 4.

c. To retrieve the public keys installed on the node, go to Step 5.

Step 3 In node view (single-shelf mode) or multishelf view (multishelf mode), click **Maintenance > Software** tab to retrieve the digitally signed software version. The following columns appear in the pane:

- Node—Displays the node name or IP address.
- Type—Displays the node type.
- Node Status—Displays the node status, which is based on the highest alarm level at the node.
- Working Version—Displays the working ONS node software version (the general software release number [n.n.n] followed by the specific software release identification number). For example, 9.2.0 (09.20-X10E-02.06).

- Protect Version—Displays the protect ONS node software version (the general software release number [n.n.n] followed by the specific software release identification number). For example, 9.2.0 (09.20-X10E-02.06).
- Download Status—Displays the status of any in-progress network software downloads.

Step 4 In node view (single-shelf mode) or shelf view (multishelf view), click **Maintenance > DIS > Info > Retrieve Signature Information** tab to retrieve signature information. The following information is displayed in the pane:

- Attribute**—**The following information is displayed:
  - Organization Name—Displays the owner of the software image.
  - Organization Unit—Displays the business unit within Cisco.
  - Serial Number—Displays the serial number of the certificate with the digital signature.
  - Common Name—Displays the name of the platform.
  - Hash Algorithm—Displays the hashing algorithm used.
  - Image Type—Shows the type of the image-Development or Production.
  - Key Version—Indicates the key version used to digitally sign the image. A key version is identified with an alphabetical character that ranges from A to Z.
  - Sign Algorithm—Refers to the RSA algorithm.
- **Working Software Information—**Displays the signature information of the working software.
- **Protect Software Information—**Displays the signature information of the protect software.

Note To refresh the signature information, click **Refresh Signature Information.**

Step 5 In node view (single-shelf mode) or shelf view (multishelf mode), click **Maintenance > DIS > Available Keys > Retrieve All Keys** tabs to retrieve public key information. The following information is displayed in the pane:

- **Key Type—**Displays the public key available on the system for verification:
  - **Release Key—**Verifies release images.
  - **Development Key—**Verifies the development images.
- **Public Key Algorithm—**Displays the name of the algorithm used for public key cryptography.
- **Exponent—**Displays the exponent of the public key algorithm—release or development keys.
- **Key Version—**Displays the key version used for verification.
- **Modulus**—Displays the modulus of the public key algorithm with a size of 2048 bits.

Note To refresh the public key information, click **Refresh All Keys.**

Stop. You have completed this procedure.

NTP-G144 Provision a Multishelf Node

Purpose	This procedure provisions a multishelf node from CTC. A multishelf node consists of a control node and subtending shelves that are configured to operate as a single node.
Tools/Equipment	None
Prerequisite Procedures	• NTP-G22 Verify Common Card Installation, page 14-4 • *Cisco ONS 15454 Hardware Installation Guide*: – "NTP-G301 Connect the ONS 15454 Multishelf Node and Subtending Shelves to an MS-ISC-100T Card" – "NTP-G302 Connect the ONS 15454 Multishelf Node and Subtending Shelves to a Catalyst 2950" – "NTP-G295 Connect the ONS 15454 Multishelf Node and Subtending Shelves to a Catalyst 3560" – "NTP-G296 Upgrade the ONS 15454 Multishelf with MS-ISC Card Configuration Using the Catalyst 3560" – "NTP-G297 Upgrade the ONS 15454 Multishelf with Catalyst 2950 Configuration Using the Catalyst 3560" – "NTP-G308 Connect the ONS 15454 M6 Multishelf Node and the ONS 15454 M6 Subtending Shelves" – "NTP-G309 Connect the ONS 15454 M6 and the ONS 15454 in a Mixed Multishelf Configuration" – NTP-G310 Upgrade the ONS 15454 Multishelf Configuration using the ONS 15454 M6
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Caution An optical shelf in a multishelf configuration must be provisioned as the node controller shelf and not as a subtending shelf. Otherwise, traffic will be dropped. If there are no slots available on the optical shelf to install the MS-ISC-100T cards (needed for a node controller shelf), install and configure the Cisco Catalyst 2950 or Cisco Catalyst 3560. See the "NTP-G302 Connect the ONS 15454 Multishelf Node and Subtending Shelves to a Catalyst 2950" procedure or the "NTP-G295 Connect the ONS 15454 Multishelf Node and Subtending Shelves to a Catalyst 3560" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If you are using an ONS 15454 M6, then refer to the applicable procedure for connecting the ONS 15454 M6 as the node controller in the *Cisco ONS 15454 Hardware Installation Guide*.

Step 1 Complete the DLP-G46 Log into CTC task at the node that you want to configure as a multishelf node.

Step 2 If you want to set up the login node as the node controller, complete the following steps. If not, continue with Step 3.

a. In node view (single-node mode) or multishelf view (multishelf mode), click the **Provisioning > General > Multishelf Config** tabs.

b. Click **Enable as Node Controller**.

c. From the LAN Config drop-down list, complete one of the following:

- Choose **Ethernet Switch** if MS-ISC-100T cards or the Catalyst 2950 or the Catalyst 3560 switches are already installed and configured. Choose the public VLAN ID and private VLAN ID for the ONS 15454 multishelf node. In case of an ONS 15454 M6, the public VLAN ID and private VLAN ID are static (1 and 2 respectively).

Note Public VLAN ID is used by the node controller to communicate with the external network. Private VLAN ID is used by the node controller to communicate with the subtending shelves.

Note If the ONS 15454 M6 shelf is used as the node controller, then you can connect the subtending shelves directly to the MSM ports on the ECU. However, a Catalyst 3560 switch can also be used along with the ONS 15454 M6 node controller to extend the number of subtending shelves.

- Choose **Stand-Alone** if MS-ISC-100T cards are not installed yet but will be included in the final layout. This option will allow a safe migration of the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card database when the multishelf configuration is complete.

d. Click **Apply**.

e. In the confirmation dialog box, click **Yes** to allow the node to reboot. The CTC view changes to network view and the node icon changes to gray. Wait for the reboot to finish. (This might take several minutes.)

f. After the node reboots, double-click the node. The multishelf view appears.

Note The shelf ID of the node controller is automatically assigned as 1.

Step 3 If you want to add a node as a subtending shelf (either ONS 15454 or ONS 15454 M6) in the multishelf configuration, complete the following steps. If not, you have completed this procedure.

Note A Cisco ONS 15454 node configured with TCC2P and TCC3 cards must not be added to a multishelf configuration containing either of the following configurations:

- Cisco ONS 15454 node with TCC3 as the node controller
- Cisco ONS 15454 M6 node with TNC as the node controller

a. In multishelf view, right-click the white space in the rack and choose **Add Shelf** from the shortcut menu.

b. Select the type of subtending shelf (ONS 15454 or ONS 15454 M6).

c. In the Shelf ID Selection dialog box, choose a shelf ID (from 2 to 30) from the drop-down list.

d. Click **OK**. The shelf appears in multishelf view.

e. Disconnect the cross-over (CAT-5) LAN cable from the RJ-45 LAN (TCP/IP) port of the ONS 15454 subtending shelf TCC2/TCC2P/TCC3 card in Slot 11 or Slot 7, or from the EMS RJ-45 LAN (TCP/IP) on the ONS 15454 M6 subtending shelf that correspond to the TNC/TNCE/TSC/TSCE card.

f. Connect your Windows PC or Solaris workstation network interface card (NIC) to the RJ-45 LAN (TCP/IP) port on the TCC2/TCC2P/TCC3 card in Slot 11 or Slot 7, or to the EMS RJ-45 LAN (TCP/IP) on the ONS 15454 M6 subtending shelf that correspond to the TNC/TNCE/TSC/TSCE card.

g. Complete the DLP-G46 Log into CTC task at the subtending shelf.

h. Click the **Provisioning > General > Multishelf Config** tabs.

i. Click **Enable as Subtended Shelf**.

j. From the Shelf ID drop-down list, choose the shelf ID that you created in Step c.

k. Click **Apply**.

l. In the confirmation dialog box, click **Yes** to reboot the shelf. The CTC view changes to network view and the node icon changes to gray. Wait for the reboot to finish. (This might take several minutes.)

m. Disconnect your Windows PC or Solaris workstation NIC from the RJ-45 LAN (TCP/IP) port of the ONS 15454 subtending shelf TCC2/TCC2P/TCC3 card in Slot 11 or Slot 7, or from the EMS RJ-45 LAN (TCP/IP) on the ONS 15454 M6 subtending shelf that correspond to the TNC/TNCE/TSC/TSCE card.

n. Reconnect the cross-over (CAT-5) LAN cable (disconnected in Step e) to the RJ-45 LAN (TCP/IP) port of the subtending shelf TCC2/TCC2P/TCC3 card in Slot 11 or Slot 7, or to the EMS RJ-45 LAN (TCP/IP) on the ONS 15454 M6 subtending shelf that correspond to the TNC/TNCE/TSC/TSCE card.

o. Repeat Steps a through n to set up additional subtending shelves.

Note To connect the subtending shelves to the node controller, refer to the applicable procedures in the *Cisco ONS 15454 Hardware Installation Guide*.

Note Non-LAN connected Multishelf nodes are not manageable from CTC unless SOCKS Proxy is enabled on the node.

Stop. You have completed this procedure.

NTP-G23 Create Users and Assign Security

Purpose	This procedure creates ONS 15454 users and assigns their security levels.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Complete the DLP-G46 Log into CTC task at the node where you need to create users. If you are already logged in, continue with Step 2.

Note You must log in as a Superuser to create additional users. The CISCO15 user provided with each ONS 15454 can be used to set up other ONS 15454 users. You can add up to 500 users to one ONS 15454.

Step 2 Complete the "DLP-G54 Create a New User on a Single Node" task on page 14-11 or the "DLP-G55 Create a New User on Multiple Nodes" task on page 14-12 as needed.

Note You must add the same user name and password to each node that a user will access.

Step 3 If you want to modify the security policy settings, including password aging and idle user timeout policies, complete the NTP-G88 Modify Users and Change Security procedure.

Stop. **You have completed this procedure**.

DLP-G54 Create a New User on a Single Node

Purpose	This task creates a new user for one ONS 15454.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **Security > Users** tabs.

Step 2 In the Users window, click **Create**.

Step 3 In the Create User dialog box, enter the following:

- Name—Type the user name. The name must be a minimum of six and a maximum of 20 alphanumeric (a-z, A-Z, 0-9) characters. For Transaction Language One (TL1) compatibility, the user name must be 6 to 10 characters.
- Password—Type the user password. The password length, by default, is set to a minimum of six and a maximum of 20 characters. You can configure the default values in node view using the Provisioning > NE Defaults > Node > security > passwordComplexity tabs. The minimum length can be set to eight, ten or twelve characters, and the maximum length to 80 characters. The password must be a combination of alphanumeric (a-z, A-Z, 0-9) and special (+, #,%) characters, where at least two characters are not alphabetic and at least one character is a special character. For TL1 compatibility, the password must be six to ten characters.

  Note The password must not contain the user name.

- Confirm Password—Type the password again to confirm it.

- Security Level—Choose a security level for the user: **RETRIEVE**, **MAINTENANCE**, **PROVISIONING**, or **SUPERUSER**.

Note Each security level has a different idle time. The idle time is the length of time that CTC can remain idle before the password must be reentered. The defaults are: Retrieve user = unlimited, Maintenance user = 60 minutes, Provisioning user = 30 minutes, and Superuser = 15 minutes. To change the idle times, see the NTP-G88 Modify Users and Change Security procedure.

Step 4 Click **OK**.

Step 5 Return to your originating procedure (NTP).

DLP-G55 Create a New User on Multiple Nodes

Purpose	This task adds a new user to multiple ONS 15454 nodes.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note All nodes where you want to add users must be accessible in network view.

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning** > **Security > Users** tabs.

Step 3 In the Users window, click **Create**.

Step 4 In the Create User dialog box, enter the following:

- Name—Type the user name. The name must be a minimum of six and a maximum of 20 alphanumeric (a-z, A-Z, 0-9) characters. For TL1 compatibility, the user name must be 6 to 10 characters.
- Password—Type the user password. The password length, by default, is set to a minimum of six and a maximum of 20 characters. You can configure the default values in node view through Provisioning > NE Defaults > Node > security > passwordComplexity. The minimum length can be set to eight, ten or twelve characters, and the maximum length to 80 characters. The password must be a combination of alphanumeric (a-z, A-Z, 0-9) and special (+, #,%) characters, where at least two characters are not alphabetic and at least one character is a special character. For TL1 compatibility, the password must be six to ten characters. The password must not contain the user name.
- Confirm Password—Type the password again to confirm it.
- Security Level—Choose a security level for the user: **RETRIEVE**, **MAINTENANCE**, **PROVISIONING**, or **SUPERUSER**.

> **Note** Each security level has a different idle time. The idle time is the length of time that CTC can remain idle before it locks up and the password must be reentered. The defaults are: Retrieve user = unlimited, Maintenance user = 60 minutes, Provisioning user = 30 minutes, and Superuser = 15 minutes. To change the idle times, refer to the NTP-G88 Modify Users and Change Security procedure.

Step 5 In the Select Applicable Nodes area, deselect any nodes where you do not want to add the user (all network nodes are selected by default).

Step 6 Click **OK**.

Step 7 In the User Creation Results dialog box, verify that the user was added to all the nodes chosen in Step 5. If not, click **OK** and repeat Steps 2 through 6. If the user was added to all nodes, click **OK** and continue with the next step.

Step 8 Return to your originating procedure (NTP).

NTP-G24 Set Up Name, Date, Time, and Contact Information

Purpose	This procedure provisions identification information for the node, including the node name, a contact name and phone number, the location of the node, and the date, time, and time zone.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task for the node you will turn up. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > General > General** tabs.

Step 3 In the Node Name/TID field, type a name for the node. For TL1 compliance, names must begin with an alpha character and have no more than 20 alphanumeric (a-z, A-Z, 0-9) characters.

> **Note** To avoid errors when you import the Cisco Transport Planner configuration file using the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47, the CTC node name and the Cisco Transport Planner site name should be the same (or at least easy to identify).

Step 4 (Optional) In the Contact field, type the name of the node contact person and the phone number, up to 255 characters.

Step 5 (Optional) In the Latitude field, enter the node latitude: N (north) or S (south), degrees, and minutes.

Step 6 (Optional) In the Longitude field, enter the node longitude: E (east) or W (west), degrees, and minutes.

Note The latitude and longitude values only indicate the geographical position of the nodes in the actual network and not the CTC node position.

Step 7 (Optional) In the Description field, type a description of the node. The description can be a maximum of 255 characters.

Step 8 (Optional) Check the Use NTP/SNTP Server check box if you want CTC to use a Network Time Protocol (NTP) or Simple Network Time Protocol (SNTP) server to set the date and time of the node. Using an NTP or SNTP server ensures that all ONS 15454 network nodes use the same date and time reference. The server synchronizes the node's time after power outages or software upgrades.

a. If you check the Use NTP/SNTP Server check box, complete the following fields:

- Use NTP/SNTP Server—Type the IP address of the primary NTP/SNTP server connected to the ONS 15454 or of another ONS 15454/15600/15310-CL/15310-MA as GNE with NTP/SNTP enabled that is connected to the ONS 15454 ENE.
- Backup NTP/SNTP Server—Type the IP address of the secondary NTP/SNTP server connected to the ONS 15454 or of another ONS 15454/15600/15310-CL/15310-MA as GNE with NTP/SNTP enabled that is connected to the ONS 15454 ENE.

When the primary NTP/SNTP server fails or is not reachable, the node uses the secondary NTP/SNTP server to synchronize its date and time. If both the primary and secondary NTP/SNTP servers fail or are not reachable, an SNTP-FAIL alarm is raised. The node checks for the availability of the primary or secondary NTP/SNTP server at regular intervals until it can get the time from any one of the NTP/SNTP servers. After the node gets the time from any one server, it synchronizes its date and time with the server's date and time and the SNTP-FAIL alarm is cleared. For each retry and resynchronization, the node checks the availability of the primary NTP/SNTP server first, followed by the secondary NTP/SNTP server. The node synchronizes its date and time every hour.

Note You will not be able to identify which NTP/SNTP server is being used for synchronization.

Note If you plan to check gateway network element (GNE) for the ONS 15454 SOCKS proxy server (see "DLP-G56 Provision IP Settings" task on page 14-17), external ONS 15454 nodes must reference the gateway ONS 15454 for NTP/SNTP timing. For more information about the ONS 15454 gateway settings, refer to Chapter 22, "Manage Network Connectivity."

Caution If you reference another ONS 15454 for the NTP/SNTP server, make sure that the second ONS 15454 references an NTP/SNTP server and not the first ONS 15454 (that is, do not create an NTP/SNTP timing loop by having two ONS 15454 nodes reference each other).

b. If you do not check Use SNTP/NTP Server, complete the Date and Time fields. The ONS 15454 will use these fields for alarm dates and times. By default, CTC displays all alarms in the CTC computer time zone for consistency. To change the display to the node time zone, complete the DLP-G118 Display Alarms and Conditions Using Time Zone task.

- Date—Type the current date in the format m/d/yyyy, for example, September 24, 2002 is 9/24/2002.
- Time—Type the current time in the format hh:mm:ss, for example, 11:24:58. The ONS 15454 uses a 24-hour clock, so 10:00 PM is entered as 22:00:00.

Step 9 Click the Time Zone field and choose a city within your time zone from the drop-down list. The list displays the 80 World Time Zones from –11 through 0 (GMT) to +14. Continental United States time zones are GMT-05:00 (Eastern), GMT-06:00 (Central), GMT-07:00 (Mountain), and GMT-08:00 (Pacific).

Step 10 Check the Use Daylight Savings Time check box if the time zone that you chose uses Daylight Savings Time.

Note The Insert AIS-V on STS-1 SD-P and SD-P BER field are not used in DWDM networks.

Step 11 Click **Apply**.

Step 12 In the confirmation dialog box, click **Yes**.

Step 13 Review the node information. If you need to make corrections, repeat Steps 3 through 12 to enter the corrections. If the information is correct, continue with the "NTP-G25 Set Battery Power Monitor Thresholds" procedure on page 14-15.

Stop. **You have completed this procedure**.

NTP-G25 Set Battery Power Monitor Thresholds

Purpose	This procedure provisions extreme high, low, and extreme low input battery power thresholds within a –48 VDC environment.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution The default battery power thresholds are normally not changed. Threshold changes should only be performed at the direction of your site administrator.

Note When the thresholds are crossed, the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card generates warning alarms in CTC. For ONS 15454 power specifications, see the Hardware Specifications.

Step 1 Complete the DLP-G46 Log into CTC task for the node that you will set up. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or shelf view (multishelf mode), click the **Provisioning > General > Power Monitor** tabs.

Note In multishelf mode, power monitor thresholds must be provisioned separately for each shelf within the multishelf including the node controller and all subtending shelves.

Step 3 To change the extreme low battery voltage threshold in 0.5 VDC increments, choose a voltage from the ELWBATVGVdc drop-down list.

Step 4 To change the low battery voltage threshold in 0.5 VDC increments, choose a voltage from the LWBATVGVdc drop-down list.

Step 5 To change the high battery voltage threshold in 0.5 VDC increments, choose a voltage from the HIBATVGVdc drop-down list.

Step 6 To change the extreme high battery voltage threshold in 0.5 VDC increments, choose a voltage from the EHIBATVGVdc drop-down list.

Step 7 Click **Apply**.

Stop. **You have completed this procedure**.

NTP-G26 Set Up CTC Network Access

Purpose	This procedure provisions network access for a node, including its subnet mask, default router, Dynamic Host Configuration Protocol (DHCP) server, Internet Inter-Orb Protocol (IIOP) listener port, gateway settings, static routes, Open Shortest Path First (OSPF) protocol, Routing Information Protocol (RIP), and designated SOCKS servers.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Complete the DLP-G46 Log into CTC task. If you are already logged in, continue with Step 2.

Step 2 Complete the "DLP-G56 Provision IP Settings" task on page 14-17 to provision the ONS 15454 IP address, subnet mask, default router, DHCP server, IIOP listener port, and SOCKS proxy server settings.

Tip If you cannot log into the node, you can change its IP address, default router, and network mask by using the LCD on the ONS 15454 fan-tray assembly (unless LCD provisioning is suppressed). See the "DLP-G57 Set the IP Address, Default Router, and Network Mask Using the LCD" task on page 14-22 for instructions. However, you cannot use the LCD to provision any other network settings. In an ONS 15454 M2 shelf assembly, the LCD is on the fan-tray assembly. In an ONS 15454 M6 shelf assembly, the LCD is a separate unit installed above the external connection unit (ECU).

Note When accessing CTC from a machine running Windows XP operating system, CTC may sometimes fail to reconnect to a GNE when the GNE proxies for several ENE nodes (approximately 15 ENE nodes). This can happen when there is a side switch or when the LAN is enabled/disabled. This is due to the Windows XP operating system limiting the number of simultaneous TCP/IP connection attempts. As a workaround, close the existing CTC session and relaunch CTC on the GNE node. You can configure a designated socks server list on the CTC to mitigate the problem.

Step 3 If TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards are installed and you want to turn on the ONS 15454 secure mode, which allows two IP addresses to be provisioned for the node, complete the "DLP-G264 Enable Node Security Mode" task on page 14-24. Secure mode is not available if TCC2 cards are installed.

Step 4 If static routes are needed, complete the "DLP-G58 Create a Static Route" task on page 14-26. For more information about static routes, refer to Chapter 22, "Manage Network Connectivity."

Step 5 If the ONS 15454 is connected to a LAN or WAN that uses OSPF and you want to share routing information between the LAN or WAN and the ONS network, complete the "DLP-G59 Set Up or Change Open Shortest Path First Protocol" task on page 14-27.

Step 6 If the ONS 15454 is connected to a LAN or WAN that uses RIP, complete the "DLP-G60 Set Up or Change Routing Information Protocol" task on page 14-30.

Step 7 Complete the "DLP-G439 Provision the Designated SOCKS Servers" task on page 14-21 after the network is provisioned and one or more of the following conditions exist:

- SOCKS proxy is enabled.
- The ratio of ENEs to GNEs is greater than eight to one.
- Most ENEs do not have LAN connectivity.

Stop. **You have completed this procedure**.

DLP-G56 Provision IP Settings

Purpose	This task provisions IP settings, which includes the IP address, IP address version, default router, DHCP access, firewall access, and SOCKS proxy server settings for an ONS 15454 node.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Caution All network changes should be approved by your network (or LAN) administrator.

Caution Verify that the IPv4 or IPv6 addresses assigned to the node are unique in the network. Duplicate IP addresses in the same network cause loss of visibility.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **Network** > **General** tabs.

Step 2 Complete the following information in the fields listed:

- IP Address—Type the IP address assigned to the ONS 15454 node.

> **Note** If TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards are installed, dual IP addressing is available using the secure mode. When secure mode is off (sometimes called repeater mode), the IP address entered in the IP Address field applies to the backplane LAN port (ONS 15454), EMS RJ-45 port or Craft port on the ECU (ONS 15454 M6), EMS RJ-45 port on the power module (ONS 15454 M2), and the TCC2P/TCC3/TNC/TNCE/TSC/TSCE TCP/IP (LAN) port. When secure mode is on, the IP Address field shows the address assigned to the TCC2P/TCC3/TNC/TNCE/TSC/TSCE TCP/IP (LAN) port and the Superuser can enable or disable display of the backplane IP address. See the "DLP-G264 Enable Node Security Mode" task on page 14-24 as needed. Refer to Chapter 22, "Manage Network Connectivity," for more information about secure mode.

- Net/Subnet Mask Length—Type the subnet mask length (decimal number representing the subnet mask length in bits) or click the arrows to adjust the subnet mask length. The subnet mask length is the same for all ONS 15454 nodes in the same subnet.
- MAC Address—(Display only) Displays the ONS 15454 IEEE 802 MAC address.

> **Note** In secure mode, the front and back TCP/IP (LAN) ports are assigned different MAC addresses, and the backplane information can be hidden or revealed by a Superuser.

- Default Router—If the ONS 15454 is connected to a LAN, enter the IP address of the default router. The default router forwards packets to network devices that the ONS 15454 cannot directly access. This field is ignored if any of the following are true:
  - The ONS 15454 is not connected to a LAN.
  - The SOCKS proxy server is enabled and the ONS 15454 is provisioned as an end network element (ENE).
  - OSPF is enabled on both the ONS 15454 and the LAN where the ONS 15454 is connected. (OSPF is provisioned in the "DLP-G59 Set Up or Change Open Shortest Path First Protocol" task on page 14-27.)
- LCD IP Setting—Choose one of the following:
  - **Allow Configuration**—Displays the node IP address on the LCD and allows users to change the IP settings using the LCD. This option enables the "DLP-G57 Set the IP Address, Default Router, and Network Mask Using the LCD" task on page 14-22.
  - **Display Only**—Displays the node IP address on the LCD but does not allow users to change the IP settings using the LCD.
  - **Suppress Display**—Suppresses the node IP address display on the LCD.
- Suppress CTC IP Display—Check this check box if you want to prevent the node IP address from appearing in CTC to users with Provisioning, Maintenance, or Retrieve security levels. (The IP address suppression is not applied to users with Superuser security level.)

Note IP address suppression is not applied to users with Superuser security level. However, in secure mode the backplane IP address visibility can be restricted to only a locally connected Superuser viewing the routing table. In this case, the backplane IP address is not revealed to any user at any other NE, either on the routing table or in autonomous messages (such as the TL1 REPT DBCHG message, alarms, and performance monitoring [PM] reporting).

- IPv6 Configuration—Allows provisioning of IPv6 addresses. After you provision an IPv6 address, you can access the device using the IPv6 address. Configure these settings only if you want to enable IPv6 on the node. IPv6 cannot be configured using the LCD push buttons.
  - Enable IPv6—Select this check box to assign an IPv6 address to the node. The IPv6 Address, Prefix Length, and IPv6 Default Router fields are enabled only if this check box is selected. The check box is disabled by default.

Note Enable SOCKS Proxy on Port check box is enabled when you enable IPv6 and can be disabled only when IPv6 is disabled.

Note By default, when IPv6 is enabled, the node processes both IPv4 and IPv6 packets on the LAN interface. If you want the node to process only IPv6 packets, you need to disable IPv4 on the node. For more information, see DLP-G317 Change Node Access and PM Clearing Privilege.

  - IPv6 Address—Enter the IPv6 address that you want to assign to the node. This IP address is the global unicast IPv6 address. This field is disabled if the Enable IPv6 check box is not selected.
  - Prefix Length—Enter the prefix length of the IPv6 address. This field is disabled if the Enable IPv6 check box is not selected.
  - IPv6 Default Router—Enter the IPv6 address of the default router of the IPv6 NE. This is optional. This field is disabled if the Enable IPv6 check box is not selected.

Note The ONS 15454 DWDM uses NAT-PT internally to support native IPv6. NAT-PT uses the IPv4 address range 128.0.0.0 to 128.0.1.254 for packet translation. Do not use this address range when you enable IPv6 feature.

Note You can provision IPv6 in secure or nonsecure mode. To enable secure mode, see "DLP-G264 Enable Node Security Mode" task on page 14-24.

- Forward DHCP Request To—Check this check box to enable DHCP. Also, enter the DHCP server IP address in the Request To field. Unchecked is the default. If you will enable any of the gateway settings to implement the ONS 15454 SOCKS proxy server features, do not check this check box.

Note If you enable DHCP, computers connected to an ONS 15454 node can obtain temporary IP addresses from an external DHCP server. The ONS 15454 only forwards DHCP requests; it does not act as a DHCP server.

- Gateway Settings—Provisions the ONS 15454 SOCKS proxy server features. (SOCKS is a standard proxy protocol for IP-based applications.) Do not change these options until you review Scenario 7 "Provisioning the ONS 15454 Proxy Server" in Chapter 22, "Manage Network Connectivity." In SOCKS proxy server networks, the ONS 15454 is either an ENE, a GNE, or a proxy-only server. Provisioning must be consistent for each NE type.
- Enable SOCKS proxy server on port—If checked, the ONS 15454 serves as a proxy for connections between CTC clients and ONS 15454 nodes that are connected by data communications channels (DCCs) to the proxy ONS 15454. The CTC client establishes connections to DCC-connected nodes through the proxy node. The CTC client does not require IP connectivity to the DCC-connected nodes; it only requires IP connectivity to the proxy ONS 15454. If the Enable SOCKS proxy server on port check box is unchecked, the node does not proxy for any CTC clients. When this box is checked, you can provision one of the following options:
  - **External Network Element (ENE)**—Choose this option when the ONS 15454 is not connected to a LAN but has DCC connections to other ONS nodes. A CTC computer connected to the ENE through the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card TCP/IP (craft) port can manage nodes that have DCC connections to the ENE. However, the CTC computer does not have direct IP connectivity to these nodes or to any LAN or WAN that those nodes might be connected to.
  - **Gateway Network Element (GNE)**—Choose this option when the ONS 15454 is connected to a LAN and has DCC connections to other nodes. A CTC computer connected to the LAN can manage all nodes that have DCC connections to the GNE, but the CTC computer does not have direct IP connectivity to them. The GNE option isolates the LAN from the DCC network so that IP traffic originating from the DCC-connected nodes and any CTC computers connected to them is prevented from reaching the LAN.
  - **SOCKS proxy only**—Choose this option when the ONS 15454 is connected to a LAN and the LAN is separated from the node by a firewall. The SOCKS proxy only option is the same as the GNE option, except that the SOCKS proxy only option does not isolate the DCC network from the LAN.

Note If a node is provisioned in secure mode, it is automatically provisioned as a GNE with SOCKS proxy enabled. However, this provisioning can be overridden, and the secure node can be changed to an ENE. In secure mode, SOCKS cannot be disabled. For information about provisioning, including GNE and ENE status, see the "DLP-G264 Enable Node Security Mode" task on page 14-24.

Step 3 Click **Apply**.

Step 4 Click **Yes** in the confirmation dialog box.

The TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards reboot one at a time if changes were made to the IP address, subnet mask, or gateway settings. During this time (approximately 5 to 6 minutes), the active and standby TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card LEDs will blink, turn on, and turn off at different intervals. Eventually, a "Lost node connection, switching to network view" message appears.

Step 5 Click **OK**. The network view appears. The node icon appears in gray, during which time you cannot access the node.

Step 6 Double-click the node icon when it becomes green.

Step 7 Return to your originating procedure (NTP).

DLP-G439 Provision the Designated SOCKS Servers

Purpose	This task identifies the ONS 15454 SOCKS servers in SOCKS-proxy-enabled networks. Identifying the SOCKS servers reduces the amount of time required to log into a node and have all NEs appear in network view (NE discovery time). The task is recommended when the combined CTC login and NE discovery time is greater than five minutes in networks with SOCKS proxy enabled. Long (or failed) login and NE discovery times can occur in networks that have a high ENE-to-GNE ratio and a low number of ENEs with LAN connectivity.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note To complete this task, you must have either the IP addresses or DNS names of all ONS 15454s in the network with LAN access that have SOCKS proxy enabled.

Note SOCKS proxy servers can be any accessible ONS network nodes that have LAN access, including the ONS 15310-MA, ONS 15310-CL, ONS 15454, ONS 15454 SDH, ONS 15600, ONS 15600 SDH, ONS 15454 M6, and ONS 15454 M2 nodes.

Note You must repeat this task any time that changes to SOCKS proxy server nodes occur, for example, whenever LAN connectivity is added to or removed from a node, or when nodes are added or removed from the network.

Note If you cannot log into a network node, complete the DLP-G46 Log into CTC task choosing the Disable Network Discovery option. Complete this task, then login again with network discovery enabled.

Step 1 From the CTC Edit menu, choose **Preferences**.

Step 2 In the Preferences dialog box, click the **SOCKS** tab.

Step 3 In the Designated SOCKS Server field, type the IP address or DNS node name of the first ONS 15454 SOCKS server. The ONS 15454 that you enter must have SOCKS proxy server enabled, and it must have LAN access.

Step 4 Click **Add**. The node is added to the SOCKS server list. If you need to remove a node on the list, click **Remove**.

Step 5 Repeat Steps 3 and 4 to add all qualified ONS 15454s within the network. Add all ONS nodes that have SOCKS proxy enabled and are connected to the LAN.

Step 6 Click **Check All Servers**. CTC verifies that all nodes can perform as SOCKS servers. Once verified, a check is placed next to the node IP address or node name in the SOCKS server list. An X placed next to the node indicates one or more of the following:

- The entry does not correspond to a valid DNS name.
- The numeric IP address is invalid.
- The node cannot be reached.
- The node can be reached, but the SOCKS port cannot be accessed, for example, a firewall problem might exist.

Step 7 Click **Apply**. The list of ONS 15454 nodes, including ones that received an X in Step 6, are added as SOCKS servers.

Step 8 Click **OK** to close the Preferences dialog box.

Step 9 Return to your originating procedure (NTP).

DLP-G57 Set the IP Address, Default Router, and Network Mask Using the LCD

Purpose	This task changes the ONS 15454 IP address, default router, and network mask using the LCD on the fan-tray assembly. Use this task if you cannot log into CTC. In an ONS 15454 M2 shelf assembly, the LCD is on the fan-tray assembly. In an ONS 15454 M6 shelf assembly, the LCD is a separate unit installed above the external connection unit (ECU).
Tools/Equipment	None
Prerequisite Procedures	"DLP-G33 Install the TCC2, TCC2P, or TCC3 Card" in the *Cisco ONS 15454 Hardware Installation Guide*
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note You cannot perform this task if the LCD IP Display field on the node view Provisioning > Network tab is set to Display Only or Suppress Display. See the "DLP-G56 Provision IP Settings" task on page 14-17 to view or change the LCD IP Display field. If the node is locked in secure mode with the LCD display disabled, you will not be able to change this provisioning unless the lock is disabled by Cisco Technical Support. Refer to Chapter 22, "Manage Network Connectivity," for more information about secure mode.

Note The LCD reverts to normal display mode after 5 seconds of button inactivity.

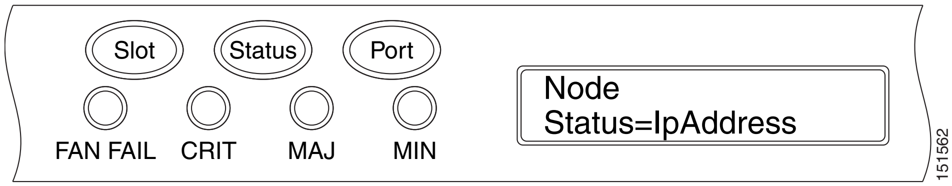
Step 1 On the ONS 15454 front panel, repeatedly press the **Slot** button until SHELF appears on the first line of the LCD. You are in the Shelf menu.

Note In an ONS 15454 M2 shelf assembly, the LCD panel and the **Slot**, **Port**, and **Status** buttons are present on the fan-tray assembly. In an ONS 15454 M6 shelf assembly, the LCD is a separate unit installed above the external connection unit (ECU); the **Slot**, **Port**, and **Status** buttons are present on the LCD unit.

Step 2 Repeatedly press the **Port** button until the following information appears:

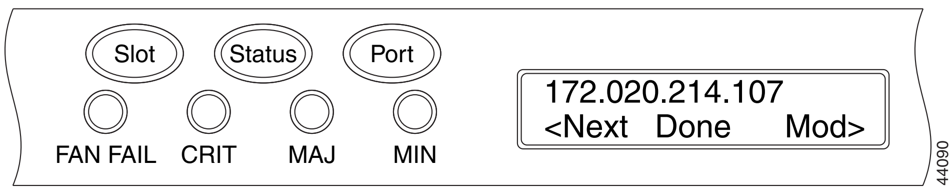
- To change the node IP address, Node Status=IpAddress (Figure 14-1)
- To change the node network mask, Node Status=Net Mask
- To change the default router IP address, Node Status=Default Rtr

Figure 14-1 Selecting the IP Address Option—ONS 15454 Shelf Assembly



Step 3 Press the **Status** button to display the node IP address (Figure 14-2), the node subnet mask length, or the default router IP address.

Figure 14-2 Changing the IP Address—ONS 15454 Shelf Assembly



Step 4 Push the **Slot** button to move to the digit of the IP address, subnet mask, or default router that you want to change. The selected digit flashes.

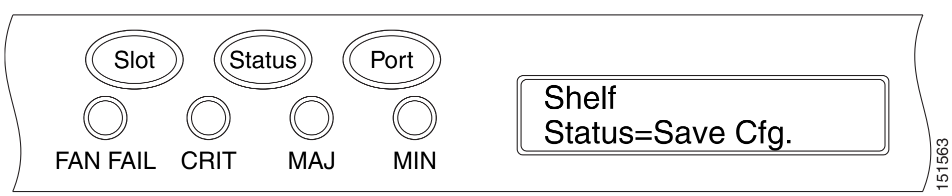
Tip The Slot, Status, and Port button positions correspond to the positions of the commands shown on the LCD. For example, in Figure 14-2, you press the Slot button to invoke the Next command and the Status button to invoke the Done command.

Step 5 Press the **Port** button to cycle the IP address, subnet mask, or default router to the correct digit.

Step 6 When the change is complete, press the **Status** button to return to the relevant Node Status menu.

Step 7 Repeatedly press the **Port** button until the Shelf Save Configuration option appears (Figure 14-3).

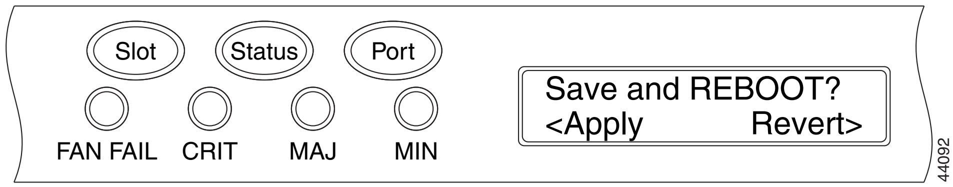
Figure 14-3 Selecting the Save Configuration Option—ONS 15454 Shelf Assembly



Step 8 Press the **Status** button to choose the Save Configuration option.

A Save and REBOOT message appears (Figure 14-4).

Figure 14-4 Saving and Rebooting the TCC2/TCC2P/TCC3—ONS 15454 Shelf Assembly



Step 9 Press the **Slot** button to apply the new IP address, subnet mask, or default router configuration or press **Port** to cancel the configuration.

> **Note** The IP address and default router must be on the same subnet. If not, you cannot apply the configuration.

Step 10 Saving the new configuration causes the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards to reboot. During the reboot, a "TCC may Reset" message appears on the LCD. The LCD returns to the normal alternating display after both TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards finish rebooting.

Step 11 Return to your originating procedure (NTP).

DLP-G264 Enable Node Security Mode

Purpose	This task enables the security mode. When security mode is enabled, two IP addresses are assigned to the node. One address is assigned to the backplane LAN port (ONS 15454) or to the EMS port (ONS 15454 M2 and M6). The other address is assigned to the TCC2P/TCC3/TNC/TNCE/TSC/TSCE RJ-45 TCP/IP (LAN) port. The TCC2 card does not support security mode.
Tools/Equipment	TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards must be installed. Do not install a mix of TCC2 and TCC2P cards.
Prerequisite Procedures	NTP-G103 Back Up the Database, page 24-2 DLP-G46 Log into CTC task
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

> **Caution** The IP address assigned to the TCC2P/TCC3/TNC/TNCE/TSC/TSCE TCP/IP (LAN) port must reside on a different subnet from the backplane LAN port (ONS 15454) and the EMS port (ONS 15454 M2 and M6). Verify that the new TCC2P/TCC3/TNC/TNCE/TSC/TSCE IP address meets this requirement.

> **Note** The node will reboot after you complete this task, causing a temporary disconnection between the CTC computer and the node.

Note If an OTS-to-OTS PPC is created between nodes, it will no longer function if the node Security Mode is enabled (see DLP-G264 Enable Node Security Mode, page 14-24). The reason for this is that if the Secure mode is enabled, it is no longer possible for the DCN extension feature to use the LAN interface to extend the internal network (due to the network isolation in this configuration mode). The result is that the topology discovery on the OTS-to-OTS PPC no longer operates.

Step 1 Click the **Provisioning > Security > Data Comm** tabs.

Note The security mode options are not available in CTC if TCC2 cards or a mix of TCC2 and TCC2P cards are installed.

Step 2 Click **Change Mode**.

Step 3 Review the information on the Change Secure Mode page, then click **Next**.

Step 4 On the TCC Ethernet Port page, enter the IP address and subnet mask for the TCC2P/TCC3/TNC/TNCE/TSC/TSCE TCP/IP (LAN) port. The IP address cannot reside on the same subnet as the backplane LAN port (ONS 15454) and the EMS port (ONS 15454 M2 and M6).

Step 5 Click **Next**.

Step 6 If needed, on the Backplane Ethernet Port page, modify the backplane IP address, subnet mask, and default router. (You normally do not modify these fields if no network changes have occurred.)

Step 7 Click **Next**.

Step 8 On the SOCKS Proxy Server Settings page, choose one of the following options:

- **External Network Element (ENE)**—If selected, the CTC computer is only visible to the ONS 15454 where the CTC computer is connected. The CTC computer is not visible to the nodes connected to the DCC. In addition, firewall is enabled, which means that the node prevents IP traffic from being routed between the DCC and the LAN port.
- **Gateway Network Element (GNE)**—If selected, the CTC computer is visible to other DCC-connected nodes. The node prevents IP traffic from being routed between the DCC and the LAN port.

Note The SOCKS proxy server is automatically enabled when you enable secure mode.

Step 9 Click **Finish**.

Within the next 30 to 40 seconds, the TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards reboot. CTC switches to network view, and the CTC Alerts dialog box appears. In network view, the node changes to gray and a DISCONNECTED condition appears in the Alarms tab.

Step 10 In the CTC Alerts dialog box, click **Close**. Wait for the reboot to finish. (This might take several minutes.)

Step 11 After the DISCONNECTED condition clears, complete the following steps to suppress the backplane IP address from appearing in CTC and the LCD. If you do not want to suppress the backplane IP address display, continue with Step 12.

a. Display the node in node view (single-shelf mode) or multishelf view (multishelf mode).

b. Click the **Provisioning > Security > Data Comm** tabs.

c. In the LCD IP Setting field, choose **Suppress Display**. The IP address will not appear on the ONS 15454 LCD.

d. Check the **Suppress CTC IP Address** check box. The IP address will not appear in the CTC information area or the Provisioning > Security > Data Comm tabs.

e. Click **Apply**.

Note After you turn on secure mode, the TCC2P/TCC3/TNC/TNCE/TSC/TSCE IP address becomes the node IP address.

Step 12 Return to your originating procedure (NTP).

DLP-G58 Create a Static Route

Purpose	This task creates a static route to establish CTC connectivity to a computer on another network. This task is performed when one of the following conditions exists: • CTC computers on one subnet need to connect to ONS 15454 nodes that are connected by a router to ONS 15454 nodes residing on another subnet. • OSPF is not enabled (the OSPF Active on LAN check box is not checked on the Provisioning > Network > OSPF tab) and the External Network Element (ENE) gateway setting is not checked. • You need to enable multiple CTC sessions among ONS 15454 nodes residing on the same subnet and the External Network Element (ENE) gateway setting is not checked.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **Network** tabs.

Step 2 Click the **Static Routing** tab. Click **Create**.

Step 3 In the Create Static Route dialog box, enter the following:

- Destination—Enter the IP address of the computer running CTC. To limit access to one computer, enter the full IP address and a subnet mask of 255.255.255.255. To allow access to all computers on the 192.168.1.0 subnet, enter 192.168.1.0 and a subnet mask of 255.255.255.0. You can enter a destination of 0.0.0.0 to allow access to all CTC computers that connect to the router.

- Mask—Enter a subnet mask. If the destination is a host route (that is, one CTC computer), enter a 32-bit subnet mask (255.255.255.255). If the destination is a subnet, adjust the subnet mask accordingly, for example, 255.255.255.0. If the destination is 0.0.0.0, CTC automatically enters a subnet mask of 0.0.0.0 to provide access to all CTC computers. You cannot change this value.
- Next Hop—Enter the IP address of the router port or the node IP address if the CTC computer is connected to the node directly.
- Cost—Enter the number of hops between the ONS 15454 and the computer.

Step 4 Click **OK**. Verify that the static route appears in the Static Route window.

Note Static route networking examples are provided in the Chapter 22, "Manage Network Connectivity."

Step 5 Return to your originating procedure (NTP).

DLP-G59 Set Up or Change Open Shortest Path First Protocol

Purpose	This task enables the OSPF routing protocol on the ONS 15454. Perform this task if you want to include the ONS 15454 in OSPF-enabled networks.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC You will need the OSPF Area ID, Hello and Dead intervals, and authentication key (if OSPF authentication is enabled) provisioned on the router to which the ONS 15454 is connected.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **Network** > **OSPF** tabs.

Step 2 On the top left side of the OSPF area, complete the following:

- DCC/GCC OSPF Area ID Table—In dotted decimal format, enter the number that identifies the ONS 15454 nodes as a unique OSPF area ID. The Area ID can be any number between 000.000.000.000 and 255.255.255.255, but must be unique to the LAN OSPF area.

ANSI Nodes

- SDCC Metric—This value is normally unchanged. It sets a cost for sending packets across the Section DCC, which is used by OSPF routers to calculate the shortest path. This value should always be higher than the LAN metric. The default SDCC metric is 100.
- LDCC Metric—Sets a cost for sending packets across the Line DCC. This value should always be lower than the SDCC metric. The default LDCC metric is 33. It is usually not changed.

ETSI Nodes

- RS-DCC Metric—This value is normally unchanged. It sets a cost for sending packets across the regenerator section DCC (RS-DCC), which is used by OSPF routers to calculate the shortest path. This value should always be higher than the LAN metric. The default RS-DCC metric is 100.
- MS-DCC Metric—Sets a cost for sending packets across the multiplex section DCC (MS-DCC). This value should always be lower than the SDCC metric. The default MS-DCC metric is 33. It is usually not changed.

Step 3 In the OSPF on LAN area, complete the following:

- OSPF active on LAN—When checked, enables the ONS 15454 OSPF topology to be advertised to OSPF routers on the LAN. Enable this field on ONS 15454 nodes that directly connect to OSPF routers.
- LAN Port Area ID—Enter the OSPF area ID (dotted decimal format) for the router port where the ONS 15454 is connected. (This number is different from the DCC/GCC OSPF Area ID.)

Step 4 By default, OSPF is set to No Authentication. If the OSPF router requires authentication, complete the following steps. If not, continue with Step 5.

a. Click the **No Authentication** button.

b. In the Edit Authentication Key dialog box, complete the following:
   - Type—Choose **Simple Password**.
   - Enter Authentication Key—Enter the password.
   - Confirm Authentication Key—Enter the same password to confirm it.

c. Click **OK**.

The authentication button label changes to Simple Password.

Step 5 Provision the OSPF priority and interval settings. The OSPF priority and interval defaults are the defaults most commonly used by OSPF routers. Verify that these defaults match the ones used by the OSPF router where the ONS 15454 is connected.

- Router Priority—Provision the router priority, which determines the designated router for a subnet.
- Hello Interval (sec)—Provision the number of seconds between OSPF hello packet advertisements sent by OSPF routers. Ten seconds is the default.
- Dead Interval—Provision the number of seconds that will pass while an OSPF router's packets are not visible before its neighbors declare the router down. Forty seconds is the default.
- Transit Delay (sec)—Provision the service speed. One second is the default.
- Retransmit Interval (sec)—Provision the number of seconds that will elapse before a packet is resent. Five seconds is the default.
- LAN Metric—Provision the cost for sending packets across the LAN. This value should always be lower than the SDCC or RS-DCC metric. Ten is the default.

Step 6 Under OSPF Area Range Table, create an area range table if one is needed:

> **Note** Area range tables consolidate the information that is outside an OSPF area border. One ONS 15454 in the ONS 15454 OSPF area is connected to the OSPF router. An area range table on this node points the router to the other nodes that reside within the ONS 15454 OSPF area.

a. Click **Create**.

b. In the Create Area Range dialog box, enter the following:

- Range Address—Enter the area IP address for the ONS 15454 nodes that reside within the OSPF area. For example, if the ONS 15454 OSPF area includes nodes with IP addresses 10.10.20.100, 10.10.30.150, 10.10.40.200, and 10.10.50.250, the range address would be 10.10.0.0.
- Range Area ID—Enter the OSPF area ID for the ONS 15454 nodes. This is either the ID in the DCC OSPF Area ID field or the ID in the Area ID for LAN Port field.
- Mask Length—Enter the subnet mask length. In the Range Address example, this is 16.
- Advertise—Check this box if you want to advertise the OSPF range table.

c. Click **OK**.

Step 7 All OSPF areas must be connected to Area 0. If the ONS 15454 OSPF area is not physically connected to Area 0, use the following steps to create a virtual link table that will provide the disconnected area with a logical path to Area 0:

a. Under the OSPF Virtual Link Table, click **Create**.

b. In the Create Virtual Link dialog box, complete the following fields. OSPF settings must match OSPF settings for the ONS 15454 OSPF area:

- Neighbor—Enter the router ID of the Area 0 router.
- Transit Delay (sec)—Enter the service speed. One second is the default.
- Hello Int (sec)—Provision the number of seconds between OSPF hello packet advertisements sent by OSPF routers. Ten seconds is the default.
- Auth Type—If the router where the ONS 15454 is connected uses authentication, choose **Simple Password**. Otherwise, choose **No Authentication**.
- Retransmit Int (sec)—Provision the time that will elapse, in seconds, before a packet is resent. Five seconds is the default.
- Dead Int (sec)—Provision the number of seconds that will pass while an OSPF router’s packets are not visible before its neighbors declare the router down. Forty seconds is the default.

c. Click **OK**.

Step 8 After entering the ONS 15454 OSPF area data, click **Apply**.

If you changed the Area ID, the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards reset, one at a time. The reset takes approximately 10 to 15 minutes.

Step 9 Return to your originating procedure (NTP).

DLP-G60 Set Up or Change Routing Information Protocol

Purpose	This task enables RIP on the ONS 15454. Perform this task if you want to include the ONS 15454 in RIP-enabled networks.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
	You need to create a static route to the router adjacent to the ONS 15454 for the ONS 15454 to communicate its routing information to non-DCC-connected nodes.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **Network** > **RIP** tabs.

Step 2 Check the **RIP Active** check box if you are activating RIP.

Step 3 Choose either RIP Version 1 or RIP Version 2 from the drop-down list, depending on which version is supported in your network.

Step 4 Set the RIP metric. The RIP metric can be set to a number between 1 and 15 and represents the number of hops.

Step 5 By default, RIP is set to No Authentication. If the router that the ONS 15454 is connected to requires authentication, complete the following steps. If not, continue with Step 6.

a. Click the **No Authentication** button.

b. In the Edit Authentication Key dialog box, complete the following:

- Type—Choose **Simple Password**.
- Enter Authentication Key—Enter the password.
- Confirm Authentication Key—Enter the same password to confirm it.

c. Click **OK**.

The authentication button label changes to Simple Password.

Step 6 If you want to complete an address summary, complete the following steps. If not, continue with Step 7. Complete the address summary only if the ONS 15454 is a gateway NE with multiple external ONS 15454 NEs attached with IP addresses in different subnets.

a. In the RIP Address Summary area, click **Create**.

b. In the Create Address Summary dialog box, complete the following:

- Summary Address—Enter the summary IP address.
- Mask Length—Enter the subnet mask length using the up and down arrows.
- Hops—Enter the number of hops. The smaller the number of hops, the higher the priority.

c. Click **OK**.

Step 7 Return to your originating procedure (NTP).

NTP-G194 Set Up EMS Secure Access to the ONS 15454

Purpose	This procedure provisions ONS 15454s and CTC computers for secure access.
Tools/Equipment	None
Prerequisite Procedures	NTP-G26 Set Up CTC Network Access, page 14-16
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser

Step 1 In node view, click the **Provisioning > Security > Access** pane.

Step 2 Under the **EMS Access** area, change the **Access State** to **Secure**.

Step 3 Click **Apply**. The CTC disconnects and reconnects through a secure socket connection.

Step 4 To create a secure connection, enter **https://node-address**.

Note After setting up a CTC connection in secure mode, http requests are automatically redirected to https mode.

Step 5 A first time connection is authenticated by the **Website Certification is Not Known** dialog box. Accept the certificate and click **OK**. The **Security Error: Domain Name Mismatch** dialog box appears. Click **OK** to continue.

Stop. You have completed this procedure.

NTP-G341 Set Up Secure Access to the ONS 15454 TL1

Purpose	This procedure provisions ONS 15454s for secure access to TL1.
Tools/Equipment	None
Prerequisite Procedures	NTP-G26 Set Up CTC Network Access, page 14-16
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser

Step 1 In the node view, click the **Provisioning > Security > Access** pane.

Step 2 Under the **TL1 Access** area, change the **Access State** to **Secure**.

Step 3 Click **Apply**.

Existing non-secure TL1 sessions, if any, are terminated.

Step 4 To create a secure TL1 connection, enter the following command at the UNIX or Linux prompt:

ssh -l *username node-ip* **-p** *port-number*

The port number for secure TL1 is 4083.

Note Use any SSH client on Windows.

Stop. You have completed this procedure.

NTP-G27 Set Up the ONS 15454 for Firewall Access

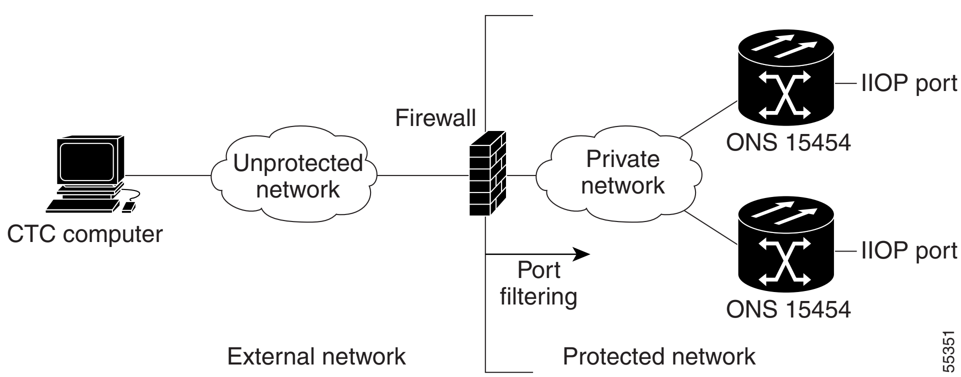
Purpose	This procedure provisions ONS 15454 nodes and CTC computers for access through firewalls.
Tools/Equipment	IIOP listener port number provided by your LAN or firewall administrator
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Log into a node that is behind the firewall. See the DLP-G46 Log into CTC task for instructions. If you are already logged in, continue with Step 2.

Step 2 If the ONS 15454 node is in a protected network and the CTC computer is in an external network, complete the "DLP-G61 Provision the IIOP Listener Port on the ONS 15454" task on page 14-34.

Figure 14-5 shows ONS 15454 nodes in a protected network and the CTC computer in an external network. For the computer to access the ONS 15454 nodes, you must provision the IIOP listener port specified by your firewall administrator on the ONS 15454.

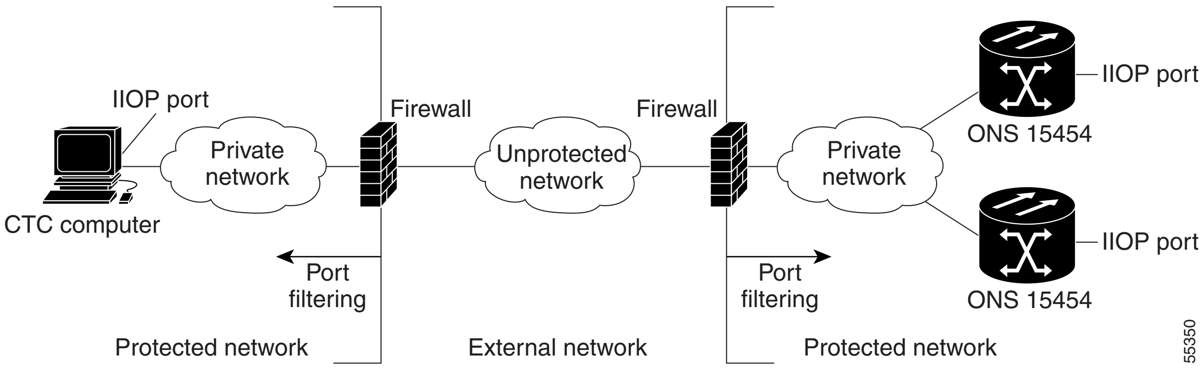
Figure 14-5 Nodes Behind a Firewall



Step 3 If the CTC computer resides behind a firewall, complete the "DLP-G62 Provision the IIOP Listener Port on the CTC Computer" task on page 14-35.

Figure 14-6 shows a CTC computer and ONS 15454 behind firewalls. For the computer to access the ONS 15454, you must provision the IIOP port on the CTC computer and on the ONS 15454.

Figure 14-6 CTC Computer and ONS 15454 Nodes Residing Behind Firewalls



Stop. **You have completed this procedure**.

NTP-G28 Create FTP Host

Purpose	This procedure provisions an FTP Host that you can use to perform database backup and restore or software download to an End Network Element (ENE) when proxy or firewall is enabled.
Tools/Equipment	None
Prerequisite Procedures	NTP-G26 Set Up CTC Network Access, page 14-16 NTP-G27 Set Up the ONS 15454 for Firewall Access, page 14-32
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser

Step 1 Complete the DLP-G46 Log into CTC task. If you are already logged in, continue with Step 2.

Step 2 If you want to turn on the ONS 15454 secure mode, which allows two IPv4 addresses to be provisioned for the node if TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards are installed, complete the "DLP-G264 Enable Node Security Mode" task on page 14-24. Refer to the Chapter 22, "Manage Network Connectivity," for information about secure mode.

Step 3 In Node view, click the **Provisioning > Network > FTP Hosts** tabs.

Step 4 Click **Create**.

Step 5 Enter a valid IP address in the FTP Host Address field. A maximum of 12 host can be entered.

Note In ONS 15454 Software Release 9.1 and later, you can configure an IPv6 address for an FTP server, in addition to an IPv4 address.

Step 6 The Mask is automatically set according to the Net/Subnet Mask length specified in "DLP-G56 Provision IP Settings" section on page 14-17. To change the Mask, click the Up/Down arrows on the **Length** menu.

Step 7 Check the **FTP Relay Enable** radio button to allow FTP commands at the GNE relay. If you will enable the relay at a later time, go to Step 9. Certain TL1 commands executed on an ENE require FTP access into the Data Communication Network (DCN), the FTP relay on the GNE provides this access. The FTP hosts that you have configured in CTC can be used with the TL1 COPY-RFILE (for database backup and restore or software download) or COPY-IOSCFG (for Cisco IOS Configuration File backup and restore) commands.

Step 8 Enter the time, in minutes, that FTP Relay will be enabled. A valid entry is a number between 0 and 60. The number 0 disallows FTP command relay. After the specified time has elapsed the FTP Relay Enable flag is unset and FTP command relay is disallowed.

Step 9 Click OK.

Step 10 Repeat Step 4 through Step 9 to provision additional FTP Hosts.

Stop. **You have completed this procedure**.

DLP-G61 Provision the IIOP Listener Port on the ONS 15454

Purpose	This task sets the IIOP listener port on the ONS 15454, ONS 15454 M2, and ONS 15454 M6 which enables you to access nodes that reside behind a firewall.
Tools/Equipment	IIOP listener port number provided by your LAN or firewall administrator
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note If the Enable SOCKS proxy on port 1080 check box is checked, CTC will use Port 1080 and ignore the configured IIOP port setting. If the check box is later unchecked, the configured IIOP listener port will be used.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Security > Access** tabs.

Step 2 In the TCC CORBA (IIOP) Listener Port area, choose a listener port option:

- **Default - TCC Fixed**—Uses Port 57790 to connect to ONS 15454 nodes on the same side of the firewall or if no firewall is used (default). This option can be used for access through a firewall if Port 57790 is available.
- **Standard Constant**—Uses Port 683, the Common Object Request Broker Architecture (CORBA) default port number.
- **Other Constant**—If Port 683 is not used, type the IIOP port specified by your firewall administrator.

Step 3 Click **Apply**.

Step 4 When the Change Network Configuration message appears, click **Yes**.

The TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards reboot, one at a time. The reboot takes approximately 15 minutes.

Step 5 Return to your originating procedure (NTP).

DLP-G62 Provision the IIOP Listener Port on the CTC Computer

Purpose	This task selects the IIOP listener port for CTC and must be completed if the computer running CTC resides behind a firewall.
Tools/Equipment	IIOP listener port number from LAN or firewall administrator
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the Edit menu, choose **Preferences**.

Step 2 In the Preferences dialog box, click the **Firewall** tab.

Step 3 In the CTC CORBA (IIOP) Listener Port area, choose a listener port option:

- **Default - Variable**—Use to connect to ONS 15454 nodes from within a firewall or if no firewall is used (default).
- **Standard Constant**—Use Port 683, the CORBA default port number.
- **Other Constant**—If Port 683 is not used, enter the IIOP port defined by your administrator.

Step 4 Click **Apply**. A warning appears telling you that the port change will apply during the next CTC login.

Step 5 Click **OK**.

Step 6 In the Preferences dialog box, click **OK**.

Step 7 To access the ONS 15454 using the IIOP port, log out of CTC then log back in. (To log out, choose **Exit** from the File menu).

Step 8 Return to your originating procedure (NTP).

NTP-G132 Provision OSI

Purpose	This procedure provisions the ONS 15454 so it can be installed in networks with other vendor NEs that use the OSI protocol stack for data communications network (DCN) communications. This procedure provisions the Target Identifier Address Resolution Protocol (TARP), OSI routers, manual area addresses, subnetwork points of attachment, and IP-over-Connectionless Network Service (CLNS) tunnels.
Tools/Equipment	None
Prerequisite Procedures	""NTP-G15 Install the Common Control Cards" section on page 3-34
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Caution This procedure requires an understanding of OSI protocols, parameters, and functions. Before you begin, review the OSI reference sections in Chapter 22, "Manage Network Connectivity" and ensure that you know the role of the ONS 15454 within the OSI and IP network.

Note This procedure requires provisioning of non-ONS equipment including routers and third party NEs. Do not begin until you have the capability to complete that provisioning.

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to provision the OSI. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the following tasks:

- DLP-G283 Provision OSI Routing Mode, page 14-37—Complete this task first.
- DLP-G284 Provision the TARP Operating Parameters, page 14-38—Complete this task second.
- DLP-G285 Add a Static TID-to-NSAP Entry to the TARP Data Cache, page 14-40—Complete this task as needed.
- DLP-G287 Add a TARP Manual Adjacency Table Entry, page 14-41—Complete this task as needed.
- DLP-G288 Provision OSI Routers, page 14-41—Complete this task as needed.
- DLP-G289 Provision Additional Manual Area Addresses, page 14-42—Complete this task as needed.
- DLP-G290 Enable the OSI Subnet on the LAN Interface, page 14-43—Complete this task as needed.
- DLP-G291 Create an IP-Over-CLNS Tunnel, page 14-44—Complete this task as needed.

Stop. You have completed this procedure.

DLP-G283 Provision OSI Routing Mode

Purpose	This task provisions the OSI routing mode. Complete this task when the ONS 15454 is connected to networks with third party NEs that use the OSI protocol stack for DCN communication.
Tools/Equipment	None
Prerequisite Procedures	"NTP-G15 Install the Common Control Cards" section on page 3-34" DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Caution Do not complete this task until you confirm the role of the node within the network. It will be either an End System, Intermediate System Level 1, or IS Level 1/Level 2. This decision must be carefully considered. For additional information about OSI provisioning, refer to Chapter 22, "Manage Network Connectivity."

Caution Link State Protocol (LSP) buffers must be the same at all NEs within the network, or loss of visibility might occur. Do not modify the LSP buffers unless you confirm that all NEs within the OSI have the same buffer size.

Caution LSP buffer sizes cannot be greater than the LAP-D maximum transmission unit (MTU) size within the OSI area.

Note For ONS 15454 nodes, three virtual routers can be provisioned. The node primary Network Service Access Point (NSAP) address is also the Router 1 primary manual area address. To edit the primary NSAP, you must edit the Router 1 primary manual area address. After you enable Router 1 on the Routers subtab, the Change Primary Area Address button is available to edit the address.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **OSI** tabs.

Step 2 Choose a routing mode:

- **End System**—The ONS 15454 performs OSI end system (ES) functions and relies upon an intermediate system (IS) for communication with nodes that reside within its OSI area.

  Note The End System routing mode is not available if more than one virtual router is enabled.

- **Intermediate System Level 1**—The ONS 15454 performs OSI IS functions. It communicates with IS and ES nodes that reside within its OSI area. It depends upon an IS L1/L2 node to communicate with IS and ES nodes that reside outside its OSI area.

- **Intermediate System Level 1/Level 2**—The ONS 15454 performs IS functions. It communicates with IS and ES nodes that reside within its OSI area. It also communicates with IS L1/L2 nodes that reside in other OSI areas. Before choosing this option, verify the following:
  - The node is connected to another IS Level 1/Level 2 node that resides in a different OSI area.
  - The node is connected to all nodes within its area that are provisioned as IS L1/L2.

Step 3 If needed, change the LSP data buffers:

- L1 LSP Buffer Size—Adjusts the Level 1 link state protocol data unit (PDU) buffer size. The default is 512. It should not be changed.
- L2 LSP Buffer Size—Adjusts the Level 2 link state PDU buffer size. The default is 512. It should not be changed.

Step 4 Return to your originating procedure (NTP).

DLP-G284 Provision the TARP Operating Parameters

Purpose	This task provisions the TARP operating parameters including TARP PDU propagation, timers, and loop detection buffer (LDB).
Tools/Equipment	None
Prerequisite procedures	DLP-G46 Log into CTC
Required/As needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > OSI > TARP > Config** tabs.

Step 2 Provision the following parameters, as needed:

- TARP PDUs L1 Propagation—If checked (default), TARP Type 1 PDUs that are received by the node and are not excluded by the LDB are propagated to other NEs within the Level 1 OSI area. (Type 1 PDUs request a protocol address that matches a target identifier [TID] within a Level 1 routing area.) The propagation does not occur if the NE is the target of the Type 1 PDU, and PDUs are not propagated to the NE from which the PDU was received.

  Note The TARP PDUs L1 Propagation parameter is not used when the Node Routing Area (on the Provisioning > OSI > Main Setup tab) is set to End System.

- TARP PDUs L2 Propagation—If checked (default), TARP Type 2 PDUs that are received by the node and are not excluded by the LDB are propagated to other NEs within the Level 2 OSI areas. (Type 2 PDUs request a protocol address that matches a TID within a Level 2 routing area.) The propagation occurs if the NE is not the target of the Type 2 PDU, and PDUs are not propagated to the NE from which the PDU was received.

  Note The TARP PDUs L2 Propagation parameter is only used when the Node Routing Area is provisioned to Intermediate System Level 1/Level 2.

- TARP PDUs Origination—If checked (default), the node performs all TARP origination functions including:
  - TID-to-NSAP resolution requests (originate TARP Type 1 and Type 2 PDUs)
  - NSAP-to-TID requests (originate Type 5 PDUs)
  - TARP address changes (originate Type 4 PDUs)

Note TARP Echo and NSAP to TID are not supported.

- TARP Data Cache—If checked (default), the node maintains a TARP data cache (TDC). The TDC is a database of TID-to-NSAP pairs created from TARP Type 3 PDUs received by the node and modified by TARP Type 4 PDUs (TID-to-NSAP updates or corrections). TARP 3 PDUs are responses to Type 1 and Type 2 PDUs. The TDC can also be populated with static entries entered on the TARP > Static TDC tab.

Note TARP Data Cache is only used when the TARP PDUs Origination parameter is enabled.

- L2 TARP Data Cache—If checked (default), the TIDs and NSAPs of NEs originating Type 2 requests are added to the TDC before the node propagates the requests to other NEs.

Note The L2 TARP Data Cache parameter is designed for Intermediate System Level 1/Level 2 nodes that are connected to other Intermediate System Level 1/Level 2 nodes. Enabling the parameter for Intermediate System Level 1 nodes is not recommended.

- LDB—If checked (default), enables the TARP loop detection buffer. The LDB prevents TARP PDUs from being sent more than once on the same subnet.

Note The LDB parameter is not used if the Node Routing Mode is provisioned to End System or if the TARP PDUs L1 Propagation parameter is not enabled.

- LAN TARP Storm Suppression—If checked (default), enables TARP storm suppression. This function prevents redundant TARP PDUs from being unnecessarily propagated across the LAN network.
- Send Type 4 PDU on Startup—If checked, a TARP Type 4 PDU is originated during the initial ONS 15454 startup. Type 4 PDUs indicate that a TID or NSAP change has occurred at the NE. (The default setting is not enabled.)
- Type 4 PDU Delay—Sets the amount of time that will pass before the Type 4 PDU is generated when Send Type 4 PDU on Startup is enabled. 60 seconds is the default. The range is 0 to 255 seconds.

Note The Send Type 4 PDU on Startup and Type 4 PDU Delay parameters are not used if TARP PDUs Origination is not enabled.

- LDB Entry—Sets the TARP loop detection buffer timer. The loop detection buffer time is assigned to each LDB entry for which the TARP sequence number (tar-seq) is zero. The default is 5 minutes. The range is 1 to 10 minutes.

- LDB Flush—Sets the frequency period for flushing the LDB. The default is 5 minutes. The range is 0 to 1440 minutes.
- T1—Sets the amount of time to wait for a response to a Type 1 PDU. Type 1 PDUs seek a specific NE TID within an OSI Level 1 area. The default is 15 seconds. The range is 0 to 3600 seconds.
- T2—Sets the amount of time to wait for a response to a Type 2 PDU. TARP Type 2 PDUs seek a specific NE TID value within OSI Level 1 and Level 2 areas. The default is 25 seconds. The range is 0 to 3600 seconds.
- T3—Sets the amount of time to wait for an address resolution request. The default is 40 seconds. The range is 0 to 3600 seconds.
- T4—Sets the amount of time to wait for an error recovery. This timer begins after the T2 timer expires without finding the requested NE TID. The default is 20 seconds. The range is 0 to 3600 seconds.

Note The T1, T2, and T4 timers are not used if the TARP PDUs Origination check box is not checked.

Step 3 Click **Apply**.

Step 4 Return to your originating procedure (NTP).

DLP-G285 Add a Static TID-to-NSAP Entry to the TARP Data Cache

Purpose	This task adds a static TID-to-NSAP entry to the TDC. The static entries are required for NEs that do not support TARP and are similar to static routes. For a specific TID, you must force a specific NSAP.
Tools/Equipment	None
Prerequisite procedures	DLP-G46 Log into CTC
Required/As needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioner or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > OSI > TARP > Static TDC** tabs.

Step 2 Click **Add Static Entry**.

Step 3 In the Add Static Entry dialog box, enter the following:

- TID—Enter the TID of the NE. (For ONS nodes, the TID is the Node Name parameter on the node or multishelf view Provisioning > General tab.)
- NSAP—Enter the OSI NSAP address in the NSAP field or, if preferred, click **Use Mask** and enter the address in the Masked NSAP Entry dialog box.

Step 4 Click **OK** to close the Masked NSAP Entry dialog box, if used, and then click **OK** to close the Add Static Entry dialog box.

Step 5 Return to your originating procedure (NTP).

DLP-G287 Add a TARP Manual Adjacency Table Entry

Purpose	This task adds an entry to the TARP manual adjacency table (MAT). Entries are added to the MAT when the ONS 15454 must communicate across routers or NEs that lack TARP capability.
Tools/Equipment	None
Prerequisite procedures	DLP-G46 Log into CTC
Required/As needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > OSI > TARP > MAT** tabs.

Step 2 Click **Add**.

Step 3 In the Add TARP Manual Adjacency Table Entry dialog box, enter the following:

- Level—Sets the TARP Type Code that will be sent:
  - **Level 1**—Indicates that the adjacency is within the same area as the current node. The entry generates Type 1 PDUs.
  - **Level 2**—Indicates that the adjacency is in a different area than the current node. The entry generates Type 2 PDUs.
- NSAP—Enter the OSI NSAP address in the NSAP field or, if preferred, click **Use Mask** and enter the address in the Masked NSAP Entry dialog box.

Step 4 Click **OK** to close the Masked NSAP Entry dialog box, if used, and then click **OK** to close the Add Static Entry dialog box.

Step 5 Return to your originating procedure (NTP).

DLP-G288 Provision OSI Routers

Purpose	This task enables an OSI router and edits its primary manual area address.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

> **Note** Router 1 must be enabled before you can enable and edit the primary manual area addresses for Routers 2 and 3.

> **Note** The Router 1 manual area address, System ID, and Selector “00” create the node NSAP address. Changing the Router 1 manual area address changes the node NSAP address.

> **Note** The System ID for Router 1 is the node MAC address. The System IDs for Routers 2 and 3 are created by adding 1 and 2 respectively to the Router 1 System ID. You cannot edit the System IDs.

Step 1 Click the **Provisioning > OSI > Routers > Setup** tabs.

Step 2 Chose the router you want provision and click **Edit**. The OSI Router Editor dialog box appears.

Step 3 In the OSI Router Editor dialog box:

a. Check **Enable Router** to enable the router and make its primary area address available for editing.

b. Click the manual area address, then click **Edit**.

c. In the Edit Manual Area Address dialog box, edit the primary area address in the Area Address field. If you prefer, click **Use Mask** and enter the edits in the Masked NSAP Entry dialog box. The address (hexadecimal format) can be 8 to 24 alphanumeric characters (0–9, a–f) in length.

d. Click **OK** successively to close the following dialog boxes: Masked NSAP Entry (if used), Edit Manual Area Address, and OSI Router Editor.

Step 4 Return to your originating procedure (NTP).

DLP-G289 Provision Additional Manual Area Addresses

Purpose	This task provisions the OSI manual area addresses. One primary area and two additional manual areas can be created for each virtual router.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
	DLP-G288 Provision OSI Routers, page 14-41
	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Click the **Provisioning > OSI > Routers > Setup** tabs.

Step 2 Chose the router where you want provision an additional manual area address and click **Edit**. The OSI Router Editor dialog box appears.

Step 3 In the OSI Router Editor dialog box:

a. Check **Enable Router** to enable the router and make its primary area address available for editing.

b. Click the manual area address, then click **Add**.

c. In the Add Manual Area Address dialog box, enter the primary area address in the Area Address field. If you prefer, click **Use Mask** and enter the address in the Masked NSAP Entry dialog box. The address (hexadecimal format) can be 2 to 24 alphanumeric characters (0–9, a–f) in length.

d. Click **OK** successively to close the following dialog boxes: Masked NSAP Entry (if used), Add Manual Area Address, and OSI Router Editor.

Step 4 Return to your originating procedure (NTP).

DLP-G290 Enable the OSI Subnet on the LAN Interface

Purpose	This task enables the OSI subnetwork point of attachment on the LAN interface.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note When you create communication channels (optical service channel [OSC] or generic communications channel [GCC]), OSI subnetwork points of attachment are enabled on the communication channels. See the "NTP-G38 Provision OSC Terminations" procedure on page 14-126 and the "DLP-G76 Provision DCC/GCC Terminations" task on page 16-81.

Note The OSI subnetwork point of attachment cannot be enabled for the LAN interface if the OSI routing mode is set to ES.

Note If secure mode is on, the OSI subnet is enabled on the backplane LAN port, not the front TCC2P/TCC3/TNC/TNCE/TSC/TSCE TCP/IP (LAN) port.

Step 1 Click the **Provisioning > OSI > Routers > Subnet** tabs.

Step 2 Click **Enable LAN Subnet**.

Step 3 In the Enable LAN Subnet dialog box, complete the following fields:

- ESH—Sets the End System Hello (ESH) propagation frequency. An ES NE transmits ESHs to inform other ESs and ISs about the NSAPs it serves. The default is 10 seconds. The range is 10 to 1000 seconds.

- ISH—Sets the Intermediate System Hello (ISH) PDU propagation frequency. An intermediate system NE sends ISHs to other ESs and ISs to inform them about the IS NEs it serves. The default is 10 seconds. The range is 10 to 1000 seconds.
- IIH—Sets the Intermediate System to Intermediate System Hello (IIH) PDU propagation frequency. The IS-IS Hello PDUs establish and maintain adjacencies between ISs. The default is 3 seconds. The range is 1 to 600 seconds.
- IS-IS Cost—Sets the cost for sending packets on the LAN subnet. The IS-IS protocol uses the cost to calculate the shortest routing path. The default IS-IS cost for LAN subnets is 20. It normally should not be changed.
- DIS Priority—Sets the designated intermediate system (DIS) priority. In IS-IS networks, one router is elected to serve as the DIS (LAN subnets only). Cisco router DIS priority is 64. For the ONS 15454 LAN subnet, the default DIS priority is 63. It normally should not be changed.

Step 4 Click **OK**.

Step 5 Return to your originating procedure (NTP).

DLP-G291 Create an IP-Over-CLNS Tunnel

Purpose	This task creates an IP-over-CLNS tunnel to allow ONS 15454 nodes to communicate across equipment and networks that use the OSI protocol stack.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution IP-over-CLNS tunnels require two endpoints. You will create one point on an ONS 15454. The other endpoint is generally provisioned on non-ONS equipment including routers and other vendor NEs. Before you begin, verify that you have the capability to create an OSI-over-CLNS tunnel on the other equipment location.

Step 1 Click the **Provisioning > OSI > Tunnels** tabs.

Step 2 Click **Create**.

Step 3 In the Create IP Over CLNS Tunnel dialog box, complete the following fields:

- Tunnel Type—Choose a tunnel type:
  - **Cisco**—Creates the proprietary Cisco IP tunnel. Cisco IP tunnels add the CLNS header to the IP packets.
  - **GRE**—Creates a generic routing encapsulation (GRE) tunnel. GRE tunnels add the CLNS header and a GRE header to the IP packets.

The Cisco proprietary tunnel is slightly more efficient than the GRE tunnel because it does not add the GRE header to each IP packet. The two tunnel types are not compatible. Most Cisco routers support the Cisco IP tunnel, while only a few support both GRE and Cisco IP tunnels. You generally should create Cisco IP tunnels if you are tunneling between two Cisco routers or between a Cisco router and an ONS node.

Caution Always verify that the IP-over-CLNS tunnel type that you choose is supported by the equipment at the other end of the tunnel.

- IP Address—Enter the IP address of the IP-over-CLNS tunnel destination.
- IP Mask—Enter the IP address subnet mask of the IP-over-CLNS destination.
- OSPF Metric—Enter the OSPF metric for sending packets across the IP-over-CLNS tunnel. The OSPF metric, or cost, is used by OSPF routers to calculate the shortest path. The default is 110. Normally, it is not be changed unless you are creating multiple tunnel routes and want to prioritize routing by assigning different metrics.
- NSAP Address—Enter the destination NE or OSI router NSAP address.

Step 4 Click **OK**.

Step 5 Provision the other tunnel endpoint using the documentation provided by the manufacturer of the third party vendor NE.

Step 6 Return to your originating procedure (NTP).

NTP-G29 Set Up SNMP

Purpose	This procedure provisions the SNMP parameters so that you can use SNMP management software with the ONS 15454.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required if SNMP is used at your site.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to set up SNMP. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **SNMP** tabs.

Step 3 In the Trap Destinations area, click **Create**.

Step 4 Complete the following in the Create SNMP Trap Destination dialog box (Figure 14-7):

- Destination IP Address—Type the IP address of your network management system (NMS). If the node you are logged into is an ENE, set the destination address to the GNE.

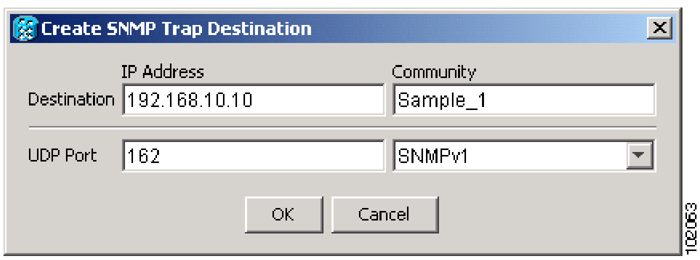
> **Note** In ONS 15454 Software Release 9.1 and later, you can configure IPv6 addresses for SNMPv2/v3 trap destinations and SNMPv3 proxy targets, in addition to IPv4 addresses.

- Community—Type the SNMP community name. For a description of SNMP community names, refer to the SNMP document.

  > **Note** The community name is a form of authentication and access control. The community name assigned to the ONS 15454 is case-sensitive and must match the community name of the NMS.

- UDP Port—The default User Datagram Protocol (UDP) port for SNMP is 162.
- Trap version—Choose either SNMPv1 or SNMPv2. Refer to your NMS documentation to determine which version to use.

Figure 14-7 Creating an SNMP Trap



Step 5 Click **OK**. The node IP address of the node where you provisioned the new trap destination appears in the Trap Destinations area.

Step 6 Click the node IP address in the Trap Destinations area. Verify the SNMP information that appears in the Selected Destination list.

Step 7 If you want the SNMP agent to accept SNMP SET requests on certain MIBs, click the **Allow SNMP Sets** check box. If this box is not checked, SET requests are rejected.

Step 8 If you want to set up the SNMP proxy feature to allow network management, message reporting, and performance statistic retrieval across ONS firewalls, click the **Allow SNMP Proxy** check box located on the SNMP tab.

> **Note** The Use Generic MIB check box is normally not checked for MSTP. It is checked only when the ONS 15454 resides in networks with multiple ONS products, and the network management system requires MIBs with the same name to have the same object IDs. By default, the ONS 15454 uses the CERENT-454-MIBs. Other ONS products, such as the ONS 15600, the ONS 15327, and ONS 15310-CL, use the CERENT-GENERIC-MIBs. If Use Generic MIB is checked, the ONS 15454 will use the CERENT-GENERIC-MIBs so the object IDs will be the same for all products.

> **Note** Using the ONS firewall proxy feature effectively breaches the ONS firewall to exchange management information.

For more information about the SNMP proxy feature, refer to SNMP.

Step 9 Click **Apply**.

Step 10 If you are setting up SNMP proxies, you can set up to three relays that send SNMP trap error counts back to the NE for each trap destination address:

a. Click the first trap destination IP address. The address and its community name appear in the Destination fields.

b. Enter up to three SNMP Proxy relay addresses and community names in the fields for Relay A, Relay B, and Relay C.

> **Note** The community names specified for each relay node must match one of the provisioned SNMP community names in the NE.

> **Note** The SNMP proxy directs SNMP traps from this node through Relay A to Relay B to Relay C to the trap destination. Ensure that you enter the IP addresses in the correct order so that this sequence runs correctly.

Step 11 Click **Apply**.

Stop. **You have completed this procedure**.

NTP-G143 Import the Cisco Transport Planner NE Update Configuration File

Purpose	This procedure imports the Cisco Transport Planner NE Update configuration file and creates a log file. The configuration file, which is provided in XML format, provisions internal patchcords, optical sides and card parameters for optical units, transponders, and passive units (DCUs and patch panels). Finally, the NE Update file installs the ANS parameters calculated by Cisco Transport Planner. The log file, which is a text document records the results of the NE update.
Tools/Equipment	A Cisco Transport Planner NE Update file for the network where the node is installed must be accessible to the CTC computer.
Prerequisite Procedures	NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

> **Caution** Verify that you have the correct Cisco Transport Planner network file before you begin this procedure. The file will have an XML extension and a name assigned by your network planner. Check with your network planner or administrator if you have any questions.

Note The Cisco Transport Planner configuration file contains parameters for the node, shelf, card type, port (including the card's wavelength), pluggable port module (PPM), as well as OTN and FEC parameters. Only the values present in XML format appear in the configuration file parameters; if the values are not in XML format, a column appears blank. The XML file values are independently reported and do not affect any configuration changes that you apply.

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to import the Cisco Transport Planner configuration file. If you are already logged in, continue with Step 2.

Step 2 If you choose the Provision Node Layout option to preprovision the cards in the shelf, complete the following steps. If not, continue with Step 3.

a. Display the node in node view (single-shelf mode) or multishelf view (multishelf mode).

b. Verify that the common control cards (TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE, AIC-I and MSC-ISC) cards are the only cards installed. If in single or multishelf mode, verify that each shelf in the multishelf has two TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards.

- If common control cards are the only cards installed, continue with Step 3.
- If other cards appear, continue with Step c.

c. If a physical card other than the common control cards is installed, remove it from the shelf.

d. If preprovisioned DWDM cards are present, delete them using the "DLP-G351 Delete a Card in CTC" task on page 14-51, then repeat Steps a and b.

Step 3 If you have not created a log file to record the results of the NE update, complete the following steps. If a log file has been created, continue with Step 4.

a. Open a text editor or word processing application.

b. Create a new text (TXT) document with a file name of your choosing.

c. Save the text document in a directory that is easy to navigate to from CTC.

Step 4 In CTC node view (single-shelf mode) or multishelf view, click the **Provisioning > WDM-ANS > Node Setup** tabs.

Step 5 Choose **Load latest installation file from node** to reload the latest XML file that was applied and stored in the node. Continue with Step 8.

Step 6 Choose **Load installation file from network repository** and navigate to the Cisco Transport Planner node setup file containing the parameters for the network where the node resides. This option downloads the XML file from the remote server. Continue with Step 8.

Step 7 In the field under Select XML file, type the path to the Cisco Transport Planner node setup file containing the parameters for the network where your node resides, or click **Browse** and navigate to the file on your computer. Click the file, then click **Open**. The file will have an XML extension. Continue with Step 8.

Step 8 In the field under Select Log file, type the path to the text file that you created in Step 3, or click **Browse** and navigate to the file on your computer or a network server where you want the node setup results recorded.

Note The log file records the parameters that were updated successfully and provides an explanation of why an update could not be completed. Each node setup session overwrites the log file contents. If you want to save the results from a previous NE update, save the log file with new name.

Step 9 Click **Apply**.

Step 10 When **Load installation file from network repository** option is chosen, the FTP Remote Installation File *Node-Name* page appears.

a. When the node is configured as a Gateway Network Element (GNE) node, enter the parameters (host name, port, user name, password, remote directory, and XML file name of the remote server) and click **Next**.

b. When the node is configured as a Elementary Network Element (ENE) node, an additional parameter called GNE Selector appear. From the **GNE Selector** drop-down list, select the appropriate GNE in the network. The FTP relay must be configured on the selected GNE to the remote server where the XML file is stored. See "NTP-G28 Create FTP Host" procedure on page 14-33 to configure the FTP relay on the selected GNE.

Step 11 When the Node Setup Selection for *Node-Name* page appears, complete the following steps. If not, continue with Step 12.

a. Choose the node profile that you want to apply to the node. The Cisco Transport Planner XML file contains profiles for all nodes in the network. Choose the profile that applies to the node you are provisioning.

b. Click **Next**.

Step 12 On the Node Setup for *node name* page, choose one or more of the following:

- Node Layout—Preprovisions the slots in each shelf in CTC for the cards defined in the network plan. Choose this option when no DWDM cards are installed. (Errors will occur if cards are installed or the slots are preprovisioned.) Preprovisioning the slots before the physical cards are installed ensures that card installers place the cards in the correct slots. Preprovisioning the slots is also useful if you want to set up the network prior to card installation. The node layout also preprovisions the chassis and passive units.
- Card Parameters—If checked, provisions the following parameters, if the cards are installed.
  - TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP cards—Provisions the OTN and FEC parameters.
  - OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-EDFA-17, OPT-EDFA-24, GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards—Provisions the card mode.
- Pluggable Port Modules— If checked, allows the provisioning of PPMs on TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP cards, including PPM payloads.
- Internal Patchcords—If checked, allows creation of internal patchcords among cards provisioned in the node.
- Optical Sides—If checked, allows the provisioning of optical sides.
- ANS Parameters—If checked, installs the ANS parameters. ANS parameters provision the values required for the node to function within the specified network design. ANS parameters include span losses, optical power, optics thresholds, amplifier working mode, gain, tilt, and many others. Refer to Chapter 12, "Node Reference" for a list of ONS 15454 ANS parameters.

Note If you are importing the Cisco Transport Planner configuration file for the first time, you normally choose all available options.

- Skip Interactive Mode—If checked, CTC provisions all the chosen setup components automatically without allowing you to view the results after each one.

- Save Installation Files (XML and log) On Node—If checked, CTC saves the XML and log files on the node.

Step 13 Click **Next.** If you chose Skip Interactive Mode, continue with Step 14. If not, the wizard page that appears depends on the options chosen in Step 12: Complete the steps shown in Table 14-2 for each option.

Table 14-2 NE Update Wizard Options

NE Update Function	
Node/Shelves Layout	View the cards and slots on the left side of the page and verify that they are the same as the layout in the Cisco Transport Planner Shelf Layout (see Table 14-1 on page 14-4). If the cards and slots match, click **Apply**. If not, click **Cancel**. and contact your next level of support to verify that you have the correct node setup file. If the site has a multishelf configuration, click **Next** and repeat this step for each shelf at the site. CTC preprovisions the slots. (This might take a few seconds.) The results appear in the Log window. Slots that are successfully provisioned display an "Applied" status. A "Slot not empty" status appears if slots cannot be provisioned because a card is physically installed or the slot is already provisioned. If this occurs, complete the following steps. Otherwise, continue with the next NE Update function. **1.** Click **Cancel**, then click **Yes** in the confirmation dialog box. The slot preprovisioning does not revert when you click Cancel. **2.** If a physical card is installed, remove it from the shelf. **3.** Perform one of the following steps: – Delete all the preprovisioned slots using the "DLP-G351 Delete a Card in CTC" task on page 14-51, then repeat Steps 2 through Step 13. – Delete the slot where the Slot Not Empty error occurred using the "DLP-G351 Delete a Card in CTC" task on page 14-51. Complete the "DLP-G353 Preprovision a Slot" task on page 14-53 to provision the slot manually, then repeat Steps 2 through 13 making sure to uncheck the Provision Node Layout option in Step 12. **Note** When you preprovision a slot, the card is purple in the CTC shelf graphic and "NP" (not present) appears on the card. After the physical card is installed, the card changes to white and "NP" is removed from the CTC shelf graphic.
Passive Units Layout	**1.** Review the passive unit settings. **2.** Click **Apply**. **3.** Click **Next.**
Pluggable Port Modules	**1.** Review the PPM settings for each TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, and OTU2_XP card. **2.** Click **Apply**. **3.** Click **Next.**
Card Parameters	**1.** Review the OTN, FEC, and card mode settings for each TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, and OTU2_XP card. **2.** Click **Apply**. **3.** Click **Next.**

Table 14-2 NE Update Wizard Options

NE Update Function	
Internal Patchcords	1. Review the internal patchcords. 2. Click **Apply**. 3. Click **Next.**
Optical Sides	1. Review the optical side assignments. 2. Click **Apply**. 3. Click **Next.**
ANS Parameters	1. Review the ANS parameters on the left half of the page. c. Click **Apply**. The log file displays the results. At the end, a Done status will appear. If a parameter could not be applied, a Setting Refused status appears. If this occurs, contact your next level of support.
Select All	1. If checked, selects all the options.
Skip Interactive Mode	If checked, CTC provisions all the chosen setup components automatically without allowing you to view the results after each one.
Save Installation Files (XML and log) On Node	If checked, CTC saves the XML and log files on the node.

Step 14 Click **Finish**, then click **OK** in the Wizard Complete confirmation dialog box. The confirmation box indicates whether the xml import process was completed successfully.

Note Common control cards are not provisioned by Cisco Transport Planner.

Stop. **You have completed this procedure**.

DLP-G351 Delete a Card in CTC

Purpose	This task deletes a card from an ONS 15454 slot that is provisioned in CTC.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note It is recommended that the card be physically removed from its slot before deleting it from CTC.

Step 1 Verify that the following conditions are not present. (During node turn-up, these conditions are normally not present):

- The card is a TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card.
- The card is part of a protection group.
- The card has optical channels or overhead circuits provisioned.
- The card is being used for timing.
- The card has an OSC/GCC termination.
- A port on the card is being used for a Link Management Protocol (LMP) channel or link.
- The card is part of an optical side.
- The card is assigned to DWDM patchcords.
- If a port on the card is in service.
- If a port on the card is part of a circuit.

If any of these conditions exist, do not continue. You will not be able to delete the card until the card is removed from protection groups; circuits, DCC, and GCCs are deleted; a different timing source is provisioned, and the LMP link or channel is deleted.

- To replace a TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
- To delete a protection group, see the NTP-G83 Modify or Delete Card Protection Settings procedure.
- To delete optical channels see the "DLP-G347 Delete Optical Channel Client Connections" task on page 16-26 and the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46; to delete overhead circuits, see the "DLP-G112 Delete Overhead Circuits" task on page 16-89.
- To remove the card as a timing source, see the NTP-G87 Change Node Timing Parameters procedure.
- To remove OSC or GCC terminations, see the NTP-G85 Modify or Delete OSC Terminations, GCC Terminations, and Provisionable Patchcords procedure.
- To delete LMP channels or links, see "NTP-G164 Configure Link Management Protocol" procedure on page 15-40.
- To remove a DWDM patchcord, see the "DLP-G355 Delete an Internal Patchcord" procedure on page 14-123.
- To remove an optical side, see the "DLP-G480 Delete an Optical Side" procedure on page 14-125.

Step 2 On the shelf graphic in CTC, right-click the card that you want to remove and choose **Delete Card**.

> **Note** A deleted card no longer reboots and reappears in CTC after R5.0.

Step 3 Return to your originating procedure (NTP).

DLP-G353 Preprovision a Slot

Purpose	This task preprovisions a ONS 15454 slot in CTC. Preprovisioning of all the slots in the shelf is normally performed when you complete the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47. Use this task if you need to manually preprovision a slot. All slot preprovisioning must be based on the Cisco Transport Planner shelf layout prepared for your site.
Tools/Equipment	Cisco Transport Planner shelf layout table or JPG file.
Prerequisite Procedures	NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), right-click an empty slot where you want to install a card.

Step 2 From the Add Card shortcut menu, choose the card type that will be installed based on the Cisco Transport Planner shelf layout (see Table 14-1 on page 14-4). Only cards that can be installed in the slot appear in the Add Card shortcut menu. Table 14-3 shows the Add Card shortcut menu, submenu, card groups, and menu options or cards that they reference.

Table 14-3 CTC Add Card Shortcut Menu for DWDM Cards

Menu Item	Submenu Category	Card Group	Submenu Item 1	Submenu Item 2	Cards
DWDM	nXP	Transponder and Muxponder	—	10GE_XP	10GE_XP
			—	10GE_XPE	10GE_XPE
			—	OTU2_XP	OTU2_XP
			—	ADM-10G	ADM-10G
			—	GE_XP	GE_XP
			—	GE_XPE	GE_XPE
			—	MXPP_MR_2.5G	MXPP_MR_2.5G
			—	MXP_2.5G_10E	MXP_2.5G_10E MXP_2.5G_10E_C MXP_2.5G_10E_L MXP_2.5G_10EX_C
			—	MXP_2.5G_10G	MXP_2.5G_10G
			—	MXP_MR_10DME	MXP_MR_10DME_C MXP_MR_10DME_L MXP_MR_10DMEX_C
			—	MXP_MR_2.5G	MXP_MR_2.5G
			—	TXPP_MR_2.5G	TXPP_MR_2.5G
			—	TXP_MR_10E	TXP_MR_10E TXP_MR_10E_C TXP_MR_10E_L TXP_MR_10EX_C
			—	TXP_MR_10G	TXP_MR_10G
			—	TXP_MR_2.5G	TXP_MR_2.5G
			—	40G-MXP-C	40G-MXP-C
			—	40E-MXP-C	40E-MXP-C 40ME-MXP-C
			—	40E-TXP-C	40E-TXP-C 40ME-TXP-C
			—	AR_MXP	AR_MXP
			—	AR_XP	AR_XP

Table 14-3 CTC Add Card Shortcut Menu for DWDM Cards (continued)

Menu Item	Submenu Category	Card Group	Submenu Item 1	Submenu Item 2	Cards
DWDM	MD	Multiplexer and Demultiplexer	C Band	32 DMXO	32DMX-O
				40 WSS	40-WSS-C or 40-WSS-CE
				32 MUXO	32MUX-O
				32 WSS	32WSS
				4MD	4MD-xx.x
				32 DMX	32DMX
				40-MUX-C	40-MUX-C
				32 MUXO	32MUX-O
				40-DMX-C, or 40-DMX-CE	40-DMX-C, or 40-DMX-CE
			L Band	32 WSS L	32WSS-L
				32 DMXL	32DMX-L
	MESH	—	C Band	40 WXC	40-WXC-C
				80 WXC	80-WXC-C
				40 SMR1 C	40-SMR1-C
				40 SMR2 C	40-SMR2-C
	OSC	Optical Service Channel	—	MMU	MMU
			—	OSC-CSM	OSC-CSM
	OADM	Optical Add/Drop Multiplexer	—	AD-1B	AD-1B-xx.x
			—	AD-1C	AD-1C-xx.x
			—	AD-2C	AD-2C-xx.x
			—	AD-4B	AD-4B-xx.x
			—	AD-4C	AD-4C-xx.x
	Ampli	Optical Amplifier	C Band	OPT-BST E	OPT-BST-E
				OPT-AMP-17	OPT-AMP-17-C
				OPT-RAMP-C	OPT-RAMP-C
				OPT-RAMP-CE	OPT-RAMP-CE
				OPT-AMP C	OPT-AMP-C
				OPT-BST	OPT-BST
				OPT-PRE	OPT-PRE
				OPT-EDFA-17	OPT-EDFA-17
				OPT-EDFA-24	OPT-EDFA-24
			L Band	OPT-BST L	OPT-BST-L
				OPT-AMP L	OPT-AMP-L
	OTHER	—	—	PSM	PSM

Table 14-3 CTC Add Card Shortcut Menu for DWDM Cards (continued)

Menu Item	Submenu Category	Card Group	Submenu Item 1	Submenu Item 2	Cards
Ethernet	—	—	—	MS-ISC-100T	MS-ISC-100T
				G1000	G1000
OSCM	—	—	—	—	OSCM (Slots 8 and 10 only)
TNC TSC[1]	—	Control Cards	—	—	TNC, TNCE, TSC, and TSCE

1. Choose the menu option TNC for both TNC and TNCE preprovision. The CTC displays the TNC or TNCE card name according to the inserted card. Same applies for TSCE card also.

Note When you preprovision a slot, the card appears purple in the CTC shelf graphic (the card appears as white when a card is installed in the slot). NP on the card graphic indicates that the card is not physically installed.

Step 3 Repeat Step 2 until all the cards shown in the Cisco Transport Planner shelf layout are provisioned in CTC.

Stop. **You have completed this procedure**.

NTP-G320 Configure the Node as a Non-DWDM Network

Purpose	This tasks configures a node as a Non-DWDM network.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 2 From the Selector area, select Network Type.

Step 3 Choose **Not-DWDM**, from the Value drop-down list. Click **Apply**.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs.

Step 5 Click the **Launch ANS** button. The relevant ports in the node will be in IS state.

Step 6 Click **OK**.

Step 7 Return to your originating procedure (NTP).

DLP-G693 Configure the Amplifier

Purpose	This task configures the optical parameters and threshold values of the amplifier card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Display the amplifier card in card view.

Step 2 Click the **Provisioning > Card** tabs.

Step 3 Select the working mode from the Card Working Mode drop-down list.

Step 4 Change to node view (single-shelf mode) or multishelf view (multishelf mode), then click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 5 From the Selector area, select the amplifier slot. If the default parameters are present, continue with Step 6. If not, click **Add** to add the Channel LOS Threshold, Amplifier Tilt, Power, and Amplifier Working Mode parameters. To add the ANS parameters, see the "DLP-G541 Add an ANS Parameter" task on page 14-60 for instructions.

Step 6 Click the value of the ANS parameter that you want to modify and enter the new value specified in Table 14-4. To modify the ANS parameters, see the "DLP-G681 Modify an ANS Parameter" task on page 14-61 for instructions.

Table 14-4 Values for the ANS Parameters (amplifier)

Port	ANS Parameter	Value
Slot 16 (OPT-AMP C).Port COM-RX	Channel LOS Threshold	35.0 dBm
Slot 16 (OPT-AMP C).Port LINE-TX	Amplifier Working Mode	Control Gain
Slot 16 (OPT-AMP C).Port LINE-TX	Amplifier Tilt	0.0 dB
Slot 16 (OPT-AMP C).Port LINE-TX	Power	1.0 dBm

Step 7 Click **Apply**.

Step 8 Click the **Provisioning > WDM-ANS > Port Status** tabs.

Step 9 Click **Launch ANS**.

Step 10 In the Apply Launch ANS dialog box, click **Yes**.

Step 11 In the Launch ANS confirmation dialog box, click **OK**.

Step 12 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 13 Verify the following in the Results column:

- Success - Changed —The parameter has been successfully changed with the ports in IS.

Step 14 Verify that the Set By column displays the value "ANS" or "APC" as the application that sets the ANS parameter.

Step 15 Return to your originating procedure (NTP).

DLP-G694 Configure the PSM

Purpose	This tasks configures the PSM behavior.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 2 From the Selector area, select the PSM slot. If the default parameters are present, continue with Step 3. If not, click **Add** to add the Channel LOS Threshold and VOA Attenuation parameters. To add the ANS parameters, see the "DLP-G541 Add an ANS Parameter" task on page 14-60 for instructions.

Step 3 Click the value of the ANS parameter that you want to modify and enter the new value specified in Table 14-4. To modify the ANS parameters, see the "DLP-G681 Modify an ANS Parameter" task on page 14-61 for instructions.

Table 14-5 Values for the ANS Parameters (PSM)

Port	ANS Parameter	Value
Slot 14(PSM).Port W-RX	VOA Attenuation	3.0 dB
Slot 14(PSM).Port W-RX	Channel LOS Threshold	15.0 dB
Slot 14(PSM).Port P-RX	VOA Attenuation	10.0 dB
Slot 14(PSM).Port P-RX	Channel LOS Threshold	20.0 dB

Step 4 Click **Apply**.

Step 5 Click the **Provisioning > WDM-ANS > Port Status** tabs.

Step 6 Click **Launch ANS**.

Step 7 In the Apply Launch ANS dialog box, click **Yes**.

Step 8 In the Launch ANS confirmation dialog box, click **OK**.

Step 9 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 10 Verify the following in the Results column:

- Success - Changed —The parameter has been successfully changed with the ports in IS.

Step 11 Verify that the Set By column displays the value "ANS" or "APC" as the application that sets the ANS parameter.

Step 12 Return to your originating procedure (NTP).

NTP-G328 Add, Modify, or Delete ANS Parameters

Purpose	This procedure allows you to add, modify, or delete ANS parameters for a DWDM node.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note It is recommended that you use the Cisco Transport Planner XML configuration file to provision the ANS parameters instead of manually adding all the parameters in CTC. ANS provisioning parameters must be manually changed only by Cisco qualified personnel. Provisioning the ANS parameters incorrectly (either as preamplifier or booster input power thresholds) may impact traffic.

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to add, modify, or delete the ANS parameters. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the following tasks:

- Complete the "DLP-G541 Add an ANS Parameter" task on page 14-60.
- Complete the "DLP-G681 Modify an ANS Parameter" task on page 14-61.
- Complete the "DLP-G542 Delete an ANS Parameter" task on page 14-63.

Stop. You have completed this procedure.

DLP-G541 Add an ANS Parameter

Purpose	This tasks adds an ANS parameter.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 2 Click **Add**. The Add ANS Parameter dialog box appears.

Step 3 Select the ANS parameter from the Parameter drop-down list.

Step 4 In the Port Selection area, complete the following fields:

- Type—Displays the card type.
- Shelf—Choose the shelf from the drop-down list.
- Slot—Choose the card from the Slot drop-down list. The drop-down list lists all the cards that support the ANS parameter selected in Step 3.
- Port—Choose the port from the Port drop-down list. The drop-down list lists all the ports for the card selected in Step 4 that support the ANS parameter selected in Step 3.

Step 5 Choose the granularity as OTS or OCH from the Granularity drop-down list.

Note Granularity can be set only for the ANS parameters applied to the LINE-RX, LINE-TX, COM-RX, or COM-TX ports.

Step 6 Type or choose the value for the ANS parameter in the Value field.

Step 7 Click **OK**.

Step 8 Return to your originating procedure (NTP).

DLP-G681 Modify an ANS Parameter

Purpose	This task modifies ANS parameters.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Do not begin this procedure until the Cisco Transport Planner NE Update file is created for the node. You must import the new NE Update file and run ANS to recalculate the ANS parameters for the node.

Caution Modifying ANS parameters on one node requires ANS upgrades on all the other nodes within the network. Do not begin this procedure until you are prepared to complete the upgrade on all the network nodes.

Caution This procedure will affect the service of unprotected circuits that pass through the node.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 2 Click the value of the ANS parameter that you want to modify and enter the new value.

Note If the new or updated value is not within the default range specified in Table 14-6, an error message is displayed.

Note When you modify the parameter value in the Value field, the active value is updated with the modified value after you run ANS.

Table 14-6 Ranges, Values, and Edit Options for the ANS Parameters

ANS Parameter	Range/Value	Editable with Port in IS
OSC LOS Threshold	-50.0 to +30.0 dBm	Yes
Channel LOS Threshold	-50.0 to +30.0 dBm	Yes
Amplifier Working Mode	Control Power, Control Gain, Fixed Gain	Yes[1]
Amplifier Gain	0.0 to 40.0 dB	No
Amplifier Tilt	-15.0 to +15.0 dB	No
OSC Power	-24.0 to 0.0 dBm	No

Table 14-6 Ranges, Values, and Edit Options for the ANS Parameters

ANS Parameter	Range/Value	Editable with Port in IS
Raman Ratio	0.0 to 100.0%	Yes
Raman Total Power	100 to 450 mW	Yes
Raman Expected Gain[2]	0.0 to 12.0 dB	Yes
Power	-30.0 to +50 dBm	Yes[3]
WXC Dithering	0 to 33	No
Min Expected Span Loss	0.0 to 60.0 dB	No
Max Expected Span Loss	0.0 to 60.0 dB	No
VOA Attenuation	0 to 30 dB	Yes[4]

1. Per-channel power and tilt can be edited when the Amplifier Working Mode is Control Gain or Control Power and Fixed Gain when Amplifier Working Mode is Fixed Gain
2. Editable only on OPT-RAMP-C and OPT-RAMP-CE cards.
3. The APC increases or decreases power by 0.5dB till the new power setpoint is reached. The APC-OUT-OF-RANGE alarm is raised if the updated power setpoint is outside the expected range.
4. VOA Attenuation associated with a single channel path can be edited when the working mode is Constant Power Value; VOA Attenuation associated with aggregated paths can be edited when the working mode is Constant Attenuation Value.

Step 3 Click **Apply**.

Step 4 Click the **Provisioning > WDM-ANS > Port Status** tabs.

Step 5 Click **Launch ANS**.

Step 6 In the Apply Launch ANS dialog box, click **Yes**.

Step 7 In the Launch ANS confirmation dialog box, click **OK**.

Step 8 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 9 Verify the following in the Results column:

- Success - Changed —The parameter has been successfully changed with the ports in IS.

Step 10 Verify that the Set By column displays the value “ANS” or “APC” as the application that sets the ANS parameter.

Step 11 Return to your originating procedure (NTP).

DLP-G542 Delete an ANS Parameter

Purpose	This tasks removes an ANS parameter.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 2 Click the ANS parameter you want to remove.

Note Only threshold related ANS parameters can be removed if the port is in service state.

Step 3 Click **Remove**, and then **Yes**.

Step 4 Return to your originating procedure (NTP).

NTP-G30 Install the DWDM Cards

Purpose	This procedure describes how to install the DWDM multiplexer, demultiplexer, wavelength selective switch, wavelength cross-connect, OADM, OSC, PSM, and optical amplifier cards.
Tools/Equipment	• Cisco Transport Planner shelf layout • The following C-band or L-band cards, as required by your site plan: – C-band: OPT-PRE, OPT-BST, OPT-BST-E, 32MUX-O, 40-MUX-C, 32DMX-O, 32DMX, 40-DMX-C, 40-DMX-CE, 32WSS, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, TDC-CC, TDC-FC, 40-SMR1-C, 40-SMR2-C, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, OPT-EDFA-24, MMU, 4MD-xx.x, AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-1B-xx.x, AD-4B-xx.x, OSCM, OSC-CSM, and PSM cards (as applicable) – L-band: 32WSS-L, 32DMX-L, OPT-BST-L, OPT-AMP-L, and PSM cards (as applicable) • The ONS 15454 NE defaults file if the node uses custom NE defaults
Prerequisite Procedures	• "NTP-G15 Install the Common Control Cards" section on page 3-34 • "NTP-G14 Install DWDM Equipment" in the *Cisco ONS 15454 Hardware Installation Guide* • NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3 • NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning **This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the Regulatory Compliance and Safety Information document for the appropriate Cisco chassis.** Statement 274

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

Warning **Class I (CDRH) and Class 1M (IEC) laser products.** Statement 1055

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Warning **High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag.** Statement 201

Caution Always use the supplied electrostatic discharge (ESD) wristband when working with a powered ONS 15454. For detailed instructions on how to wear the ESD wristband, refer to the *Electrostatic Discharge and Grounding Guide for Cisco CPT and Cisco ONS Platforms*.

Note For United States installations, complies with the United States Federal Drug Administration Code of Federal Regulations Title 21, Sections 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.

Note If protective clips are installed on the backplane connectors of the cards, remove the clips before installing the cards.

Note If you install a card incorrectly, the FAIL LED flashes continuously.

Step 1 If the node requires a custom NE default settings to be installed on the node, complete the "NTP-G136 Import Network Element Defaults" procedure on page 24-24. If not, continue with Step 2. (For information about the ONS 15454 NE defaults, refer to Appendix H, "Network Element Defaults.")

Caution If custom NE defaults are required, they must be installed before you install the DWDM cards.

Step 2 Verify that you have one of the following guides for the DWDM card installation:

- The slots that were preprovisioned when you completed the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47.
- The Cisco Transport Planner shelf layout report (see Table 14-1 on page 14-4).

Step 3 If the slots are preprovisioned, continue with Step 4. If you are using the Cisco Transport Planner shelf layout report, complete the "DLP-G348 Use the Cisco Transport Planner Shelf Layout Report" task on page 14-67.

Step 4 Remove a DWDM card from its packaging, then remove the protective caps from the backplane connectors. (Safety caps are typically yellow.)

Step 5 Open the card latches/ejectors.

Step 6 Use the latches/ejectors to firmly slide the card along the slot guide rails until the card plugs into the receptacle at the back of the slot. The correct slot is designated by the Cisco Transport Planner shelf layout.

Step 7 Verify that the card is inserted correctly. Simultaneously close the latches/ejectors on the card.

Note It is possible to close the latches/ejectors when the card is not completely plugged in. Ensure that you cannot insert the card any further.

After installing the card, the following LED activity will occur:

- The card's LEDs will go through a sequence of activities (turn on, turn off, blinking.) This will take 2 to 3 minutes.
- The ACT LED turns on.
- The signal fail (SF) LED might persist until all card ports connect to their far-end counterparts and a signal is present.

Step 8 If the card does not boot up properly, or the LED activity is not similar to the activity in Step 7, check the following:

- When a physical card type does not match the type of card provisioned for that slot in CTC, the card might not boot. If a DWDM card does not boot, open CTC and ensure that the slot is not provisioned for a different card type before assuming that the card is faulty.
- If the red FAIL LED does not turn on, check the power.
- If you insert a card into a slot provisioned for a different card, all LEDs turn off and a minor equipment mismatch alarm appears on the CTC Alarms tab.
- If the red FAIL LED is on continuously or the LEDs behave erratically, the card is not installed.

If any of conditions are present, remove the card and repeat Steps 4 to 7. If the card does not boot up properly the second time, it might be defective. Contact your next level of support.

Step 9 Repeat Steps 5 through 8 until all the DWDM cards are installed in the node.

Step 10 If an OPT-PRE card (or OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-EDFA-17, or OPT-EDFA-24 card in OPT-PRE card mode) is installed, complete one of the following steps for each OPT-PRE card based on the Cisco Transport Planner shelf layout. If an OPT-PRE is not installed, you have completed this procedure.

- If the Cisco Transport Planner shelf layout does not include DCUs, install a patchcord and 4-dB attenuator with a tolerance of +/–1 dB between the OPT-PRE or OPT-AMP-L DC TX and RX ports for each OPT-PRE or OPT-AMP-L card installed in the shelf.
- If the shelf layout includes DCUs, complete the "NTP-G31 Install the DWDM Dispersion Compensating Units" procedure on page 14-68 for each side of the shelf that requires a DCU.

Stop. You have completed this procedure.

DLP-G348 Use the Cisco Transport Planner Shelf Layout Report

Purpose	This task describes how to use the Cisco Transport Planner shelf layout report to install cards in a DWDM node.
Tools/Equipment	None
Prerequisite Procedures	NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 Display the Cisco Transport Planner shelf layout report for your site. The report can be viewed in Cisco Transport Planner. It can also be viewed as a JPEG graphic. Refer to the *Cisco Transport Planner DWDM Operations Guide* for information about generating shelf layout reports.

Step 2 Review the following installation information:

- Rack—Indicates the rack in the node where the cards must be installed.
- Shelf—Indicates the shelf in the rack where the cards must be installed. Shelf options include:
  - Flex Shelf—The ONS 15216 FlexLayer mechanical shelf houses Y-cable modules. Flex shelf positions are numbered 1 to 4 from left to right.
  - DCU Shelf—The Cisco ONS 15216 dispersion compensation shelf assembly houses DCUs. DCU positions are numbered 1 to 2 from left to right.
  - Shelf-ANSI-*n* or Shelf-ETSI-*n*—The ONS 15454 shelf assembly houses ONS 15454 common, DWDM, and client cards. Positions in this type of shelf are numbered 1 to 17 from left to right. Multiple shelves might appear.
- Slot—Indicates the slot in the specific shelf where the cards must be installed:
  - Unit Name (Product ID)— Identifies the card by its Product ID.
  - Unit Description—Identifies the card by its name.
- Unit Side—Identifies the side of the node that the specific card is serving: A, B, C, D, E, F, G, or H.
- Unit Plug-in Modules—Identifies the type and number of PPMs that will be used with specific TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards.

Step 3 Return to your originating procedure (NTP).

NTP-G31 Install the DWDM Dispersion Compensating Units

Purpose	This procedure describes how to install the DCUs for DWDM shelves.
Tools/Equipment	DCUs
Prerequisite Procedures	"NTP-G15 Install the Common Control Cards" section on page 3-34 "NTP-G14 Install DWDM Equipment" in the *Cisco ONS 15454 Hardware Installation Guide* NTP-G30 Install the DWDM Cards, page 14-64 NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning **Class I (CDRH) and Class 1M (IEC) laser products.** Statement 1055

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Caution Always use the supplied ESD wristband when working with a powered ONS 15454. For detailed instructions on how to wear the ESD wristband, refer to the *Electrostatic Discharge and Grounding Guide for Cisco CPT and Cisco ONS Platforms*.

Note For US installations, complies with the US Federal Drug Administration Code of Federal Regulations Title 21, Sections 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.

Step 1 Remove the DCU from its packaging, then remove the protective caps from the connectors. (Safety caps are typically yellow.)

Step 2 Use both hands to push the DCU all the way into the chassis until the connector spring lock on the right side of the module clicks into place.

Step 3 Open the cover with the laser warning on the connector adapter and then connect the cable connector.

Note The Side A DCU is commonly installed on the left side and the Side B DCU is commonly installed on the right side.

Note Double-check the placement of the DCU card(s) with your Cisco Transport Planner shelf layout. If you install the wrong DCU in a slot, remove the DCU and install the correct one.

Stop. You have completed this procedure.

NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards

Purpose	This procedure describes how to install the ONS 15454 TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP cards.
Tools/Equipment	TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, TXP_MR_10EX_C, TXP_MR_2.5G, TXPP_MR_2.5G, 40E-TXP-C, 40ME-TXP-C, MXP_2.5G_10G, MXPP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_2.5G_10EX_C, MXP_MR_2.5G, MXP_MR_10DME_C, MXP_MR_10DME_L, MXP_MR_10DMEX_C, 40G-MXP-C, 40E-MXP-C, 40ME-MXP-C, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP cards (as applicable)
Prerequisite Procedures	"NTP-G15 Install the Common Control Cards" section on page 3-34 "NTP-G14 Install DWDM Equipment" in the *Cisco ONS 15454 Hardware Installation Guide* NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself.** Statement 94

Warning **Class 1 laser product.** Statement 1008

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Warning **Class I (CDRH) and Class 1M (IEC) laser products.** Statement 1055

Caution Always use the supplied ESD wristband when working with a powered ONS 15454. For detailed instructions on how to wear the ESD wristband, refer to the *Electrostatic Discharge and Grounding Guide for Cisco CPT and Cisco ONS Platforms*.

Caution A fan-tray assembly (15454E-CC-FTA for the ETSI shelf or 15454-CC-FTA for the ANSI shelf) must be installed in a shelf where a GE, ADM-10G, or OTU2_XP card is installed.

Note For US installations, complies with the US Federal Drug Administration Code of Federal Regulations Title 21, Sections 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.

Note If protective clips are installed on the backplane connectors of the cards, remove the clips before installing the cards.

Note If you install a card incorrectly, the FAIL LED flashes continuously.

Step 1 Display the Cisco Transport Planner shelf layout (see Table 14-1 on page 14-4) for the node where you will install the card.

Step 2 Remove the card from its packaging, then remove the protective clips from the backplane connectors.

Step 3 Open the card latches/ejectors.

Step 4 Use the latches/ejectors to firmly slide the card along the guide rails until the card plugs into the receptacle at the back of the slot designated by the Cisco Transport Planner shelf layout.

Step 5 Verify that the card is inserted correctly and simultaneously close the latches/ejectors on the card.

Note It is possible to close the latches and ejectors when the card is not completely plugged into the backplane. Ensure that you cannot insert the card any further.

Note If you install the card in the wrong slot, CTC will raise a MEA (EQPT) alarm. To clear this alarm, open the latches, slide the card out, then insert it in the correct slot.

After you install the card, the FAIL, ACT, and SF LEDs will go through a sequence of activities. They will turn on, turn off, and blink at different points. After approximately 2 to 3 minutes, the ACT or ACT/STBY LED turns on. The SF LED might persist until all card ports connect to their far-end counterparts and a signal is present.

Note Until a card is provisioned, the card is in the standby condition and the ACT/STBY LED remains amber in color.

Step 6 If the card does not boot up properly or the LEDs do not progress through the activities described in Step 5, check the following:

- When a physical card type does not match the type of card provisioned for that slot in CTC, the card might not boot and CTC will show a MEA (EQPT) alarm. If the card does not boot, open CTC and ensure that the slot is not provisioned for a different card type before assuming that the card is faulty.

- If the red FAIL LED does not turn on, check the power.
- If you insert a card into a slot provisioned for a different card, all LEDs turn off.
- If the red FAIL LED is on continuously or the LEDs behave erratically, the card is not installed properly.

If any of these conditions are present, remove the card and repeat Steps 3 to 5. If the card does not boot up properly the second time, contact your next level of support.

Step 7 If the card requires a Small Form-factor Pluggable (SFP or XFP) connector, complete one of the following tasks:

- DLP-G63 Install an SFP or XFP, page 14-72—Complete this task to install the physical SFP or XFP into the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card.
- DLP-G273 Preprovision an SFP or XFP Slot, page 14-73—(Optional) Complete this task if you do not have the physical SFP or XFP and need to preprovision the SFP or XFP slot.

Note SFPs/XFPs are hot-swappable input/output devices that plug into a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, OTU2_XP, or line card port to link the port with the fiber-optic network. For more information, refer to the *Hardware Specifications* and the *Installing GBIC, SFP, SFP+, and XFP Optics Modules in ONS Platforms* documents.

Note PPM provisioning determines how the SFPs and XFPs are used in CTC. PPM provisioning procedures are provided in Chapter 11, "Provision Transponder and Muxponder Cards."

Step 8 If you need to remove an SFP or XFP, complete the "DLP-G64 Remove an SFP or XFP" task on page 14-74.

Note You will provision the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP cards after you complete all node turn-up procedures. TXP and MXP provisioning procedures are provided in Chapter 11, "Provision Transponder and Muxponder Cards."

Note Until a card is provisioned, the card is in the standby condition and the ACT/STBY LED remains amber in color.

Stop. You have completed this procedure.

DLP-G63 Install an SFP or XFP

Purpose	This task installs SFPs and XFPs into TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP cards. SFPs and XFPs provide a fiber interface to the card.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning **The intrabuilding ports of the ONS 15454 are suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding ports of the ONS 15454 must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intrabuilding interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE, Issue 4), and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection while connecting these interfaces metallically to the OSP wiring.**

Warning **The intrabuilding ports of the ONS 15454 are suitable for connection only to shielded intrabuilding cabling, grounded at both ends.**

Note In case of a full C-band tunable XFP, it is mandatory to use optical cables that are fully compliant with NEBS Telcordia GR-326-CORE, Issue 3 recommendation. The Cisco patchcord indicated by the Cisco Transport Planner (CTP) tool is fully compliant with NEBS Telcordia GR-326-CORE, Issue 3 recommendation.

Note The CC-FTA fan tray assembly must be installed in a shelf where CWDM and DWDM SFPs or XFPs are used.

Note SFPs and XFPs are hot-swappable I/O devices that plug into a TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP port to link the port with the fiber-optic network. For more information, see to the *Hardware Specifications* and the *Installing GBIC, SFP, SFP+, and XFP Optics Modules in ONS Platforms* documents.

Note If you have installed a fan tray lower than CC-FTA on the MSTP unit, you must have the TXP_MR_10E transponder card (only if you have installed ONS-XC-10G-L2 XFP on the TXP_MR_10E card) installed in Slot 5, 6, 12, or 13. This limitation does not exist for fan-tray versions higher than CC-FTA.

Note SFPs and XFPs are generically called PPMs in CTC. After installing multirate SFPs or XFPs, multirate PPMs must be provisioned in CTC. To complete the provisioning of the pluggable port, complete the "DLP-G277 Provision a Multirate PPM" task on page 11-152.

Step 1 Verify that the SFP or XFP is correct for your network and TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card (see Chapter 11, "Provision Transponder and Muxponder Cards". Ensure that you are installing compatible SFPs or XFPs, for example, SX to SX or LX/LH to LX/LH.

Step 2 Install the SFP or XFP:

- For a mylar tab SFP or XFP— Slide the SFP or XFP into the slot.
- For an actuator/button SFP or XFP— Slide the SFP or XFP all the way into the slot until you hear a click.
- For a bail clasp SFP or XFP— Latch (flip upwards) the bail clasp before inserting the SFP or XFP into the slot and then slide it into the slot.

Note SFP and XFPs are keyed to prevent incorrect installation.

Do not remove the protective caps from the SFP or XFP until you are ready to attach the network fiber-optic cable.

Step 3 Return to your originating procedure (NTP).

DLP-G273 Preprovision an SFP or XFP Slot

Purpose	This task preprovisions SFPs and XFPs, which connect fiber to TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note SFPs and XFPs are generically called PPMs in CTC. After installing multirate SFPs or XFPs, multirate PPMs must be provisioned in CTC.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card where you want to provision SFPs or XFPs.

Step 2 Click the **Provisioning > Pluggable Port Modules** tabs.

Step 3 In the Pluggable Port Modules area, click **Create**. The Create PPM dialog box appears.

Step 4 In the Create PPM dialog box, complete the following:

- PPM—Choose the PPM slot number where the SFP or XFP is installed from the drop-down list.
- PPM Type—Choose the number of ports supported by your SFP or XFP from the drop-down list. The drop-down list displays the number of PPMs that are available for provisioning. If only one port is supported, **PPM (1 port)** is the only option.

Step 5 Click **OK**. The newly created port appears in the Pluggable Port Modules pane. The row in the Pluggable Port Modules pane turns light blue. The Actual Equipment Type column remains blank until the actual SFP or XFP is installed. After the SFP or XFP is installed, the row in the pane turns white and the Actual Equipment Type column shows the equipment name.

Step 6 Verify that the PPM appears in the list in the Pluggable Port Modules pane. If it does not, repeat Steps 3 through 5.

Step 7 Repeat the task to provision a second PPM, if needed. If not, continue with Step 8.

Step 8 Click **OK**.

Step 9 Return to your originating procedure (NTP).

DLP-G64 Remove an SFP or XFP

Purpose	This task removes SFPs and XFPs from TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Note This task removes the SFP or XFP hardware. To delete the provisioning for an SFP or XFP, see the "DLP-G280 Delete a PPM" procedure on page 11-161.

Step 1 If a fiber is connected, disconnect the network fiber cable from the SFP or XFP LC-type connector.

Step 2 Release the SFP or XFP from the slot by performing one of the following actions (depending on which latch is on the SFP or XFP):

- For a mylar tab SFP or XFP— Pull out the mylar tab.
- For an actuator/button SFP or XFP— Press the actuator/button.
- For a bail clasp SFP or XFP— Unlatch the bail clasp and swing it downward.

Step 3 Slide the SFP or XFP out of the slot.

Step 4 Return to your originating procedure (NTP).

Note Removing an SFP from the client ports of a Y-cable protection group card causes an IMPROPRMVL (PPM) alarm. The working port raises the CR,IMPROPRMVL,SA alarm and the protected port raises the MN,IMPROPRMVL,NSA alarm. The severity on the client ports is changed according to the protection switch state.

NTP-G123 Install the Filler Cards

Purpose	This procedure explains how to install the filler cards (blank faceplates). The filler card aids in maintaining proper air flow and electro-magnetic interference (EMI) requirements.
Tools/Equipment	Filler cards
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
	NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68
	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Warning **Blank faceplates (filler panels) serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards and faceplates are in place.** Statement 156

Caution Always use the supplied ESD wristband when working with a powered ONS 15454. For detailed instructions on how to wear the ESD wristband, refer to the *Electrostatic Discharge and Grounding Guide for Cisco CPT and Cisco ONS Platforms*.

Caution In an ONS 15454 shelf assembly, a filler card (Cisco P/N 15454-FILLER) can be installed in any unused traffic or AIC-I card slots (Slots 1 through 6, 9, and 12 through 17). These cards are detected by CTC in Software Release 6.0 and later.

Note In an ONS 15454 M6 shelf assembly, the line card fillers (15454-M-FILLER) can be installed in any unused line card slots (Slots 1 through 7), and a control card filler (15454-MT-FILLER) can be installed in any unused control card slot (Slot 1 or Slot 8). In an ONS 15454 M2 shelf assembly, the line card filler (15454-M-FILLER) can be installed in any unused line card slots (Slot 2 or Slot 3). CTC does not detect the filler card in Release 9.2; however, CTC may detect it in later software releases.

Step 1 Open the card ejectors.

Step 2 Slide the card along the guide rails into the correct slot.

Step 3 Close the ejectors.

Step 4 Repeat for any remaining unused card slots.

Stop. You have completed this procedure.

NTP-G239 Add and Delete Passive Units

Purpose	This procedure explains how to add or delete passive units on a DWDM node.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 node on the network.

Step 2 Complete the "DLP-G543 Add Passive Units Manually" task on page 14-76 to manually preprovision a passive unit.

Step 3 Complete the "DLP-G544 Delete a Passive Unit" task on page 14-77 to delete a passive unit.

Stop. You have completed this procedure.

DLP-G543 Add Passive Units Manually

Purpose	This task preprovisions passive units (patch panels and DCUs) in CTC. Preprovisioning of the passive units is normally performed when you complete the"NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" section on page 14-47. Use this task if you need to manually preprovision a passive unit. All slot preprovisioning must be based upon the Cisco Transport Planner shelf layout prepared for your site.
Tools/Equipment	Cisco Transport Planner shelf layout table or JPG file.
Prerequisite Procedures	DLP-G46 Log into CTC NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In the node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Passive Cards** tabs.

Step 2 Click **Create**. The Create Passive Card dialog box appears.

Step 3 Choose the passive unit from the Card Type drop-down list and click **OK**.

The passive unit is installed in the first available slot in the rack.

Note You can also add a passive unit in the multishelf view by right-clicking the slot inside the rack. Refer to the NTP-G146 Add a Rack, Passive Unit, or Shelf to a Multishelf Node procedure.

Note If you need to view the details of the passive units that have been installed on a node, click the Inventory tab.

Step 4 Return to your originating procedure (NTP).

DLP-G544 Delete a Passive Unit

Purpose	This task deletes a passive unit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In the node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Passive Cards** tabs.

Step 2 Click the passive unit you want to delete.

Step 3 Click **Delete**, then click **Yes**.

Note You can also delete a passive unit in the multi-shelf view. Refer to NTP-G147 Delete a Passive Unit, Shelf, or Rack from a Multishelf Node procedure.

Step 4 Return to your originating procedure (NTP).

NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs

Purpose	This procedure attaches fiber-optic cables on the DWDM cards and DCUs.
Tools/Equipment	Fiber-optic cables Cisco Transport Planner Internal Connections Report
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64 NTP-G31 Install the DWDM Dispersion Compensating Units, page 14-68 (as applicable) NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Warning **Class I (CDRH) and Class 1M (IEC) laser products.** Statement 1055

Caution To comply with the Telcordia GR-1089 NEBS, Issue 5 standard, do not use optical fibers with exposed metallic ferrules. Exposed metallic ferrules may result in ESD damage to the system and can be service affecting.

Note For US installations, complies with the US Federal Drug Administration Code of Federal Regulations Title 21, Sections 1040.10 and 1040.11, except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001.

Note In this procedure, you will generally connect fibers in an Side B-to-Side A or Side B-to-Side B pattern only. "Side A" refers to cards and ports in Slots 1 through 8. "Side B" refers to cards and ports installed in Slots 10 through 17.

Note You will install fiber-optic cables on TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP cards later in the chapter during the "NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes" procedure on page 14-82.

Step 1 Refer to the "DLP-G349 Use the Cisco Transport Planner Internal Connections Report" task on page 14-80 to install cables to the DWDM cards.

Step 2 Verify that the appropriate fiber optic cables are available to complete the connections shown in the Cisco Transport Planner Internal Connections report:

a. Count the number of connections listed in the Internal Connections and verify that you have the same number of cables.

b. Measure the distance between Origination Position and Destination Position for each connection, then verify that the fiber lengths will fit each one.

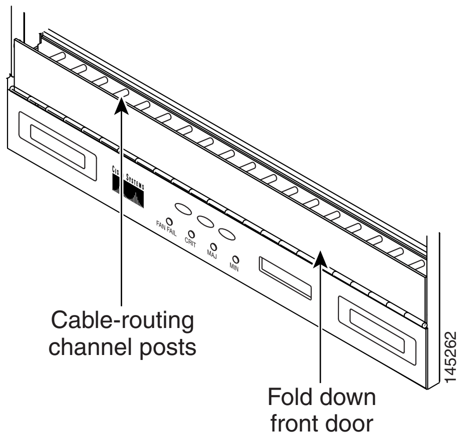
Step 3 Complete the for all fiber connections, even new fiber. Dust particles can degrade performance. Put caps on any fiber connectors that are not used.

Step 4 On the front of the fiber-storage tray (usually installed below the node you are fibering), push the tabs on the left and right sides inward to release the lock on the tray.

Step 5 Pull the fiber-storage tray away from the shelf until it is fully opened.

Step 6 Open the fold-down door that at the bottom of the shelf assembly to expose the cable-routing channel (Figure 14-8).

Figure 14-8 Managing Cables on the Front Panel



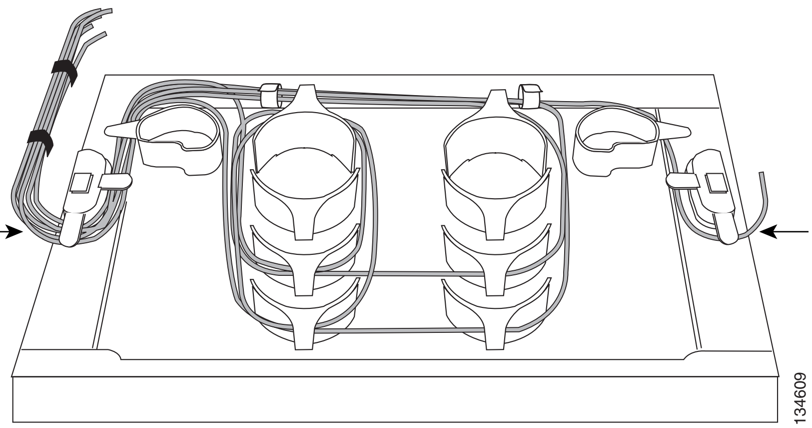
Step 7 Using the Cisco Transport Planner Internal Connections Report, connect one end of the fiber cable plug into the Origination Position.

Step 8 Route the fiber cable on the card faceplate through the fiber clip on the faceplate, if provided. (Fiber clips are factory-attached to the faceplates of 32MUX-O, 32DMX, 32DMX-O, OSCM, OSC-CSM, OPT-PRE, OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 cards.)

Step 9 Route the fiber cable through the cable-routing channel and cutout on the appropriate side of the shelf assembly, as necessary.

Step 10 As needed, route slack fiber-optic cable around the round cable retainers in the fiber-storage tray (Figure 14-9).

Figure 14-9 Fiber-Storage Tray



Caution When you close the fiber-storage tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the fiber-storage tray, make sure that adequate cable slack remains.

Step 11 Route the fiber cable out either side of the fiber-storage tray as necessary.

Step 12 Plug the other end of the cable into the Destination position.

Note Cards display an SF LED after the OSC terminations are created (see the "NTP-G38 Provision OSC Terminations" procedure on page 14-126) if transmit and receive fibers are not connected correctly. For example, an RX port is connected to another RX port or a TX port is connected to another TX port.

Step 13 Repeat Steps 4 through 12 until you have connected the intra-shelf fibers according to the Cisco Transport Planner Internal Connections report.

Step 14 To close the fiber-storage tray, push the tray back toward the rack until it locks into place.

Stop. You have completed this procedure.

DLP-G349 Use the Cisco Transport Planner Internal Connections Report

Purpose	This task describes how to use the Cisco Transport Planner Internal Connections report to install cables on the DWDM cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 Display the Cisco Transport Planner Internal Connections report for the node that you are provisioning. The Internal Connections report is presented in two views, a patchcord installation view and a software provisioning view. The **Patchcord installation view** lists all the patchcord connections that the installer has to mechanically cable within the site between the different ports of the DWDM cards. The **SW Provisioning view** contains all the connections to be manually set or removed via CTC with respect to the default connections that are automatically generated by the system software running on the node.

The tables identify the patchcords that you must cable by their endpoints. Starting from the left side of report, Position identifies the fiber origination point. The location shown in the next Position to right is the destination point for the fiber connection. The patchcord endpoints are identified by site, assembly shelf, slot, and port number. Information provided by the Internal Connections Software report includes:

- Name—Displays the name of the site. On the SW provisioning view, this column indicates whether the connection was automatically set, or should be manually set or removed via CTC.
- Position—The cable origination in the format is Rack.Shelf.Slot. For example, Rack#1.Shelf Assembly 1.Slot 2 refers to Slot 2 in shelf assembly 1(DWDM) shelf of Rack 1. Refer to the Cisco Transport Planner Site Dialog box for rack and shelf names and locations.
- Unit—The ONS 15454 DWDM card (unit) that is installed in the Position's slot. This is where the patchcord originates.
- Port Number—The port number where the patchcord connection originates.
- Port ID—(Software provisioning view only) The port identifier shown in TL1 for the Position-1 connection.
- Port Label—The name of the physical port printed on the DWDM card's front panel and shown in CTC card view.
- Attenuator—If attenuation is required, the product ID (PID) of the bulk fixed attenuator is shown. "Att-Lpbk-4dB" indicates that the DC TX and DC RX ports on an OPT-PRE (or OPT-AMP-L, OPT-AMP-17-C, or OPT-AMP-C card provisioned in OPT-PRE card mode) card are to be connected with an attenuated loopback that is shipped with the OPT-PRE card. This parameter also indicates when an internal attenuator must be placed between the OPT-PRE DC-TX and DC-RX ports on the when a DCU is equipped.

Note If the Attenuator field is blank, no attenuation is needed.

- Position—The cable termination in the format is Rack.Shelf.Slot.
- Unit—The ONS 15454 DWDM card that is installed in the Position's slot. This is where the cabling terminates.
- Port—The port number where the patchcord connection terminates.
- Port ID—(Software provisioning view only) The port identifier shown in TL1 for the Position-2 connection.
- Port Label—The name of the physical port printed on the DWDM card's front panel and shown in CTC card view.
- P/F—Indicates whether you must create the connection manually in CTC. A Yes appearing in this column means that you must create the connection manually.

Caution Failure to create the required manual connections will prevent the node from turning up properly

Step 2 Return to your originating procedure (NTP).

NTP-G140 Install Fiber-Optic Cables Between Terminal, Hub, or ROADM Nodes

Purpose	This procedure routes fiber-optic cables from the DWDM optical cards in a terminal, hub, or ROADM node to the patch panel, and from the patch panel to TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G cards.
Tools/Equipment	• See Step 1 for a list of equipment specific to each node type. • All node types require fiber-optic cables, terminated with a single LC-type connector on each end. • Cisco Transport Planner Internal Connections Report
Prerequisite Procedures	• In the *Cisco ONS 15454 Hardware Installation Guide* – "DLP-G28 Install the Fiber Patch-Panel Tray" – "DLP-G29 Install the Fiber-Storage Tray" • NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78 • DLP-G348 Use the Cisco Transport Planner Shelf Layout Report, page 14-67
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Determine which type of node you are fibering.

The following node types require the listed equipment. The cards and patch panels should already be installed before you begin this procedure.

- Terminal node:
  - One of 32DMX-O card and 32MUX-O card, and one standard or deep patch panel tray
  - One of 32WSS card and 32DMX or 32DMX-O card, and one standard or deep patch panel tray
  - One of 32WSS-L card and 32DMX-L card, and one standard or deep patch panel tray
  - One of 40-WSS-C or 40-WSS-CE card and 40-DMX-C or 40-DMX-CE card, and one standard or deep patch panel tray
  - One of 40-MUX-C card and 40-DMX-C or 40-DMX-CE card, and one standard or deep patch panel tray
  - One 40-SMR1-C card and one 15216-MD-40-ODD,15216-EF-40-ODD, or 15216-MD-48-ODD (ONS 15216 40 or 48-channel mux/demux) patch panel
  - One 40-SMR2-C card and one 15216-MD-40-ODD,15216-EF-40-ODD, or 15216-MD-48-ODD (ONS 15216 40 or 48-channel mux/demux) patch panel

- One 80-WXC-C card, one 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit, and one 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN unit, and one 15216-MD-ID-50 or 15216-MD-48-CM unit

- Hub node:
  - Two of 32MUX-O cards and 32DMX-O or 32DMX cards, and two standard or deep patch panel trays
  - Two of 32WSS cards and 32DMX or 32DMX-O cards, and two standard or deep patch panel trays
  - Two of 32WSS-L cards and 32DMX-L cards, and two standard or deep patch panel trays
  - Two of 40-WSS-C or 40-WSS-CE cards and 40-DMX-C or 40DMX-CE cards, and two standard or deep patch panel trays
  - Two 40-SMR1-C cards and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panels
  - Two 40-SMR2-C cards and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panels
- ROADM node:
  - Two 32WSS cards, optionally, two 32DMX or 32DMX-O cards, and two standard or deep patch panel trays
  - Two 32WSS-L cards, optionally, two 32DMX-L cards, and two standard or deep patch panel trays
  - Two 40-WSS-C or 40-WSS-CE cards, optionally, two 40-DMX-C or 40-DMX-CE cards, and two standard or deep patch panel trays
  - Two 40-SMR1-C cards and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panels
  - Two 40-SMR2-C cards and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panels
  - Two 80-WXC-C cards and two 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD units and 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN units and two 15216-MD-ID-50 or 15216-MD-48-CM units
- Expanded ROADM node:
  - Two of 40-WSS-C/40-WSS-CE cards and 40-DMX-C/40-DMX-CE cards, and two 40-channel patch panel trays, preinstalled with MPO-LC cables

Note If you are using standard patch panels, you will also need eight multifiber push-on (MPO) cables per standard patch panel. MPO cables are fiber-optic cables terminated on one end with one MPO connector and with eight LC-type connectors on the other end. Deep patch panel trays come preinstalled with MPO cables.

Step 2 On the front of the patch panel tray, push the tabs on the left and right sides inward to release the lock on the tray.

Step 3 Pull the patch panel tray away from the shelf until it is fully opened.

Note The red latch inside the patch panel tray at the top left corner will automatically click and lock the tray in the open position when you have fully opened the tray.

Step 4 Depending on the type of patch panel tray you are using:

- Standard patch panel tray:
  - Complete the "DLP-G315 Install Fiber-Optic Cables From the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Standard Patch Panel Tray" task on page 14-85.
  - Complete the "DLP-G316 Install Fiber-Optic Cables from TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP Cards to the Standard Patch Panel Tray" task on page 14-89.
- Deep patch panel tray:
  - Complete the "DLP-G356 Install Fiber-Optic Cables from the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Deep Patch Panel Tray" task on page 14-90.
  - Complete the "DLP-G357 Install Fiber-Optic Cables from the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP Cards to the Deep Patch Panel Tray or 40-Channel Patch Panel Tray" task on page 14-97.
- 40-channel patch panel tray:
  - As needed, complete the "DLP-G427 Reroute Fiber-Optic Cables in the 40-Channel Patch Panel Tray" task on page 14-93 to route the MPO cables out of the right side of the tray so they can be easily connected to cards installed on the right side of the shelf (Slots 12 through 17).
  - Complete the "DLP-G428 Install Fiber-Optic Cables from the 40-WSS-C/40-WSS-CE and 40-DMX-C/40-DMX-CE Cards in an Expanded ROADM, Terminal, or Hub Node to the 40-Channel Patch Panel Tray" task on page 14-95.
- 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel:
  - Complete the "DLP-G530 Install Fiber-Optic Cables from the 40-SMR1-C, 40-SMR2-C, or 80-WXC-C Cards in a ROADM, Terminal, or Hub Node to the 15216-MD-40 or 15216-MD-48 Patch Panel Tray" task on page 14-99

Step 5 To close the patch panel tray, unlock it by pressing the red latch in the top left corner, and then push the tray back toward the rack until it locks into place.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Stop. You have completed this procedure.

DLP-G315 Install Fiber-Optic Cables From the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Standard Patch Panel Tray

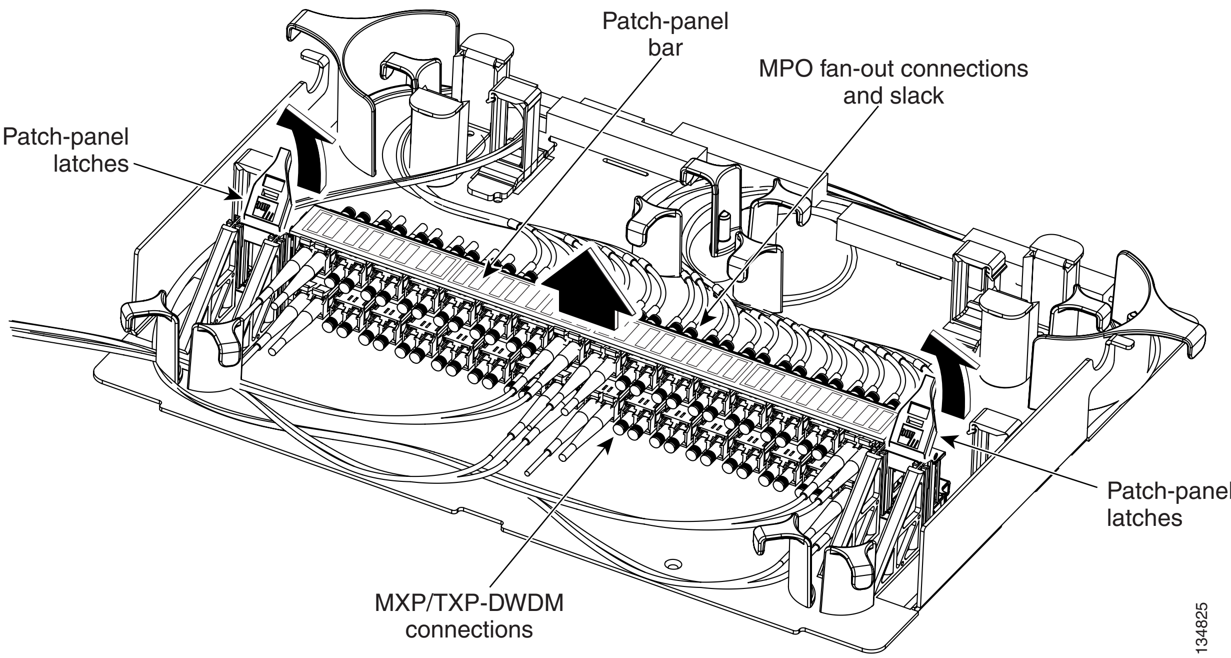
Purpose	This task describes how to route fiber-optic cables from 32MUX-O, 32WSS, 32DMX-O, and 32DMX cards in a terminal, hub, or ROADM node to the standard patch panel.
Tools/Equipment	The following node types require the following equipment. The cards and patch panels should already be installed before you begin this procedure. Terminal node: • One 32DMX-O card • One 32MUX-O card • One standard patch panel tray • Eight fiber-optic MPO cables: each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors Hub node: • Two 32DMX-O cards • Two 32MUX-O cards • Two standard patch panel trays • Sixteen fiber-optic MPO cables: each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors ROADM node: • Two 32WSS cards • Two 32DMX cards • Two standard patch panel trays • Sixteen fiber-optic MPO cables: each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors
Prerequisite Procedures	NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note For a ROADM or hub node, two patch panels will be used, one for Side B side and one for Side A. The Side B 32WSS/32DMX card will connect to the Side B patch panel. The Side A 32WSS/32DMX card will connect to the Side A patch panel.

Step 1 Choose either the Side B or Side A to cable the 32MUX-O and 32DMX-O cards (or the 32WSS and 32DMX cards for a ROADM node).

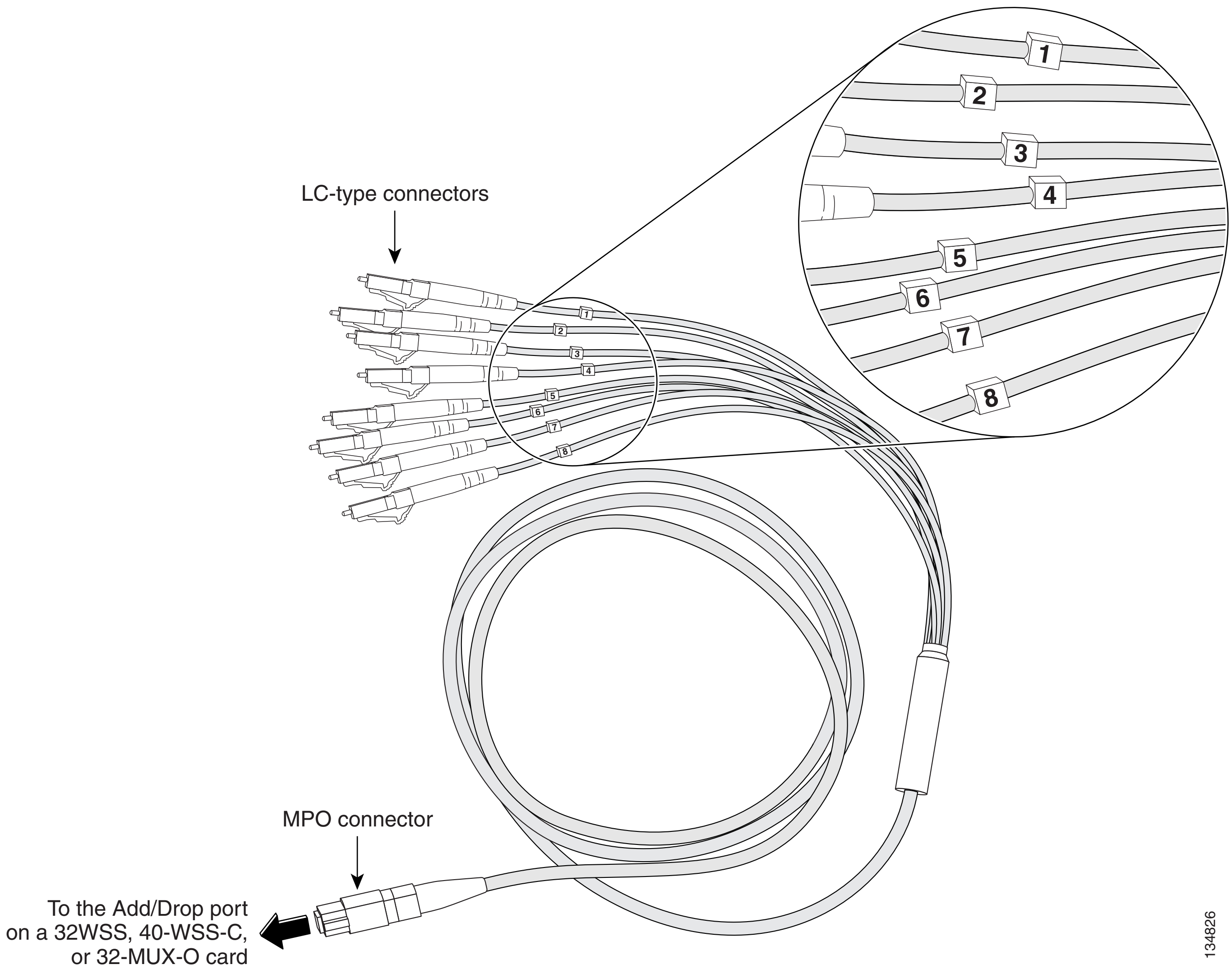
Step 2 On the patch panel, pull up firmly on the two latches and use them to slide the patch panel up until it snaps in place above the tray (Figure 14-10).

Figure 14-10 Using the Patch Panel Latches to Slide the Patch Panel Away from the Tray



Step 3 At the 32WSS or 32MUX-O card in the node, plug the MPO connector of an MPO cable (Figure 14-11) into the top Add RX (30.3–36.6) port of the card. If you are connecting a subsequent MPO cable, plug the MPO connector into the first vacant Add RX card port below the last MPO cable that was installed.

Figure 14-11 MPO Cable



Step 4 Route the MPO cable slack through the patch panel tray as necessary.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Step 5 While facing the front of the patch panel, at the rear side of the patch panel, plug the eight LC-connector fan-out cables on the MPO cable into their corresponding connectors on the bottom row of the patch panel. You should plug the fan-out cables from left to right (as you face the patch panel), following the numbers tagged (1 through 8) on the cables.

Figure 14-12 shows the patch panel connectors from the rear of the patch panel tray. Figure 14-13 shows the assigned wavelengths for each port on the patch panel, as indicated at the top of the patch panel bar. The numbers on the patch panel bar correspond to a wavelength on the ITU grid.

Figure 14-12 Rear View of the Patch Panel

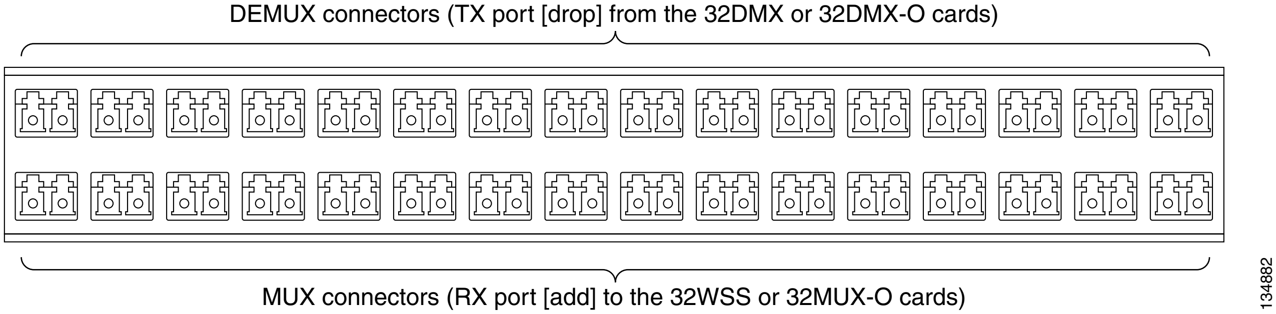
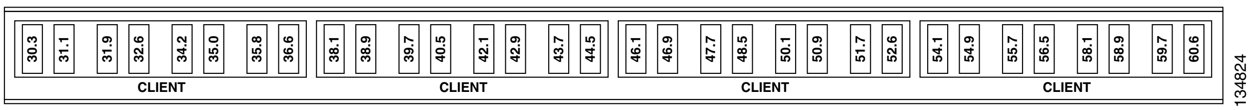


Figure 14-13 Top View of the Patch Panel Bar



Step 6 As necessary, repeat Steps 3 through 5 for the remaining three Add RX ports on the 32WSS or 32MUX-O card, until all 32 LC connectors on the bottom row of the rear of the patch panel are connected.

Step 7 At the adjacent 32DMX or 32DMX-O card in the same side of the shelf, plug the MPO connector of an MPO cable into the top Drop TX (30.3–36.6) port of the 32DMX or 32DMX-O card. If you are connecting a subsequent MPO cable, plug the MPO connector into the first vacant Drop TX card port below the last MPO cable that was installed.

Step 8 Route the MPO cable slack through the patch panel tray as necessary.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Step 9 While facing the front of the patch panel, at the rear of the patch panel, plug the eight LC-connector fan-out cables on the MPO cable into their corresponding connectors on the top row of the patch panel. You should plug the fan-out cables from left to right (as you face the patch panel), following the numbers tagged (1 through 8) on the cables.

Step 10 As necessary, repeat Steps 7 through 9 for the remaining three Drop TX ports on the 32DMX or DMX-O card, until all 32 LC connectors on the top row of the rear of the patch panel are connected.

Step 11 For a hub or ROADM node, repeat Steps 2 through 10 to cable the other side of the shelf to the second patch panel. For a terminal node, go to Step 12.

Step 12 Return to your originating procedure (NTP).

DLP-G316 Install Fiber-Optic Cables from TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP Cards to the Standard Patch Panel Tray

Purpose	This task describes how to route fiber-optic cables from the patch panel to TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP cards.
Tools/Equipment	TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card(s) Fiber-optic cable(s)
Prerequisite Procedures	NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 At the appropriate TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card, plug one end of a fiber-optic cable into the TX port of the DWDM adapter.

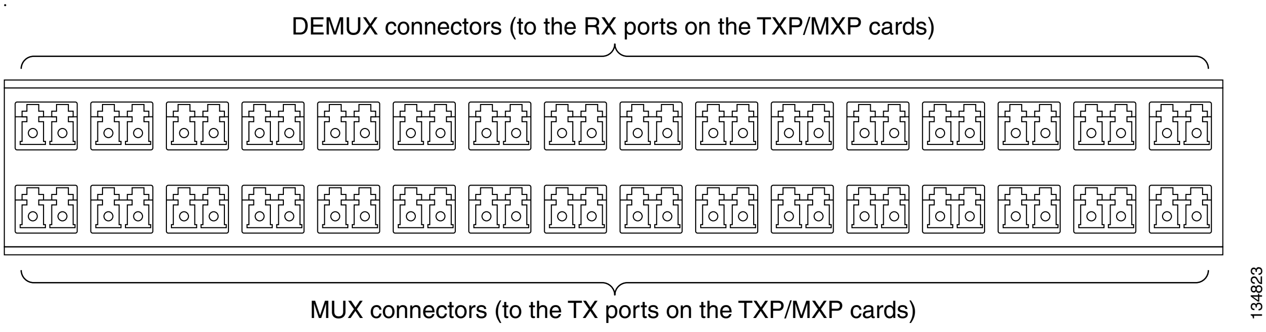
Step 2 As needed, route slack fiber-optic cable around the round cable retainers in the fiber-storage tray.

Caution When you close the fiber-storage tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the fiber-storage tray, make sure that adequate cable slack remains.

Step 3 On the DWDM (front) side of the patch panel, plug the other end of the cable into the connector on the bottom row that corresponds to the wavelength to which the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP port is tuned. (See Figure 14-13 on page 14-88 for a view of the wavelengths assigned to the patch panel connectors).

Figure 14-14 shows the patch panel connectors from the front of the patch panel tray.

Figure 14-14 Front View of the Patch Panel



Step 4 Plug one end of a fiber-optic cable into the RX port of the DWDM adapter on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card.

Step 5 On the DWDM (front) side of the patch panel, plug the other end of the cable into the connector on the top row that corresponds to the wavelength to which the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card is tuned.

Step 6 Repeat Steps 1 through 5 for all of the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP cards that you want to connect to this patch panel.

Step 7 Return to your originating procedure (NTP).

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DLP-G356 Install Fiber-Optic Cables from the 32WSS/32DMX and 32MUX-O/32DMX-O Cards to the Deep Patch Panel Tray

Purpose	This task describes how to route fiber-optic cables from 32MUX-O, 32WSS, 32DMX-O, and 32DMX cards in a terminal, hub, or ROADM node to the deep patch panel tray.
Tools/Equipment	The following node types require the following equipment. The cards and patch panels should already be installed before you begin this procedure. For terminal nodes, one of the following card sets: • One 32MUX-O card and one 32DMX-O or 32DMX card • One 32WSS card and one 32DMX or 32DMX-O card • One 32WSS-L cards and one 32DMX-L card Plus one deep patch panel tray, preinstalled with MPO cables (each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors) For hub nodes, one of the following card sets: • Two 32MUX-O cards and two 32DMX-O or 32DMX cards • Two 32WSS cards and two 32DMX or 32DMX-O cards • Two 32WSS-L cards and two 32DMX-L cards Plus two deep patch panel trays, preinstalled with MPO cables (each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors) For ROADM nodes, one of the following card sets: • Two 32WSS cards and two 32DMX or 32DMX-O cards • Two 32WSS-L cards and two 32DMX-L cards Plus two deep patch panel trays, preinstalled with MPO cables (each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors)
Prerequisite Procedures	NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

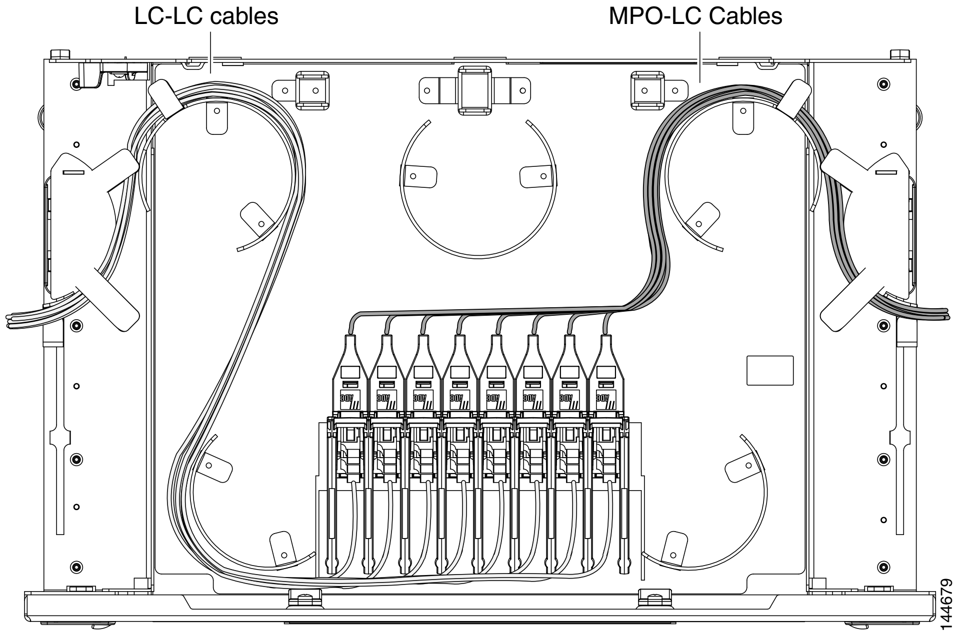
Note For a ROADM or hub node, two patch panels will be used, one for Side A (Slots 1 through 6) and one for Side B (Slots 12 through 17). The Side B 32WSS/32DMX card will connect to the Side B patch panel. The Side A 32WSS/32DMX card will connect to the Side A patch panel. The MPO cables in the patch panel are preinstalled and routed out of the right side of the patch panel tray.

Step 1 Choose either Side A or Side B of the shelf to cable the 32MUX-O and 32DMX-O cards (or the 32WSS and 32DMX cards for a ROADM node).

Step 2 On the patch panel, locate the MPO connectors (Figure 14-11 on page 14-87).

Step 3 Route the preinstalled MPO cables out of the tray to the right or left (Figure 14-15).

Figure 14-15 Deep Patch Panel Tray



Step 4 At the 32WSS or 32MUX-O card in the node, plug the MPO connector labeled 1 RX on an MPO cable (Figure 14-11 on page 14-87) into the top Add RX (30.3–36.6) port of the card.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

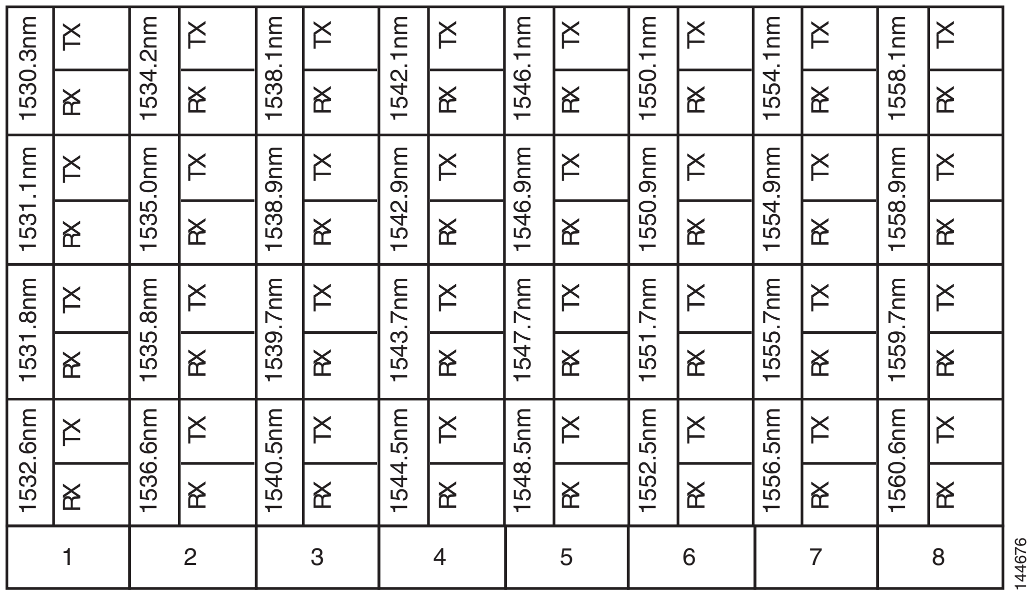
Step 5 Plug the MPO connector labeled 2-RX into the Add RX (38.1–44.5) port on the card.

Step 6 Plug the MPO connector labeled 3-RX into the Add RX (46.1–52.5) port on the card.

Step 7 Plug the MPO connector labeled 4-RX into the Add RX (54.1–60.6) port on the card.

Figure 14-16 shows the deep patch panel ports and corresponding wavelengths.

Figure 14-16 Deep Patch Panel Port Wavelengths



Step 8 At the adjacent 32DMX or 32DMX-O card in the same side of the shelf, plug the MPO connector labeled 1 TX on the MPO cable (Figure 14-11 on page 14-87) into the top Drop TX (30.3–36.6) port of the card (Figure 14-16).

Step 9 Plug the MPO connector labeled 2-TX into the Drop TX (38.1–44.5) port on the card.

Step 10 Plug the MPO connector labeled 3-TX into the Drop TX (46.1–52.5) port on the card.

Step 11 Plug the MPO connector labeled 4-TX into the Drop TX (54.1–60.6) port on the card.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Step 12 For a hub or ROADM node, repeat Steps 2 through 11 to cable the other side of the shelf to the second patch panel. For a terminal node, go to Step 13.

Step 13 Return to your originating procedure (NTP).

DLP-G427 Reroute Fiber-Optic Cables in the 40-Channel Patch Panel Tray

Purpose	This task reroutes the MPO cables that are preinstalled in the 40-channel patch panel tray. The cables exit to the left when shipped; this task reroutes the cables out of the right side of the tray. Use this task when you want to connect these MPO cables to cards installed on the right side of the shelf (Slots 12 through 17).
Tools/Equipment	#2 Phillips screwdriver
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Carefully unwind all of the MPO cables in the patch panel tray and gently set the cables to the side of the tray, out of the way of the internal hardware.

Figure 14-17 and Figure 14-18 show the 40-channel patch panel tray.

Figure 14-17 40-Channel Patch Panel Tray, Side View

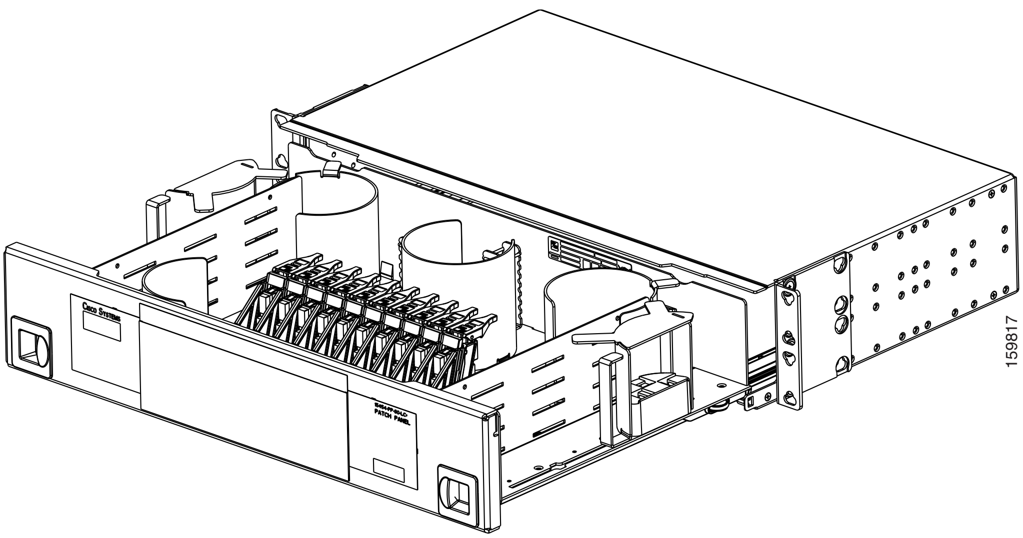
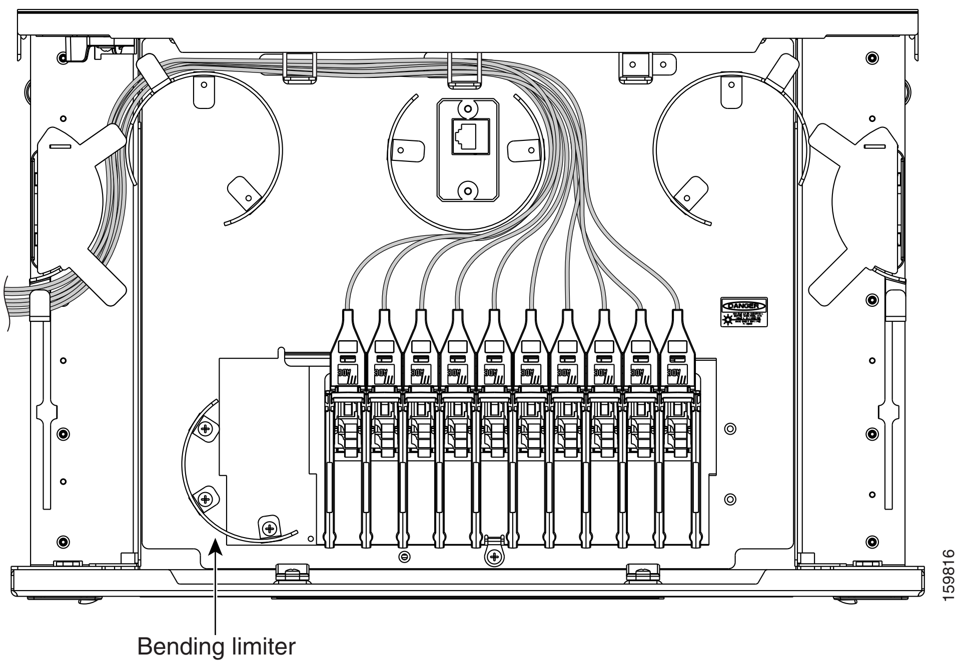


Figure 14-18 40-Channel Patch Panel Tray, Top View



Step 2 Slide each of the ten LC-port adapter packs upward.

Step 3 Unscrew the two screws in the bottom left bending limiter and remove the bending limiter.

Step 4 Remove the single screw below the center of the patch panel to free the patch panel hardware.

Step 5 Slide the patch panel to the left, and reinstall the screw below the center of the patch panel.

Step 6 Install the bending limiter to the right of the patch panel by installing the two screws.

Step 7 Carefully route all of the MPO cables around the bending limiter and out the exit on the right side of the patch panel tray.

Step 8 Slide each of the ten LC-port adapter packs downward.

Step 9 Return to your originating procedure (NTP).

DLP-G428 Install Fiber-Optic Cables from the 40-WSS-C/40-WSS-CE and 40-DMX-C/40-DMX-CE Cards in an Expanded ROADM, Terminal, or Hub Node to the 40-Channel Patch Panel Tray

Purpose	This task describes how to route fiber-optic cables from 40-WSS-C/40-WSS-CE and 40-DMX-C/40-DMX-CE cards in an expanded ROADM, terminal, or hub node to the 40-channel (80-port) patch panel tray (15454-PP-80).
Tools/Equipment	The following node types require the following equipment. The cards and patch panels should already be installed before you begin this procedure. Expanded terminal nodes: • One 40-WSS-C or 40-WSS-CE card • One 40-DMX-C or 40-DMX-CE card Plus one 40-channel patch panel tray, preinstalled with MPO cables (each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors) Expanded hub or ROADM nodes: • Two 40-WSS-C or 40-WSS-CE cards • Two 40-DMX-C or 40-DMX-CE cards Plus two 40-channel patch panel trays, preinstalled with MPO cables (each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors)
Prerequisite Procedures	NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78 DLP-G427 Reroute Fiber-Optic Cables in the 40-Channel Patch Panel Tray, page 14-93
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note For a ROADM node, two patch panels will be used, one for the Side A (Slots 1 through 6) and one for Side B (Slots 12 through 17). The Side B 40-WSS-C/40-WSS-CE card will connect to the Side B patch panel. The Side A 40-WSS-C/40-WSS-CE will connect to the Side A patch panel. The MPO cables in the patch panel are preinstalled and routed out of the left side of the patch panel tray.

Step 1 Choose either the Side A or Side B side of the shelf to cable the 40-WSS-C/40-WSS-CE and 40-DMX-C/40-DMX-CE cards.

Note If you are cabling cards on Side B of the shelf, you must first perform the "DLP-G427 Reroute Fiber-Optic Cables in the 40-Channel Patch Panel Tray" task on page 14-93 to route the MPO cables out of the right side of the patch panel tray, or route the cables through a fiber storage panel.

Step 2 On the patch panel, locate the MPO cables and connectors.

Step 3 At the 40-WSS-C/40-WSS-CE card in the node, plug the MPO connector labeled 1 RX on an MPO cable (Figure 14-11 on page 14-87) into the top Add RX (30.3–35.8) port of the card.

Step 4 Plug the MPO connector labeled 2-RX into the Add RX (36.6–42.1) port on the card.

Step 5 Plug the MPO connector labeled 3-RX into the Add RX (42.9–48.5) port on the card.

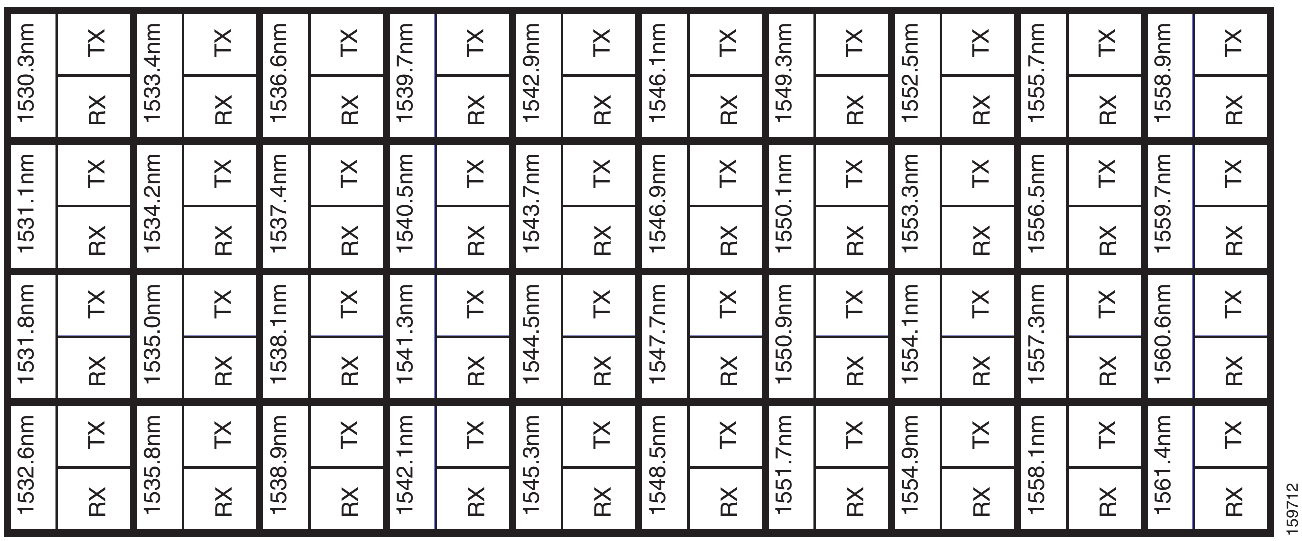
Step 6 Plug the MPO connector labeled 4-RX into the Add RX (49.3–54.9) port on the card.

Step 7 Plug the MPO connector labeled 5-RX into the Add RX (55.7–61.4) port on the card.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Figure 14-19 shows the 40-channel patch panel ports and corresponding wavelengths.

Figure 14-19 40-Channel (15454-PP-80) Patch Panel Port Wavelengths



Step 8 At the adjacent 40-DMX-C/40-DMX-CE card in the same side of the shelf, plug the MPO connector labeled 1 TX on the MPO cable into the top Drop TX (30.3–35.8) port of the card.

Step 9 Plug the MPO connector labeled 2-TX into the Drop TX (36.6–42.1) port on the card.

Step 10 Plug the MPO connector labeled 3-TX into the Drop TX (42.9–48.5) port on the card.

Step 11 Plug the MPO connector labeled 4-TX into the Drop TX (49.3–54.9) port on the card.

Step 12 Plug the MPO connector labeled 5-TX into the Drop TX (55.7–61.4) port on the card.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Step 13 Repeat Steps 2 through 12 to cable the other side of the shelf to the second patch panel.

Step 14 Return to your originating procedure (NTP).

DLP-G357 Install Fiber-Optic Cables from the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP Cards to the Deep Patch Panel Tray or 40-Channel Patch Panel Tray

Purpose	This task describes how to route fiber-optic cables from the deep patch panel (32-channel) or 40-channel patch panel to TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP cards.
Tools/Equipment	TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card(s) Deep (32-channel) patch panel tray or 40-channel patch panel tray Fiber-optic cable(s) Cisco Transport Planner Internal Connections Report
Prerequisite Procedures	NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Refer to the Cisco Transport Planner Internal Connections Report to connect the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card to the proper (Side A or Side B) patch panel. Cisco Transport Planner designates Side A as Slots 1 to 6 and Side B as Slots 12 to 17. At the appropriate TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card, plug one end of a fiber-optic cable into the TX port of the DWDM adapter.

Step 2 As needed, route slack fiber-optic cable around the round cable retainers in the fiber-storage tray.

Caution When you close the fiber-storage tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the fiber-storage tray, make sure that adequate cable slack remains.

Step 3 Plug the other end of the cable into the RX connector on the patch panel that corresponds to the wavelength to which the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP port is tuned. (See Figure 14-16 on page 14-92 for a view of the wavelengths assigned to the deep patch panel connectors or Figure 14-19 on page 14-96 for a view of the wavelengths assigned to the 40-channel patch panel connectors).

Step 4 On the patch panel tray, slide each of the ten LC-port adapter packs upward.

Step 5 Plug one end of a fiber-optic cable into the RX port of the DWDM adapter on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card.

Step 6 Plug the other end of the cable into the TX connector on the patch panel that corresponds to the wavelength to which the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP port is tuned.

Step 7 Repeat Steps 1 through 6 for each TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, or OTU2_XP card that you want to connect to this patch panel.

Step 8 Return to your originating procedure (NTP).

DLP-G530 Install Fiber-Optic Cables from the 40-SMR1-C, 40-SMR2-C, or 80-WXC-C Cards in a ROADM, Terminal, or Hub Node to the 15216-MD-40 or 15216-MD-48 Patch Panel Tray

Purpose	This task describes how to route fiber-optic cables from the 40-SMR1-C[1], 40-SMR2-C[1], or 80-WXC-C[2] cards in a ROADM, terminal, or hub node to the 15216-MD-40 or 15216-MD-48 patch panel tray.
Tools/Equipment	The following node types require the following equipment. The cards and patch panels should already be installed before you begin this procedure. Terminal nodes: • One 40-SMR1-C[1] and one 15216 Odd patch panel[3] • One 40-SMR2-C[1] and one 15216 Odd patch panel[3] • One 80-WXC-C[2] card, one 15216 Odd patch panel[3], and one 15216 Even patch panel[4], and one 15216-MD-ID-50 or 15216-MD-48-CM unit Hub nodes: • Two 40-SMR1-C[1] cards and two 15216 Odd patch panels[3] • Two 40-SMR2-C[1] cards and two 15216 Odd patch panels[3] ROADM nodes: • Two 40-SMR1-C[1] cards and two 15216 Odd patch panels[3] • Two 40-SMR2-C[1] cards and two 15216 Odd patch panels[3] • Two 80-WXC-C[2] cards, two 15216 Odd patch panels[3], and 15216 Even patch panels[4] and 15216-MD-ID-50 or 15216-MD-48-CM units
Prerequisite Procedures	Install and route fiber-optic cables on the patch panel. For more information, see the required installation guide: • *Installing the Cisco ONS 15216-MD-40-ODD and 15216-MD-40-EVEN Mux/Demux Patch Panels* • *Installing the Cisco ONS 15216-EF-40-ODD and 15216-EF-40-EVEN Mux/Demux Patch Panels* • *Installing the Cisco ONS 15216-MD-48-ODD and 15216-MD-48-EVEN Mux/Demux Patch Panels* • *Installing Cisco ONS 15216-MD-ID-50 Optical Interleaver and Deinterleaver Pluggable* • *Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable*
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

1. The 40-SMR1-C and 40-SMR2-C cards can be connected only to the odd patch panel (15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD).

2. The 80-WXC-C card can be connected to the odd patch panel (15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD) and the even patch panel (15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN) in the presence of interleaver and deinterleaver pluggable (15216-MD-ID-50 or 15216-MD-48-CM).
3. 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel.
4. 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN patch panel.

Note For optical interconnections between the odd patch panel, interleaver and deinterleaver module, and the even patch panel, see the "*Installing Cisco ONS 15216-MD-ID-50 Optical Interleaver and Deinterleaver Pluggable*" or "*Installing the Cisco ONS 15216-MD-48-CM Interleaver and Deinterleaver Pluggable*" guide.

Note For a ROADM node, two patch panels will be used, one for the Side A (Slots 1 through 6) and one for Side B (Slots 12 through 17). The Side B 40-SMR1-C[1] or 40-SMR2-C[1] card will connect to the Side B patch panel. The Side A 40-SMR1-C[1] or 40-SMR2-C[1] will connect to the Side A patch panel.

Step 1 Choose Side A or Side B of the shelf to route the cables from the 40-SMR1-C, 40-SMR2-C, or 80-WXC-C card.

Step 2 On the 15216 patch panel[1,2], locate the COM TX port and insert one end of an LC-LC cable.

Step 3 Route the LC-LC cable through the 15216 patch panel[1,2] to the 40-SMR1-C[1] card, 40-SMR2-C[1] card, or 80-WXC-C[2] card on Side A of the node.

Step 4 Connect the other end of the LC-LC cable to the ADD RX port on the 40-SMR1-C or 40-SMR2-C cards or the AD port on the 80-WXC-C card.

Step 5 On the 15216 patch panel[1,2], locate the COM RX port and insert one end of an LC-LC cable.

Step 6 Route the LC-LC cable through the 15216 patch panel[1,2] to the 40-SMR1-C[1], 40-SMR2-C[1] or 80-WXC-C[2] card on Side A of the node.

Step 7 Connect the other end of the LC-LC cable to the DROP TX port on the 40-SMR1-C[1], 40-SMR2-C[1], or 80-WXC-C[2] card.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Step 8 For a hub or ROADM node, repeat Steps 2 through 7 to cable the other side of the shelf to the second patch panel. For a terminal node, go to Step 9.

Note For a ROADM node using 40-SMR2-C[1] cards, you must use a special reversed MPO cable (15454-MPO-XMPO-2=) to connect the EXP ports of the Side A 40-SMR2-C[1] to the EXP ports of the Side B 40-SMR2-C[1].

Step 9 Return to your originating procedure (NTP).

NTP-G185 Install Fiber-Optic Cables between Mesh Nodes

Purpose	This procedure describes how to install fiber-optic cables to create mesh nodes. You must route fiber-optic cables from: • 40-MUX-C and 40-DMX-C cards in a mesh node to the 40-channel (80-port) patch panel tray (15454-PP-80) • 40-WXC-C or 80-WXC-C cards in a mesh node to one of the mesh patch panel trays (four-degree or eight-degree) • 40-SMR2-C cards in a mesh node to the 15454-PP-4-SMR patch panel tray.
Tools/Equipment	Mesh nodes require the following equipment. The cards and patch panels should already be installed before you begin this procedure. • One 40-MUX-C card per side of the mesh node (up to 8 sides per node) • One 40-DMX-C card per side of the mesh node (up to 8 sides per node) • One 40-channel patch panel tray per side of the mesh node (up to 8 sides per node) • One 40-WXC-C card per side (up to 8 sides per node) • One 80-WXC-C card per side (up to 8 sides per node) • One 40-SMR2-C card per side (up to 4 sides per node) • One MPO-MPO fiber-optic cable per side (up to 8 sides per node) • One LC-LC fiber-optic cable per side (up to 8 sides per node) • One PP-MESH-4 (four-degree), PP-MESH-8 (eight-degree), or 15454-PP-4-SMR (four-degree) mesh patch panel tray depending on the type of mesh node you want to install **Note** Use the PP-MESH-4 or PP-MESH-8 mesh patch panel trays for the 40-WXC-C or 80-WXC-C cards and the 15454-PP-4-SMR mesh patch panel tray for the 40-SMR2-C card.
Prerequisite Procedures	NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78 DLP-G427 Reroute Fiber-Optic Cables in the 40-Channel Patch Panel Tray, page 14-93
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Open the patch panel tray:

- 40-channel patch panel tray—On the front of the patch panel tray, push the tabs on the left and right sides inward to release the lock on the tray. Pull the patch panel tray away from the shelf until it is fully opened.
- Mesh patch panel tray—On the front of the patch panel tray, push the tabs on the left and right sides inward to open the front door. Raise the plunger located to the right of the TEST ACCESS TX port and pull the tray away from the rack.

Step 2 Complete the "DLP-G430 Install Fiber-Optic Cables from the 40-MUX-C and 40-DMX-C Cards in a Mesh Node to the 40-Channel Patch Panel Tray" task on page 14-102.

Step 3 Complete the "DLP-G431 Install Fiber-Optic Cables from the 40-WXC-C, or 40-SMR2-C Cards in a Mesh Node to a Mesh Patch Panel Tray" task on page 14-104.

Step 4 Close the patch panel tray:

- 40-channel patch panel tray: Push the tray back toward the rack until it locks into place.
- Mesh patch panel tray: Raise the plunger located on the right of the TEST ACCESS Tx port and push the tray until the plunger locks into the closed position.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the tray, make sure that adequate cable slack remains.

Stop. You have completed this procedure.

DLP-G430 Install Fiber-Optic Cables from the 40-MUX-C and 40-DMX-C Cards in a Mesh Node to the 40-Channel Patch Panel Tray

Purpose	This task describes how to route fiber-optic cables from 40-MUX-C and 40-DMX-C cards in mesh node to the 40-channel (80-port) patch panel tray (15454-PP-80). In a mesh node, one 40-channel patch panel tray is required for each direction. The Side A 40-MUX-C and 40-DMX-C cards will connect to the Side A 40-channel patch panel. The Side B 40-MUX-C and 40-DMX-C cards will connect to the Side B 40-channel patch panel, and so forth, up to a maximum of an eight-degree mesh node (Sides A through H).
Tools/Equipment	The cards and patch panels should already be installed before you begin this procedure. • One 40-MUX-C card per side of the mesh node • One 40-DMX-C card per side of the mesh node • One 40-channel patch panel trays per side of the mesh node, preinstalled with MPO cables (each MPO cable is terminated on one end with one MPO connector and on the other end with eight LC-type connectors)
Prerequisite Procedures	NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78 DLP-G427 Reroute Fiber-Optic Cables in the 40-Channel Patch Panel Tray, page 14-93
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Choose Side A of the shelf to cable the 40-MUX-C and 40-DMX-C cards.

Note If you are cabling any cards from the right side of the shelf (Slots 12 through 17), you must first perform the "DLP-G427 Reroute Fiber-Optic Cables in the 40-Channel Patch Panel Tray" task on page 14-93 to route the MPO cables out of the right side of the patch panel tray, or route the cables through a fiber storage panel.

Step 2 On the patch panel, locate the MPO cables and connectors.

Step 3 At the 40-MUX-C card in the node, plug the MPO connector labeled 1 RX on an MPO cable into the top Add RX (30.3–35.8) port of the card.

Step 4 Plug the MPO connector labeled 2-RX into the Add RX (36.6–42.1) port on the card.

Step 5 Plug the MPO connector labeled 3-RX into the Add RX (42.9–48.5) port on the card.

Step 6 Plug the MPO connector labeled 4-RX into the Add RX (49.3–54.9) port on the card.

Step 7 Plug the MPO connector labeled 5-RX into the Add RX (55.7–61.4) port on the card.

Step 8 At the adjacent 40-DMX-C card in the same side of the shelf, plug the MPO connector labeled 1 TX on the MPO cable.

Step 9 Plug the MPO connector labeled 2-TX into the Drop TX (36.6–42.1) port on the card.

Step 10 Plug the MPO connector labeled 3-TX into the Drop TX (42.9–48.5) port on the card.

Step 11 Plug the MPO connector labeled 4-TX into the Drop TX (49.3–54.9) port on the card.

Step 12 Plug the MPO connector labeled 5-TX into the Drop TX (55.7–61.4) port on the card.

Caution When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Step 13 Repeat Steps 2 through 12 for the remaining sides of the mesh node (Sides B through H, depending on the type of mesh node you want to cable).

Step 14 Return to your originating procedure (NTP).

DLP-G431 Install Fiber-Optic Cables from the 40-WXC-C, or 40-SMR2-C Cards in a Mesh Node to a Mesh Patch Panel Tray

Purpose	This task connects fiber-optic cables from the 40-WXC-C or 40-SMR2-C cards in a mesh node to the 4-degree (PP-MESH-4 or 15454-PP-4-SMR) or 8-degree (PP-MESH-8) mesh patch panel. The four-degree patch panel allows up to 4 sides to be used per node, while the eight-degree patch panel allows up to 8 sides to be used per node.
Tools/Equipment	The cards and patch panel trays should already be installed before you begin this procedure. • One 40-WXC-C card per side (up to 8 sides per node) • One 40-SMR2-C card per side (up to 4 sides per node) • One MPO-MPO fiber-optic cable per side • One LC-LC fiber-optic cable per side • One PP-MESH-4 (four-degree), PP-MESH-8 (eight-degree), or 15454-PP-4-SMR (four-degree) mesh patch panel tray • Cisco Transport Planner Internal Connections Report **Note** Use the PP-MESH-4 or PP-MESH-8 mesh patch panel trays for the 40-WXC-C or 80-WXC-C cards and the 15454-PP-4-SMR mesh patch panel tray for the 40-SMR2-C card.
Prerequisite Procedures	• In the *Cisco ONS 15454 Hardware Installation Guide* – “DLP-G28 Install the Fiber Patch-Panel Tray” i – “DLP-G29 Install the Fiber-Storage Tray” • NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78 • DLP-G348 Use the Cisco Transport Planner Shelf Layout Report, page 14-67 • Install and route fiber-optic cables on the 15454-PP-4-SMR mesh patch panel. For more information, see the *Installing Cisco ONS 15454-PP-4-SMR Patch Panel*.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Choose Side A of the shelf to cable the 40-WXC-C, or 40-SMR2-C card to the mesh patch panel.

Step 2 On the mesh patch panel, locate the EXP TX A port (for PP-MESH-4 and PP-MESH-8) or EXP-A port (for 15454-PP-4-SMR) and insert one end of an MPO-MPO cable.

Step 3 Route the MPO cable through the mesh patch panel and out to the 40-WXC-C, or 40-SMR2-C card on Side A of the node.

Step 4 Connect the other end of the MPO cable to the EXP RX port on the 40-WXC-C, or EXP port on the 40-SMR2-C card.

> **Note** If you are connecting a 40-SMR2-C card to the 15454-PP-4-SMR mesh patch panel, skip steps 5 through 7.

Step 5 On the PP-MESH-4 or PP-MESH-8 mesh patch panel, locate the COM RX A port and insert one end of an LC-LC cable.

Step 6 Route the LC cable through the mesh patch panel to the 40-WXC-C card on Side A of the node.

Step 7 Connect the other end of the LC cable to the EXP TX port on the 40-WXC-C.

Step 8 Repeat Steps 1 through 7 as necessary to cable Sides B through D for a 4-degree patch panel, and Sides B through H for an 8-degree patch panel.

> **Caution** When you close the patch panel tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the patch panel tray, make sure that adequate cable slack remains.

Stop. **You have completed this procedure**.

NTP-G191 Install Fiber-Optic Cables on Passthrough ROADM Nodes

Purpose	This procedure routes fiber-optic cables from a 32WSS card in a ROADM node in one shelf to the corresponding 32WSS card in a ROADM node in another shelf. The purpose of this routing is to connect East and West intershelf ROADMs in a passthrough configuration.
Tools/Equipment	Each ROADM node requires the listed equipment. The cards and fiber-storage trays should already be installed before you begin this procedure. • One 32WSS card • One fiber-storage tray • Two 3-meter fiber-optic cables, each terminated with a single LC connector on each end. • Cisco Transport Planner Internal Connections Report
Prerequisite Procedures	"DLP-G29 Install the Fiber-Storage Tray" in the *Cisco ONS 15454 Hardware Installation Guide* DLP-G348 Use the Cisco Transport Planner Shelf Layout Report, page 14-67
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Choose either the East or West side of the first shelf to cable the 32WSS card for the first ROADM node.

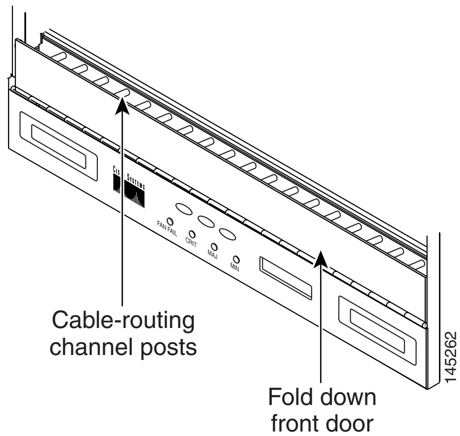
Step 2 Choose the corresponding West or East side of the second shelf to cable the 32WSS card for the second ROADM node.

Step 3 On the front of the fiber-storage tray that will be used for routing the fiber-optic cable, push the tabs on the left and right sides inward to release the lock on the tray.

Step 4 Pull the fiber-storage tray away from the shelf until it is fully opened.

Step 5 Open the fold-down door located at the bottom of both shelf assemblies to expose the cable-routing channels for each (Figure 14-20).

Figure 14-20 Managing Cables on the Front Panel



Step 6 Plug one end of the first 3-meter fiber-optic cable into the EXP-TX connector on the first 32WSS card.

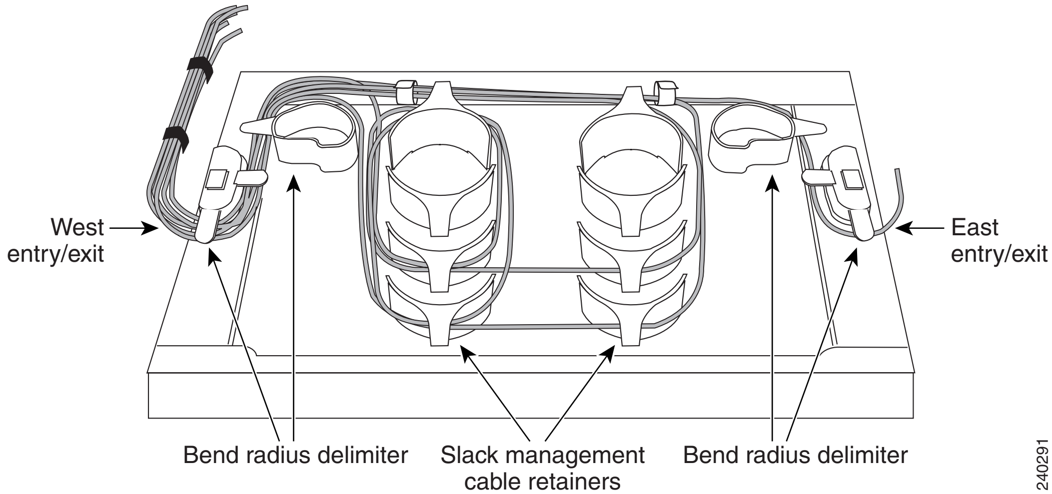
Step 7 Route the fiber-optic cable through the shelf cable-routing channel and cutout on the appropriate side of the shelf assembly, as necessary.

Step 8 Route the fiber-optic cable through the vertical fiber guide as needed to reach the entry to the fiber-storage tray.

Step 9 Thread the cable into the fiber-storage tray at the appropriate side and around the first bend radius delimiter as shown (Figure 14-21).

Step 10 As needed, route slack fiber-optic cable around the slack management cable retainers in the fiber-storage tray (Figure 14-21).

Figure 14-21 Fiber-Storage Tray



> **Caution** When you close the fiber-storage tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the fiber-storage tray, make sure that adequate cable slack remains.

Step 11 Thread the fiber cable through the second bend delimiter and out the appropriate side of the fiber-storage tray as necessary.

Step 12 Route the fiber-optic cable through the vertical fiber guide as needed to reach the second ROADM shelf where the second 32WSS is located.

Step 13 Route the fiber-optic cable through the shelf cutout and through the shelf cable routing channel as needed.

Step 14 Plug the end of the 3-meter fiber-optic cable into the EXP-RX port of the second 32WSS card.

Step 15 Plug one end of the second 3-meter fiber-optic cable into the EXP-TX connector on the second 32WSS card.

Step 16 Follow Step 7 through Step 14 to connect the EXP-TX connector of the second 32WSS card to the EXP-RX port of the first 32WSS card.

Step 17 Close the fold-down doors located at the bottom of both shelf assemblies and slide the fiber-storage tray back into its normal locked position.

Stop. **You have completed this procedure**.

NTP-G141 Install Fiber-Optic Cables for Y-Cable Protection Modules

Purpose	This procedure installs and routes fiber-optic cables from the client signal to the Y-cable protection module (single mode or multimode), and from the Y-cable module to the transponder node. Using one Y-cable protection module, you can protect one client signal with two TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards, and two client signals with four TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards. You can use Y-cable protection modules that you have installed in a FleyLayer shelf, or Y-cable modules installed in a Y-cable module tray.
Tools/Equipment	Fiber-optic cables Cisco Transport Planner Internal Connections Report
Prerequisite Procedures	See *Cisco ONS 15454 Hardware Installation Guide*: • "DLP-G32 Install the Y-Cable Protection Modules in the FlexLayer Shelf" • "DLP-G377 Install the Y-Cable Protection Modules in the Y-Cable Module Tray"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note For more information about Y-cable protection, see Chapter 1, "Install the Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 Shelf" and Chapter 11, "Provision Transponder and Muxponder Cards".

Note To use Y-cable protection for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, the cards must be provisioned in 10GE MXP, 20GE MXP, or 10GE TXP mode. (See the "DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode" task on page 11-149.) Y-cable protection cannot be used for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards that are provisioned in L2-over-DWDM mode.

Step 1 As needed, complete the "DLP-G375 Install Fiber-Optic Cables on the Y-Cable Modules in the FlexLayer Shelf" task on page 14-109.

Step 2 As needed, complete the "DLP-G376 Install Fiber-Optic Cables on the Y-Cable Modules in the Y-Cable Module Tray" task on page 14-110.

Stop. **You have completed this procedure**.

DLP-G375 Install Fiber-Optic Cables on the Y-Cable Modules in the FlexLayer Shelf

Purpose	This task installs fiber-optic cables from the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, AR_MXP, or AR_XP cards to the Y-cable modules installed in the FlexLayer shelves, and from the Y-cable modules to the client devices.
Tools/Equipment	Fiber-optic cables Cisco Transport Planner Internal Connections Report
Prerequisite Procedures	"DLP-G32 Install the Y-Cable Protection Modules in the FlexLayer Shelf" in the *Cisco ONS 15454 Hardware Installation Guide* NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Referring to the Cisco Transport Planner Internal Connections Report, install a fiber-optic cable between a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, AR_MXP, or AR_XP card and a Y-cable module.

If you want to protect one client signal, connect the fiber-optic cables according to either Table 14-7 or Table 14-8. To protect two client signals using a single Y-cable module, connect the cables according to both Table 14-7 and Table 14-8.

Table 14-7 Cable Connections for Y-Cable Protection of One Client Signal

From	To (Y-Cable Port Number)
Client 1 TX port	10
Client 1 RX port	5
TXP/MXP/GE_XP/GE_XPE/10GE_XP/10GE_XPE 1 TX port	1
TXP/MXP/GE_XP/GE_XPE/10GE_XP/10GE_XPE 1 RX port	2
TXP/MXP/GE_XP/GE_XPE/10GE_XP/10GE_XPE 2TX port	6
TXP/MXP/GE_XP/GE_XPE/10GE_XP/10GE_XPE2RX port	7

Table 14-8 Cable Connections for Y-Cable Protection of a Second Client Signal

From	To (Y-Cable Port Number)
Client 2 TX port	12
Client 2 RX port	11
TXP/MXP/GE_XP/GE_XPE/10GE_XP/10GE_XPE3 TX port	3
TXP/MXP/GE_XP/GE_XPE/10GE_XP/10GE_XPE 3 RX port	4

Table 14-8 Cable Connections for Y-Cable Protection of a Second Client Signal (continued)

From	To (Y-Cable Port Number)
TXP/MXP/GE_XP/GE_XPE/10GE_XP/10GE_XPE 4 TX port	8
TXP/MXP/GE_XP/GE_XPE/10GE_XP/10GE_XPE 4 RX port	9

Step 2 As needed, route slack fiber-optic cable around the round cable retainers in the fiber-storage tray as you install cables between the Y-cable module and the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards (Figure 14-9 on page 14-80).

Caution When you close the fiber-storage tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the fiber-storage tray, make sure that adequate cable slack remains.

Step 3 Install a fiber-optic cable between the client device and the Y-cable module where you just installed a fiber-optic cable to the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card.

Step 4 Repeat Steps 1 through 3 for each Y-cable module you need to use for Y-cable protection.

Step 5 Return to your originating procedure (NTP).

DLP-G376 Install Fiber-Optic Cables on the Y-Cable Modules in the Y-Cable Module Tray

Purpose	This task installs fiber-optic cables from the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards to the Y-cable modules installed in the Y-cable module tray, and from the Y-cable modules to the client devices.
Tools/Equipment	Fiber-optic cables (4-meter [13.12-foot]), single-mode or multimode as appropriate Cisco Transport Planner Internal Connections Report
Prerequisite Procedures	"DLP-G32 Install the Y-Cable Protection Modules in the FlexLayer Shelf" in the *Cisco ONS 15454 Hardware Installation Guide* NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Open the drawer of the tray by pushing inward on the latches located at the left and right front of the tray.

Step 2 On each Y-cable module you will connect, use the tab to slide the module up so that it is fully extended and easily accessible in the tray.

Step 3 Referring to the Cisco Transport Planner Internal Connections Report, install a 4-meter (13.12-foot) fiber-optic cable (single-mode or multimode, as appropriate) between a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card and the Y-cable module installed farthest to the left. Proceed according to the port label affixed to the front of the tray to identify the ports on each installed module (Figure 14-22).

Figure 14-22 Y-Cable Protection Port Label

Client TX	Client TX	Client TX	Client TX	Client TX	Client TX	Client TX	Client TX
Client RX	Client RX	Client RX	Client RX	Client RX	Client RX	Client RX	Client RX
TXP W TX	TXP W TX	TXP W TX	TXP W TX	TXP W TX	TXP W TX	TXP W TX	TXP W TX
TXP W RX	TXP W RX	TXP W RX	TXP W RX	TXP W RX	TXP W RX	TXP W RX	TXP W RX
TXP P TX	TXP P TX	TXP P TX	TXP P TX	TXP P TX	TXP P TX	TXP P TX	TXP P TX
TXP P RX	TXP P RX	TXP P RX	TXP P RX	TXP P RX	TXP P RX	TXP P RX	TXP P RX
#1	#2	#3	#4	#5	#6	#7	#8

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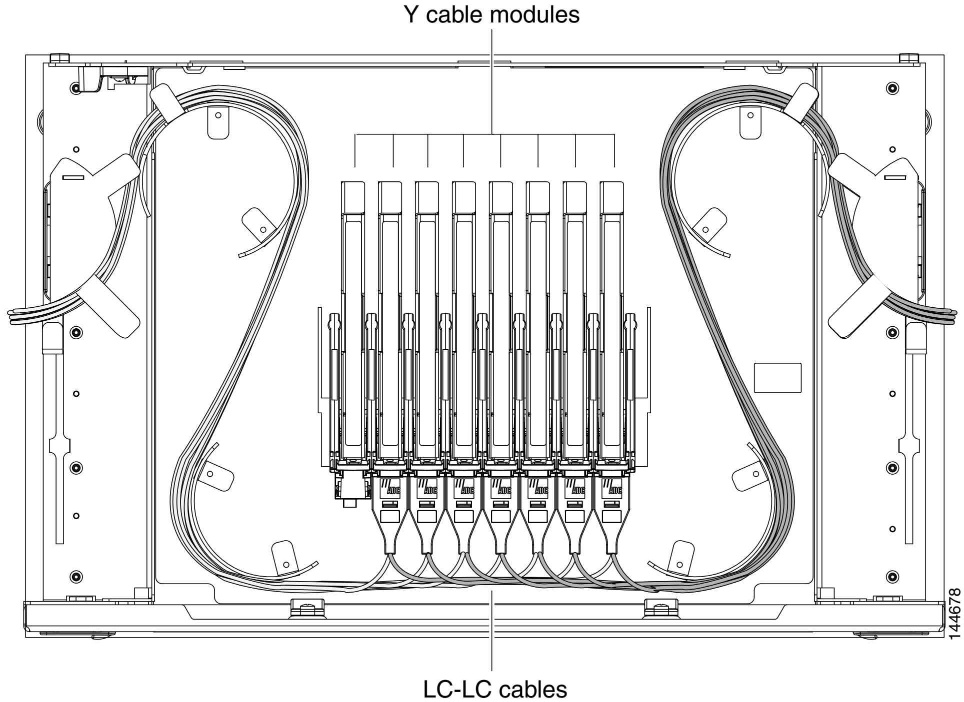
Note You can use the label shown in Figure 14-22 to take notes as to which wavelength/port you are connecting to each Y-cable module. “W” denotes the indicated Working port on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card. “P” denotes the indicated Protect port on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card.

Note Protective covers are installed over the third and fourth ports on the Y-cable modules because they are not used.

As needed, route slack fiber-optic cable around the round cable retainers in theY-cable module tray as you install cables between the Y-cable module and the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card (Figure 14-23).

Figure 14-23 Y-Cable Protection Module Tray



Caution When you close the Y-cable module tray, the cables must not be pinched, and the cable bend radius must be equal to or greater than the minimum radius that is recommended in your site specifications. As you route each cable through the tray, make sure that adequate cable slack remains.

Step 4 Referring to the Cisco Transport Planner Internal Connections Report, install a fiber-optic cable of adequate length (single-mode or multimode, as appropriate) between the Y-cable module and the client signal that you want to protect.

Step 5 As needed, route slack fiber-optic cable around the round cable retainers in theY-cable module tray as you install cables between the Y-cable module and the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card.

Step 6 Repeat Steps 2 through 5 for each Y-cable module you need to use for Y-cable protection.

Step 7 To close the tray, unlock the drawer from the open position by depressing the red lock at the back left of the tray and push the tray closed.

Step 8 Return to your originating procedure (NTP).

NTP-G152 Create and Verify Internal Patchcords

Purpose	This procedure imports the internal patchcords using the CTP XML file. Internal patchcords can also be manually provisioned.
Tools/Equipment	• Cisco Transport Planner shelf layout • Cisco Transport Planner Internal Connections Report
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4 NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to provision the DWDM cable connections. If you are already logged in, continue with Step 2.

Step 2 Complete the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47 to import the Cisco Transport Planner NE update file.

Step 3 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Internal Patchcords** tabs.

Note The Internal Patchcords tab does not show OPT-PRE DCU connections or span connections.

Note The number of rows in the Provisioning > WDM-ANS > Internal Patchcords tab are created dynamically, as per the number of sides present in a node.

Note On the 15454-M2 and the 15454-M6 shelves, you can create internal patchcords between the TNC and TNCE cards and the optical amplifier cards.

Step 4 Verify that the connections in the Internal Patchcords tab match the connections in the Cisco Transport Planner Internal Connections Report for the DWDM cards (see the "DLP-G349 Use the Cisco Transport Planner Internal Connections Report" task on page 14-80). The Internal Patchcords tab will not show OPT-PRE DCU connections or span connections.

Step 5 Complete the "NTP-G242 Create an Internal Patchcord Manually" procedure on page 14-114 for any connections that require manual provisioning, for example, to create patchcords between TXP and MXP trunk ports and OCH filter ports. If you need to delete a connection, complete the "DLP-G355 Delete an Internal Patchcord" task on page 14-123.

Note Connections related to optical bypass circuits must be manually provisioned.

Stop. **You have completed this procedure**.

NTP-G242 Create an Internal Patchcord Manually

Purpose	This procedure creates an internal patchcord manually.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note Use only one management interface to complete the creation of internal patchcords. For example, do not begin the internal patchcord creation using the TL1 interface or CTP XML file and end the internal patchcord creation using CTC.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Internal Patchcord** tabs.

Step 2 Click **Create**.

Step 3 Choose one of the following link types for the internal patchcord:

- Trunk to Trunk (L2)—Creates a bidirectional patchcord between the trunk ports of GE_XP and 10GE_XP cards. If you choose this option, complete "DLP-G354 Create an Internal Patchcord Manually Using the Trunk to Trunk (L2) Option" task on page 14-115.
- OCH-Trunk to OCH-Filter—Creates an internal patchcord between an optical channel trunk port on a TXP/MXP stage card (which includes TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, OTU2_XP, AR_MXP, AR_XP or ITU-T line cards) and an optical channel filter port on an add/drop stage card (which includes 32MUX, 40-MUX-C, 32WSS, 40-WSS-C/40-WSS-CE, 32DMX, 32DMX-O, 40DMX, 40-SMR1-C, or 40-SMR2-C cards).

  You can use this option to also create an internal patchcord between an optical channel trunk port on a TXP/MXP stage card (which includes TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, OTU2_XP, AR_MXP, AR_XP or ITU-T line cards) and the COM port on a PSM card in channel protection configuration (where, PSM card is equipped between one TXP/MXP stage and two add/drop stages). In this case, the Internal Patchcord Creation wizard will prompt you to create patchcords between the working and protect ports on the PSM card and the ports on the two different add/drop stage cards (which includes 32MUX, 40-MUX-C, 32WSS, 40-WSS-C/40-WSS-CE, 32DMX, 32DMX-O, 40DMX, 40-SMR1-C, 40-SMR2-C, or 80-WXC-C cards). If you choose this option, complete "DLP-G547 Create an Internal Patchcord Manually Using the OCH-Trunk to OCH-Filter Option" task on page 14-116.
- OCH-Filter to OCH-Filter—Creates an unidirectional or bidirectional internal patchcord between a MUX input port and a DMX output port. If you choose this option, complete "DLP-G548 Create an Internal Patchcord Manually Using the OCH-Filter to OCH-Filter Option" task on page 14-118.
- OTS to OTS—Creates a unidirectional or bidirectional internal patchcord between two optical transport section (OTS) ports, between two optical cards, between an optical card and a passive card, between two passive cards, or between the TNC or TNCE cards and an optical amplifier card. This option also includes OSC ports. If you choose this option, complete "DLP-G549 Create an Internal Patchcord Manually Using the OTS to OTS Option" task on page 14-120.

- Optical Path—Creates an internal patchcord between two optical cards, or between an optical card and a passive card. If you choose this option, complete "DLP-G531 Create an Internal Patchcord Manually Using the Optical Path Option" task on page 14-122.

Note Manual creation of OTS/OCH to OTS/OCH internal patchcords is not required for standard DWDM nodes. However, manual creation might be required for non-standard nodes, for example, a hub node that has wavelength selective switches installed. In such cases, manual creation is recommended by Cisco Transport Planner.

Note To successfully create an internal patchcord between WSS/DMX channel port and TXP trunk port, choose the TXP as the source endpoint and WSS/DMX as the destination endpoint.

Stop. **You have completed this procedure**.

DLP-G354 Create an Internal Patchcord Manually Using the Trunk to Trunk (L2) Option

Purpose	This task creates a bidirectional internal patchcord between the trunk ports of two GE_XP or 10GE_XP cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Internal Patchcord** tabs.

Step 2 Click **Create**.

Step 3 On the Internal Patchcord Type Selection page, choose the patchcord type as Trunk to Trunk (L2) and click **Next**.

Step 4 On the Internal Patchcord Origination page, provision the internal patchcord origination parameters:

- Slot—Choose the slot containing the card where the internal patchcord originates.
- Tx Port—Choose the TX port where the internal patchcord originates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 5 Click **Next**.

Step 6 In the Internal Patchcord Termination page, provision the internal patchcord termination parameters:

- Slot—Choose the slot containing the card where the internal patchcord terminates.
- Port—Choose the RX port where the internal patchcord terminates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 7 Click **Next**.

Step 8 Review the display-only information on the Internal Patchcord Origination Reverse page. This page shows the slot, and port that CTC will use for the opposite internal patchcord origination route.

Step 9 Click **Next**.

Step 10 Review the information displayed on the Internal Patchcord Termination Reverse page. This display-only page shows the slot, and port that CTC will use for the reverse internal patchcord termination route.

Step 11 Click **Finish**. The new internal patchcord appears in the Internal Patchcord table.

Step 12 Return to your originating procedure (NTP).

DLP-G547 Create an Internal Patchcord Manually Using the OCH-Trunk to OCH-Filter Option

Purpose	This task creates a bidirectional internal patchcord between a TXP, MXP, or XP trunk and a DWDM add and drop channel port.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Internal Patchcord** tabs.

Step 2 Click **Create**.

Step 3 On the Internal Patchcord Type Selection page, choose the patchcord type as OCH-Trunk to OCH-Filter option and click **Next**.

Step 4 On the Internal PatchcordOCH Attributes page, provision the following parameters:

- OCHNC Wavelength—Sets the OCHNC wavelength for the OCH trunk to OCH filter internal patchcord. Use the unnamed band selection box below to display C-band or L-band wavelengths in the OCHNC Wavelength field. Provision the OCHNC wavelength to the wavelength provisioned for the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE, ADM-10G, OTU2_XP, AR_MXP, AR_XP or ITU-T line card trunk port.
- PSM Protection—Select this check box if you have provisioned a PSM card in channel protection configuration.
- Colorless—Select this check box if you want to create a colorless patchcord.

Step 5 Click **Next**.

Step 6 On the Internal Patchcord Origination page, provision the internal patchcord origination parameters:

- Slot—Choose the slot containing the card where the internal patchcord originates.
- Tx Port—Choose the TX port where the internal patchcord originates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 7 In the Internal Patchcord Termination page, provision the internal patchcord termination parameters:

- Type—Choose the type of card (optical or passive card) where the internal patchcord terminates.
- Side—Choose the side where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Slot—Choose the slot containing the card where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord terminates. This field is visible only if you have chosen the type as Passive Card.
- Rx Port—Choose the RX port where the internal patchcord terminates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 8 Click **Next**.

Step 9 In the Internal Patchcord Origination Reverse page, provision the internal patchcord parameters for the reverse internal patchcord origination route:

- Type—Choose the type of card (optical or passive card) where the internal patchcord originates.
- Side—Choose the side where the internal patchcord originates. This field is visible only if you have chosen the type as Optical Card.
- Slot—Choose the slot containing the card where the internal patchcord originates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord originates. This field is visible only if you have chosen the type as Passive Card.

Note Choose the same passive card that you chose in Step 7.

- Tx Port—Choose the TX port where the internal patchcord originates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 10 Click **Next**.

Step 11 In the internal Patchcord Termination Reverse page, provision the internal patchcord parameters for the reverse internal patchcord termination route:

- Slot—Choose the slot containing the card where the internal patchcord originates.
- Rx Port—Choose the RX port where the internal patchcord originates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 12 Click **Next**.

Step 13 Click **Finish**. The new internal patchcord appears in the Internal Patchcord table.

Return to your originating procedure (NTP).

DLP-G548 Create an Internal Patchcord Manually Using the OCH-Filter to OCH-Filter Option

Purpose	This task creates a unidirectional or bidirectional internal patchcord between two DWDM add and drop channel ports.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Internal Patchcord** tabs.

Step 2 Click **Create**.

Step 3 On the Internal Patchcord Type Selection page, choose the patchcord type as OCH-Filter to OCH-Filter option and click **Next**.

Step 4 On the Internal Patchcord OCH Attributes page, provision the following parameters:

- OCHNC Wavelength—Sets the OCHNC wavelength for the OCH trunk to OCH filter internal patchcord. Use the unnamed band selection box below to display C-band or L-band wavelengths in the OCHNC Wavelength field. Provision the OCHNC wavelength to the wavelength provisioned for the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE, ADM-10G, OTU2_XP, AR_MXP, AR_XP or ITU-T line card trunk port.
- Bidirectional—If checked, creates a bidirectional internal patchcord.
- PSM Protection—Select this check box if you have provisioned a PSM card in channel protection configuration.

Step 5 Click **Next**.

Step 6 On the Internal Patchcord Origination page, provision the internal patchcord origination parameters:

- Type—Choose the type of card (optical or passive card) where the internal patchcord terminates.
- Side—Choose the side where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Slot—Choose the slot containing the card where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord terminates. This field is visible only if you have chosen the type as Passive Card.
- Tx Port—Choose the TX port where the internal patchcord terminates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 7 In the Internal Patchcord Termination page, provision the internal patchcord termination parameters:

- Type—Choose the type of card (optical or passive card) where the internal patchcord terminates.
- Side—Choose the side where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.

- Slot—Choose the slot containing the card where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord terminates. This field is visible only if you have chosen the type as Passive Card.
- Rx Port—Choose the RX port where the internal patchcord terminates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 8 If you did not choose bidirectional in Step 4, continue with Step 13. Otherwise, continue with the next step.

Step 9 Click **Next**.

Step 10 In the Internal Patchcord Origination Reverse page, provision the internal patchcord parameters for the reverse internal patchcord origination route:

- Type—Choose the type of card (optical or passive card) where the internal patchcord originates.
- Side—Choose the side where the internal patchcord originates. This field is visible only if you have chosen the type as Optical Card.
- Slot—Choose the slot containing the card where the internal patchcord originates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord originates. This field is visible only if you have chosen the type as Passive Card.

Note Choose the same passive card that you chose in Step 7.

- Tx Port—Choose the TX port where the internal patchcord originates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 11 Click **Next**.

Step 12 In the internal Patchcord Termination Reverse page, provision the internal patchcord parameters for the reverse internal patchcord termination route:

- Type—Choose the type of card (optical or passive card) where the internal patchcord terminates.
- Side—Choose the side where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Slot—Choose the slot containing the card where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord terminates. This field is visible only if you have chosen the type as Passive Card.

Note Choose the same passive card that you chose in Step 6.

- Rx Port—Choose the RX port where the internal patchcord terminates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 13 Click **Finish**. The new internal patchcord appears in the Internal Patchcord table.

Return to your originating procedure (NTP).

DLP-G549 Create an Internal Patchcord Manually Using the OTS to OTS Option

Purpose	This task creates a unidirectional or bidirectional internal patchcord between two optical transport section (OTS) ports.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Internal Patchcord** tabs.

Step 2 Click **Create**.

Step 3 On the Internal Patchcord Type Selection page, choose the patchcord type as OTS to OTS and click **Next**.

Step 4 On the Internal Patchcords OTS Attributes page, provision the following parameters:

- Bidirectional—If checked, creates a bidirectional internal patchcord.
- MPO Connection—Creates all the patchcords between two MPO connectors. If this option is checked, the bidirectional option is disabled.
- Exclude Used Port—If checked, excludes the used ports for patchcord creation. If unchecked, more than one patchcord can be created starting from the same port.
- Grid Filter—Select the grid option from the drop-down list.
- Port Type—Select the port type from the drop-down list. The options are:
  - OSC only—Cards with OSC ports and OSCM cards are available for patchcord creation. The MPO Connection and Exclude Used Ports checkboxes are disabled and the Bidirectional option is checked.
  - DC only—Cards with DC ports and passive DCUs are available for patchcord creation. The MPO Connection and Exclude Used Ports checkboxes are disabled and the Bidirectional option is checked. Allows to create an internal patchcord between an optical card and a passive card.

Step 5 Click **Next.**

Step 6 On the Internal Patchcord Origination page, provision the internal patchcord origination parameters:

- Type—Choose the type of card (optical or passive card) where the internal patchcord originates.
- Slot—Choose the slot containing the card where the internal patchcord originates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord originates. This field is visible only if you have chosen the type as Passive Card.
- Tx Port—Choose the TX port where the internal patchcord originates. CTC automatically displays the list of ports that are available depending on the link type you choose.
- MPO—Choose the port where the internal patchcord originates.CTC automatically displays the list of ports that are available depending on the link type you choose. This field is visible only if you have chosen MPO connection in Step 4.

Step 7 Click **Next.**

Step 8 In the Internal Patchcord Termination page, provision the internal patchcord termination parameters:

- Type—Choose the type of card (optical or passive card) where the internal patchcord terminates.
- Slot—Choose the slot containing the card where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord terminates. This field is visible only if you have chosen the type as Passive Card.
- Rx Port—Choose the RX port where the internal patchcord terminates. CTC automatically displays the list of ports that are available depending on the link type you choose.
- MPO—Choose the port where the internal patchcord originates.CTC automatically displays the list of ports that are available depending on the link type you choose. This field is visible only if you have chosen MPO connection in Step 4.

Step 9 If you did not choose bidirectional in Step 4, continue with Step 14. Otherwise, continue with the next step.

Step 10 Click **Next**.

Step 11 In the Internal Patchcord Origination Reverse page, provision the internal patchcord parameters for the reverse internal patchcord origination route:

- Type—Choose the type of card (optical or passive card) where the internal patchcord originates.
- Side—Choose the side where the internal patchcord originates. This field is visible only if you have chosen the type as Optical Card.
- Slot—Choose the slot containing the card where the internal patchcord originates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord originates. This field is visible only if you have chosen the type as Passive Card.

Note Choose the same passive card that you chose in Step 8.

- Tx Port—Choose the TX port where the internal patchcord originates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 12 Click **Next**.

Step 13 In the internal Patchcord Termination Reverse page, provision the internal patchcord parameters for the reverse internal patchcord termination route:

- Type—Choose the type of card (optical or passive card) where the internal patchcord terminates.
- Side—Choose the side where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Slot—Choose the slot containing the card where the internal patchcord terminates. This field is visible only if you have chosen the type as Optical Card.
- Unit—Choose the passive card where the internal patchcord terminates. This field is visible only if you have chosen the type as Passive Card.

Note Choose the same passive card that you chose in Step 6.

- Rx Port—Choose the RX port where the internal patchcord terminates. CTC automatically displays the list of ports that are available depending on the link type you choose.

Step 14 Click **Finish**. The new internal patchcord appears in the Internal Patchcord table.

Return to your originating procedure (NTP).

DLP-G531 Create an Internal Patchcord Manually Using the Optical Path Option

Purpose	This task creates an internal patchcord manually between two optical cards or between an optical card and a passive card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Internal Patchcord** tabs.

Step 2 Click **Create**.

Step 3 On the Internal Patchcord Type Selection page, choose the patchcord type as Optical Path and click **Next**.

Step 4 On the Internal Patchcord Card List page, provision the following parameters:

- Card From Selection area:
  - Type—Choose the type of card (optical or passive card) where the internal patchcord originates.
  - Shelf—(Multishelf nodes only) Choose the shelf where the internal patchcord originates.
  - Slot—Choose the slot containing the card where the internal patchcord originates.
- Card To Selection area:
  - Type—Choose the type of card (optical or passive card) where the internal patchcord terminates.
  - Shelf—(Multishelf nodes only) Choose the shelf where the internal patchcord terminates.
  - Slot—Choose the slot containing the card where the internal patchcord terminates.
- Choose the required patchcord from the list that CTC generates.

Step 5 Click **Next** to continue creating internal patchcords between cards and repeat Step 4. In the Internal Patchcord Card List page that follows, CTC automatically populates the Card From Selection fields with the values you entered in the Card To Selection fields in the previous page.

Step 6 After creating all the internal patchcords between cards, click **Finish**. The new internal patchcords appear on the Internal Patchcord table.

Step 7 Return to your originating procedure (NTP).

DLP-G355 Delete an Internal Patchcord

Purpose	This task deletes an internal patchcord.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Internal Patchcord** tabs.

Step 2 Click the connection you want to delete.

Step 3 Click **Delete**, then click **Yes**.

Step 4 Return to your originating procedure (NTP).

NTP-G209 Create, Edit, and Delete Optical Sides

Purpose	This procedure allows you to create, edit, and delete optical sides on a DWDM node.
Tools/Equipment	None
Prerequisite Procedures	NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note For any node type including mesh nodes, the association between the shelf, line card and side is reported in the left top window of CTC (Vital Status Pane) in the mode view.

Note For mesh nodes, the association between sides and the 40-WXC-C cards can be found in the **Provisioning > WDM-ANS > Internal Patchcords** screen.
For example:
PP-MESH, LC (A): Shelf 1, Slot 3 (40 WXC), port EXP-TX
PP-MESH, MPO (A): Shelf 1, Slot 3 (40 WXC), port EXP-RX
The above rows indicate that the:
WXC port located in Shelf 1, Slot 3 is connected to the LC connector A (Side A) on PP-MESH.
WXC port located in Shelf 1, Slot 3 is connected to the MPO connector A (Side A) on PP-MESH.

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to provision the optical side. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the following tasks:

- Complete the "DLP-G491 Create an Optical Side" task on page 14-124.
- Complete the "DLP-G492 Edit an Optical Side" task on page 14-125.
- Complete the "DLP-G480 Delete an Optical Side" task on page 14-125.

Stop. **You have completed this procedure**.

DLP-G491 Create an Optical Side

Purpose	This task creates an optical side. For more details on optical sides, refer to Chapter 12, "Node Reference.".
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Optical Sides** tabs.

Step 2 Click **Create**.

Step 3 In the Create Side dialog box, enter the following:

- Side ID—Choose a side ID (A, B,C, D, E, F, G, or H) from the drop-down list.
- Line In—Choose an RX port from the drop-down list.
- Line Out—Choose a TX port from the drop-down list.

Note For a terminal node equipped with a PSM card in line or multiplex section protection configuration, you can only choose the W-RX and W-TX ports while creating an optical side. After you create the working (w) optical side, the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card automatically creates the protected (p) optical side involving the P-RX and P-TX ports of the PSM card. CTC refreshes the Optical Sides tab with both the working and protected optical sides.

Step 4 Return to your originating procedure (NTP).

DLP-G492 Edit an Optical Side

Purpose	This task edits the side ID of an optical side.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Optical Sides** tabs.

Step 2 Click the optical side that you want to edit.

Step 3 Click **Edit**.

Step 4 In the Edit Side ID dialog box, choose a side ID (A, B,C, D, E, F, G, or H) from the drop-down list.

Step 5 Click **OK**.

Step 6 Return to your originating procedure (NTP).

DLP-G480 Delete an Optical Side

Purpose	This task deletes an optical side.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click **Provisioning > WDM-ANS > Optical Sides** tabs.

Step 2 Click the optical side that you want to delete.

Step 3 Click **Delete**.

Step 4 In the confirmation dialog box, click **Yes** to continue.

Step 5 Return to your originating procedure (NTP).

NTP-G38 Provision OSC Terminations

Purpose	This procedure provisions the OSC terminations. The OSC provides a bidirectional channel that connects all nodes within a DWDM ring. The OSC carries a supervisory data channel and synchronizes clocking at network nodes. The OSC also carries a user data channel.
Tools/Equipment	None
Prerequisite Procedures	NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note Before provisioning OSC terminations on TNC ports carrying Fast Ethernet (FE) payloads, ensure to set the ALS mode on these ports to Disabled.

Note This procedure automatically turns on any OPT-RAMP-C, OPT-RAMP-CE, or RAMAN-CTP cards installed in the DWDM ring.

Note The DCCs, GCCs, and OSCs should not be provisioned between SONET (ANSI) and SDH (ETSI) nodes using CTC or TL1 because they cannot operate between SONET and SDH nodes. These communication channels should be provisioned on similar nodes, such as SONET-to-SONET or SDH-to-SDH.

Note In a pure ONS 15454 M6 network configuration, provision the OSC in GE or FE SFP mode. If an OC3 OSC is mandatory, then the network must be timing-synchronized as SONET. Identify the master node and provide external timing signal to the BITS input pins of the master node and provision line timing to the remaining nodes in the network.
In a mixed ONS 15454 and ONS 15454 M6 network configuration, provision the OSC only in OC3 SFP mode. Identify the master node and provide external timing signal to the BITS input pins of the master node and provision line timing to the remaining nodes in the network.

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to provision the OSC terminations. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Comm Channels > OSC** tabs.

Step 3 In the OSC Terminations area, click **Create**.

Step 4 In the Create OSC Terminations dialog box, choose the ports where you want to create the OSC termination. To select more than one port, press the **Shift** key (to select a range of ports) or the **Ctrl** key (to select multiple individual ports).

> **Note** The number of OSC terminations that you create depends on the node type defined by Cisco Transport Planner. Terminal nodes require one OSC termination. Hub, OADM, and ROADM nodes require two OSC terminations.

Step 5 In the Layer 3 area, check the OSI box if the following conditions are met:

- The OSC termination is between the ONS 15454 and another ONS node.
- Third party NEs that use the OSI protocol stack are on the same network.

If you checked OSI, complete the following steps. If not, continue with Step 6.

a. Click **Next**.

b. Provision the following fields:

   - Router—Choose the OSI router.
   - ESH—Set the ESH propagation frequency. End system NEs transmit ESHs to inform other ESs and ISs about the NSAPs they serve. The default is 10 seconds. The range is 10 to 1000 seconds.
   - ISH—Sets the ISH PDU propagation frequency. Intermediate system NEs send ISHs to other ESs and ISs to inform them about the IS NETs it serves. The default is 10 seconds. The range is 10 to 1000 seconds.
   - IIH—Sets the IIH PDU propagation frequency. The IS-IS Hello PDUs establish and maintain adjacencies between ISs. The default is 3 seconds. The range is 1 to 600 seconds.
   - Metric—Sets the cost for sending packets on the LAN subnet. The IS-IS protocol uses the cost to calculate the shortest routing path. The default metric cost for LAN subnets is 20. It normally should not be changed.

Step 6 Click **Finish**. Ports are automatically placed in service. The following alarms might appear in the node view (single-shelf mode) or multishelf view (multishelf mode) Alarms tab Description field. They will remain until all the network OSC connections between the adjacent nodes are created:

- SDCC Termination Failure (ANSI) or RS-DCC Termination Failure (ETSI) on the OSCM or OSC-CSM card
- LOS on the OC-3 port (Port 1) on the OSCM, OSC-CSM, or OPT-BST card
- OPWR-LFAIL on the OPT-BST or OSC-CSM card

> **Note** After the OSC termination is created, the line ports are placed in service and span power levels are checked.

Stop. **You have completed this procedure**.

NTP-G37 Run Automatic Node Setup

Purpose	This procedure runs the Launch ANS function. Launch ANS applies the ANS parameters (calculated in the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47) to the node and to the ports for cards installed in the node. The applied ANS parameters include span loss values, threshold values, power references, and others. Launch ANS also sets the VOA references based on the calculated power references.
Tools/Equipment	The Cisco Transport Planner Installation Parameters file
Prerequisite Procedures	NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3 NTP-G30 Install the DWDM Cards, page 14-64 NTP-G152 Create and Verify Internal Patchcords, page 14-113 NTP-G143 Import the Cisco Transport Planner NE Update Configuration File, page 14-47
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note ANS provisioning parameters must be calculated by Cisco Transport Planner. ANS provisioning parameters must be manually changed only by Cisco qualified personnel. Setting wrong ANS provisioning (either as preamplifier or booster input power thresholds) may impact traffic.

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to run ANS. If you are already logged in, continue with Step 2.

Step 2 Referring to the Cisco Transport Planner Installation Parameters (see Table 14-1 on page 14-4), identify the parameters that have a Yes in the Manually Set column. If there are no parameters that have a Yes in the Manually Set column, continue with Step 6.

Step 3 In CTC, display the card where the parameter is to be manually provisioned in card view.

Step 4 Enter the specified Calibration parameter from the Cisco Transport Planner Installation Parameters table. Click **Apply**.

Step 5 Repeat Steps 2 through 4 for each parameter in the Cisco Transport Planner Installation Parameters table that displays Yes in the Manually Set field.

Step 6 Change to node view (single-shelf mode) or multishelf view (multishelf mode).

Step 7 Click the **Provisioning > WDM-ANS > Port Status** tabs.

Step 8 Click **Launch ANS**.

Step 9 In the Apply Launch ANS dialog box, click **Yes**.

Step 10 In the Launch ANS confirmation dialog box, click **OK**.

Step 11 Verify that one of the following status appears in the Result column for all the ports:

- Success - Changed—The parameter setpoint was recalculated successfully.
- Success - Unchanged—The parameter setpoint did not need recalculation.
- Not applicable—When ports are not in use.

If one of the following statuses is shown, complete the provided instructions:

- Fail - Out of Range—The calculated setpoint is outside the expected range. If this status appears, do not continue until you have investigated and cleared the cause. This status might appear because of an error in the Cisco Transport Planner file. It could also appear because the insertion loss of the installed cards is greater than the estimated insertion loss calculated by Cisco Transport Planner. If so, the Cisco Transport Planner file will need to be recalculated. All of these possible causes should be investigated. Contact your next level of support if you are unable to clear this status.
- Fail - Missing Input Parameter—The parameter could not be calculated because the required provisioning data is unknown or unavailable. If this status appears, check if the correct Cisco Transport Planner file was imported.
- Unchanged - Port in IS—The parameter could not be calculated because the port is in service. This status should normally not appear at this point in node turn-up. If it does, display the card in card view, change the port administrative state to OOS,DSLB (ANSI) or Locked,disabled (ETSI), and repeat Steps 6 through 11.

Note If the ports that are in service carry circuits, you must delete the circuits before you can place the ports out of service. See the "DLP-G347 Delete Optical Channel Client Connections" task on page 16-26, the "DLP-G418 Delete an Optical Channel Trail" task on page 16-37, or the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46.

Stop. **You have completed this procedure**.

NTP-G39 Verify OSCM Transmit Power

Purpose	This procedure verifies that the transmit power for the ONS 15454 OSCM and the OSC-CSM cards is correct.
Tools/Equipment	None
Prerequisite Procedures	NTP-G37 Run Automatic Node Setup, page 14-128
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note Throughout this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to verify the OSCM or OSC-CSM transmit power. If you are already logged in, continue with Step 2.

Step 2 Disable automatic laser shutdown (ALS) on Side A or (for terminal nodes) the terminal side OSCM or OSC-CSM card:

a. In the node view (single-shelf mode) or shelf view (multishelf mode), double-click the Side A or terminal-side OSCM or OSC-CSM card.

b. Click the **Maintenance > ALS** tabs.

c. From the ALS Mode drop-down list, choose **Disable**.

d. Click **Apply**. Click **Yes** in the confirmation dialog box.

Step 3 If an OSC-CSM or OSCM card is installed on Side B, complete the following steps. If not, continue with Step 4.

a. In the node view (single-shelf mode) or shelf view (multishelf mode), double-click the Side B OSCM or OSC-CSM card.

b. Click the **Maintenance > ALS** tabs.

c. From the ALS Mode drop-down list, choose **Disable**.

d. Click **Apply**. Click **Yes** in the confirmation dialog box.

Step 4 Complete the "DLP-G314 Verify OSCM Transmit Power" task on page 14-130.

Step 5 Change ALS to Auto Restart on the Side A or (for terminal nodes) the terminal side OSCM or OSC-CSM card:

a. In the node view (single-shelf mode) or shelf view (multishelf mode), double-click the Side A or terminal-side OSCM or OSC-CSM card.

b. Click the **Maintenance > ALS** tabs.

c. From the ALS Mode drop-down list, choose **Auto Restart**.

d. Click **Apply**. Click **Yes** in the confirmation dialog box.

Step 6 If an OSC-CSM or OSCM card is installed on Side B, complete the following steps. If not, you have completed this procedure.

a. In the node view (single-shelf mode) or shelf view (multishelf mode), double-click Side B OSCM or OSC-CSM card.

b. Click the **Maintenance > ALS** tabs.

c. From the ALS Mode drop-down list, choose **Auto Restart**.

d. Click **Apply**. Click **Yes** in the confirmation dialog box.

Stop. **You have completed this procedure**.

DLP-G314 Verify OSCM Transmit Power

Purpose	This task verifies that the transmit power of the OSCM card is correct.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the OSCM card in card view.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Record the Port 3 (OSC TX) Power value: _____.

Step 4 Change to node view (single-shelf mode) or multishelf view (multishelf mode), then click the **Provisioning > WDM-ANS > Provisioning** tabs.

Step 5 Record the OSC Power value under the OSCM card in the tree view.

Step 6 If the power value recorded in Step 3 is not within the range of +/– 0.5 dBm recorded in Step 5, complete the following steps. Otherwise, continue with Step 7.

a. Click the **Maintenance > ALS** tabs. Verify that the ALS Command is set to OSRI Off. If not, choose **Off** from the drop-down list. Click **Apply**, then click **Yes**.

b. Clean the optical connections.

c. Complete the following procedures:

- Delete the two OSC channels using the DLP-G186 Delete an OSC Termination.
- Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.
- Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

d. Repeat Step 3 through Step 6. If the power level is still not within the specified range, contact your next level of support.

Step 7 Return to your originating procedure (NTP).

NTP-G163 Upgrade Nodes in Single-Shelf Mode to Multishelf Mode

Purpose	This procedure upgrades nodes in single-shelf mode to multishelf mode.
Tools/Equipment	The node you plan to use as the node controller must be equipped with optical units and cannot have a cross-connect card installed. Any nodes that you plan to add to the multishelf configuration as subtending shelves can be equipped with transponder and muxponder units. For more information on multishelf configurations, see Chapter 12, "Node Reference."
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4 One of the following procedures in the *Cisco ONS 15454 Hardware Installation Guide*: • "NTP-G301 Connect the ONS 15454 Multishelf Node and Subtending Shelves to an MS-ISC-100T Card", or • "NTP-G302 Connect the ONS 15454 Multishelf Node and Subtending Shelves to a Catalyst 2950" • "NTP-G308 Connect the ONS 15454 M6 Multishelf Node and the ONS 15454 M6 Subtending Shelves" • "DLP-G682 Connect the ONS 15454 M6 as the Node Controller in a Mixed Multishelf Configuration"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Caution An optical shelf in a multishelf configuration must be provisioned as the node controller shelf and not a subtending shelf, otherwise traffic will be dropped. If no slots are available on an optical shelf to install the MS-ISC-100T cards needed for a node controller shelf, install and configure the Cisco Catalyst 2950. See the "NTP-G302 Connect the ONS 15454 Multishelf Node and Subtending Shelves to a Catalyst 2950" procedure in the *Cisco ONS 15454 Hardware Installation Guide*.

Step 1 Complete the DLP-G46 Log into CTC task at the node that you want to configure as a multishelf node.

Step 2 If you want to configure a shelf as the node controller, continue with Step 3. If you want to configure a shelf as a subtending shelf, continue with Step 4.

Step 3 To set up the login node as the node controller, complete the following steps:

a. In node view (single-node mode) or multishelf view (multishelf mode), click the **Provisioning > General > Multishelf Config** tabs.

b. Click **Enable as Node Controller**.

c. From the LAN Config drop-down list, complete one of the following:

- Choose **Ethernet Switch** if MS-ISC-100T cards or the Catalyst 2950 switches are already installed and configured.
- Choose **Stand-Alone** if MS-ISC-100T cards are not installed yet but will be in the final layout or if this is a line amplifier or an OSC-only site. This option will allow a safe migration of the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE database when the multishelf configuration is complete.

d. Click **Apply**.

e. In the confirmation dialog box, click **Yes** to allow the node to reboot. The CTC view changes to network view and the node icon changes to gray. Wait for the reboot to finish. (This might take several minutes.)

f. After the node reboots, double-click the node. The multishelf view appears.

Note The shelf ID of the node controller is automatically assigned as 1.

Step 4 To add a node as a subtending shelf in the multishelf configuration, complete the following:

a. In multishelf view, right-click in the white space in the rack and choose **Add Shelf**.

b. Select the type of subtending shelf (ONS 15454 or ONS 15454 M6).

c. In the Shelf ID Selection dialog box, choose a shelf ID (from 2 to 30) from the drop-down list.

d. Click **OK**. The shelf appears in the multishelf view.

e. Preprovision the new shelf so that it has the same provisioning as the actual shelf that you will add as the subtending shelf:

Caution If the subtending shelf is not preprovisioned, traffic will be lost.

- Cards, PPMs, administrative states, client and trunk port configuration—For more information on card and port settings, see Chapter 11, "Provision Transponder and Muxponder Cards."
- Timing—For more information, see the "NTP-G53 Set Up Timing" procedure on page 15-27.

- GCC—For more information, see the "DLP-G76 Provision DCC/GCC Terminations" task on page 16-81.

f. Disconnect the cross-over (CAT-5) LAN cable from the RJ-45 (LAN) port of the ONS 15454 subtending shelf TCC2/TCC2P/TCC3 card in Slot 7 or Slot 11, or from the EMS port of ONS 15454 M6 subtending shelf.

g. Connect your Windows PC or Solaris workstation NIC to the RJ-45 (LAN) port on the subtending shelf ONS 15454 TCC2/TCC2P/TCC3 card in Slot 7 or Slot 11, or to the EMS port of the ONS 15454 M6 subtending shelf.

h. Complete the DLP-G46 Log into CTC task at the subtending shelf.

i. Click the **Provisioning > General > Multishelf Config** tabs.

j. Click **Enable as Subtended Shelf**.

k. Select the appropriate subtending shelf (ONS 15454 or ONS 15454 M6).

l. From the Shelf ID drop-down list, choose the shelf ID that you created in Step c.

m. Click **Apply**.

n. In the confirmation dialog box, click **Yes** to reboot the shelf. The CTC view changes to network view and the node icon changes to gray. Wait for the reboot to finish. (This might take several minutes.)

o. Disconnect your Windows PC or Solaris workstation network interface card (NIC) from the RJ-45 (LAN) port of the subtending shelf TCC2/TCC2P/TCC3 card in Slot 7 or Slot 11, or from the EMS port of the ONS 15454 M6 subtending shelf.

p. Reconnect the cross-over (CAT-5) LAN cable (disconnected in Step f) to the RJ-45 (LAN) port of the subtending shelf TCC2/TCC2P/TCC3 card in Slot 7 or Slot 11, or to the EMS port of the ONS 15454 M6 subtending shelf.

Note The Ethernet cable must be connected to the subtended shelf TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card soon after this TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card completes its boot phase (when it becomes active and its peer TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card starts rebooting). Connecting it before the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card completes its boot phase is a risk in the conversion process. Connecting it long time after completion of the boot phase might affect traffic due to missing provisioning.

q. Repeat Steps a through p to set up additional subtending shelves.

Note Cisco Transport Manager (CTM) users can use the CTM NE Explorer to monitor and configure single-shelf and multishelf nodes. When the upgrade is complete, the original individual subtending shelves will remain the CTM network view and must be manually deleted. For detailed information, refer to the *Cisco Transport Manager User Guide*, Appendix B, "NE Explorer Information."

Stop. You have completed this procedure.

NTP-G210 Provision Node for SNMPv3

Purpose	This procedure provisions the node to allow SNMPv3 access.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required if you want to implement SNMPv3 on your network.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task on the node on which you want to set up SNMPv3. If you are already logged in, go to Step 2.

Step 2 In node view, click the **Provisioning** > **SNMP > SNMP V3** tabs.

Step 3 Complete the following tasks as required:

- DLP-G496 Create an SNMPv3 User, page 14-138
- DLP-G498 Create Group Access, page 14-139

Note A group named default_group is defined in the initial configuration. The default group has read and notify access to the complete MIB tree.

- DLP-G497 Create MIB Views, page 14-139

Note A view named full_view is defined in the initial configuration. It includes the complete MIB tree supported on the node.

Stop. You have completed this procedure.

NTP-G211 Provision Node to Send SNMPv3 Traps

Purpose	This procedure provisions a node to send SNMP v3 traps.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required if you want to implement SNMPv3 on your network.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task on the node on which you want to set up SNMPv3. If you are already logged in, go to Step 2.

Step 2 In node view, click the **Provisioning** > **SNMP > SNMP V3** tabs.

Step 3 Complete the following tasks as required:

- DLP-G496 Create an SNMPv3 User, page 14-138
- DLP-G498 Create Group Access, page 14-139
- DLP-G497 Create MIB Views, page 14-139
- DLP-G501 Create Notification Filters, page 14-142
- DLP-G499 Configure SNMPv3 Trap Destination, page 14-140. When you configure an SNMPv3 trap destination, use the IP address of the NMS, and the port number on which the NMS is listening for traps.

Stop. You have completed this procedure.

NTP-G212 Manually Provision a GNE/ENE to Manage an ENE using SNMPv3

Purpose	This procedure describes how to manually configure a GNE/ENE to allow the NMS to manage an ENE using SNMPv3.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required if you want to implement SNMPv3 on your network.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task on the node on which you want to set up SNMPv3. If you are already logged in, go to Step 2.

Step 2 Go to network view.

Step 3 Double-click the ENE.

Step 4 Click **Provisioning > SNMP > SNMP V3 > General** and note the context engine ID. The is required in Step 8.

Step 5 Double-click the GNE.

Step 6 Complete the "DLP-G496 Create an SNMPv3 User" task on page 14-138 to create an SNMPv3 user on the GNE.

Step 7 Complete the following tasks as needed on the ENE:

- DLP-G496 Create an SNMPv3 User, page 14-138
- DLP-G498 Create Group Access, page 14-139
- DLP-G497 Create MIB Views, page 14-139

Step 8 Complete the "DLP-G502 Manually Configure the SNMPv3 Proxy Forwarder Table" task on page 14-142. Use the from Step 4, the local user details created in Step 6, and the remote user created in Step 7.

Stop. You have completed this procedure.

NTP-G213 Automatically Provision a GNE to Manage an ENE using SNMPv3

Purpose	This procedure describes how to automatically configure a GNE to allow an NMS to manage an ENE using SNMPv3.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required if you want to implement SNMPv3 on your network.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task on the node on which you want to set up SNMPv3. If you are already logged in, go to Step 2.

Step 2 Go to network view.

Step 3 Double-click the GNE.

Step 4 Complete the "DLP-G496 Create an SNMPv3 User" task on page 14-138 to create an SNMPv3 user on the GNE.

Step 5 Complete the "DLP-G503 Automatically Configure the SNMPv3 Proxy Forwarder Table" task on page 14-143. Use the GNE user that you defined in Step 4 when you configure the Proxy Forwarder table.

Note When you use the automatic procedure, CTC automatically creates an ons_proxy user on the ENE, provides ENE user details for the proxy configuration, and provides the of the ENE.

Stop. You have completed this procedure.

NTP-G214 Manually Provision a GNE/ENE to Send SNMPv3 Traps from an ENE using SNMPv3

Purpose	This procedure describes how to manually configure the GNE/ENE to allow an ENE to send SNMPv3 traps to the NMS.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required if you want to implement SNMPv3 on your network.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task on the node on which you want to set up SNMPv3. If you are already logged in, go to Step 2.

Step 2 Go to network view.

Step 3 Double-click the GNE.

Step 4 Complete the "DLP-G496 Create an SNMPv3 User" task on page 14-138 to create an SNMPv3 user on the GNE.

Step 5 On the GNE, complete the "DLP-G499 Configure SNMPv3 Trap Destination" task on page 14-140. The target IP address must be the IPv4 or IPv6 address of the NMS. For the UDP Port number, use the port number on which the NMS is listening for traps. Use the user name configured in Step 4. Also, specify a target tag name.

Step 6 Double-click the ENE.

Step 7 Complete the "DLP-G496 Create an SNMPv3 User" task on page 14-138 to create an SNMPv3 user on the ENE.

Step 8 Complete the following tasks as required:

- DLP-G498 Create Group Access, page 14-139 to create a group on the ENE
- DLP-G497 Create MIB Views, page 14-139 to create a MIB view on the ENE
- DLP-G501 Create Notification Filters, page 14-142

Step 9 On the ENE, complete the "DLP-G499 Configure SNMPv3 Trap Destination" task on page 14-140. The target IP address should be the IP address of the GNE. The UDP port number is 161. Use the user name configured in Step 7.

Step 10 From the network view, click the **Provisioning** > **SNMPv3** tabs.

Step 11 Complete the "DLP-G504 Manually Configure the SNMPv3 Proxy Trap Forwarder Table" task on page 14-144.

The source of the trap must be the IP address of the ENE. For the field, provide the of the ENE. Also, you need to specify the target tag defined in Step 5, and the incoming user details configured in Step 7.

Stop. You have completed this procedure.

NTP-G215 Automatically Provision a GNE/ENE to Send SNMPv3 Traps from an ENE Using SNMPv3

Purpose	This procedure describes how to automatically configure the GNE/ENE to allow an ENE to send SNMPv3 traps to the NMS.
Tools/Equipment	None
Prerequisite Procedures	NTP-G22 Verify Common Card Installation, page 14-4
Required/As Needed	Required if you want to implement SNMPv3 on your network.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task on the node on which you want to set up SNMPv3. If you are already logged in, go to Step 2.

Step 2 Go to Network View.

Step 3 Double-click the GNE.

Step 4 Complete the task "DLP-G496 Create an SNMPv3 User" task on page 14-138 to create an SNMPv3 user on the GNE.

Step 5 On the GNE, complete the following tasks:

- DLP-G499 Configure SNMPv3 Trap Destination, page 14-140. The target IP address must be the IPv4 or IPv6 address of the NMS. For the UDP Port number, use the port number on which the NMS is listening for traps. Also, specify a target tag name.
- DLP-G505 Automatically Configure the SNMPv3 Proxy Trap Forwarder Table, page 14-145. Use the target tag configured in Step 4. Use the IP address of the ENE as the source of trap. The following details are created automatically:
  - A user named ons_trap_user on the ENE
  - Trap destination on the ENE with an IP address of the GNE as the target IP and 161 as the UDP port number
  - Remote user details of the ENE on the GNE

Stop. You have completed this procedure.

DLP-G496 Create an SNMPv3 User

Purpose	This procedure creates an SNMPv3 user.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning** > **SNMP** > **SNMP V3** > **User** tabs.

Step 2 Click **Create**.

Step 3 In the Create User dialog box, enter the following information:

- User Name—Specify the name of the user on the host that connects to the agent. The user name must be a minimum of six and a maximum of 20 alphanumeric (a-z, A-Z, 0-9) characters. For TL1 compatibility, the user name must be of 6 to 10 characters.
- Group Name—Specify the group to which the user belongs.
- Authentication
  - Protocol—Select the authentication algorithm that you want to use. The options are NONE, MD5, and SHA.
  - Password—Enter a password if you select MD5 or SHA. By default, the password length is set to a minimum of eight characters.
- Privacy—Initiates a privacy authentication level setting session that enables the host to encrypt the contents of the message that is sent to the agent.
  - Protocol—Select NONE or DES as the privacy authentication algorithm.

- Password—Enter a password if you select DES.

Step 4 Click **OK** to save the information.

Step 5 Return to your originating procedure (NTP).

DLP-G497 Create MIB Views

Purpose	This procedure creates an SNMPv3 MIB view.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning** > **SNMP > SNMP V3 > MIB views** tabs.

Step 2 Click **Create**.

Step 3 In the Create Views dialog box, enter the following information:

- Name—Name of the view.
- Subtree OID—The MIB subtree which, when combined with the mask, defines the family of subtrees.
- Bit Mask—A family of view subtrees. Each bit in the bit mask corresponds to a sub-identifier of the subtree OID.
- Type—Select the view type. Options are Include and Exclude. Type defines whether the family of subtrees that are defined by the subtree OID and the bit mask combination are included or excluded from the notification filter.

Step 4 Click **OK** to save the information.

Step 5 Return to your originating procedure (NTP).

DLP-G498 Create Group Access

Purpose	This procedure creates a user group and configures the access parameters for the users in the group.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning** > **SNMP > SNMP V3 > Group Access** tabs.

Step 2 Click **Create**.

Step 3 In the Create Group Access dialog box, enter the following information:

- Group Name—The name of the SNMP group, or collection of users, who share a common access policy.
- Security Level—The security level for which the access parameters are defined. Select from the following options:
  - noAuthNoPriv—Uses a user name match for authentication.
  - AuthNoPriv—Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms.
  - AuthPriv—Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms. Provides DES 56-bit encryption based on the CBC-DES (DES-56) standard, in addition to authentication.

  If you select authNoPriv or authPriv for a group, the corresponding user must be configured with an authentication protocol and password, with privacy protocol and password, or both.
- Views
  - Read View Name—Read view name for the group.
  - Notify View Name—Notify view name for the group.
- Allow SNMP Sets—Select this check box if you want the SNMP agent to accept SNMP SET requests. If this check box is not selected, SET requests are rejected.

Note SNMP SET request access is implemented for very few objects.

Step 4 Click **OK** to save the information.

Step 5 Return to your originating procedure (NTP).

DLP-G499 Configure SNMPv3 Trap Destination

Purpose	This procedure provisions SNMPv3 trap destination.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning** > **SNMP > SNMP V3 > Trap Destinations (V3)** tabs.

Step 2 Click **Create**.

Step 3 In the Configure SNMPv3 Trap dialog box, enter the following information:

- Target Address—Target to which the traps should be sent. Use an IPv4 or an IPv6 address.
- UDP Port—UDP port number that the host uses. Default value is 162.
- User Name—Specify the name of the user on the host that connects to the agent.

- Security Level—Select one of the following options:
  - noAuthNoPriv—Uses a user name match for authentication.
  - AuthNoPriv—Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms.
  - AuthPriv—Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms. Provides DES 56-bit encryption based on the CBC-DES (DES-56) standard, in addition to authentication.
- Filter Profile—Select this check box and enter the filter profile name. Traps are sent only if you provide a filter profile name and create a notification filter. For more information, see "DLP-G501 Create Notification Filters" task on page 14-142.
- Proxy Traps Only—If selected, forwards only proxy traps from the ENE. Traps from this node are not sent to the trap destination identified by this entry.
- Proxy Tags—Specify a list of tags. The tag list is needed on a GNE only if an ENE needs to send traps to the trap destination identified by this entry, and wants to use the GNE as the proxy.

Step 4 Click **OK** to save the information.

Step 5 Return to your originating procedure (NTP).

DLP-G500 Delete SNMPv3 Trap Destination

Purpose	This procedure deletes an SNMPv3 trap destination.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning > SNMP> SNMPv3 > Trap Destination** tabs.

Step 2 In the Trap Destinations area, select the trap you want to delete.

Step 3 Click **Delete**. A confirmation dialog box appears.

Step 4 Click **Yes**.

Step 5 Return to your originating procedure (NTP).

DLP-G501 Create Notification Filters

Purpose	This procedure creates SNMPv3 notification filters.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning** > **SNMP > SNMP V3 > Notification Filters** tabs.

Step 2 Click **Create**.

Step 3 In the Create Notify dialog box, enter the following information:

- Filter Profile Name—Specify a name for the filter.
- Subtree OID—The MIB subtree which, when combined with the mask, defines the family of subtrees.
- Bit Mask—A family of view subtrees. Each bit in the bit mask corresponds to a sub-identifier of the subtree OID.
- View Type—Select the view type. Options are Include and Exclude. Type defines whether the family of subtrees that are defined by the subtree OID and the bit mask combination are included or excluded from the notification filter.

Step 4 Click **OK** to save the information.

Step 5 Return to your originating procedure (NTP).

DLP-G502 Manually Configure the SNMPv3 Proxy Forwarder Table

Purpose	This procedure creates an entry in the SNMPv3 Proxy Forwarder Table.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In network view, click **Provisioning > SNMPv3**.

Step 2 In the SNMPv3 Proxy Server area, complete the following:

- Select the GNE to be used as the SNMPv3 proxy server from the drop-down list.
- Select the **Enable IPv6 Target/Trap** check box if the nodes and the NMS stations are on an IPv6 network.

Step 3 In the SNMPv3 Proxy Forwarder Table area, click **Manual Create**.

Step 4 In the Manual Configuration of SNMPv3 Proxy Forwarder dialog box, enter the following information:

- Target IP Address—Target to which the request should be forwarded. Use an IPv4 or an IPv6 address.
- Context Engine ID—The context engine ID of the ENE to which the request is to be forwarded. The context engine ID should be the same as the context engine ID of the incoming request.
- Proxy Type—Type of SNMP request that needs to be forwarded. The options are Read and Write.
- Local User Details—The details of the local user who proxies on behalf of the ENE user.
  - User Name—Specify the name of the user on the host that connects to the agent.
  - Local Security Level—Select the security level of the incoming requests that are to be forwarded. The options are noAuthNoPriv, AuthNoPriv, and AuthPriv.
- Remote User Details—User to which the request is forwarded.
  - User Name—Specify the user name of the remote user.
  - Remote Security Level—Select the security level of the outgoing requests. The options are noAuthNoPriv, AuthNoPriv, and AuthPriv.
- Authentication
  - Protocol—Select the authentication algorithm you want to use. The options are NONE, MD5, and SHA.
  - Password—Enter the password if you select MD5 or SHA.
- Privacy—Enables the host to encrypt the contents of the message that is sent to the agent.
  - Protocol—Select NONE or DES as the privacy authentication algorithm.
  - Password—Enter the password if you select DES. The password should not exceed 64 characters.

Step 5 Click **OK** to save the information.

Step 6 Return to your originating procedure (NTP).

DLP-G503 Automatically Configure the SNMPv3 Proxy Forwarder Table

Purpose	This procedure creates an entry in the SNMPv3 Proxy Forwarder Table.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In network view, click **Provisioning > SNMPv3** tabs.

Step 2 In the SNMPv3 Proxy Server area, complete the following:

- Select the GNE to be used as the SNMPv3 proxy server from the drop-down list.
- Select the **Enable IPv6 Target/Trap** check box if the nodes and the NMS stations are on an IPv6 network.

Step 3 In the SNMPv3 Proxy Forwarder Table area, click **Auto Create**.

Step 4 In the Automatic Configuration of SNMPv3 Proxy Forwarder dialog box, enter the following information:

- Proxy Type—Select the type of proxies to be forwarded. The options are Read and Write.
- Security Level—Select the security level for the incoming requests that are to be forwarded. The options are:
  - noAuthNoPriv—Uses a username match for authentication.
  - AuthNoPriv—Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms.
  - AuthPriv—Provides authentication based on the HMAC-MD5 or HMAC-SHA algorithms. Provides DES 56-bit encryption based on the CBC-DES (DES-56) standard, in addition to authentication.
- Target Address List—Select the proxy destination.
- Local User Name—Select the user name from the list of users.

Note When you configure SNMPv3 Proxy Forwarder Table automatically, the default_group is used on the ENE. The default_group does not have write access. To enable write access and allow SNMP sets, you need to edit the default_group on ENE.

Step 5 Click **OK** to save the settings.

Step 6 Return to your originating procedure (NTP).

DLP-G504 Manually Configure the SNMPv3 Proxy Trap Forwarder Table

Purpose	This procedure creates an entry in the SNMPv3 Proxy Trap Forwarder Table.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In network view, click **Provisioning > SNMPv3** tabs.

Step 2 In the SNMPv3 Proxy Server area, complete the following:

- Select the GNE to be used as the SNMPv3 proxy server from the drop-down list.
- Select the **Enable IPv6 Target/Trap** check box if the nodes and the NMS stations are on an IPv6 network.

Step 3 In the SNMPv3 Proxy Trap Forwarder Table area, click **Manual Create**.

Step 4 In the Manual Configuration of SNMPv3 Proxy Trap Forwarder dialog box, enter the following information:

- Remote Trap Source—Select the IP address from which the traps are sent. If the IP address is not listed, enter the IP address manually.

- Context Engine ID—Specify the context engine ID of the ENE from which traps need to be forwarded. This field is automatically populated if the source of trap is selected. If the source of trap is not specified, you need to manually enter the context engine ID.
- Target Tag—Specify the tag name. The tag identifies the list of NMS that should receive the forwarded traps. Traps are forwarded to all GNE Trap destinations whose proxy tags list contains this tag.
- Remote User Details
  - User Name—Specify the user name.
  - Security Level—Select the security level for the user. The options are noAuthNoPriv, AuthNoPriv, and AuthPriv.
- Authentication—Select the authentication algorithm.
  - Protocol—Select the authentication algorithm you want to use. The options are NONE, MD5, and SHA. Default is None.
  - Password—Enter the password if you select MD5 or SHA.
- Privacy—Enables the host to encrypt the contents of the message that is sent to the agent.
  - Protocol—Select NONE or DES as the privacy authentication algorithm. Encryption is disabled if NONE is selected.
  - Password—Enter the password if you select DES. The password should not exceed 64 characters.

Step 5 Click **OK** to save the information.

Step 6 Return to your originating procedure (NTP).

DLP-G505 Automatically Configure the SNMPv3 Proxy Trap Forwarder Table

Purpose	This procedure creates an entry in the SNMPv3 Proxy Trap Forwarder Table automatically.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 In network view, click **Provisioning > SNMPv3** tabs.

Step 2 In the SNMPv3 Proxy Server area, complete the following:

- Select the GNE to be used as the SNMPv3 proxy server from the drop-down list.
- Select the Enable IPv6 Target/Trap check box if the nodes and the NMS stations are on an IPv6 network.

Step 3 In the **SNMPv3 Proxy Trap Forwarder Table** area, click **Auto Create**.

Step 4 In the Automatic Configuration of SNMPv3 Proxy Trap Forwarder dialog box, enter the following information:

- Target Tag—Specify the tag name. The tag identifies the list of NMS that should receive the forwarded traps. All GNE Trap destinations that have this tag in their proxy tags list are chosen.
- Source of Trap—The list of ENEs whose traps are forwarded to the SNMPv3 Trap destinations that are identified by the Target Tag.

Step 5 Click **OK** to save the information.

Step 6 Return to your originating procedure (NTP).

CHAPTER 21

Perform Node Acceptance Tests

This chapter provides test procedures to verify that installed cards are operating correctly in a Cisco ONS 15454 dense wavelength division multiplexing (DWDM) node. The procedures are optional.

Note The procedures and tasks described in this chapter for the Cisco ONS 15454 platform is applicable to the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, unless noted otherwise.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI (SONET) and ETSI (SDH) shelf assemblies.

Note This chapter does not test the transponder (TXP), muxponder (MXP), GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE, or ADM-10G card installation. Installation and verification for those cards is performed in Chapter 11, "Provision Transponder and Muxponder Cards."

Before You Begin

This section lists the non-trouble procedures (NTPs) required to validate a DWDM node. Turn to a procedure for applicable detailed level procedures (DLPs).

1. NTP-G41 Perform the Terminal or Hub Node with 32MUX-O and 32DMX-O Cards Acceptance Test, page 21-3—Complete this procedure to test terminal and hub nodes with 32MUX-O and 32DMX-O cards installed.
2. NTP-G168 Perform the Terminal or Hub Node with 40-MUX-C and 40-DMX-C Cards Acceptance Test, page 21-8—Complete this procedure to test terminal and hub nodes with 40-MUX-C and 40-DMX-C cards installed. This procedure can also be performed for 40-MUX-C and 40-DMX-CE cards.
3. NTP-G42 Perform the Terminal Node with 32WSS and 32DMX Cards Acceptance Test, page 21-11—Complete this procedure to test terminal nodes with 32WSS and 32DMX cards installed.
4. NTP-G167 Perform the Terminal Node with 40-WSS-C and 40-DMX-C Cards Acceptance Test, page 21-16—Complete this procedure to test terminal nodes with 40-WSS-C and 40-DMX-C cards installed. This procedure can also be performed to test terminal nodes for 40-WSS-CE and 40-DMX-CE cards

5. NTP-G153 Perform the Terminal Node with 32WSS-L and 32DMX-L Cards Acceptance Test, page 21-21—Complete this procedure to test terminal nodes with 32WSS-L and 32DMX-L cards installed.
6. NTP-G43 Perform the ROADM Node with 32WSS and 32DMX Cards Acceptance Test, page 21-28—Complete this procedure to test reconfigurable optical add/drop multiplexing (ROADM) nodes with 32WSS and 32DMX cards installed.
7. NTP-G154 Perform the ROADM Node with 32WSS-L and 32DMX-L Cards Acceptance Test, page 21-40—Complete this procedure to test ROADM nodes with 32WSS-L and 32DMX-L cards installed.
8. NTP-G180 Perform the ROADM Node with 40-WSS-C and 40-DMX-C Cards Acceptance Test, page 21-63—Complete this procedure to test a ROADM node with 40-WSS-C and 40-DMX-C cards installed. This procedure can also be performed for 40-WSS-CE and 40-DMX-CE cards.
9. NTP-G276 Perform the 80-Channel n-degree ROADM Node Acceptance Tests, page 21-68—Complete this procedure to test a n- degree ROADM node with 80-WXC-C cards installed.
10. NTP-G44 Perform the Anti-ASE Hub Node Acceptance Test, page 21-72—Complete this procedure to test anti-amplified spontaneous emission (anti-ASE) hub nodes.
11. NTP-G45 Perform the C-Band and L-Band Line Amplifier Node with OSCM Cards Acceptance Test, page 21-75—Complete this procedure to test C-band and L-Band line amplifier nodes with OSCM cards installed on both Side A and Side B of the shelf.
12. NTP-G46 Perform the C-Band Line Amplifier Node with OSC-CSM Cards Acceptance Test, page 21-79—Complete this procedure to test C-band line amplifier nodes with OSC-CSM cards installed on both Side A and Side B of the shelf.
13. NTP-G156 Perform the L-Band Line Amplifier Node with OSC-CSM Cards Acceptance Test, page 21-83—Complete this procedure to test L-band line amplifier nodes with OSC-CSM cards installed on both Side A and Side B of the shelf.
14. NTP-G47 Perform the C-Band Line Amplifier Node with OSCM and OSC-CSM Cards Acceptance Test, page 21-87—Complete this procedure to test C-band line amplifier nodes with OSCM and OSC-CSM cards installed.
15. NTP-G157 Perform the L-Band Line Amplifier Node with OSCM and OSC-CSM Cards Acceptance Test, page 21-91—Complete this procedure to test L-band line amplifier nodes with OSCM and OSC-CSM cards installed.
16. NTP-G48 Perform the OADM Node Acceptance Test on a Symmetric Node with OSCM Cards, page 21-95—Complete this procedure to test optical add/drop multiplexing (OADM) nodes with OSCM cards installed on both Side A and Side B of the shelf.
17. NTP-G49 Perform the Active OADM Node Acceptance Test on a Symmetric Node with OSC-CSM Cards, page 21-107—Complete this procedure to test OADM nodes with OSC-CSM and OPT-BST or OPT-BST-E cards installed on both Side A and Side B of the shelf.
18. NTP-G50 Perform the Passive OADM Node Acceptance Test on a Symmetric Node with OSC-CSM Cards, page 21-113—Complete this procedure to test OADM nodes with OSC-CSM cards installed on both Side A and Side B of the shelf and no OPT-BST or OPT-BST-E cards installed.
19. NTP-G186 Perform the Four-Degree and Eight-Degree Mesh Patch Panel Acceptance Test, page 21-115—Complete this procedure to test four-degree or eight-degree mesh nodes.
20. NTP-G187 Perform the Multiring Site Acceptance Test, page 21-127—Complete this procedure to test multiring sites.

21. NTP-G188 Perform the Native Mesh Node Acceptance Test, page 21-135—Complete this procedure to test native mesh nodes.
22. NTP-G189 Perform the Node Upgrade Acceptance Test, page 21-140—Complete this procedure to test an upgraded node. The upgraded node connects an existing in-service ROADM node with two sides (each equipped with MMU cards) to a native mesh node with two sides.
23. NTP-G243 Perform the Two-Degree ROADM Node with 40-SMR-1-C and OPT-AMP-17-C Cards Acceptance Test, page 21-148—Complete this procedure to test ROADM nodes with 40-SMR-1-C and OPT-AMP-17-C cards installed.
24. NTP-G244 Perform the Four Degree ROADM Node with 40-SMR-2-C Cards Acceptance Test, page 21-152—Complete this procedure to test ROADM nodes with 40-SMR-2-C cards installed.

NTP-G41 Perform the Terminal or Hub Node with 32MUX-O and 32DMX-O Cards Acceptance Test

Purpose	This procedure tests a DWDM terminal or hub node with 32MUX-O and 32DMX-O cards installed.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Note This procedure tests Side A of hub nodes first, then Side B. If you are testing a terminal node, apply instructions for Side A of the hub node to the terminal side (Side B or Side A) of the terminal node.

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node" they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the hub or terminal node that you want to test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note If optical service channel (OSC) terminations are created, there will be two alarms, one for low power on the OPT-BST or OPT-BST-E card and one for the OSC channel.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If a different status appears, complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 5 Create a physical loopback on the Side A (or terminal) OSC-CSM, OPT-BST or OPT-BST-E amplifier by using a patchcord with 10-dB bulk attenuators to connect the LINE TX port to the LINE RX port.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will appear due to the OSC signal loopback.

Step 6 Wait approximately two minutes, then verify that the OSC link is active on the Side A OSCM or OSC-CSM card by observing whether or not the LOS alarm on the OSCM or OSC-CSM (and the OPT-BST or OPT-BST-E card, if present) clears. (The OSC termination must already be provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Note If the LOS alarm does not clear on the OSC-CSM card, verify that the opwrMin (dBm) Optic Thresholds setting for the OSC-RX port is not higher than the port's Optical Line power value. In the OSC-CSM card view, click the **Provisioning > Optical Line > Optic Thresholds** tabs and record the opwrMin (dBm) setting and compare it to the value found in the Power column for the OSC-RX port in the **Provisioning > Optical Line > Parameters** tabs. Reduce the Optic Thresholds setting for the opwrMin (dBm) value temporarily until the loopback test has been completed to clear the LOS alarm. Reset the Optic Thresholds setting to its original value after clearing the physical loopback.

Step 7 Set the tunable laser or the TXP_MR_10E_C card to the first wavelength of the 100-GHz ITU-T C-band grid (1530.33 nm). Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 8 Connect the tunable laser transmitter or TXP_MR_10E_C card DWDM TX port to the CHAN RX 01 port on the Side A (or terminal) 32MUX-O card using the available patch panel.

Step 9 Display the Side A (or terminal) 32MUX-O card in card view.

Step 10 Click the **Provisioning** > **Optical Chn** > **Parameters** tabs.

Step 11 Change the Port 1 administrative state to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI).

Step 12 Verify that the Port 1 power level reaches the provisioned VOA Power Ref set point.

Note The tunable laser minimum optical output power (Pout) must be 6 dBm. If the output power is lower than the specified value, the 32MUX-O card might not reach the provisioned set point.

Step 13 If an OPT-BST, OPT-BST-E, or OPT-BST-L card is installed, complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 on the Side A (or terminal) OPT-BST, OPT-BST-E, or OPT-BST-L to ensure that the amplifier is working properly. If an OSC-CSM card is installed, go to Step 15.

Step 14 Complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 on the Side A (or terminal) OPT-PRE card to ensure that the amplifier is working properly.

Step 15 Complete the "DLP-G78 Verify the 32MUX-O or 40-MUX-C Card Power" task on page 21-7 to verify that the 32MUX-O is powered correctly.

Step 16 Complete the "DLP-G269 Verify the 32DMX-O or 40-DMX-C Card Power" task on page 21-7 to verify that the 32DMX-O card is powered correctly.

Step 17 Restore the default IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state to the 32MUX-O card port that was changed to OOS,MT (ANSI) or Locked,maintenance (ETSI) in Step 11.

Step 18 Repeat Steps 7 through 17 for the remaining 31 wavelengths of the 100-GHz grid to verify the correct behavior of all variable optical attenuators (VOAs) inside the 32MUX-O card.

Step 19 Remove the loopback created in Step 5.

Step 20 If the node is a hub node, repeat Steps 5 through 19 for the Side B cards.

Step 21 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 22 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Stop. **You have completed this procedure**.

DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power

Purpose	This task verifies that the OPT-BST, OPT-BST-E, or OPT-BST-L amplifier laser is on and provisioned to the correct power.
Tools/Equipment	None
Prerequisite Procedures	"DLP-G46 Log into CTC"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Complete the "DLP-G46 Log into CTC" task at the node that you want to test. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-BST, OPT-BST-E, or OPT-BST-L amplifier to display the card view.

Step 3 Click the **Maintenance** > **ALS** tabs. If the value in the Currently Shutdown field is NO, continue with Step 4. If not, complete the following steps:

a. Check the optical safety remote interlock (OSRI) setting. If it is set to On, change it to **Off**. If the OSRI setting is set to Off and the Currently Shutdown field is Yes, contact your next level of support.

b. Click **Apply**, then click **Yes**.

c. Check the Currently Shutdown field. If it changes to NO, continue with Step 4. If not, contact your next level of support. The amplifier might need to be replaced.

Note The Currently Shutdown field will not change to NO until an active channel is flowing through the OPT-BST, OPT-BST-E, or OPT-BST-L amplifier.

Step 4 Click the **Provisioning > Opt Ampli Line > Parameters** tabs.

Step 5 Click **Reset**.

Step 6 Scroll to the right and locate the Signal Output Power parameter for Port 6 (LINE-TX). Verify that the Signal Output Power value is greater than or equal to the Channel Power Ref.

If the Signal Output Power is not greater than or equal to 1.5 dBm, do not continue. Begin troubleshooting or contact your next level of support.

Step 7 Return to your originating procedure (NTP).

DLP-G80 Verify the OPT-PRE Amplifier Laser and Power

Purpose	This task verifies that the OPT-PRE amplifier laser is on and provisioned to the correct power.
Tools/Equipment	None
Prerequisite Procedures	"DLP-G46 Log into CTC"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf view) or shelf view (multishelf view), double-click the OPT-PRE amplifier to display the card view.

Step 2 Click the **Maintenance > ALS** tabs.

Step 3 If the value shown in the Currently Shutdown field is NO, continue with Step 4. If not, complete the following steps:

a. Check the OSRI setting. If it is set to ON, click the table cell and chose **OFF** from the drop-down list. If the OSRI setting is set to OFF and the Currently Shutdown field is Yes, contact your next level of support.

b. Click **Apply**, then click **Yes**.

c. Check the Currently Shutdown field. If it changes to NO, continue with Step 4. If not, contact your next level of support. The amplifier might need to be replaced.

Step 4 Click the **Provisioning > Opt Ampli Line > Parameters** tabs.

Step 5 Locate the Signal Output Power parameter for Port 2 (COM-TX). Verify that the Signal Output Power value is greater than or equal to the Channel Power Ref. If the Signal Output Power is greater than or equal to the Channel Power Ref, continue with Step 6. If the Signal Output Power is less than the Channel Power Ref, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 6 Scroll to the right to locate the DCU Insertion Loss parameter. Verify that the DCU Insertion Loss value is less than or equal to 10 dB.

If the DCU Insertion Loss is greater than 10 dB, do not continue. Begin troubleshooting or contact your next level of support.

Step 7 Return to your originating procedure (NTP).

DLP-G78 Verify the 32MUX-O or 40-MUX-C Card Power

Purpose	This task verifies 32MUX-O or 40-MUX-C card power.
Tools/Equipment	None
Prerequisite Procedures	"DLP-G46 Log into CTC"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the 32MUX-O or 40-MUX-C card in card view.

Step 2 Click the **Provisioning > Optical Chn > Parameters** tabs.

Step 3 Change the administrative state of the corresponding port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI).

Step 4 Click **Apply**, then click **Yes**.

Step 5 Check that the value in the Power column for the port reaches the value shown in the VOA Power Ref column.

Step 6 Return to your originating procedure (NTP).

DLP-G269 Verify the 32DMX-O or 40-DMX-C Card Power

Purpose	This task verifies that the 32DMX-O or 40-DMX-C card is provisioned to the correct power.
Tools/Equipment	None

Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the 32DMX-O or 40-DMX-C card in card view.

Step 2 Click the **Provisioning > Optical Chn > Parameters** tabs.

Step 3 Change the administrative state for the appropriate port to **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI).

Step 4 Click **Apply**, then click **Yes**.

Step 5 Verify that the value in the Power table cell is the same as the VOA Power Ref table cell value for the port under test.

Step 6 Connect a power meter to the CHAN TX 01 port through the patch panel. Verify that the physical optical power value coming from drop Port 1 on the Side A 32DMX-O card is consistent with the value read (the maximum allowed error is +/– 0.5 dBm).

Step 7 Return to your originating procedure (NTP).

NTP-G168 Perform the Terminal or Hub Node with 40-MUX-C and 40-DMX-C Cards Acceptance Test

Purpose	This procedure tests a DWDM terminal or hub node with 40-MUX-C and 40-DMX-C cards installed.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Note This procedure tests Side A of hub nodes first, then Side B. If you are testing a terminal node, apply instructions for Side A of the hub node to the terminal side (Side B or Side A) of the terminal node.

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node" they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the hub or terminal node that you want to test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note If OSC terminations are created, there will be two alarms, one for low power on the OPT-BST or OPT-BST-E card, and the other an OSC channel alarm.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If a different status appears, complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 5 Create a physical loopback on the Side A (or terminal) OPT-BST or OPT-BST-E amplifier by using a patchcord with 10-dB bulk attenuators to connect the LINE TX port to the LINE RX port.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will appear due to the OSC signal loopback.

Step 6 Verify that the OSC link becomes active on the Side A OSCM or OSC-CSM card. (The OSC termination must already be provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Step 7 Set the tunable laser or the TXP_MR_10E_C card to the first wavelength of the 100-GHz ITU-T C-band grid (1530.33 nm). Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 8 Connect the tunable laser transmitter or TXP_MR_10E_C card DWDM TX port to the CHAN RX 01 port on the Side A (or terminal) 40-MUX-C card using the available patch panel.

Step 9 Display the Side A (or terminal) 40-MUX-C card in card view.

Step 10 Click the **Provisioning** > **Optical Chn** > **Parameters** tabs.

Step 11 Change the Port 1 administrative state to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI).

Step 12 Verify that the Port 1 power level reaches the provisioned VOA Power Ref set point.

Note The tunable laser minimum optical output power (Pout) must be 6 dBm. If the output power is lower than the specified value, the 40-MUX-C card might not reach the provisioned set point.

Step 13 If an OPT-BST, OPT-BST-E, or OPT-BST-L card is installed, complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 on the Side A (or terminal) OPT-BST, OPT-BST-E, or OPT-BST-L to ensure that the amplifier is working properly.

Step 14 Complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 on the Side A (or terminal) OPT-PRE card to ensure that the amplifier is working properly.

Step 15 Complete the "DLP-G78 Verify the 32MUX-O or 40-MUX-C Card Power" task on page 21-7 to verify that the 40-MUX-C card is powered correctly.

Step 16 Complete the "DLP-G269 Verify the 32DMX-O or 40-DMX-C Card Power" task on page 21-7 to verify that the 40-DMX-C card is powered correctly.

Step 17 Restore the default IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state to the 40-MUX-C port that was changed to OOS,MT (ANSI) or Locked,maintenance (ETSI) in Step 11.

Step 18 Repeat Steps 7 through 17 for the remaining 31 wavelengths of the 100-GHz grid to verify the correct behavior of all variable optical attenuators (VOAs) inside the 40-MUX-C card.

Step 19 Remove the loopback created in Step 5.

Step 20 If the node is a hub node, repeat Steps 5 through 19 for the Side B cards.

Step 21 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 22 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Stop. You have completed this procedure.

NTP-G42 Perform the Terminal Node with 32WSS and 32DMX Cards Acceptance Test

Purpose	This acceptance test verifies that a terminal node with 32WSS and 32DMX cards installed is operating properly before you connect it to the network. The test verifies the operation of the amplifiers and also verifies that each 32WSS and 32DMX add/drop and pass-through port operates properly. The test also checks the power levels at each transmit and receive port to ensure that power loss in the cabling is within tolerance. If MMU cards are installed, the test verifies that the MMU insertion loss does not impact add, drop, or pass-through circuits.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C An optical power meter or optical spectrum analyzer 1 bulk attenuator (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Note This procedure creates an optical loopback on the OPT-BST or OPT-BST-E line. An optical signal is sent from the 32WSS input (add) to the OPT-BST or OPT-BST-E common receive (RX) port and back out the OPT-BST or OPT-BST-E transmit (TX) line. The OPT-BST or OPT-BST-E line receives the looped signal from the OPT-BST or OPT-BST-E TX port. It then passes the signal to the OPT-BST or OPT-BST-E common TX port and into the OPT-PRE common RX line. The OPT-PRE sends the signal to the 32DMX card. The optical signal from the tunable laser or TXP_MR_10E_C card must pass successfully through the 32WSS card and out the 32DMX card.

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node" they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the terminal node that you want to test. If you are already logged in, continue with Step 2.

Step 2 Display the terminal node in node view (single-shelf mode) or multishelf view (multishelf mode).

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms (indicated by EQPT in the Cond column) appear indicating equipment failure or other hardware problems. If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note If OSC terminations are created, an OSC channel alarm will appear.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If a different status appears, or if errors (indicated in red) appear, delete the OSC channels and complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128. Provision the OSC channels when automatic node setup (ANS) is complete.

Step 5 Create a physical loopback on the OPT-BST, OPT-BST-E, or OSC-CSM card by using a patchcord with 10-dB bulk attenuators to connect the LINE TX port to the LINE RX port.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will appear due to the OSC signal loopback. This is observed as an alarm on Port 1 of the OSCM or OSC-CSM card.

Step 6 Wait approximately two minutes, then verify that the OSC link is active on the Side A OSCM or OSC-CSM card by observing whether or not the loss of signal (LOS) alarm on the OSCM or OSC-CSM (and the OPT-BST or OPT-BST-E card, if present) clears. (The OSC termination must already be provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Note If the LOS alarm does not clear on the OSC-CSM card, verify that the opwrMin (dBm) Optic Thresholds setting for the OSC-RX port is not higher than the port's Optical Line power value. In the OSC-CSM card view, click the **Provisioning > Optical Line > Optic Thresholds** tabs and record the opwrMin (dBm) setting and compare it to the value found in the Power column for the OSC-RX port in the **Provisioning > Optical Line > Parameters** tabs. Reduce the Optic Thresholds setting for the opwrMin (dBm) value temporarily until the loopback test has been completed to clear the LOS alarm. Reset the Optic Thresholds setting to its original value after clearing the physical loopback.

Step 7 If you are using a tunable laser, follow the manufacturer's instructions to complete the following substeps. If you are using a TXP_MR_10E_C card, continue with Step 8.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength you will test, then continue with Step 9.

Step 8 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 9 Using the available patch panel, connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the CHAN RX 01 port on the 32WSS card.

Note The tunable laser minimum Pout must be –6 dBm. If the output power is lower than –6 dBm, the 32WSS card might not reach the provisioned set point.

Step 10 Display the 32WSS card in card view.

Step 11 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 12 Click the **Admin State** table cell for the add (CHAN-RX) port carrying the tested wavelength, then choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list. For example, if the tested wavelength is 1530.33 nm (shown as 1530.3), you would click the Port 1 (CHAN-RX) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list.

Step 13 Change the administrative state of the pass-through port corresponding to the port in Step 9 to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). For example, if the tested wavelength is 1530.33 nm (shown as 1530.3), you would click the Port 33 (PASS-THROUGH) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list. Refer to Table 21-1 on page 21-42, if needed.

Step 14 Click **Apply**, then click **Yes**.

Step 15 Click the **Maintenance** tab.

Step 16 For Channel #1, change the Operating Mode to **Add Drop**.

Step 17 Click **Apply**, then click **Yes**.

Step 18 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelength under test.

Step 19 Verify that the actual power coming from the tunable laser or TXP_MR_10E_C card shown under the Power column is equal to the specified VOA Power Ref power (+/– 0.2 dB) shown in the same row.

Step 20 Click the **Optical Line** tab.

Step 21 Verify that the Port 83 (COM-TX) Power column value is the same as the VOA Power Ref set point in Step 19 (+/– 0.5 dB). This verifies that the optical signal is traveling correctly through the 32WSS card.

Step 22 If an OPT-BST or OPT-BST-E card is installed, complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 on the OPT-BST or OPT-BST-E to ensure that the amplifier is working properly.

Step 23 If an OSC-CSM is installed, continue with Step 25. If an OPT-BST is installed, verify the connection between Port 67 (COM-TX) on the 32WSS and Port 1 (COM-RX) on the OPT-BST or OPT-BST-E cards:

a. Display the 32WSS card in card view.
b. Click the **Provisioning > Optical Line** tabs.
c. Record the value in the Power table cell for Port 83 (COM-TX).
d. Display the OPT-BST or OPT-BST-E card in card view.
e. Click the **Provisioning > Optical Line > Parameters** tabs.
f. Verify that the value in the Power table cell for Port 1 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST or OPT-BST-E card and the 32WSS cards. Check the values again. If they still do not match, contact your next level of support.

Step 24 If an OPT-BST, OPT-BST-E, or OPT-BST-L card is installed on the Side A or terminal side, complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 to ensure that the amplifier is working properly.

Step 25 Complete the following steps to verify the connection between Port 67 (COM-TX) on the 32WSS and Port 2 (COM-RX) on the OSC-CSM card:

a. Display the 32WSS card in card view.
b. Click the **Provisioning > Optical Line** tabs.

c. Record the value in Power table cell for Port 67 (COM-TX).

d. Display the OSC-CSM card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power table cell for Port 2 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OSC-CSM and 32WSS cards. Check the values again. If they still do not match, contact your next level of support.

Step 26 Complete the following steps to verify the connection between Port 2 (COM-TX) on the OPT-PRE card and Port 33 (COM-RX) on the 32DMX card:

a. Display the OPT-PRE card in card view.

b. Click the **Provisioning > OptAmpliLine** > **Parameters** tabs.

c. Record the value in Power table cell for Port 2 (COM-TX).

d. Display the 32DMX card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power table cell for Port 33 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-PRE and 32DMX cards. Check the values again. If they still do not match, contact your next level of support.

Step 27 Complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 on the OPT-PRE to ensure that the amplifier is working properly.

Step 28 Complete the "DLP-G270 Verify the 32DMX or 40-DMX-C Power" task on page 21-15 to verify that the 32DMX card is powered correctly.

Step 29 Display the 32WSS in card view.

Step 30 Click the **Maintenance** tab.

Step 31 For the circuit (channel) under test, click the **Operating Mode** table cell and choose **Not Assigned** from the drop-down list.

Step 32 Click **Apply**, then **Yes**.

Step 33 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelength under test.

Step 34 Click the **Admin State** table cell. Choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list for all ports that were changed to OOS,MT or Locked,maintenance.

Step 35 Click **Apply**, then **Yes**.

Step 36 Repeat Steps 7 through 35 for the remaining 31 wavelengths of the 100-Ghz grid to verify the correct behavior of all VOAs inside the 32WSS card.

Step 37 Disconnect the TXP card or tunable laser from the 32WSS card.

Step 38 Remove the loopback created in Step 5.

Step 39 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 40 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Stop. **You have completed this procedure**.

DLP-G270 Verify the 32DMX or 40-DMX-C Power

Purpose	This task verifies that the 32DMX or 40-DMX-C card is provisioned to the correct power.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the 32DMX or 40-DMX-C card in card view.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Change the administrative state for the COM TX (Port 33 for the 32DMX or Port 41 for the 40-DMX-C) to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI)

Step 4 Click **Apply**, then **Yes**.

Step 5 Verify that the value shown in the power column is equal to the specified VOA Power Ref column (+/- 0.2dB).

Step 6 (Optional) Connect a power meter to the CHAN TX 01 port through the patch panel. Verify that the physical optical power value coming from the 32DMX or 40-DMX-C drop Port 1 is consistent with the Power value on the Parameters tab, +/– 1.0 dBm.

Step 7 Change the administrative state for the COM TX port to **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI).

Step 8 Return to your originating procedure (NTP).

NTP-G167 Perform the Terminal Node with 40-WSS-C and 40-DMX-C Cards Acceptance Test

Purpose	This acceptance test verifies that a terminal node with 40-WSS-C and 40-DMX-C cards installed is operating properly before you connect it to the network. The test verifies the operation of the amplifiers and also verifies that each 40-WSS-C and 40-DMX-C add/drop and pass-through port operates properly. The test also checks the power levels at each transmit and receive port to ensure that power loss in the cabling is within tolerance. If MMU cards are installed, the test verifies that the MMU insertion loss does not impact add, drop, or pass-through circuits.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C An optical power meter or optical spectrum analyzer 1 bulk attenuator (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Note This procedure creates an optical loopback on the OPT-BST or OPT-BST-E line. An optical signal is sent from the 40-WSS-C input (add) to the OPT-BST or OPT-BST-E common receive (RX) port and back out the OPT-BST or OPT-BST-E transmit (TX) line. The OPT-BST or OPT-BST-E line receives the looped signal from the OPT-BST or OPT-BST-E TX port. It then passes the signal to the OPT-BST or OPT-BST-E common TX port and into the OPT-PRE common RX line. The OPT-PRE sends the signal to the 40-DMX-C. The optical signal from the tunable laser or TXP_MR_10E_C must pass successfully through the 40-WSS-C and out the 40-DMX-C.

Note If the shelf is equipped with an OSC-CSM, this procedure creates an optical loopback on the OSC-CSM line. An optical signal is sent from the 40-WSS-C input (add) to the OSC-CSM common receive (RX) port and back out the OSC-CSM transmit (TX) line. The OSC-CSM line receives the looped signal from the OSC-CSM-TX port. It then passes the signal to the OSC-CSM common TX port and sends the signal to the 40DMX-C. The optical signal from the tunable lase or TXP_MR_!)E_C must pass successfully through the 40-WSS-C and out the 40DMX-C.

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node" they can be used for this procedure. No additional cabling changes are needed.

Warning **The OSC-RX port opwrMin (dBm) Optic Thresholds setting provisioned by CTP can be set too high and generate LOS and Power Fail alarms for this port while performing an optical loopback on the OSC-CSM card. CTP provisions the opwrMin (dBm) Optic Thresholds value higher than the power received during the loopback test, because CTP calculates the thresholds based on the incoming amplified signal from an adjacent node instead of a loopbacked signal from the OSC-CSM card. To clear the alarms, reduce the Optic Thresholds setting for the opwrMin (dBm) value temporarily until the loopback test has been completed. Reset the Optic Thresholds setting to its original value after clearing the physical loopback.**

Step 1 Complete the DLP-G46 Log into CTC at the terminal node that you want to test. If you are already logged in, continue with Step 2.

Step 2 Display the terminal node in node view (single-shelf mode) or multishelf view (multishelf mode).

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms (indicated by EQPT in the Cond column) appear indicating equipment failure or other hardware problems. If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note The OSC terminations created during node turn-up will generate LOS alarms on the OPT-BST, OPT-BST-E, or OPT-AMP-17-C cards, and on the OSC-CSM and OSCM cards. If OSCM cards are installed in ANSI shelves, EOC SDCC Termination Failure alarms will appear.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If other statuses appear, or if errors (indicated in red) appear, delete the OSC channels and complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128. Provision the OSC channels when ANS is complete.

Step 5 If no OSC terminations are present, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 6 Create a physical loopback on the OPT-BST, OPT-BST-E, OPT-AMP-17, or OSC-CSM card by connecting a fiber optic jumper between the LINE TX and RX ports. For OPT-BST or OPT-BST-E cards, connect a 10 dB bulk attenuator to each end of the jumper. The OSC-CSM card does not require attenuation.

Note For ANSI shelves, an EOC SDCC Termination Failure alarm will appear due to the OSC signal loopback. This is observed as an alarm on Port 1 of the OSCM or OSC-CSM card.

Step 7 Provision OSC terminations. Complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 8 Wait approximately two minutes, then verify that the OSC link is active on the Side A OSCM or OSC-CSM card by observing whether or not the LOS alarm on the OSCM or OSC-CSM (and the OPT-BST or OPT-BST-E card, if present) clears. (The OSC termination must already be provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Note If the LOS alarm does not clear on the OSC-CSM card, verify that the opwrMin (dBm) Optic Thresholds setting for the OSC-RX port is not higher than the port's Optical Line power value. In the OSC-CSM card view, click the **Provisioning > Optical Line > Optic Thresholds** tabs and record the opwrMin (dBm) setting and compare it to the value found in the Power column for the OSC-RX port in the **Provisioning > Optical Line > Parameters** tabs. Reduce the Optic Thresholds setting for the opwrMin (dBm) value temporarily until the loopback test has been completed to clear the LOS alarm. Reset the Optic Thresholds setting to its original value after clearing the physical loopback.

Step 9 If you are using a tunable laser, follow the manufacturer's instructions to complete the following substeps. If you are using a TXP_MR_10E_C card, continue with Step 10.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength you will test, then continue with Step 11.

Step 10 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 11 Using the available patch panel, connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the correct CHAN RX port on the 40-WSS-C card for the wavelength that you want to test. Refer to Table 4-1 on page 4-28, if needed. For example, if the tested wavelength is 1530.33 nm (shown as 1530.3), then connect the TXP_MR_10E_C card DWDM TX port to the Optical Connector 1, CHAN RX 01 port on the 40-WSS-C card.

Note The tunable laser minimum Pout must be –6 dBm. If the output power is lower than –6 dBm, the 40-WSS-C card might not reach the provisioned set point.

Step 12 Display the 40-WSS-C card in card view.

Step 13 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 14 Click the **Admin State** table cell for the add (CHAN-RX) port carrying the tested wavelength, then choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list. For example, if the tested wavelength is 1530.33 nm (shown as 1530.3), you would click the Port 1 (CHAN-RX) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list.

Step 15 Change the administrative state of the pass-through port corresponding to the port in Step 11 to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). For example, if the tested wavelength is 1530.33 nm (shown as 1530.3), you would click the Port 41 (PASS-THROUGH) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list. Refer to Table 21-1 on page 21-42, if needed.

Step 16 Click **Apply**, then click **Yes**.

Step 17 Click the **Maintenance** tab.

Step 18 For Channel #1, change Operating Mode to **Add Drop**.

Step 19 Click **Apply**, then click **Yes**.

Step 20 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelength under test.

Step 21 Verify that the actual power coming from the tunable laser or TXP_MR_10E_C card shown under the Power column is equal to the specified VOA Power Ref power (+/– 0.2 dB) shown in the same row.

Step 22 Click the **Optical Line** tab.

Step 23 Verify that the Port 83 (COM-TX) Power column value is the same as the VOA Power Ref set point in Step 21 (+/– 0.5 dB). This verifies that the optical signal is traveling correctly through the 40-WSS-C card.

Step 24 If an OPT-BST, OPT-BST-E, or OPT-BST-L card is installed, complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 on the OPT-BST or OPT-BST-E to ensure that the amplifier is working properly. If an OSC-CSM is installed, complete the "DLP-G84 Verify the OSC-CSM Incoming Power" task on page 21-104.

Step 25 If an OSC-CSM is installed, continue with Step 27. If an OPT-BST is installed, verify the connection between Port 83 (COM-TX) on the 40-WSS-C and Port 1 (COM-RX) on the OPT-BST or OPT-BST-E cards:

a. Display the 40-WSS-C card in card view.

b. Click the **Provisioning > Optical Line** tabs.

c. Record the value in the Power column for Port 83 (COM-TX).

d. Display the OPT-BST or OPT-BST-E card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power column for Port 1 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST or OPT-BST-E card and the 40-WSS-C cards. Check the values again. If they still do not match, contact your next level of support.

Step 26 If an OPT-BST, OPT-BST-E, or OPT-BST-L card is installed on the Side A or terminal side, complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 to ensure that the amplifier is working properly. Continue with Step 29.

Step 27 Complete the following steps to verify the connection between Port 83 (COM-TX) on the 40-WSS-C and the Port 2 (COM-RX) on the OSC-CSM card:

a. Display the 40-WSS-C card in card view.

b. Click the **Provisioning > Optical Line** tabs.

c. Record the value in Power table cell for Port 83 (COM-TX).

d. Display the OSC-CSM card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power table cell for Port 2 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OSC-CSM and 40-WSS-C cards. Check the values again. If they still do not match, contact your next level of support.

Step 28 Complete the following steps to verify the connection between Port 2 (COM-TX) on the OPT-PRE card and Port 41 (COM-RX) on the 40-DMX-C card:

a. Display the OPT-PRE card in card view.

b. Click the **Provisioning > OptAmpliLine** > **Parameters** tabs.

c. Record the total output power in Power column for Port 2 (COM-TX).

d. Display the 40-DMX-C card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power column for Port 41 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-PRE and 40-DMX-C cards. Check the values again. If they still do not match, contact your next level of support.

Step 29 If an OPT-PRE card is installed on the Side A or terminal side, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 on the OPT-PRE card to ensure that the amplifier is working properly. If OSC-CSM cards are installed, complete the "DLP-G84 Verify the OSC-CSM Incoming Power" task on page 21-104.

Step 30 Complete the "DLP-G270 Verify the 32DMX or 40-DMX-C Power" task on page 21-15 to verify that the 40-DMX-C card is powered correctly.

Step 31 Display the 40-WSS-C card in card view.

Step 32 Click the **Maintenance** tab.

Step 33 For the circuit (channel) under test, click the **Operating Mode** table cell and choose **Not Assigned** from the drop-down list.

Step 34 Click **Apply**, then **Yes**.

Step 35 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelength under test.

Step 36 Click the **Admin State** table cell. Choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list for all ports that were changed to OOS,MT or Locked,maintenance in Steps 13 and 14 of this procedure. For example, if the tested wavelength is 1430-33 nm (shown as 1530.3), you would click the Admin State field and choose IS,ANSI (ANSI) or Unlocked,AutomaticInService (ETSI) from the drop-down list for both Port 1 (CHAN-RX) and Port 41 (PASS-THROUGH).

Step 37 Repeat Steps 9 through 36 for the remaining 39 wavelengths of the 100-Ghz grid to verify the correct behavior of all VOAs inside the 40-WSS-C card.

Step 38 Disconnect the TXP card or tunable laser from the 40-WSS-C card.

Step 39 Remove the loopback created in Step 6.

Step 40 Complete the"NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 41 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Stop. **You have completed this procedure**.

NTP-G153 Perform the Terminal Node with 32WSS-L and 32DMX-L Cards Acceptance Test

Purpose	This acceptance test verifies that a terminal node provisioned for L-band wavelengths is operating properly before you connect it to the network. The test verifies the operation of the amplifiers and also verifies that each add/drop and pass-through port on the 32WSS-L and 32DMX-L cards operates properly. The test also checks the power levels at each transmit and receive port to ensure that power loss in the cabling is within tolerance. If MMU cards are installed, the test verifies that the MMU insertion loss does not impact add, drop, or pass-through circuits.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_L An optical power meter or optical spectrum analyzer 1 bulk attenuator (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node" they can be used for this procedure. No additional cabling changes are needed.

Note This procedure creates an optical loopback on the OPT-BST-L line. An optical signal is sent from the 32WSS-L input (add) to the OPT-BST-L common RX port and back out the OPT-BST-L TX line. The OPT-BST-L line receives the looped signal from the OPT-BST-L TX port. It then passes the signal to the OPT-BST-L common TX port and into the OPT-AMP-L (when provisioned in OPT-PRE mode) common RX port. The OPT-AMP-L card sends the signal to the 32DMX-L card. The optical signal from the tunable laser or TXP_MR_10E_L card must pass successfully through the 32WSS-L card and out the 32DMX-L card.

Step 1 Complete the "DLP-G46 Log into CTC" task at the hub or terminal node that you want to test. If you are already logged in, continue with Step 2.

Step 2 Display the terminal node in node view (single-shelf mode) or multishelf view (multishelf mode).

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note If OSC terminations are created, an OSC channel alarm will appear.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed, or Success - Unchanged. If a different status appears, or if errors (indicated in red) appear, delete the OSC channels and complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128. Provision the OSC channels when ANS is complete.

Step 5 Create a physical loopback on the OPT-BST-L, OCSM, or OSC-CSM card by using a patchcord with 10-dB bulk attenuators to connect the LINE TX port to the LINE RX port.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will appear due to the OSC signal loopback. This is observed as an alarm on Port 1 of the OSCM or OSC-CSM card.

Step 6 Wait approximately two minutes, then verify that the OSC link is active on the Side A OSCM or OSC-CSM card by observing whether or not the LOS alarm on the OSCM or OSC-CSM card (and the OPT-BST-L card, if present) clears. (The OSC termination must already be provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Step 7 If you are using a tunable laser, follow the manufacturer's instructions to complete the following substeps. If you are using a TXP_MR_10E_L card, continue with Step 8.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength you will test, then continue with Step 9.

Step 8 If you are using a TXP_MR_10E_L card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test.

Step 9 Using the available patch panel, connect the tunable laser transmitter or the TXP_MR_10E_L card DWDM TX port to the CHAN RX 01 port on the 32WSS-L card.

Note The tunable laser minimum Pout must be –6 dBm. If the output power is lower than –6 dBm, the 32WSS-L card might not reach the provisioned set point.

Step 10 Display the 32WSS-L card in card view.

Step 11 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 12 Click the **Admin State** table cell for the add (CHAN-RX) port carrying the tested wavelength, then choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list. For example, if the tested wavelength is 1577.86 nm (shown as 1577.8), you would click the Port 1 (CHAN-RX) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list.

Step 13 Change the administrative state of the pass-through port corresponding to the port in Step 9 to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). For example, if the tested wavelength is 1577.86 nm (shown as 1577.86), you would click the Port 33 (PASS-THROUGH) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list. Refer to Table 21-1 on page 21-42, if needed.

Step 14 Click **Apply**, then click **Yes**.

Step 15 Click the **Maintenance** tab.

Step 16 For channel under test, change Operating Mode to **Add Drop**.

Step 17 Click **Apply**, then click **Yes**.

Step 18 Click the **Provisioning** > **Optical Chn** > **Parameters** *n* tabs where *n* = the optical connector number that carries the wavelength under test.

Step 19 Verify that the actual power coming from the tunable laser or TXP_MR_10E_L card shown under the Power column is equal to the specified VOA Power Ref power (+/– 0.2 dB) shown in the same row.

Step 20 Click the **Optical Line** tab.

Step 21 Verify that the Port 67 (TX COM) has the same Power column value as the VOA Power Ref set point (+/– 0.5 dB) in Step 19. This verifies that the optical signal is traveling correctly through the 32WSS-L card.

Step 22 If an OPT-BST-L card is installed, complete the "DLP-G359 Verify the OPT-BST-L or OPT-AMP-L (OPT-Line Mode) Amplifier Laser and Power" task on page 21-26 on the OPT-BST-L card to ensure that the amplifier is working properly.

Step 23 If an OSC-CSM is installed, continue with Step 24. If an OPT-BST-L card is installed, verify the connection between Port 67 (COM-TX) on the 32WSS-L and Port 1 (COM-RX) on the OPT-BST-L cards:

- **a.** Display the 32WSS-L card in card view.
- **b.** Click the **Provisioning > Optical Line** tabs.
- **c.** Record the value in the Power table cell for Port 67 (COM-TX).
- **d.** Display the OPT-BST-L card in card view.
- **e.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **f.** Verify that the value in the Power table cell for Port 1 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L and 32WSS-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 24 If an OPT-BST-L card is installed on the Side A or terminal side, complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 to ensure the amplifier is working properly.

Step 25 Complete the following steps to verify the connection between Port 67 (COM-TX) on the 32WSS-L and the Port 2 (COM-RX) on the OSC-CSM card:

- **a.** Display the 32WSS-L card in card view.
- **b.** Click the **Provisioning > Optical Line** tabs.
- **c.** Record the value in Power table cell for Port 67 (COM-TX).
- **d.** Display the OSC-CSM card in card view.
- **e.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **f.** Verify that the value in the Power table cell for Port 2 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OSC-CSM and 32WSS-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 26 Complete the following steps to verify the connection between Port 2 (COM-TX) on the OPT-AMP-L card provisioned in OPT-PRE mode and Port 33 (COM-RX) on the 32DMX-L card:

a. Display the OPT-AMP-L card in card view.

b. Click the **Provisioning > OptAmpliLine** > **Parameters** tabs.

c. Record the value in Power table cell for Port 2 (COM-TX).

d. Display the 32DMX-L card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power table cell for Port 33 (COM-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-AMP-L and 32DMX-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 27 Complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26 on the OPT-PRE card to ensure that the amplifier is working properly.

Step 28 Complete the "DLP-G361 Verify the 32DMX-L Power" task on page 21-27 to verify that the 32DMX card is powered correctly.

Step 29 Display the 32WSS-L in card view.

Step 30 Click the **Maintenance** tab.

Step 31 For the circuit (channel) under test, click the **Operating Mode** table cell and choose **Not Assigned** from the drop-down list.

Step 32 Click **Apply**, then **Yes**.

Step 33 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelength under test.

Step 34 Click the **Admin State** table cell. Choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list for all ports that were changed to OOS,MT or Locked,maintenance.

Step 35 Repeat Steps 7 through 34 for the remaining wavelengths of the 100-Ghz grid to verify the correct behavior of all VOAs inside the 32WSS-L card.

Step 36 Disconnect the TXP card or tunable laser from the 32WSS-L card.

Step 37 Remove the loopback created in Step 5.

Step 38 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 39 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Stop. **You have completed this procedure**.

DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing

Purpose	This procedure provisions a TXP_MR_10E_L and TXP_MR_10E_C cards for acceptance testing when a tunable laser is not available.
Tools/Equipment	TXP_MR_10E_L and TXP_MR_10E_C
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs, page 14-78 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 If you have installed and verified the TXP_MR_10E_L or TXP_MR_10E_C card, continue with Step 2. If you have not installed it, install the cards using the "NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards" procedure on page 14-69.

Step 2 In Cisco Transport Controller (CTC), display the TXP_MR_10E_L or TXP_MR_10E_C card in card view.

Step 3 Click the **Provisioning** > **Line >** *Service-Type* tabs.

Step 4 Click the **Admin State** table cell for the trunk port and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the drop-down list.

Step 5 Click **Apply**, then click **Yes**.

Step 6 Click the **Provisioning > Card** tabs.

Step 7 In the Wavelength field, choose the first wavelength required by the acceptance test.

Step 8 Click **Apply**.

Step 9 Click the **Provisioning** > **Line >** *Service-Type* tabs.

Step 10 Click the **Admin State** table cell for the trunk port and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list.

Step 11 Click **Apply**, then click **Yes**.

Step 12 Connect a power meter to the DWDM TX port. Verify that the output power falls within –4.5 dBm and 1.0 dBm. If it does not fall within this range, replace the card or contact your next level of support.

Step 13 Return to your originating procedure (NTP).

DLP-G359 Verify the OPT-BST-L or OPT-AMP-L (OPT-Line Mode) Amplifier Laser and Power

Purpose	This task verifies that the OPT-BST-L or OPT-AMP-L (when provisioned in OPT-Line mode) amplifier laser is on and provisioned to the correct power.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-BST-L or OPT-AMP-L amplifier to display the card view.

Step 2 Click the **Maintenance > ALS** tabs. If the value in the Currently Shutdown field is NO, continue with Step 3. If not, complete the following steps:

a. Check the OSRI setting. If it is set to On, change it to **Off** and click **Apply**.

b. Check the Currently Shutdown field. If it changes to NO, continue with Step 3. If not, contact your next level of support. The amplifier might need to be replaced.

Step 3 Click the **Provisioning > Opt Ampli Line > Parameters** tabs.

Step 4 Click **Reset**.

Step 5 Scroll to the right and locate the Signal Output Power parameter for Port 6. Verify that the Signal Output Power value is greater than or equal to 1.5 dBm.

If the Signal Output Power is not greater than or equal to 1.5 dBm, do not continue. Begin troubleshooting or contact your next level of support.

Step 6 Return to your originating procedure (NTP).

DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power

Purpose	This task verifies that the OPT-AMP-L (when provisioned in OPT-PRE mode) amplifier laser is on and provisioned to the correct power.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 In node view (single-shelf view) or shelf view (multishelf view), double-click the OPT-AMP-L amplifier to display the card view.

Step 2 Click the **Maintenance > ALS** tabs.

Step 3 If the value shown in the Currently Shutdown field is NO, continue with Step 4. If not, complete the following steps:

a. If the OSRI setting is set to ON, click the table cell and choose **OFF** from the drop-down list.

b. Click **Apply**.

c. Check the Currently Shutdown field. If it changes to NO, continue with Step 4. If not, contact your next level of support.

Step 4 Click the **Provisioning > Opt Ampli Line > Parameters** tabs.

Step 5 Locate the Signal Output Power parameter for Port 2. Verify that the Signal Output Power value is greater than or equal to 1.5 dBm. If the optical power is greater than or equal to 1.5 dBm, continue with Step 6. If the optical power is less than 1.5 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 6 Scroll to the right to locate the DCU Insertion Loss parameter. Verify that the DCU Insertion Loss value is less than or equal to 10 dB.

If the optical power is not greater than or equal to 10 dB, do not continue. Begin troubleshooting or contact your next level of support.

Step 7 Return to your originating procedure (NTP).

DLP-G361 Verify the 32DMX-L Power

Purpose	This task verifies that the 32DMX-L card is provisioned to the correct power.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the 32DMX-L card in card view.

Step 2 Click the **Provisioning > Optical Chn > Parameters** tabs.

Step 3 Change the administrative state for Port 33 to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI)

Step 4 Verify that the VOA Power Ref reaches the provisioned set point.

Step 5 Connect a power meter to the CHAN TX 01 port through the patch panel. Verify that the physical optical power value coming from drop Port 1 on the Side A 32DMX card is consistent with the value read (the maximum allowed error is +/– 1.0 dBm).

Step 6 Change the administrative state for Port 1 to **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI).

Step 7 Return to your originating procedure (NTP).

NTP-G43 Perform the ROADM Node with 32WSS and 32DMX Cards Acceptance Test

Purpose	This acceptance test verifies that a ROADM node provisioned for C-band wavelengths is operating properly before you connect it to the network. The test verifies the operation of the amplifiers and also verifies that each add/drop and pass-through port on the 32WSS and 32DMX cards operates properly. The test also checks the power levels at each transmit and receive port to ensure that power loss in the cabling is within tolerance. If MMU cards are installed, the test verifies that the MMU insertion loss does not impact add, drop, or pass through circuits.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node" they can be used for this procedure. No additional cabling changes are needed.

Note Because the node is isolated and no line-side fibers are connected during the test, the power levels going into the line-side cards will not be the same as the levels after the node is connected to the network. Therefore, if the ROADM shelf does not contain either OPT-BST or OPT-BST-E amplifiers, and OPT-PRE amplifiers on both Side B and Side A, lower the OPT-PRE power thresholds so that it turns on properly. At the end of the test, you will run ANS to configure the node with the correct parameters for the network acceptance test.

Note Throughout this procedure, Side A refers to Slots 1 through 8, and Side B refers to Slots 10 through 17.

Step 1 Complete the "DLP-G46 Log into CTC" task at the ROADM node that you want to test. If you are already logged in, continue with Step 2.

Step 2 Display the ROADM node in node view (single-shelf mode) or multishelf view (multishelf mode).

Step 3 Import the Xml file to fully configure node: layout, patchcords, parameters. See the NTP-G143 Import the Cisco TransportPlanner NE Update Configuration File as necessary.

Step 4 Install the cards and fiber up the node according with the xml file settings.

Step 5 Run the ANS at node level and verify no errors are present. See "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 as necessary.
In node view (single-shelf mode) or multishelf view (multishelf mode), click the Provisioning > WDM-ANS > Port Status tabs. Verify that all statuses under Link Status are either Success - Changed, or Success - Unchanged. If any are not, complete the following step: "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 6 Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 7 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note The OSC terminations created during node turn-up will generate two alarms for each side of the shelf: one an LOS alarm on the OPT-BST or OPT-BST-E card, and the other an LOS alarm on the OSC-CSM or OSCM card. If OSCM cards are installed in ANSI shelves, EOC DCC Termination Failure alarms will appear.

Step 8 Complete the "DLP-G310 Verify ROADM Node C-Band Pass-Through Channels with 32WSS and 40-WSS-C Cards" task on page 21-30.

Step 9 Complete the following tasks for channels that will be added or dropped on the node.

- DLP-G311 Verify the Side A or Side B ROADM C-Band Add/Drop Channels with 32WSS and 40-WSS-C Cards, page 21-35

Step 10 Delete both OSC channels using the "DLP-G186 Delete an OSC Termination" task.

Step 11 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 12 Create the two OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 13 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment failure alarms appear on the node. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Stop. **You have completed this procedure**.

DLP-G310 Verify ROADM Node C-Band Pass-Through Channels with 32WSS and 40-WSS-C Cards

Purpose	This task verifies the signal flow through a ROADM node for C-band pass-through channels. Pass-through channels pass through both the 32WSS or both 40-WSS-C cards. The channels pass through the first 32WSS or 40-WSS-C from the COM-RX port to the EXP-TX port. In the second 32WSS or 40-WSS-C, the channel goes from the EXP-RX port to the COM-TX port. The channel is not terminated inside the node. If MMU cards are installed, the channel passes through the MMU COM-RX and EXP-TX ports to the 32WSS or the 40-WSS-C COM-RX and EXP-TX ports on one side. On the other side, the channel goes from the 32WSS or 40-WSS-C EXP-RX and COM-TX ports to the MMU EXP-RX and COM-TX ports.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	DLP-G46 Log into CTC NTP-G38 Provision OSC Terminations, page 14-126
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this task, Side A refers to Slots 1 through 8, and Side B refers to Slots 10 through 17.

Step 1 Create a physical loopback on the Side A OPT-BST, OPT-BST-E, or OSC-CSM card by connecting the LINE TX port to its LINE RX port. For OPT-BST or OPT-BST-E cards, connect a 10-dB bulk attenuator to the fiber. (OSC-CSM cards do not require attenuation.)

Caution Failure to use proper attenuation might damage the equipment.

Step 2 If an OPT-PRE amplifier or OSC-CSM card is installed on Side A (where the physical loopback was created), perform the following steps. If not, continue with Step 3.

a. Display the OPT-PRE card in card view, then click the **Provisioning > Optical Line > Optics Thresholds** tabs.

b. In the Types area, click **Alarm**, then click **Refresh**. The alarm thresholds for the OPT-PRE card will appear.

c. Double-click the **Power Failure Low** table cell for Port 1 (COM-RX) and delete the current value.

d. Type a new value of **–30.0** and press the **Enter** key.

e. In the CTC window, click **Apply**, then click **Yes** in the confirmation dialog box.

Step 3 If an OPT-PRE or OSC-CSM card is installed on Side B, complete the following steps. If not, continue with Step 4.

a. Display the Side B OPT-PRE card in card view, then click the **Provisioning > Optical Line > Optics Thresholds** tabs.

b. In the Types area, click **Alarm**, then click **Refresh**. The alarm thresholds for the OPT-PRE card will appear.

c. Double-click the **Power Failure Low** table cell for Port 1 (COM-RX) and delete the current value.

d. Type a new value of **–30.0** and press the **Enter** key.

e. In the CTC window, click **Apply**, then click **Yes** in the confirmation dialog box.

Step 4 Wait 2 to 3 minutes, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the Side A OSCM or OSC-CSM card and the OPT-BST or OPT-BST-E card have cleared. The clearing of the LOS alarms indicates that the OSC link is active on Side A. If the alarms do not clear, contact your next level of support.

Note For ANSI shelves, an EOC SDCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

Step 5 Create an OCH-DCN circuit for channel 1 on side A related to EXP path.
The circuit is bidirectional and goes from LINE-RX port of the OPT-BST (or OSC-CSM) side B to the LINE-TX port of the OPT-BST (or OSC-CSM) on the opposite side A.

Step 6 Connect the tunable laser transmitter or the TXP_MR_10E_C card TRUNK-TX port to the Side B OPT-BST, OPT-BST-E, or OSC-CSM LINE RX port. If a Side B OPT-PRE is installed, insert a 10-dB attenuator on the fiber coming from the TXP_MR_10E_C card.

Caution Failure to use proper attenuation might damage the equipment.

Step 7 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_C card, continue with Step 8.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength you will test, then continue with Step 9.

Step 8 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP transmitting the wavelength you will test.

Step 9 If an OPT-PRE card is installed on Side B, complete the following steps. If not, continue with Step 10.

a. Display the Side B OPT-PRE in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Power parameter for Port 1 (COM-RX). Record the value.

d. Display the Side B OPT-BST, OPT-BST-E, or OSC-CSM card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Locate the Power value for Port 2 (COM-TX) (OPT-BST or OPT-BST-E) or Port 3 (COM-TX) (OSC-CSM). Verify that the value matches the power recorded in Step c., +/– 2.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation*

Guide to clean the fiber connection between the OPT-PRE card and the OPT-BST, OPT-BST-E, or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.

g. For the Side B OPT-PRE card, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6.

Step 10 If an MMU card is installed on Side B, complete the following steps, then continue with Step 12. If an MMU card is not installed, continue with Step 11

a. Display the Side B MMU card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 3 (COM-RX) power parameter. Record the value.

d. If a Side B OPT-PRE card is installed, display it in card view and complete Step e. If not, continue with Step f.

e. Click the OPT-PRE **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If a Side B OPT-BST or OPT-BST-E card is installed, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display the Side B OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that value in the Step e, g, or h matches the power recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the MMU card and the OPT-BST, OPT-BST-E, OPT-PRE, or OSC-CSM cards. Check the values again. If they still do not match, contact your next level of support.

j. Display the Side B MMU card in card view.

k. Click the **Provisioning > Optical Line > Parameters** tabs.

l. Record the value in the Power table cell for Port 2 (EXP-TX) of the Side B MMU card.

m. Display the Side B 32WSS or 40-WSS-C card in card view.

n. Click the **Provisioning > Optical Line > Parameters** tabs.

o. Verify that the value in the Power table cell for Port 68 (COM-RX) is equal to the value recorded in Step l, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 40-WSS-C and MMU cards. Check the values again. If they still do not match, contact your next level of support.

p. Continue with Step 12.

Step 11 Verify the Side B 32WSS or 40-WSS-C card to OPT-BST, OPT-PRE, or OSC-CSM card cable connection:

a. Display the Side B 32WSS or 40-WSS-C in card view.

b. Click the **Provisioning > Optical Line > Parameters tabs.**

c. Locate the Port 68 (COM-RX) (for 32WSS card) or Port 84 (COM-RX) (for 40-WSS-C card) Power parameter. Record the value.

d. If a Side B OPT-PRE card is installed, display it in card view and complete Step e. If not, continue with Step f.

e. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If an OPT-BST or OPT-BST-E card is installed on Side B, display it in card view and complete Step g. If not, continue with Step g.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display the Side B OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that the value in Step e, g, or g matches the power recorded in Step c, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS or 40-WSS-C card and the OPT-PRE, OPT-BST, OPT-BST-E, or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.

Step 12 Verify the EXPRESS cable connection between the two 32WSS or two 40-WSS-C cards:

a. Display the Side B 32WSS or 40-WSS-C in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 65 (EXP-TX) (for 32WSS card) or Port 81 (EXP-TX) (for 40-WSS-C card) Power parameter. Record the value.

d. Display the Side A 32WSS or 40-WSS-C in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Locate the Power value for EXPRESS Port 66 (EXP-RX) (for 32WSS card) or Port 82 (EXP-RX) (for 40-WSS-C card). Verify that the value matches the power recorded in Step c, +/–1 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS or 40-WSS-C cards. Check the values again. If they still do not match, contact your next level of support.

Step 13 Display the Side A 32WSS or 40-WSS-C card in card view.
Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the connector number containing the wavelength you are testing. Refer to Table 21-2 on page 21-65, if needed. Wait 60 to 70 seconds (or click **Reset**), then locate the Power and VOA Power Ref parameters for the tested PASS-THROUGH port. Verify that the Power value is equal to the VOA Power Ref value, +/– 1.5 dBm. If the Power value is not equal to the VOA Power Ref value +/–1.5 dBm, contact your next level of support.

Step 14 If an MMU card is installed on Side A, complete the following steps. If an MMU card is not installed on Side A, continue with Step 15.

a. Display the Side A 32WSS or 40-WSS-C card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Record the value in the Power table cell for Port 67 (COM-TX) (for 32WSS card) or Port 83 (COM-TX) (for 40-WSS-C card).

d. Display the Side A MMU card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power table cell for Port 1 (EXP-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS or 40-WSS-C and MMU cards. Check the values again. If they still do not match, contact your next level of support.

g. Record the value in the Power table cell for Port 4 (COM-TX).

h. If a Side A OPT-BST or OPT-BST-E card is installed, display it in card view and complete Step i. If not, continue with Step j.

i. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 1 (COM-RX), then continue with Step k.

j. Display the Side A OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step k.

k. Verify that the value in Step i or j matches the power recorded in Step g, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST, OPT-BST-E, or OSC-CSM card and the MMU cards. Check the values again. If they still do not match, contact your next level of support.

l. Continue with Step 18.

Step 15 For OPT-BST, OPT-BST-E, or OSC-CSM card is installed on Side A, complete the following steps.

a. Display the Side A OPT-BST, OPT-BST-E, or OSC-CSM in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 1 (COM-RX) Power parameter (OPT-BST or OPT-BST-E cards) or the Port 2 (COM-RX) Power parameter (OSC-CSM cards). Record the value.

d. Display the Side A 32WSS or 40-WSS-C in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Locate the Power value for Port 67 (COM-TX) (for 32WSS card) or Port 83 (COM-TX) (for 40-WSS-C card). Verify that the value matches the power recorded in Step c, +/–1 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST, OPT-BST-E, or OSC-CSM card and the 40-WSS-C card. Check the values again. If they still do not match, contact your next level of support.

Step 16 If on Side A an OPT-BST or OPT-BST-E card is installed, complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5. If instead an OSC-CSM is installed, no action is needed.

Step 17 Repeat steps from Step 9 to Step 16 for the same wavelength running on opposite direction (side A-> side B)

Step 18 Complete Step 13 for the additional wavelengths that you want to test. If you have tested all the wavelengths, continue with Step 19.

Step 19 Delete the OCH-DCN circuit created on Step 5.

Step 20 If you used a tunable laser or an installed TXP_MR_10E_C card for this test, disconnect it from the Side A OPT-BST, OPT-BST-E, or OSC-CSM line side RX ports.

Step 21 Remove the loopback fiber from the line RX and TX in the Side A OPT-BST, OPT-BST-E, or OSC-CSM card.

Step 22 Return to your originating procedure (NTP).

DLP-G311 Verify the Side A or Side B ROADM C-Band Add/Drop Channels with 32WSS and 40-WSS-C Cards

Purpose	This task verifies the signal flow through Side A or Side B of a ROADM node for C-band add/drop channels.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this task Side X refers to side you want to test (Side A or Side B) and Side Y refers to the opposite side.

Note Throughout this task, Side A refers to Slots 1 through 8, and Side B refers to Slots 10 through 17.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), display the Alarms tab.

Step 2 Create a physical loopback on the Side X OPT-BST, OPT-BST-E, or OSC-CSM card by connecting the LINE TX port to its LINE RX port. For OPT-BST or OPT-BST-E cards, connect a 10-dB bulk attenuator to the fiber. (OSC-CSM cards do not require attenuation.)

Caution Failure to use proper attenuation might damage the equipment.

Step 3 Wait 2 to 3 minutes, then click the **Alarms** tab. Verify that the LOS alarms on the Side X OSCM or OSC-CSM card and the OPT-BST or OPT-BST-E card have cleared. The clearing of the LOS alarms indicates that the OSC link is active on Side X.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

Step 4 Create an OCH-DCN circuit for channel 1 on Side X related to ADD/DROP path. The circuit is bidirectional and goes from CHAN-RX port (Add) of the 32WSS or 40-WSS-C Side X to the LINE-TX port of the OPT-BST (or OSC-CSM) on the same side and backward from LINE-RX port of the OPT-BST (or OSC-CSM) on Side Y to the CHAN-TX port (Drop) of the 32DMX or 40-WSS-C card belonging to Side X.

Step 5 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_C card, continue with .

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength you are testing, then continue with Step 8.

Step 6 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP transmitting the wavelength you will test. Refer to Table 11-36 on page 11-148, if needed.

Step 7 If you are using a TXP_MR_10E_C card, complete the following steps. If you are using a tunable laser continue with Step 8.

a. Display the TXP_MR_10E_C in card view.

b. Click the **Performance > Optics PM > Current Values** tabs.

c. Locate the Port 2 (Trunk) table cell for the TX Optical Pwr parameter. Record the value.

Step 8 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the Side X fiber patch panel MUX port that is connected to the Side X 32WSS or 40-WSS-C card CHAN RX port carrying the tested wavelength. (If the TXP_MR_10E_C card was installed during Chapter 14, "Turn Up a Node" simply verify the cable connection.)

Step 9 Connect the TXP_MR_10E_C DWDM RX port or the power meter RX port to the Side X fiber patch panel DMX port that is connected with the Side X 32DMX or 40-DMX-C card CHAN-TX port carrying the tested wavelength. (If the TXP_MR_10E_C card was installed during Chapter 14, "Turn Up a Node" simply verify the cable connection.)

Step 10 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you will test. Refer to Table 11-36 on page 11-148, if needed.

Step 11 Find the tested wavelength CHAN RX port, then scroll to the right until you see the Power Add parameter. Verify that the Power Add value for the tested port CHAN RX is equal to the output power level of the tunable laser or the TXP_MR_10E_C card measured in Step 7, +/– 1.0 dBm.

Step 12 Click the **Provisioning > Optical Line > Parameters** tabs and record the value in the Power table cell for Port 67 (COM-TX) for the wavelength under test.

Step 13 Verify that the power value from Step 12 reaches the Shelf *i* Slot *i* (32WSS or 40-WSS-C).Port COM-TX. Power set point +/– 1.0 dBm on Side X. To view this set point:

a. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector window on the left, expand the 32WSS or 40-WSS-C card on Side X.

c. Expand the Port COM-TX category.

d. Select Power.

e. View the value of the Shelf *i* Slot *i* (32WSS or 40-WSS-C).Port COM-TX. Power parameter on the right pane.

f. If the power value does not match the value recorded in Step 12 (+/– 2.0 dBm), contact your next level of support.

Step 14 If an MMU card is installed on Side X, complete the following steps. If an MMU card is not installed on Side X, continue with Step 15.

a. Display the Side X 32WSS or 40-WSS-C card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Record the value in the Power table cell for Port 67 (COM-TX).

d. Display the Side X MMU card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

- **f.** Verify that the value in the Power table cell for Port 1 (EXP-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS or 40-WSS-C and MMU cards. Check the values again. If they still do not match, contact your next level of support.
- **g.** Record the value in the Power table cell for Port 4 (COM-TX).
- **h.** If a Side X OPT-BST or OPT-BST-E card is installed, display it in card view and complete Step i. If not, continue with Step j.
- **i.** Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 1 (COM-RX), then continue with Step k.
- **j.** Display the Side X OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step k.
- **k.** Verify that the value in Step i or j matches the power recorded in Step g, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST, OPT-BST-E, or OSC-CSM card and the MMU cards. Check the values again. If they still do not match, contact your next level of support.
- **l.** Continue with Step 16.

Step 15 Verify the connection between the 32WSS or 40-WSS-C card and the OPT-BST, OPT-BST-E or OSC-CSM cards:

- **a.** Display the Side X 32WSS or 40-WSS-C card in card view.
- **b.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **c.** Record the value in the Power table cell for Port 67 (COM-TX).
- **d.** If a OPT-BST or OPT-BST-E card is installed on Side X, display it in card view and complete Step e. If not, continue with Step f.
- **e.** Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 1 (COM-RX), then continue with Step g.
- **f.** Display the Side X OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step g.
- **g.** Verify that the value in Step e or f matches the power recorded in Step c, +/– 1.0 dB. If so, continue with Step 16. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST, OPT-BST-E, or OSC-CSM card and the 32WSS or 40-WSS-C cards. Check the values again. If they still do not match, contact your next level of support.

Step 16 If an OPT-PRE card is installed on Side X, complete the following steps. If not, continue with Step 17.

- **a.** Display the Side X OPT-PRE in card view.
- **b.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **c.** Locate the Power parameter for Port 1 (COM-RX). Record the value.
- **d.** Display the Side X OPT-BST, OPT-BST-E, or OSC-CSM card in card view.
- **e.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **f.** Locate the Port 2 (COM-TX) Power value (for OPT-BST or OPT-BST-E cards) or Port 3 (COM-TX) Power value (for OSC-CSM cards). Verify that the value matches the power recorded in Step c, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454*

Hardware Installation Guide to clean the fiber connection between the OPT-PRE card and the OPT-BST, OPT-BST-E, or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.

g. For the Side X OPT-PRE card, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6.

Step 17 If an MMU card is installed on Side X, complete the following steps. If an MMU card is not installed on Side X, continue with Step 18.

a. Display the Side X MMU card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 68 (COM-RX) Power parameter. Record the value.

d. If an OPT-PRE card is installed on Side X, display it in card view and complete Step e. If not, continue with Step f.

e. Click the OPT-PRE **Provisioning > Opt.Ampli.Line > Parameters** tabs. Record the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If a Side X OPT-BST or OPT-BST-E card is installed, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display a Side X OSC-CSM card in card view, click the Provisioning > Optical Line > Parameters tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that value in the Step e, g, or h matches the power recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the MMU card and the OPT-BST, OPT-BST-E, or OSC-CSM cards. Check the values again. If they still do not match, contact your next level of support.

j. Display the Side X MMU card in card view.

k. Click the **Provisioning > Optical Line > Parameters** tabs.

l. Record the value in the Power table cell for Port 2 (EXP-TX).

m. Display the Side X 32WSS or 40-WSS-C card in card view.

n. Click the **Provisioning > Optical Line > Parameters** tabs.

o. Verify that the value in the Power table cell for Port 68 (COM-RX) is equal to the value recorded in Step l, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS or 40-WSS-C and MMU cards. Check the values again. If they still do not match, contact your next level of support.

p. Continue with Step 19.

Step 18 Verify the connection between the Side X 32WSS or 40-WSS-C card and the OPT-BST, OPT-BST-E, OPT-PRE, or OSC-CSM card:

a. Display the Side X 32WSS or 40-WSS-C card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 68 (COM-RX) Power parameter. Record the value.

d. If a Side X OPT-PRE card is installed, display it in card view and complete Step e. If not, continue with Step f.

e. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If a Side X OPT-BST or OPT-BST-E card is installed, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display the Side X OSC-CSM card in card view. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that the value in Step e, g, or h matches the power recorded in Step c, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS or 40-WSS-C card and the OPT-PRE, OPT-BST, or OSC-CSM card.

Step 19 Verify the Side X 32WSS or 40-WSS-C and 32DMX or 40-DMX-C connection:

a. Display the Side X 32WSS or 40-WSS-C card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs and record the value in the Power table cell for Port 69 (DROP-TX).

c. Display the Side X 32DMX or 40-DMX-C card in card view.

d. Click the **Provisioning > Optical Line > Parameters** tabs. Record the value in the Port 2 for Side A and Port 33 for Side B for a 32DMX or 40-DMX-C card.

e. (COM-RX) table cell. Verify that the value is equal to the value recorded in b, +/– 1.0 dBm. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS and 32DMX cards. Check the values again. If they still do not match, contact your next level of support.

Step 20 Display the Side X 32DMX or 40-DMX-C card in card view.

Step 21 Click the **Provisioning > Optical Chn > Parameters** tab. Record the CHAN-TX port value under the Power parameter for the wavelength under test.

Step 22 Verify that the power value from Step 21 reaches the Shelf *i* Slot *i* (32DMX or 40-DMX-C).Port CHAN-TX.Power set point +/– 2 dBm on Side X. To view this set point:

a. Go to node view (single-shelf mode) or multishelf view (multishelf mode) and click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector window on the left, expand the 32DMX or 40-DMX-C card on Side X.

c. Expand the Port CHAN-TX category.

d. Select **Power**.

e. View the value of the Shelf *i* Slot *i* (32DMX or 40-DMX-C).Port CHAN-TX.Power parameter on the right pane.

f. If the power value does not match the value recorded in Step 21 (+/– 2 dBm), contact your next level of support.

Step 23 If you are using a TXP_MR_10E_C card, display it in card view. If not, read the values called for in Step 25 from the optical test set or tunable laser you are using.

Step 24 Click the **Performance > Optics PM > Current Values** tabs.

Step 25 In the Port 2 (Trunk) column, locate the RX Optical Power value. Verify that the value matches the power recorded in Step 21, +/– 2 dBm. If the power values do not match (+/– 2 dBm), complete the following steps:

a. Remove, clean, and replace the cable connecting the TXP_MR_10E_C RX port to the Side X fiber patch panel DMX port for the tested wavelength. See the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide.*

b. Repeat this step. If the power values still do not match (+/– 2 dBm) contact your next level of support.

Step 26 Repeat Steps 5 through 25 for the remaining wavelengths.

Step 27 Delete the OCH-DCN circuit created on Step 4

Step 28 If you used a tunable laser or installed a TXP_MR_10E_C card for this test, disconnect it from the Side X patch panel.

Step 29 Unplug the physical loopback fiber from the line TX and RX in the OPT-BST, OPT-BST-E, or OSC-CSM card.

Step 30 Return to your originating procedure (NTP).

NTP-G154 Perform the ROADM Node with 32WSS-L and 32DMX-L Cards Acceptance Test

Purpose	This acceptance test verifies that a ROADM node provisioned for L-band wavelengths is operating properly before you connect it to the network. The test verifies the operation of the amplifiers and also verifies that each add/drop and pass-through port on the 32WSS-L and 32DMX-L cards operates properly. The test also checks the power levels at each transmit and receive port to ensure that power loss in the cabling is within tolerance. If MMU cards are installed, the test verifies that the MMU insertion loss does not impact add, drop, or pass-through traffic.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_L An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node" they can be used for this procedure. No additional cabling changes are needed.

Note Because the node is isolated and no line-side fibers are connected during the test, the power levels going into the line-side components will not be the same as they would be in a real network setup. Therefore, if the ROADM shelf does not contain OPT-BST-L and OPT-AMP-L (provisioned in OPT-PRE mode) amplifiers on both Side B and Side A, you must lower the OPT-AMP-L power thresholds so that it turns on properly. At the end of the test, you will run ANS to configure the node with the correct parameters for the network acceptance test.

Step 1 Make a copy of Table 21-1 on page 21-42 and place it in a convenient location for reference throughout this procedure. The table shows the 32WSS-L ports and the wavelengths assigned to them. The 32 wavelengths are divided among four physical MPO connectors on the 32WSS-L card. Each MPO connector is assigned eight wavelengths. In CTC, the MPO connector appears in the card view Provisioning > Optical Connector tab. Each Optical Connector subtab represents an MPO connector. Ports 1 through 32 are the channel RX (add) ports; Ports 33 through 64 are the pass-through ports.

Table 21-1 32WSS-L Ports and Wavelengths Test Checklist

32WSS-L Provisioning Subtab	Port #	Wavelength	Tested: Pass-Through	Tested: Add/Drop Side A	Tested: Add/Drop Side B
Optical Chn:	RX 1, PT 33	1577.86			
Optical Connector 1	RX 2, PT 34	1578.69			
	RX 3, PT 35	1579.52			
	RX 4, PT 36	1580.35			
	RX 5, PT 37	1581.18			
	RX 6, PT 38	1582.02			
	RX 7, PT 39	1582.85			
	RX 8, PT 40	1583.69			
Optical Chn:	RX 9, PT 41	1584.53			
Optical Connector 2	RX 10, PT 42	1585.36			
	RX 11, PT 43	1586.20			
	RX 12, PT 44	1587.04			
	RX 13, PT 45	1587.88			
	RX 14, PT 46	1588.73			
	RX 15, PT 47	1589.57			
	RX 16, PT 48	1590.41			
Optical Chn:	RX 17, PT 49	1591.26			
Optical Connector 3	RX 18, PT 50	1592.10			
	RX 19, PT 51	1592.95			
	RX 20, PT 52	1593.79			
	RX 21, PT 53	1594.64			
	RX 22, PT 54	1595.49			
	RX 23, PT 55	1596.34			
	RX 24, PT 56	1597.19			
Optical Chn:	RX 25, PT 57	1598.04			
Optical Connector 4	RX 26, PT 58	1598.89			
	RX 27, PT 59	1599.75			
	RX 28, PT 60	1600.60			
	RX 29, PT 61	1601.46			
	RX 30, PT 62	1602.31			
	RX 31, PT 63	1603.17			
	RX 32, PT 64	1604.03			

Step 2 Complete the DLP-G46 Log into CTC at the ROADM node that you want to test. If you are already logged in, continue with Step 3.

Step 3 Display the ROADM node in node view (single-shelf mode) or multishelf view (multishelf mode).

Step 4 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

> **Note** The OSC terminations created during node turn-up will generate two alarms for each side of the shelf, one for an LOS on the OPT-BST-L card, and the other for an LOS on the OSC-CSM or OSCM card. If OSCM cards are installed on ANSI shelves, EOC DCC Termination Failure alarms will appear.

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If any are not, complete the following steps:

a. Delete the two OSC channels using the "DLP-G186 Delete an OSC Termination" task.

b. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

c. Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 6 If MMU cards are installed, complete the following steps. If not, continue with Step 7.

a. Display the Side B MMU card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Click the **Admin State** table cell for the COM RX, COM TX, EXP RX, and EXP TX ports and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list.

d. Click **Apply**, then click **Yes** to confirm.

e. Display the Side A MMU card in card view.

f. Click the **Provisioning > Optical Line > Parameters** tabs.

g. Click the **Admin State** table cell for the COM RX, COM TX, EXP RX, and EXP TX ports and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list.

Step 7 Display the Side B 32WSS-L in card view.

Step 8 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 9 Click the **Admin State** table cell for the add port carrying the tested wavelength, then choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list. For example, if the tested wavelength is 1530.33 nm (shown as 1530.3), you would click the Port 1 (CHAN-RX) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list.

Step 10 Change the administrative state of the pass-through port corresponding to the port in Step 9 to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). For example, if the tested wavelength is 1577.86 nm (shown as 1577.8), you would click the Port 33 (PASS-THROUGH) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list. Refer to Table 21-1 on page 21-42, if needed.

Step 11 Click **Apply**, then click **Yes** to confirm.

Step 12 Repeat Steps 8 through 11 for all wavelengths that you will test.

Step 13 Display the Side A 32WSS-L in card view.

Step 14 Repeat Steps 8 through 12 for the Side A 32WSS-L card.

Step 15 Display the Side B 32DMX-L in card view and complete the following steps:

a. Choose the **Provisioning > Optical Line > Parameters** tabs.

b. For Port 33 (COM-RX), click the **Admin State** table cell and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list.

c. Click **Apply**, then click **Yes** to confirm.

Step 16 Repeat Step 15 for the Side A 32DMX-L card.

Step 17 Complete the "DLP-G362 Verify ROADM Node L-Band Pass-Through Channels" task on page 21-45.

Step 18 Complete the following tasks for channels that will be added or dropped on the node.

- DLP-G363 Verify the Side B ROADM L-Band Add/Drop Channels, page 21-53
- DLP-G364 Verify the Side A ROADM L-Band Add/Drop Channels, page 21-58

Step 19 If MMU cards are installed, complete the following steps. If not, continue with Step 20.

a. Display the Side B MMU card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Click the **Admin State** table cell for the COM RX, COM TX, EXP RX, and EXP TX ports and choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list.

d. Click **Apply**, then click **Yes** to confirm.

e. Display the Side A MMU card in card view.

f. Click the **Provisioning > Optical Line > Parameters** tabs.

g. Click the **Admin State** table cell for the COM RX, COM TX, EXP RX, and EXP TX ports and choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list.

Step 20 Display the Side B 32WSS-L card in card view.

Step 21 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you tested.

Step 22 Click the **Admin State** table cell then choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list for all ports that were changed to OOS,MT or Locked,Maintenance.

Step 23 Click **Apply**.

Step 24 Repeat Steps 21 through 23 for all the ports that are **OOS,MT** or **Locked,maintenance** on the Side B 32WSS-L card.

Step 25 Display the Side A 32WSS-L card in card view.

Step 26 Repeat Steps 21 through 24 for all ports on the Side A 32WSS-L card.

Step 27 Display the Side B 32DMX-L card in card view.

Step 28 Choose the **Provisioning > Optical Line > Parameters** tabs.

Step 29 For Port 33, click the **Admin State** table cell and choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list.

Step 30 Click **Apply**.

Step 31 Display the Side A 32DMX-L card in card view.

Step 32 Repeat Steps 28 through 30 for the Side A 32DMX-L card.

Step 33 Delete both OSC channels using the "DLP-G186 Delete an OSC Termination" task.

Step 34 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 35 Create the two OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 36 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment failure alarms appear on the node. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Stop. **You have completed this procedure**.

DLP-G362 Verify ROADM Node L-Band Pass-Through Channels

Purpose	This task verifies the signal flow through a ROADM node for L-band pass-through channels. Configuring a channel pass-through mode means that the channel passes through both 32WSS-L cards. The channel passes through the first 32WSS-L card from the COM RX port to the EXP TX port. In the second 32WSS-L card, the channel goes from the EXP RX port to the COM TX port. The channel is not terminated inside the node. If MMU cards are installed, the channel passes through the MMU COM RX and EXP TX ports to the 32WSS-L COM RX and EXP TX ports on one side. On the other side, the channel goes from the 32WSS-L EXP RX and 32WSS-L COM TX ports to the MMU EXP RX and COM TX.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_L An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this task, Side A refers to Slots 1 through 8, and Side B refers to Slots 10 through 17.

Step 1 Create a physical loopback on the Side A OPT-BST-L or OSC-CSM card by connecting the LINE TX port to its LINE RX port. For OPT-BST-L cards, connect a 10-dB bulk attenuator to the fiber. (OSC-CSM cards do not require attenuation.)

Caution Failure to use proper attenuation might damage the equipment.

Step 2 If an OPT-AMP-L amplifier (provisioned in OPT-PRE mode) is installed on Side A (where the physical loopback was created), perform the following steps. If not, continue with Step 3.

a. Display the OPT-AMP-L card in card view, then click the **Provisioning > Optical Line > Optics Thresholds** tabs.

b. In the Types area, click **Alarm**, then click **Refresh**. The alarm thresholds for the OPT-AMP-L card will appear.

c. Double-click the Power Failure Low table cell for Port 1 (1-Line-2-1 RX) and delete the current value.

d. Type a new value of **–30**. Press the **Enter** key.

e. In the CTC window, click **Apply**, then click **Yes** in the confirmation dialog box.

Step 3 If an OPT-AMP-L amplifier (provisioned in OPT-PRE mode) is installed on Side B (where the physical loopback was created), perform the following steps. If not, continue with Step 4.

a. Display the OPT-AMP-L card in card view, then click the **Provisioning > Optical Line > Optics Thresholds** tabs.

b. In the Types area, click **Alarm**, then click **Refresh**. The alarm thresholds for the OPT-AMP-L card will appear.

c. Double-click the Power Failure Low table cell for Port 1 (1-Line-2-1 RX) and delete the current value.

d. Type a new value of **–30**. Press the **Enter** key.

e. In the CTC window, click **Apply**, then click **Yes** in the confirmation dialog box.

Step 4 Wait 2 to 3 minutes, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the Side A OSCM or OSC-CSM card and the OPT-BST-L card have cleared. The clearing of the LOS alarms indicates that the OSC link is active on Side A. If the alarms do not clear, contact your next level of support.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

Step 5 Display the Side A 32WSS-L card in card view.

Step 6 Click the **Maintenance** tab.

Step 7 Click the Operating Mode table cell and choose **Pass Through** from the drop-down list.

Step 8 Click **Apply**, then click **Yes** to confirm.

Step 9 Display the Side B 32WSS-L card in card view.

Step 10 Repeat Steps 6 through 8 for the Side B 32WSS-L card.

Step 11 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_L card, continue with Step 12.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength you will test, then continue with Step 13.

Step 12 If you are using a TXP_MR_10E_L card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test.

Step 13 Connect the tunable laser transmitter or the TXP_MR_10E_L card DWDM TX port to the Side B OPT-BST-L or OSC-CSM LINE RX port. If a Side B OPT-AMP-L card is installed, insert a 10-dB attenuator on the fiber coming from the TXP_MR_10E_L card.

Caution Failure to use proper attenuation might damage the equipment.

Step 14 If an OPT-AMP-L card configured as an OPT-PRE is installed on Side B, complete the following steps. If not, continue with Step 15.

- **a.** Display the Side B OPT-AMP-L card in card view.
- **b.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **c.** Locate the Power parameter for Port 1. Record the value.
- **d.** Display the Side B OPT-BST-L or OSC-CSM card in card view.
- **e.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **f.** Locate the Power value for Port 2 (if an OPT-BST-L card) or Port 3 (if an OSC-CSM card). Verify that the value matches the power recorded in Step c, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-AMP-L card and the OPT-BST-L or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.
- **g.** Complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26.

Step 15 If MMU cards are installed complete the following steps. If an MMU cards are not installed, continue with Step 16.

- **a.** Display the Side B MMU card in card view.
- **b.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **c.** Locate the Port 3 (COM-RX) power parameter. Record the value.
- **d.** If a Side B OPT-AMP-L card provisioned as an OPT-PRE is installed, display it in card view and complete Step e. If not, continue with Step f.
- **e.** Click the OPT-AMP-L **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2 (COM-TX), then continue with Step i.
- **f.** If a Side B OPT-BST-L card is installed, display it in card view and complete Step g. If not, continue with Step h.
- **g.** Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.
- **h.** Display the Side B OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.
- **i.** Verify that value in Step e, g, or h matches the power recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the MMU card and the OPT-BST-L, OPT-AMP-L, or OSC-CSM cards. Check the values again. If they still do not match, contact your next level of support.
- **j.** Display the Side B MMU card in card view.
- **k.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **l.** Record the value in the Power table cell for Port 2 (EXP-TX) of the Side B MMU card.

m. Display the Side B 32WSS-L card in card view.

n. Click the **Provisioning > Optical Line > Parameters** tabs.

o. Verify that the value in the Power table cell for Port 68 (COM-RX) is equal to the value recorded in Step l, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS and MMU cards. Check the values again. If they still do not match, contact your next level of support.

p. Continue with Step 17.

Step 16 Verify the Side B 32WSS-L to OPT-BST-L, OPT-AMP-L, or OSC-CSM card cable connection:

a. Display the Side B 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 68 Power parameter. Record the value.

d. If a Side B OPT-AMP-L card provisioned as an OPT-PRE is installed, display it in card view and complete Step e. If not, continue with Step f.

e. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2, then continue with Step i.

f. If a Side B OPT-BST-L card is installed, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Power value for Port 3, then continue with Step i.

h. **D**isplay the Side B OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2, then continue with Step i.

i. Verify that the value in Step e, g, or h matches the power recorded in Step c, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L card and the OPT-AMP-L, OPT-BST-L, or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.

Step 17 Verify the EXPRESS cable connection between the two 32WSS-L cards:

a. Display the Side B 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 65 (EXP-TX) Power parameter. Record the value.

a. Display the Side A 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Power value for Port 66 (EXP-RX). Verify that the value matches the power recorded in Step c, +/–1 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 18 Display the Side A 32WSS-L card in card view.

Step 19 Click the **Provisioning > Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the connector number containing the wavelength you are testing. Refer to Table 21-1 on page 21-42, if needed.

Step 20 Wait 60 to 70 seconds, then locate the Power and VOA Power Ref parameters for the tested PASS-THROUGH port. Verify that the Power value is equal to the VOA Power Ref value, +/– 1.5 dBm. If the Power value is not equal to the VOA Power Ref value, +/– 1.5 dBm, contact your next level of support.

Step 21 If an MMU card is installed on Side A, complete the following steps. If an MMU card is not installed on Side A, continue with Step 22.

a. Display the Side A 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Record the value in the Power table cell for Port 67 (COM-TX).

d. Display the Side A MMU card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power table cell for Port 1 (EXP-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS and MMU cards. Check the values again. If they still do not match, contact your next level of support.

g. Record the value in the Power table cell for Port 4 (COM-TX).

h. If an OPT-BST-L card is installed on Side A, display it in card view and complete Step i. If not, continue with Step j.

i. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 1 (COM-RX), then continue with Step k.

j. Display the Side A OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step k.

k. Verify that the value in Step i or j matches the power recorded in Step g, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L or OSC-CSM card, and the MMU card. Check the values again. If they still do not match, contact your next level of support.

l. Continue with Step 23.

Step 22 If an OPT-BST-L card is installed on Side B, complete the following steps. If not, continue with Step 23.

a. Display the Side B OPT-BST-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 1 Power parameter. Record the value.

d. Display the Side B 32WSS-L card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Locate the Power value for Port 67. Verify that the value matches the power recorded in Step c, +/–1 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L and 32WSS-L cards. Check the values again. If they still do not match, contact your next level of support.

g. Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5.

Step 23 If a Side A OPT-AMP-L card provisioned as an OPT-PRE is installed, complete the following steps. If not, continue with Step 24.

a. Display the Side A OPT-AMP-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Power parameter for Port 1 (COM-RX). Record the value.

d. Display the Side A OPT-BST-L or OSC-CSM card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Locate the Power value for Port 2 (COM-TX) (OPT-BST-L) or Port 3 (COM-TX) (OSC-CSM). Verify that the value matches the power recorded in Step c, +/– 2.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-AMP-L card and the OPT-BST-L or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.

g. For the Side A OPT-AMP-L card provisioned as an OPT-PRE, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26.

Step 24 If an MMU card is installed on Side A, complete the following steps, then continue with Step 26. If an MMU card is not installed on Side A, continue with Step 25.

a. Display the Side A MMU card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 3 (COM-RX) power parameter. Record the value.

d. If a Side A OPT-AMP-L card provisioned in OPT-PRE mode is installed, display it in card view and complete Step e. If not, continue with Step f.

e. Click the OPT-AMP-L **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If an OPT-BST-L card is installed on Side A, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display the Side A OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that value in the Step e, g, or h matches the power recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the MMU card and the OPT-BST-L, OPT-AMP-L, or OSC-CSM cards. Check the values again. If they still do not match, contact your next level of support.

j. Display the Side B MMU card in card view.

k. Click the **Provisioning > Optical Line > Parameters** tabs.

l. Record the value in the Power table cell for Port 2 (EXP-TX) of the Side A MMU card.

m. Display the Side A 32WSS-L card in card view.

n. Click the **Provisioning > Optical Line > Parameters** tabs.

o. Verify that the value in the Power table cell for Port 68 (COM-RX) is equal to the value recorded in Step l, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS and cards and the MMU cards. Check the values again. If they still do not match, contact your next level of support.

p. Continue with Step 26.

Step 25 Verify the Side A 32WSS-L card to OPT-BST-L, OPT-AMP-L, or OSC-CSM card cable connection:

a. Display the Side A 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 68 (COM-RX) Power parameter. Record the value.

d. If a Side A OPT-AMP-L card is installed, display it in card view, and complete Step e. If not, continue with Step f.

e. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If a Side A OPT-BST-L card is installed, display it in card view, and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. **D**isplay the Side A OSC-CSM card in card view, click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that the value in Step e, g, or h matches the power recorded in Step c, +/–1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L card and the OPT-AMP-L, OPT-BST-L, or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.

Step 26 Verify the EXPRESS cable connection between the two 32WSS-L cards:

a. Display the Side A 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 65 (EXP-TX) Power parameter. Record the value.

a. Display the Side B 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Power value for Port 66 (EXP-RX). Verify that the value matches the power recorded in Step c, +/– 1 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 27 Display the Side B 32WSS-L card in card view.

Step 28 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the connector number containing the wavelength you are testing. Refer to Table 21-1 on page 21-42, if needed.

Step 29 Wait 60 to 70 seconds (or click **Reset**), then locate the Power and VOA Power Ref parameters for the tested PASS-THROUGH port. Verify that the Power value is equal to the VOA Power Ref value, +/– 1.5 dBm. If the Power value is not equal to the VOA Power Ref value +/– 1.5 dBm, consult your next level of support.

Step 30 If an MMU card is installed on Side B, complete the following steps. If an MMU card is not installed on Side B, continue with Step 31.

a. Display the Side B 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Record the value in the Power table cell for Port 67 (COM-TX).

d. Display the Side B MMU card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power table cell for Port 1 (EXP-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L and MMU cards. Check the values again. If they still do not match, contact your next level of support.

g. Record the value in the Power table cell for Port 4 (COM-TX).

h. If a Side B OPT-BST-L card is installed, display it in card view and complete Step i. If not, continue with Step j.

i. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 1 (COM-RX), then continue with Step k.

j. Display the Side B OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step k.

k. Verify that the value in Step i or j matches the power recorded in Step g, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L or OSC-CSM card and the MMU cards. Check the values again. If they still do not match, contact your next level of support.

l. Continue with Step 32.

Step 31 If an OPT-BST-L or OSC-CSM card is installed on Side B, complete the following steps. If not, continue with Step 32.

a. Display the Side B OPT-BST-L or OSC-CSM card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 1 (COM-RX) Power parameter (OPT-BST-L card) or the Port 2 (COM-RX) Power parameter (OSC-CSM card). Record the value.

d. Display the Side B 32WSS-L card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Locate the Power value for Port 67 (COM-TX). Verify that the value matches the power recorded in Step c, +/–1 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L card and the OSC-CSM or 32WSS-L card. Check the values again. If they still do not match, contact your next level of support.

g. Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5.

Step 32 Repeat Steps 18 through 20 and 27 through 29 for the remaining wavelengths to be tested. If you have tested all the wavelengths, continue with Step 33.

Step 33 Display the Side B 32WSS-L card in card view.

Step 34 Click the **Maintenance** tab.

Step 35 In the Operating Mode, click the table cell and choose **Not Assigned** from the drop-down list for all wavelengths.

Step 36 Click **Apply**, then click **Yes** to confirm.

Step 37 Display the Side A 32WSS-L in card view.

Step 38 Repeat Steps 34 through 36 for the Side A 32WSS-L card.

Step 39 Remove the TXP or tunable laser from the Side B OPT-BST-L or OSC-CSM line side TX and RX ports.

Step 40 Remove the loopback fiber from the line RX and TX in the Side A OPT-BST-L or OSC-CSM card.

Step 41 Return to your originating procedure (NTP).

DLP-G363 Verify the Side B ROADM L-Band Add/Drop Channels

Purpose	This procedure verifies the signal flow through Side B of a ROADM node for L-band add/drop channels.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_L An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this task, Side A refers to Slots 1 through 8, and Side B refers to Slots 10 through 17.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), display the Alarms tab.

Step 2 Create a physical loopback on the Side B OPT-BST-L or OSC-CSM card by connecting the LINE TX port to its LINE RX port. For OPT-BST-L cards, connect a 10-dB bulk attenuator to the fiber. (OSC-CSM cards do not require attenuation.)

Caution Failure to use proper attenuation might damage the equipment.

Step 3 Wait 2 to 3 minutes, then click the **Alarms** tab. Verify that the LOS alarms on the Side B OSCM or OSC-CSM card and the OPT-BST-L card have cleared. The clearing of the LOS alarms indicates that the OSC link is active on Side B.

Note For ANSI shelves, EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

Step 4 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_L card, continue with Step 5.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength you are testing, then continue with Step 7.

Step 5 If you are using a TXP_MR_10E_L card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test. See Table 21-1 on page 21-42, if needed.

Step 6 If you are using a TXP_MR_10E_L card, complete the following steps. If you are using a tunable laser, continue with Step 7.

a. Display the TXP_MR_10E_L in card view.

b. Click the **Performance > Optics PM > Current Values** tabs.

c. Locate the Port 2 (Trunk) table cell for the TX Optical Pwr parameter. Record the value.

Step 7 Connect the tunable laser transmitter or the TXP_MR_10E_L card DWDM TX port to the Side B fiber patch panel MUX port that corresponds to the Side B 32WSS-L card port carrying the tested wavelength.

Step 8 Connect the TXP_MR_10E_L DWDM RX port or the power meter RX port to the Side B fiber patch panel DMX port that is connected with the Side B 32DMX-L card CHAN-TX port carrying the tested wavelength. (If the TXP_MR_10E_L card was installed during Chapter 14, "Turn Up a Node" simply verify the cable connection.)

Step 9 Display the 32WSS-L card in card view.

Step 10 Click the **Maintenance** tab.

Step 11 For each wavelength that you will test, click the table cell in the Operating Mode column and choose **Add Drop** from the drop-down list.

Step 12 Click **Apply** and then **Yes**, to confirm.

Step 13 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 14 Find the tested wavelength CHAN RX port, then scroll to the right until you see the Power Add parameter. Verify that the Power Add value for the tested port CHAN RX is equal to the output power level of the tunable laser or the TXP_MR_10E_L card measured in Step 6, +/– 1.0 dBm.

Step 15 Click the **Provisioning > Optical Line > Parameters** tabs and record the value in the Power table cell for Port 67 (COM-TX) for the wavelength under test.

Step 16 Verify that the power value from Step 15 reaches the Shelf i Slot i (32WSS-L).Port COM-TX.Power set +/– 1.0 dBm on Side B. To view this set point:

- **a.** In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.
- **b.** In the Selector window on the left, expand the 32WSS-L card on Side B.
- **c.** Expand the COM-TX category.
- **d.** Select **Power**.
- **e.** View the value of the Shelf *i* Slot *i* (32WSS-L).Port COM-TX.Power parameter on the right pane.
- **f.** If the power value does not match the value recorded in Step 15 (+/– 2.0 dBm), contact your next level of support.

Step 17 If an MMU card is installed on Side B, complete the following steps. If an MMU card is not installed on Side B, continue with Step 18.

- **a.** Display the Side B 32WSS-L card in card view.
- **b.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **c.** Record the value in the Power table cell for Port 67 (COM-TX).
- **d.** Display the Side B MMU card in card view.
- **e.** Click the **Provisioning > Optical Line > Parameters** tabs.
- **f.** Verify that the value in the Power table cell for Port 1 (EXP-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L and MMU cards. Check the values again. If they still do not match, contact your next level of support.
- **g.** Record the value in the Power table cell for Port 4 (COM-TX).
- **h.** If a Side B OPT-BST-L card is installed, display it in card view and complete Step i. If not, continue with Step j.

i. Click the Provisioning > Optical Line > Parameters tabs and read the Power value for Port 1 (COM-RX), then continue with Step k.

j. Display the Side B OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step k.

k. Verify that the value in Step i or j matches the power recorded in Step g, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L or OSC-CSM card and the MMU cards. Check the values again. If they still do not match, contact your next level of support.

l. Continue with Step 19.

Step 18 Verify the connection between the 32WSS-L card and the OPT-BST-L or OSC-CSM cards:

a. Display the Side B 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Record the value in the Power table cell for Port 67 (COM-TX).

d. If a OPT-BST-L card is installed on Side B, display it in card view and complete Step e. If not, continue with Step f.

e. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 1 (COM-RX), then continue with Step g.

f. Display the Side B OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step g.

g. Verify that the value in Step e or f matches the power recorded in Step c, +/– 1.0 dB. If so, continue with Step 19. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L or OSC-CSM card and the 32WSS-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 19 If an OPT-AMP-L card provisioned in OPT-PRE mode is installed on Side B, complete the following steps. If not, continue with Step 20.

a. Display the Side B OPT-AMP-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Power parameter for Port 1 (COM-RX). Record the value.

d. Display the Side B OPT-BST-L or OSC-CSM card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Locate the Port 2 (COM-TX) Power value (for OPT-BST-L cards) or Port 3 (COM-TX) Power value (for OSC-CSM cards). Verify that the value matches the power recorded in Step c, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-AMP-L card and the OPT-BST-L or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.

g. For the Side B OPT-AMP-L card, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6.

Step 20 If an MMU card is installed on Side B, complete the following steps. If an MMU card is not installed on Side B, continue with Step 21.

a. Display the Side B MMU card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 68 (COM-RX) Power parameter. Record the value.

d. If an OPT-AMP-L card provisioned in OPT-PRE mode is installed on Side B, display it in card view and complete Step e. If not, continue with Step f.

e. Click the OPT-PRE **Provisioning > Opt.Ampli.Line > Parameters** tabs. Record the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If a Side B OPT-BST-L card is installed, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display the Side B OSC-CSM card in card view, click the Provisioning > Optical Line > Parameters tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that value in the Step e, g, or h matches the power recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the MMU card and the OPT-BST-L or OSC-CSM cards. Check the values again. If they still do not match, contact your next level of support.

j. Display the Side B MMU card in card view.

k. Click the **Provisioning > Optical Line > Parameters** tabs.

l. Record the value in the Power table cell for Port 2 (EXP-TX).

m. Display the Side B 32WSS-L card in card view.

n. Click the **Provisioning > Optical Line > Parameters** tabs.

o. Verify that the value in the Power table cell for Port 68 (COM-RX) is equal to the value recorded in Step l, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L and MMU cards. Check the values again. If they still do not match, contact your next level of support.

p. Continue with Step 22.

Step 21 Verify the connection between the Side B 32WSS-L card and the OPT-BST-L, OPT-AMP-L (in OPT-PRE mode), or OSC-CSM card:

a. Display the Side B 32WSS-L in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 68 (COM-RX) Power parameter. Record the value.

d. If a Side B OPT-AMP-L card provisioned in OPT-PRE mode is installed, display it in card view and complete Step e. If not, continue with Step f.

e. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If a Side B OPT-BST-L card is installed, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display the Side B OSC-CSM card in card view. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that the value in Step e, g, or h matches the power recorded in Step c, +/– 1.5 dB. If not, use the “NTP-G115 Clean Fiber Connectors” procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L card and the OPT-AMP-L, OPT-BST-L, or OSC-CSM card.

Step 22 Verify the Side B 32WSS-L and 32DMX-L connection:

a. Display the Side B 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs and record the value in the Power table cell for Port 69 (DROP-TX).

c. Display the Side B 32DMX-L card in card view.

d. Click the **Provisioning > Optical Line > Parameters** tabs. Record the value in the Port 2 (COM-RX) table cell. Verify that the value is equal to the value recorded in b, +/– 1.0 dBm. If not, use the “NTP-G115 Clean Fiber Connectors” procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L and 32DMX-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 23 Display the Side B 32DMX-L card in card view.

Step 24 Click the **Provisioning > Optical Chn > Parameters** tab. Record the CHAN-TX port value under the Power parameter for the wavelength under test.

Step 25 Verify that the power value from Step 24 reaches the Shelf *i* Slot *i* (32DMX-L).Port CHAN-TX.Power set point +/– 2 dBm on Side B. To view this set point:

a. Go to node view (single-shelf mode) or multishelf view (multishelf mode) and click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector window on the left, expand the 32DMX-L card.

c. Expand the CHAN-TX category.

d. Select **Power**.

e. View the value of the Side B Shelf *i* Slot *i* (32DMX-L).Port CHAN-TX.Power parameter on the right pane.

f. If the power value does not match the value recorded in Step 24 (+/– 2 dBm), contact your next level of support.

Step 26 Display the TXP_MR_10E_L card in card view.

Step 27 Click the **Performance > Optics PM > Current Values** tabs.

Step 28 In the Port 2 (Trunk) column, locate the RX Optical Power value. Verify that the value matches the power in Step 24, +/– 2 dBm. If the power values do not match (+/– 2 dBm), complete the following steps:

a. Remove, clean, and replace the cable connecting the TXP_MR_10E_C RX port to the Side B fiber patch panel DMX port for the tested wavelength. See the “NTP-G115 Clean Fiber Connectors” procedure in the *Cisco ONS 15454 Hardware Installation Guide*.

b. Repeat this step. If the power values still do not match (+/– 2 dBm) contact your next level of support.

Step 29 Repeat Steps 4 through 28 for the remaining wavelengths.

Step 30 Display the Side B 32WSS-L card in card view.

Step 31 Click the **Maintenance** tab.

Step 32 Click the table cell in the Operating Mode column and choose **Not Assigned** from the drop-down list for all wavelengths.

Step 33 Click **Apply**, then click **Yes** to confirm.

Step 34 Disconnect the TXP or tunable laser from the Side B patch panel.

Step 35 Unplug the physical loopback fiber from the line TX and RX in the OPT-BST-L or OSC-CSM card.

Step 36 Return to your originating procedure (NTP).

DLP-G364 Verify the Side A ROADM L-Band Add/Drop Channels

Purpose	This procedure verifies the signal flow through Side A of a ROADM node for L-band add/drop channels.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_L An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Throughout this task, Side A refers to Slots 1 through 8, and Side B refers to Slots 10 through 17.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), display the Alarms tab.

Step 2 Create a physical loopback on the Side A OPT-BST-L or OSC-CSM card by connecting the LINE TX port to its LINE RX port. For OPT-BST-L cards, connect a 10-dB bulk attenuator to the fiber. (OSC-CSM cards do not require attenuation.)

Caution Failure to use proper attenuation might damage the equipment.

Step 3 Wait 2 to 3 minutes, then click the **Alarms** tab. Verify that the LOS alarms on the Side A OSCM or OSC-CSM card and the OPT-BST-L card have cleared. The clearing of the LOS alarms indicates that the OSC link is active on Side A.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

Step 4 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_L card, continue with Step 5.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength you are testing, then continue with Step 7.

Step 5 If you are using a TXP_MR_10E_L card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 6 If you are using a TXP_MR_10E_L card, complete the following steps. If you are using a tunable laser, continue with Step 7.

a. Display the TXP_MR_10E_L in card view.

b. Click the **Performance > Optics PM > Current Values** tabs.

c. Locate the Port 2 (Trunk) table cell for the TX Optical Pwr parameter. Record the value.

Step 7 Connect the tunable laser transmitter or the TXP_MR_10E_L card DWDM TX port to the Side A fiber patch panel MUX port that corresponds to the Side A 32WSS-L card port carrying the tested wavelength.

Step 8 Connect the TXP_MR_10E_L DWDM RX port or the power meter RX port to the Side A fiber patch panel DMX port that is connected with the Side A 32DMX-L card CHAN-TX port carrying the tested wavelength. (If the TXP_MR_10E_L card was installed during Chapter 14, "Turn Up a Node" simply verify the cable connection.)

Step 9 Display the 32WSS-L card in card view.

Step 10 Click the **Maintenance** tab.

Step 11 For each wavelength that you will test, click the table cell in the Operating Mode column and choose **Add Drop** from the drop-down list.

Step 12 Click **Apply** and then **Yes**, to confirm.

Step 13 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 14 Find the tested wavelength CHAN RX port, then scroll to the right until you see the Power Add parameter. Verify that the Power Add value for the tested port CHAN RX is equal to the output power level of the tunable laser or the TXP_MR_10E_L card measured in Step 6, +/– 1.0 dBm.

Step 15 Click the **Provisioning > Optical Line > Parameters** tabs and record the value in the Power table cell for Port 67 (COM-TX) for the wavelength under test.

Step 16 Verify that the power value from Step 15 reaches the Shelf i Slot i (32WSS-L).Port COM-TX.Power +/– 1.0 dBm on Side A. To view this set point:

a. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector window on the left, expand the 32WSS-L card on Side A.

c. Expand the Port COM-TX category.

d. Select **Power**.

e. View the Shelf *i* Slot *i* (32WSS-L).Port COM-TX.Power parameter on the right pane.

f. If the power value does not match the value recorded in Step 15 (+/– 2.0 dBm), contact your next level of support.

Step 17 If an MMU card is installed on Side A, complete the following steps. If an MMU card is not installed on Side A, continue with Step 18.

a. Display the Side A 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Record the value in the Power table cell for Port 67 (COM-TX).

d. Display the Side A MMU card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Verify that the value in the Power table cell for Port 1 (EXP-RX) is equal to the value recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L and MMU cards. Check the values again. If they still do not match, contact your next level of support.

g. Record the value in the Power table cell for Port 4 (COM-TX).

h. If a Side A OPT-BST-L card is installed, display it in card view and complete Step i. If not, continue with Step j.

i. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 1 (COM-RX), then continue with Step k.

j. Display the Side A OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step k.

k. Verify that the value in Step i or j matches the power recorded in Step g, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L or OSC-CSM card and the MMU cards. Check the values again. If they still do not match, contact your next level of support.

l. Continue with Step 19.

Step 18 Verify the connection between the 32WSS-L card and the OPT-BST-L or OSC-CSM cards:

a. Display the Side A 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Record the value in the Power table cell for Port 67 (COM-TX).

d. If a OPT-BST-L card is installed on Side A, display it in card view and complete Step e. If not, continue with Step f.

e. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 1 (COM-RX), then continue with Step g.

f. Display the Side A OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-RX), then continue with Step g.

g. Verify that the value in Step e or f matches the power recorded in Step c, +/– 1.0 dB. If so, continue with Step 19. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the OPT-BST-L or OSC-CSM card and the 32WSS-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 19 If an OPT-AMP-L card provisioned in OPT-PRE mode is installed on Side A, complete the following steps. If not, continue with Step 20.

a. Display the Side A OPT-AMP-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Power parameter for Port 1 (COM-RX). Record the value.

d. Display the Side A OPT-BST-L or OSC-CSM card in card view.

e. Click the **Provisioning > Optical Line > Parameters** tabs.

f. Locate the Port 2 (COM-TX) Power value (for OPT-BST-L cards) or Port 3 (COM-TX) Power value (for OSC-CSM cards). Verify that the value matches the power recorded in Step c, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware*

Installation Guide to clean the fiber connection between the OPT-AMP-L card and the OPT-BST-L or OSC-CSM card. Check the values again. If they still do not match, contact your next level of support.

g. For the Side A OPT-AMP-L card, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6.

Step 20 If an MMU card is installed on Side A, complete the following steps. If an MMU card is not installed on Side A, continue with Step 21.

a. Display the Side A MMU card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 68 (COM-RX) Power parameter. Record the value.

d. If an OPT-AMP-L card provisioned in OPT-PRE mode is installed on Side A, display it in card view and complete Step e. If not, continue with Step f.

e. Click the OPT-PRE **Provisioning > Opt.Ampli.Line > Parameters** tabs. Record the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If a Side A OPT-BST-L card is installed, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display the Side A OSC-CSM card in card view, click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that value in the Step e, g, or h matches the power recorded in Step c, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the MMU card and the OPT-BST-L or OSC-CSM cards. Check the values again. If they still do not match, contact your next level of support.

j. Display the Side A MMU card in card view.

k. Click the **Provisioning > Optical Line > Parameters** tabs.

l. Record the value in the Power table cell for Port 2 (EXP-TX).

m. Display the Side A 32WSS-L card in card view.

n. Click the **Provisioning > Optical Line > Parameters** tabs.

o. Verify that the value in the Power table cell for Port 68 (COM-RX) is equal to the value recorded in Step l, +/– 1.0 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L and MMU cards. Check the values again. If they still do not match, contact your next level of support.

p. Continue with Step 22.

Step 21 Verify the connection between the Side A 32WSS-L card and the OPT-BST-L, OPT-AMP-L (in OPT-PRE mode), or OSC-CSM card:

a. Display the Side A 32WSS-L in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Locate the Port 68 (COM-RX) Power parameter. Record the value.

d. If a Side A OPT-AMP-L card provisioned in OPT-PRE mode is installed, display it in card view and complete Step e. If not, continue with Step f.

e. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs and read the Total Output Power value for Port 2 (COM-TX), then continue with Step i.

f. If a Side A OPT-BST-L card is installed, display it in card view and complete Step g. If not, continue with Step h.

g. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 2 (COM-TX), then continue with Step i.

h. Display the Side A OSC-CSM card in card view. Click the **Provisioning > Optical Line > Parameters** tabs and read the Power value for Port 3 (COM-TX), then continue with Step i.

i. Verify that the value in Step e, g, or h matches the power recorded in Step c, +/– 1.5 dB. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L card and the OPT-AMP-L, OPT-BST-L, or OSC-CSM card.

Step 22 Verify the Side A 32WSS-L and 32DMX-L connection:

a. Display the Side A 32WSS-L card in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs and record the value in the Power table cell for Port 69 (DROP-TX).

c. Display the Side A 32DMX-L card in card view.

d. Click the **Provisioning > Optical Line > Parameters** tabs. Record the value in the Port 2 (COM-RX) table cell. Verify that the value is equal to the value recorded in b, +/– 1.0 dBm. If not, use the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide* to clean the fiber connection between the 32WSS-L and 32DMX-L cards. Check the values again. If they still do not match, contact your next level of support.

Step 23 Display the Side A 32DMX-L card in card view.

Step 24 Click the **Provisioning > Optical Chn > Parameters** tab. Record the CHAN-TX port value under the Power parameter for the wavelength under test.

Step 25 Verify that the power value from Step 24 reaches the Shelf *i* Slot *i* (32DMX-L).Port CHAN-TX.Power set point +/– 2 dBm on Side A. To view this set point:

a. Go to node view (single-shelf mode) or multishelf view (multishelf mode) and click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector window on the left, expand the 32DMX-L card on Side A.

c. Expand the Port CHAN-TX category.

d. Select **Power**.

e. View the value of the Shelf *i* Slot *i* (32DMX-L).Port CHAN-TX.Power parameter on the right pane.

f. If the power value does not match the value recorded in Step 24 (+/– 2 dBm), contact your next level of support.

Step 26 Display the TXP_MR_10E_L card in card view.

Step 27 Click the **Performance > Optics PM > Current Values** tabs.

Step 28 In the Port 2 (Trunk) column, locate the RX Optical Power value. Verify that the value matches the power in Step 24, +/– 2 dBm. If the power values do not match (+/– 2 dBm), complete the following steps:

a. Remove, clean, and replace the cable connecting the TXP_MR_10E_L RX port to the Side A fiber patch panel DMX port for the tested wavelength. See the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*

b. Repeat this step. If the power values still do not match (+/– 2 dBm) contact your next level of support.

Step 29 Repeat Steps 4 through 28 for the remaining wavelengths.

Step 30 Display the Side A 32WSS-L card in card view.

Step 31 Click the **Maintenance** tab.

Step 32 Click the table cell in the Operating Mode column and choose **Not Assigned** from the drop-down list for all wavelengths.

Step 33 Click **Apply**, then click **Yes** to confirm.

Step 34 Disconnect the TXP or tunable laser from the Side A patch panel.

Step 35 Unplug the physical loopback fiber from the line TX and RX in the OPT-BST-L or OSC-CSM card.

Step 36 Return to your originating procedure (NTP).

NTP-G180 Perform the ROADM Node with 40-WSS-C and 40-DMX-C Cards Acceptance Test

Purpose	This acceptance test verifies that a ROADM node provisioned for C-band wavelengths is operating properly before you connect it to the network. The test verifies the operation of the amplifiers and also verifies that each add/drop and pass-through port on the 40-WSS-C and 40-DMX-C cards operates properly. The test also checks the power levels at each transmit and receive port to ensure that power loss in the cabling is within tolerance. If MMU cards are installed, the test verifies that the MMU insertion loss does not impact add, drop, or pass through circuits.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node" they can be used for this procedure. No additional cabling changes are needed.

Note Because the node is isolated and no line-side fibers are connected during the test, the power levels going into the line-side cards will not be the same as the levels after the node is connected to the network. Therefore, if the ROADM shelf does not contain either OPT-BST or OPT-BST-E amplifiers, and OPT-PRE amplifiers on both the Side B and Side A sides, lower the OPT-PRE power thresholds so that the ROADM shelf turns on properly. At the end of the test, you will run ANS to configure the node with the correct parameters for the network acceptance test.

Note Throughout this procedure, Side A refers to Slots 1 through 8, and Side B refers to Slots 10 through 17.

Step 1 Make a copy of Table 21-2 on page 21-65 and place it in a convenient location for reference throughout this procedure. The table shows the 40-WSS-C ports and the wavelengths assigned to them. The 40 wavelengths are divided among five physical multi-fiber push on (MPO) connectors on the 40-WSS-C card. Each MPO connector is assigned eight wavelengths. In Cisco Transport controller (CTC), the MPO connector appears in the card view Provisioning > Optical Chn:Optical Connector tab. Each Optical Connector subtab represents an MPO connector. Ports 1 through 40 are the channel (CHAN) RX (add) ports; Ports 41 through 80 are the pass-through ports.

Step 2 Complete the "DLP-G46 Log into CTC" task at the ROADM node that you want to test. If you are already logged in, continue with Step 3.

Step 3 Display the ROADM node in node view (single-shelf mode) or multishelf view (multishelf mode).

Step 4 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note The OSC terminations created during node turn-up will generate LOS alarms on the OPT-BST, OPT-BST-E, or OPT-AMP-C cards, and on the OSC-CSM and OSCM cards. If OSCM cards are installed in ANSI shelves, EOC SDCC Termination Failure alarms will also appear.

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are either Success - Changed or Success - Unchanged. If any are not, complete the following steps:

a. Delete the two OSC channels using the "DLP-G186 Delete an OSC Termination" task.

b. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

c. Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Note The OSC terminations created will generate LOS alarms on the OPT-BST, OPT-BST-E, OPT-AMP-C cards and on the OSC-CSM and OSCM cards. If OSCM cards are installed in ANSI shelves, EOC DCC Termination Failure alarms will also appear.

Step 6 If MMU cards are installed, complete the following steps. If not, continue with Step 7.

a. Display the Side B MMU in card view.

b. Click the **Provisioning > Optical Line > Parameters** tabs.

c. Click the **Admin State** table cell for the COM RX, COM TX, EXP RX, and EXP TX ports and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list.

d. Click **Apply**, then click **Yes** to confirm.

e. Display the Side A MMU in card view.

f. Click the **Provisioning > Optical Line > Parameters** tabs.

g. Click the **Admin State** table cell for the COM RX, COM TX, EXP RX, and EXP TX ports and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list.

Step 7 Display the Side B 40-WSS-C in card view.

Step 8 Click the **Provisioning** > **Optical Chn Optical Connector** *n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you will test. Refer to Table 21-2, if needed.

Step 9 Click the **Admin State** table cell for the add port carrying the tested wavelength, then choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list. For example, if the tested wavelength is 1530.33 nm (shown as 1530.3), you would click the Port 1 (CHAN-RX) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list.

Step 10 Change the administrative state of the pass-through port corresponding to the port in Step 9 to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). For example, if the tested wavelength is 1530.33 nm (shown as 1530.3), you would click the Port 33 (PASS-THROUGH) Admin State field and choose OOS,MT or Locked,maintenance from the drop-down list. Refer to Table 21-2, if needed.

Table 21-2 40-WSS-C Ports and Wavelengths Test Checklist

40-WSS-C Provisioning Subtab	Port #	Wavelength	Tested: Pass-Through	Tested: Add/Drop Side A	Tested: Add/Drop Side B
Optical Chn:	RX 1, PT 41	1530.33			
Optical Connector 1	RX 2, PT 42	1531.12			
	RX 3, PT 43	1531.90			
	RX 4, PT 44	1532.68			
	RX 5, PT 45	1533.47			
	RX 6, PT 46	1533.47			
	RX 7, PT 47	1535.04			
	RX 8, PT 48	1535.82			
Optical Chn:	RX 9, PT 49	1536.81			
Optical Connector 2	RX 10, PT 50	1537.40			
	RX 11, PT 51	1538.19			
	RX 12, PT 52	1538.98			
	RX 13, PT 53	1539.77			
	RX 14, PT 54	1540.56			
	RX 15, PT 55	1541.35			
	RX 16, PT 56	1542.14			

Table 21-2 40-WSS-C Ports and Wavelengths Test Checklist

40-WSS-C Provisioning Subtab	Port #	Wavelength	Tested: Pass-Through	Tested: Add/Drop Side A	Tested: Add/Drop Side B
Optical Chn: Optical Connector 3	RX 17, PT 57	1542.19			
	RX 18, PT 58	1543.73			
	RX 19, PT 59	1544.53			
	RX 20, PT 60	1545.32			
	RX 21, PT 61	1546.12			
	RX 22, PT 62	1546.92			
	RX 23, PT 63	1547.72			
	RX 24, PT 64	1548.51			
Optical Chn: Optical Connector 4	RX 25, PT 65	1549.32			
	RX 26, PT 66	1550.12			
	RX 27, PT 67	1550.92			
	RX 28, PT 68	1551.72			
	RX 29, PT 69	1552.52			
	RX 30, PT 70	1553.33			
	RX 31, PT 71	1554.13			
	RX 32, PT 72	1554.94			
Optical Chn: Optical Connector 5	RX 33, PT 73	1555.75			
	RX 34, PT 74	1556.55			
	RX 35, PT 75	1557.36			
	RX 36, PT 76	1558.17			
	RX 37, PT 77	1558.98			
	RX 38, PT 78	1559.71			
	RX 39, PT 79	1560.61			
	RX 40, PT 80	1561.42			

Step 11 Click **Apply**, then click **Yes** to confirm.

Step 12 Repeat Steps 8 through 11 for each wavelength that you will test.

Step 13 Display the Side A 40-WSS-C in card view.

Step 14 Repeat Steps 8 through 12 for the Side A 40-WSS-C card.

Step 15 Display the Side B 40-DMX-C card in card view and complete the following steps:

a. Choose the **Provisioning > Optical Line > Parameters** tabs.

b. For Port 41 (COM-RX), click the **Admin State** table cell and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the drop-down list.

c. Click **Apply**, then click **Yes** to confirm.

Step 16 Repeat Step 15 for the Side A 40-DMX-C card.

Step 17 Complete the "DLP-G310 Verify ROADM Node C-Band Pass-Through Channels with 32WSS and 40-WSS-C Cards" task on page 21-30.

Step 18 Complete the following tasks for channels that will be added or dropped on the node.
DLP-G311 Verify the Side A or Side B ROADM C-Band Add/Drop Channels with 32WSS and 40-WSS-C Cards, page 21-35

Step 19 If MMU cards are installed, complete the following steps. If not, continue with Step 20.

a. Display the Side B MMU in card view.
b. Click the **Provisioning > Optical Line > Parameters** tabs.
c. Click **Admin State** for the COM RX, COM TX, EXP RX, and EXP TX ports and choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list.
d. Click **Apply**, then click **Yes** to confirm.
e. Display the Side A MMU in card view.
f. Click the **Provisioning > Optical Line > Parameters** tabs.
g. Click **Admin State** for the COM RX, COM TX, EXP RX, and EXP TX ports and choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list.

Step 20 Display the Side B 40-WSS-C in card view.

Step 21 Click the **Provisioning** > **Optical Chn Optical Connector***n* > **Parameters** tabs, where *n* = the optical connector number that carries the wavelengths you tested.

Step 22 Click the **Admin State** table cell then choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list for all ports that were changed to OOS,MT or Locked,Maintenance in Steps 9 and 10.

Step 23 Click **Apply**.

Step 24 Repeat Steps 21 through 23 for all the ports that are in OOS,MT or Locked,maintenance state on the Side B 40-WSS-C card.

Step 25 Display the Side A 40-WSS-C in card view.

Step 26 Repeat Steps 21 through 23 for all ports on the Side A 40-WSS-C card.

Step 27 Display the Side B 40-DMX-C in card view.

Step 28 Choose the **Provisioning > Optical Line > Parameters** tabs.

Step 29 For Port 33, click the **Admin State** table cell and choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the drop-down list.

Step 30 Click **Apply**.

Step 31 Display the Side A 40-DMX-C card in card view.

Step 32 Repeat Steps 28 through 30 for the Side A 40-DMX-C card.

Step 33 Delete both OSC channels using the "DLP-G186 Delete an OSC Termination" task.

Step 34 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 35 Create the two OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 36 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment failure alarms appear on the node. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Stop. **You have completed this procedure**.

NTP-G276 Perform the 80-Channel n-degree ROADM Node Acceptance Tests

Purpose	This procedure checks the power values and the optical connections for an 80 channel n-degree ROADM node. Use this test for both existing and new installations of 80 channel ROADM nodes. Use this procedure to also test the installation of a new side to a node. This procedure cannot be performed on the node on which the OPT-RAMP-C or OPT-RAMP-CE card is installed.
Tools/Equipment	• Fully C-band tunable transponder or tunable laser source with an LC patchcord • 1 LC-LC adapter • 15dB optical attenuator • Optical power meter
Prerequisite Procedures	• All sides must be completely fibered (including mesh patch panels); for more information, see Chapter 14, "Turn Up a Node" • "NTP-G186 Perform the Four-Degree and Eight-Degree Mesh Patch Panel Acceptance Test" section on page 21-115 (optional) • "NTP-G37 Run Automatic Node Setup" procedure on page 14-128
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Identify the sides that are already carrying traffic and the sides that are going to be tested.

Step 1 Complete the "DLP-G46 Log into CTC" task at the mesh native node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (An equipment alarm is indicated in the Alarms tab, Cond column as EQPT.) If equipment failure alarms are present, investigate and resolve them before continuing. For information on how to clear an alarm, see the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

Step 4 Insert a full C-band tunable transponder into an available slot on the side that you want to test.

Note In this procedure Side A through H is referred as Side *x*.

Step 5 Connect the TX port of the transponder to the EAD*i* (where *i*=1) port of the 80-WXC-C card on the side to be tested.

Step 6 Select a wavelength that is not already used by a side carrying traffic. Select 1530.33 nm for a new installation. Set the transponder wavelength to the selected wavelength *yyyy.yy* by completing the "DLP-G432 Set the Transponder Wavelength" task on page 21-125.

Step 7 Place the trunk port of the transponder in the In-Service (IS) state.

Step 8 In node view, click the **Provisioning** > **WDM-ANS** > **Provisioning** tabs and record the Power value of the COM port of the 80-WXC-C card for the side you are verifying.

Step 9 On Side *x*, go to the card view of the 80-WXC-C card and complete the following steps:

a. Click the **Provisioning** > **WXC Line** > **Parameters** tabs and record the Power value of the EAD*i* port.

b. Click the **Maintenance** > **OCHNC** tabs.

- Set the Target Power to the value recorded in Step 8.

Note The target power is not set if the power value recorded in Step 8 is higher than the channel power that is allocated and equalized.

- From the Port pull-down menu, select EAD*i* and from the Wavelength pull-down menu, select *yyyy.yy*

c. Click **Refresh** and verify that the target power is reached.

d. Place the trunk port of the transponder in OutofService (OOS) state.

Step 10 To check the wavelengths for the EAD1 port, repeat from Step 6 and Step 9d for the remaining 79 wavelengths.

Note It is not mandatory to test the 80 wavelengths for all the ports (EAD*i* where *i* = 1 to 8).

Step 11 Disconnect the transponder from EAD*i* port and restore the fiber connection to the EAD*i* port.

Step 12 Repeat Step 5 through Step 11 for the remaining EAD*i* ports where *i* = 2 to 8.

Step 13 Plug a 15-dB LC attenuator into the trunk TX port of the transponder card.

Step 14 Select a wavelength that is not already used by a side carrying traffic. Select 1530.33 nm for a new installation. Set the transponder wavelength to the selected wavelength *yyyy.yy* by completing the "DLP-G432 Set the Transponder Wavelength" task on page 21-125.

Step 15 Connect the optical power meter to the trunk TX port of the transponder card.

Step 16 Complete the "DLP-G433 Record Transponder Optical Power" task on page 21-126.

Step 17 Disconnect the optical power meter from the TX port of the transponder card.

Step 18 In card view, display the OPT-AMP-C card configured as LINE for Side *x* (slot 1 or 17) and complete the following steps:

a. Click the **Maintenance** > **ALS** tabs and from the OSRI pull-down menu, select **OFF**.

b. From the ALS Mode pull-down menu, select **Disable**.

Step 19 Make the following connections:

a. Connect the transponder output port (with the 15-dB attenuator) to the Line RX port of the booster amplifier (OPT-AMP-C configured as LINE in slot 1 or 17) on Side *x*.

b. Connect the optical power meter to the LINE-TX port of the booster amplifier (OPT-AMP-C configured as LINE in slot 1 or 17) on Side *x*.

c. Use a fiber jumper to connect the DROP-TX port to the AD port of the 80-WXC-C card for Side *x*.

Step 20 Create an OCHNC DCN circuit for wavelength *yyyy.yy* from LINE amplifier of Side *x* to local add/drop ports of the 80-WXC-C card of Side *x* using the "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41 and wait till all the alarms clear.

Step 21 In card view, display the booster amplifier card for Side *x*. Click the **Inventory** > **Info** tabs and record the IL02 (LINE RX->COM TX) insertion loss value.

Step 22 In card view, display the transponder card and click the **Provisioning** > **Line** tabs. For the trunk port, choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 23 In card view, display the booster amplifier card for Side *x*, and complete the following steps:

a. Click the **Provisioning** > **Optical Line** > **Parameters** tabs and record the Power value of the COM-TX port.

b. Verify the power value of the COM-TX port = (Optical power meter value in Step 16) – (LINE RX->COM TX insertion loss value read in Step 21) (+\– 1 dB).

Step 24 In card view, display the preamplifier card (OPT-AMP-C configured as PRE in slot 2 or 16) for Side *x* and complete the following steps:

a. Click the **Provisioning** > **Optical Line** > **Parameters** tabs and record the Power value of the COM-RX port.

b. Verify that the COM-RX power value matches the value in Step 23 b(+\– 1 dB).

c. Click the **Provisioning** > **Opt. Ampli. Line** > **Parameters** tabs and record the Total Output Power value of the LINE-TX port.

Step 25 In card view, display the 80-WXC-C card for Side *x* and complete the following steps:

a. Click the **Provisioning** > **Optical Line** > **Parameters** tabs and record the Power value of the COM-RX port.

b. Verify that the value matches the LINE-TX port power value in Step 24c (+/- 1dB).

c. Click the **Inventory** > **Info** tabs and record the COM-RX -> EXP-TX insertion loss.

d. Record the COM-RX -> DROP-TX insertion loss.

e. Click the **Provisioning** > **Optical Line** > **Parameters** tabs and record the Power value of the EXP-TX port.

f. Record the Power value of the DROP-TX port.

g. Verify that the EXP-TX Power value inStep 25e = (COM-RX value in Step 25a) – (COM-RX -> EXP-TX value in Step 25c) (+\– 1 dB).

h. Click the **Provisioning** > **WXC Line** > **Parameters** tabs and record the Power value of the AD port.

i. Verify that the value matches the DROP-TX port power value in Step 25f (+/- 1dB).

j. Click the **Provisioning** > **WXC Line** > **Parameters** tabs and record the Power value of the COM port.

k. Verify that the power value in Step 25j matches the COM port power value in the node view > **Provisioning** > **WDM-ANS** > **Provisioning** tabs for the 80-WXC-C card under test.

Step 26 In card view, display the 80-WXC-C card for a side different from Side *x* and complete the following steps:

Note This step must be performed for a single wavelength *yyyy.yy* only that is not used on any of the installed sides.

a. Click the **Maintenance** > **Wavelength Power** tabs and select PORT EAD*i*, where *i* depends on the value of *x*. (*x*,*i*) = (A,1) (B,2) (C,3) (D,4) (E,5) (F,6) (G,7) (H,8)

b. Record the power value for wavelength *yyyy.yy.*

c. Verify if the power value in Step 26b is equal to the (power value recorded in Step 25e - 8dB) if a PP-MESH-4 is used or is equal to the (power value recorded in Step 25e - 12dB) if a PP-MESH-8 is used.

Step 27 In card view, display the booster amplifier card for Side *x*, and complete the following:

a. Click the **Provisioning** > **Optical Line** > **Parameters** tabs and record the Power value of the COM-RX port.

b. Verify COM-RX Power value matches the COM Power value in Step 25j (+\– 1 dB).

c. Click the **Provisioning** > **Opt. Ampli. Line** > **Parameters** tabs and record the Power value of the LINE-TX port.

d. Verify that the LINE-TX value matches the power on the LINE-TX port power value in node view > **Provisioning** > **WDM-ANS** > **Provisioning** tabs (+\– 2 dB).

e. Record the optical power meter value.

f. Verify that the optical power meter value matches the LINE-TX value in Step 27c (+\– 1 dB).

Step 28 Delete the OCHNC DCN circuit on wavelength *yyyy.yy* from LINE amplifier of Side *x* to local add/drop ports of the 80-WXC-C card of Side *x* using the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46.

Step 29 In card view, display the transponder card and click the **Provisioning** > **Line** tabs. For the trunk port, choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 30 To test all wavelengths, repeat Step 6 through Step 29 for each wavelength. In Step 6, set the wavelength to the next wavelength.

Step 31 Remove the fiber jumper connected between the DROP-TX port and the AD port in the 80-WXC-C card on Side *x.*

Step 32 Restore the original connections between the AD and DROP-TX ports of the 80-WXC-C card and the respective ports of the 15216 40 or 48-channel mux/demux patch panel according to the Cisco Transport Planner Internal Connections Report.

Step 33 Use a fiber jumper to connect the TX port to the RX port associated to the wavelength *yyyy.yy* to be tested in the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD or in the 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN unit for Side *x* (depending on which 15216 40 or 48-channel mux/demux patch panel the wavelength *yyyy.yy* is managed).

Step 34 Select a wavelength *yyyy.yy* on the full C band tunable transponder. Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder for the selected wavelength yyyy.yy.

Step 35 Create an OCHNC DCN circuit on wavelength *yyyy.yy* from LINE amplifier of side *x* to local add/drop ports of the 80-WXC-C card of Side *x* using the "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41 and wait till all the alarms clear on the node.

Step 36 In card view, display the 80-WXC-C card for Side *x* and complete the following steps:

a. Click the **Provisioning** > **Optical Line** > **Parameters** tabs and record the Power value of the DROP-TX port.

b. Click the **Provisioning** > **WXC Line** > **Parameters** tabs and record the Power value of the AD port.

c. Verify that the Power value of the AD port in Step 36b is > the Power value of the DROP-TX port in Step 36a – 18dB.

Step 37 Delete the OCHNC DCN circuit on wavelength *yyyy.yy* from LINE amplifier of Side *x* to local add/drop ports of the 80-WXC-C card of Side *x* using the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46.

Step 38 In card view, display the transponder card and click the **Provisioning** > **Line** tabs. For the trunk port, choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 39 Remove the fiber jumper that was connected in Step 33 between the TX and RX ports associated to the tested wavelength *yyyy.yy* on the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD or the 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN unit for Side *x*.

Step 40 To verify all the 40 ports of the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit and the 40 ports of the 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN unit, repeat the previous steps from Step 33 through Step 38 by changing the wavelength *yyyy.yy* to cover all other 79 available wavelengths.

Step 41 Disconnect the optical power meter from the LINE-TX port of the booster amplifier of the Side *x*.

Step 42 Disconnect the transponder output port (with the 15-dB attenuator) from the LINE-RX port of the booster amplifier of the Side *x*.

Step 43 Repeat Step 4 through Step 42 for all the others sides that are being installed.

Step 44 In card view, display the OPT-AMP-C card configured as LINE for Side *x* (slot 1 or 17) and complete the following:

a. Click the **Maintenance** > **ALS** tabs and from the OSRI pull-down menu, select **OFF**.

b. From the ALS Mode pull-down menu, select **Auto Restart**.

Stop. You have completed this procedure.

NTP-G44 Perform the Anti-ASE Hub Node Acceptance Test

Purpose	This procedure tests an anti-ASE hub node.
Tools/Equipment	A tunable laser or a TXP_MR_10E_C card
	An optical power meter or optical spectrum analyzer
	Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed

Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note The OSC terminations created during node turn-up will generate two alarms for each side of the shelf: one for LOS on the OPT-BST or OPT-BST-E card, and the other for LOS on the OSC-CSM or OSCM card.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are Success - Changed or Success - Unchanged. If any are not, complete the following steps:

a. Delete the two OSC channels using the "DLP-G186 Delete an OSC Termination" task.

b. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

c. Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 5 From your Cisco TransportPlanner site configuration file, identify the dropped and added channels that are configured in pass-through mode in both directions.

Note Configuring a channel pass-through mode means that the channel is dropped along one direction by a 32DMX-O/32DMX or 40-DMX-C (15xx.xx TX port) located on one side (Side A or Side B) of the shelf, and then added by a 32MUX-O/40-DMX-C (1522.22 RX port) on the opposite side of the shelf but in the same direction. The channel is not terminated inside the site.

Step 6 Create a loopback on the Side A OPT-BST or OPT-BST-E amplifier by connecting a patchcord from the LINE TX port to the LINE RX port with a 10-dB bulk attenuator.

Step 7 Verify that the OSC link becomes active on the Side A OSCM or OSC-CSM card. (The OSC termination must already be provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Step 8 For pass-through channels, continue with Step 9. For add and drop channels, continue with Step 18.

Step 9 Verify the first channel connection configured in pass-through mode in both directions:

a. If you are using a tunable laser, set the output power to a nominal value, such as –3 dBm. If you are using a TXP_MR_10E_C card, continue with Step b.

b. Set the tunable laser or TXP_MR_10E_C card to a corresponding wavelength on the 100-GHz ITU-T grid. Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

c. Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the LINE RX port of the Side B OPT-BST or OPT-BST-E using a 10-dB bulk attenuator.

Step 10 Complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 for the Side B OPT-PRE amplifier.

Step 11 Complete the "DLP-G269 Verify the 32DMX-O or 40-DMX-C Card Power" task on page 21-7 for the Side A 32MUX-O or 40-MUX-C cards.

Step 12 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the Side A OPT-BST or OPT-BST-E amplifier.

Step 13 Complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 for the Side A OPT-PRE amplifier.

Step 14 Complete the "DLP-G269 Verify the 32DMX-O or 40-DMX-C Card Power" task on page 21-7 for the Side A 32DMX-O or 40-DMX-C cards.

Step 15 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the Side B OPT-BST or OPT-BST-E amplifier.

Step 16 Repeat Steps 9 through 15 for the remaining wavelengths on the 100-GHz grid that are pass-through wavelengths.

Step 17 If you have add and drop channels, continue with Step 18 to verify the channels. If not, continue with Step 30.

Step 18 Set the tunable laser or TXP_MR_10E_C card to the first wavelength of the 100-GHz ITU-T grid that is not a pass-through wavelength. Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 19 Connect the tunable laser or TXP_MR_10E_C card to the CHAN RX *nn* port on the Side A 32MUX-O card, where *nn* is the first add or drop channel.

Step 20 Display the Side A 32MUX-O or 40-MUX-C card in card view.

Step 21 Click the **Provisioning > Optical Chn > Parameter**s tabs.

Step 22 Change the administrative state of Port *nn* to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI).

Step 23 Check that the power value on Port *nn* reaches the provisioned set point (VOA Power Ref).

Step 24 Display the Side A 32DMX-O/32DMX OR 40-DMX-C card in card view.

Step 25 Click the **Provisioning > Optical Chn > Parameter**s tabs.

Step 26 Change the administrative state of Port *nn* to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI).

Step 27 Check that the power value on Port *nn* reaches the provisioned set point (VOA Power Ref).

Step 28 Connect a power meter to the CHAN TX *nn* port through the patch panel and verify that the physical optical power coming out of drop Port *nn* on the Side A 32DMX-O/32DMX or 40-DMX-C card is consistent with the value read on the meter within 0.5 dB.

Step 29 Repeat Steps 18 through 28 for the remaining wavelengths on the 100-GHz grid that are not pass-through wavelengths.

Step 30 Remove the loopback connection on the Side A OPT-BST or OPT-BST-E card.

Step 31 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 32 Create a loopback on the Side B OPT-BST or OPT-BST-E amplifier by connecting a patchcord from the LINE TX port to the LINE RX port with 10-dB bulk attenuator.

Step 33 Verify that the OSC link becomes active on the Side B OSCM card. (The OSC termination must be already provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Step 34 Repeat 18 through 31 for Side B add and drop cards.

Step 35 Remove the loopback on the Side B OPT-BST or OPT-BST-E card.

Step 36 Restore the default administrative state (IS,AINS/Unlocked,automaticInService) on all the ports previously set to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI).

Stop. You have completed this procedure.

NTP-G45 Perform the C-Band and L-Band Line Amplifier Node with OSCM Cards Acceptance Test

Purpose	This procedure tests the C-band and L-band line amplifier node with OSCM cards installed on both the Side B and Side A sides of the shelf by looping a single wavelength through the shelf.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C for C-band testing • TXP_MR_10E_L for L-band testing An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note To perform L-Band line amplifier node with OSCM cards acceptance test, repeat all the procedures in this NTP by replacing the TXP_MR_10E_C card with TXP_MR_10E_L card and OPT-BST card with the OPT-BST-L

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 If you are using TXP_MR_10E_C cards, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25. If not, continue with Step 3.

Step 3 From the View menu, choose **Go to Home View**.

Step 4 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note The OSC terminations created during node turn-up will generate two alarms for each side of the shelf, one for LOS on the OPT-BST or OPT-BST-E card and the other for LOS on the OSCM card.

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If any are not, complete the following steps:

a. Delete the two OSC channels using the "DLP-G186 Delete an OSC Termination" task.

b. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

c. Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 6 Create a loopback on the Side A OPT-BST or OPT-BST-E card by using a fiber with a 10-dB bulk attenuator to connect the LINE TX port to the LINE RX port.

Step 7 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_C card, continue with Step 8.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength under test, then continue with Step 9.

Step 8 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25, for the TXP transmitting the wavelength you will test. Refer to Table 11-36 on page 11-148, if needed.

Step 9 Connect the tunable laser transmitter, the TXP_MR_10E_C card, or DWDM TX port to the LINE RX port of the Side B OPT-BST or OPT-BST-E card using a 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 10 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the Side A OPT-BST or OPT-BST-E and OSCM cards have cleared. The clearing of the LOS alarms indicates that the OSC link is active on Side A.

Note For ANSI shelves, an EOC DCC Termination Failure alarm continues to appear due to the OSC signal loopback. An LOS-O alarm appears on the Side B OPT-BST or OPT-BST-E card, and an LOS alarm appears on the Side B OCSM card.

If the alarms clear, continue with Step 11. If not, perform the following steps:

a. Display the Side A OPT-BST or OPT-BST-E card in card view.

b. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

c. In the Types area, click **Alarms**, then click **Refresh**.

d. Locate the Port 2 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

e. Locate the Port 4 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

f. Click **Apply**, and then **Yes**.

g. Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the Side A OPT-BST or OPT-BST-E card has cleared. If so, continue with Step 11. If not, disconnect the OSCM card from the OPT-BST card.

h. Create a loopback on the OSCM card by connecting a patch cable from the OSC TX port to the OSC RX port using a 10-dB bulk attenuator.

i. Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the Side A OSCM card has cleared. If so, replace the OPT-BST or OPT-BST-E card. If not, replace the OSCM card. See the "NTP-G30 Install the DWDM Cards" procedure on page 14-64.

Step 11 If an OPT-PRE card or an OPT-AMP-L card (provisioned as an OPT-PRE) is installed on Side B, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 12.

Step 12 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the Side A OPT-BST or OPT-BST-E amplifier.

Step 13 If an OPT-PRE amplifier or an OPT-AMP-L amplifier (provisioned as an OPT-PRE) is installed on Side A, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. It not, continue with continue with Step 14.

Step 14 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the Side B OPT-BST or OPT-BST-E amplifier.

Step 15 Disconnect the TXP card or tunable laser from the Side B OPT-BST or OPT-BST-E card.

Step 16 Remove the loopback on the Side A OPT-BST or OPT-BST-E card created in Step 6.

Step 17 Create a loopback on the Side B OPT-BST or OPT-BST-E card by connecting a patchcord from the LINE TX port to the LINE RX port with a 10-dB bulk attenuator.

Step 18 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_C card, continue with Step 19.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength under test, then continue with Step 20.

Step 19 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25, for the TXP transmitting the wavelength you will test. Refer to Table 11-36 on page 11-148, if needed.

Step 20 Connect the tunable laser transmitter, the TXP_MR_10E_C card, or DWDM TX port to the LINE RX port of the Side A OPT-BST or OPT-BST-E card using a 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 21 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the Side B OPT-BST or OPT-BST-E card and the Side B OSCM cards have cleared. The clearing of the LOS alarms indicates that the OSC link is active on Side B.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback. An LOS-O alarm appears on the Side A OPT-BST or OPT-BST-E card, and an LOS alarm appears on the Side A OCSM card.

If the alarms clear, continue with Step 22. If not, perform the following steps:

a. Display the Side B OPT-BST or OPT-BST-E card in card view.

b. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

c. In the Types area, click **Alarms**, then click **Refresh**.

d. Locate the Port 2 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

e. Locate the Port 4 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

f. Click **Apply**, and then **Yes**.

g. Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the Side B OPT-BST or OPT-BST-E card has cleared. If so, continue with Step 22. If not, disconnect the OSCM card from the OPT-BST or OPT-BST-E card.

h. Create a loopback on the OSCM card by connecting a patch cable from the OSC TX port to the OSC RX port using a 10-dB bulk attenuator.

i. Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the Side B OSCM card has cleared. If so, replace the OPT-BST or OPT-BST-E card. If not, replace the OSCM card. See the "NTP-G30 Install the DWDM Cards" procedure on page 14-64.

Step 22 If an OPT-PRE card or an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on Side A, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 23.

Step 23 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the Side B OPT-BST or OPT-BST-E amplifier.

Step 24 If an OPT-PRE amplifier or an OPT-AMP-L (provisioned in OPT-PRE mode) amplifier is installed on Side B, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. It not, continue with continue with Step 25.

Step 25 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the Side A OPT-BST or OPT-BST-E amplifier.

Step 26 Disconnect the TXP or tunable laser from the Side A OPT-BST or OPT-BST-E card.

Step 27 Remove the loopback on the Side B OPT-BST or OPT-BST-E amplifier created in Step 17.

Step 28 Delete both OSC channels using the "DLP-G186 Delete an OSC Termination" task.

Step 29 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 30 Create the two OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Stop. **You have completed this procedure**.

NTP-G46 Perform the C-Band Line Amplifier Node with OSC-CSM Cards Acceptance Test

Purpose	This procedure tests a C-band line amplifier node with OSC-CSM cards installed on both Side B and Side A of the shelf by looping a single wavelength through the shelf.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_C card An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 If you are using TXP_MR_10E_C cards, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25. If not, continue with Step 3.

Step 3 From the View menu, choose **Go to Home View**.

Step 4 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note The OSC terminations created during node turn-up will generate an LOS alarm on the OSC-CSM card.

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If any are not, complete the following:

a. Delete the two OSC channels using the "DLP-G186 Delete an OSC Termination" task.

b. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

c. Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 6 Create a physical loopback on the Side A OSC-CSM card by connecting the LINE TX port to the LINE RX port with a fiber and 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 7 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the Side A OSC-CSM card has cleared. The clearing of the LOS alarm indicates that the OSC link is active on Side A.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback, and an LOS alarm will appear for the Side B OSC-CSM card, Port 1 (OSC).

If the alarm clears, continue with Step 8. If not, perform the following steps:

a. Remove the 10-dB bulk attenuator on the OSC-CSM LINE TX and LINE RX ports and reconnect using only the patchcord.

b. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the Side A OSC-CSM card clears, continue with Step 8. If not, continue with Step c.

c. Display the OSC-CSM card in card view.

d. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

e. In the Types area, click **Alarm**, then click **Refresh.**

f. Locate the Port 3 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

g. Locate the Port 6 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

h. Click **Apply**, and then **Yes**.

i. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the Side A OSC-CSM card clears, continue with Step 8. If not, replace the OSC-CSM card.

Step 8 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_C card, continue with Step 9.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength under test, then continue with Step 10.

Step 9 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 10 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the Side B OSC-CSM LINE RX port using a 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 11 If an OPT-PRE card is installed on Side B, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 12.

Step 12 Display the Side A OSC-CSM card in card view.

Step 13 Click the **Provisioning > Optical Line > Parameters** tabs. Locate the Port 3 Power value. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 14 If an OPT-PRE card is installed on Side A of the shelf, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 15.

Step 15 Display the Side B OSC-CSM card in card view.

Step 16 Click the **Provisioning > Optical Line > Parameters** tabs. Locate the Port 2 Power value. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 17 Disconnect the TXP or tunable laser from the Side B OSC-CSM card.

Step 18 Remove the physical loopback created on the Side A OSC-CSM card in Step 6.

Step 19 Create a loopback on the Side B OSC-CSM card by connecting the LINE TX port with LINE RX port using a patchcord and 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 20 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the Side B OSC-CSM card has cleared. The clearing of the LOS alarm indicates that the OSC link is active on Side B.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback, and an LOS alarm will appear for the Side A OSC-CSM card, Port 1 (OSC).

If the alarm clears, continue with Step 21. If not, perform the following steps:

a. Remove the 10-dB bulk attenuator on the OSC-CSM LINE TX and LINE RX ports and reconnect using only the patchcord.

b. Wait 90 to 100 seconds then, in node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the Side B OSC-CSM card clears, continue with Step 21. If not, continue with Step c.

c. Display the OSC-CSM card in card view.

d. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

e. In the Types area, click **Alarm**, then click **Refresh.**

f. Locate the Port 3 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

g. Locate the Port 6 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

h. Click **Apply**, and then **Yes**.

i. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the Side B OSC-CSM card clears, continue with Step 21. If not, replace the OSC-CSM card.

Step 21 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_C card, continue with Step 22.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength under test, then continue with Step 23.

Step 22 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 23 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the Side A OSC-CSM LINE RX port using a 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 24 If an OPT-PRE card is installed on Side A, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 25.

Step 25 Display the Side B OSC-CSM card in card view.

Step 26 Click the **Provisioning > Optical Line > Parameters** tabs. Locate the Port 3 Power value. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 27 If an OPT-PRE is installed on Side B of the shelf, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 for the Side B OPT-PRE amplifier. If not, continue with Step 28.

Step 28 Display the Side A OSC-CSM card in card view.

Step 29 Click the **Provisioning > Optical Line > Parameters** tabs and locate the Power value for Port 2. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 30 Disconnect the TXP card or tunable laser from the Side A OSC-CSM card.

Step 31 Remove the loopback created on the Side B OSC-CSM card in Step 19.

Step 32 Delete both OSC channels. See the "DLP-G186 Delete an OSC Termination" task.

Step 33 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 34 Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Stop. You have completed this procedure.

NTP-G156 Perform the L-Band Line Amplifier Node with OSC-CSM Cards Acceptance Test

Purpose	This procedure tests a L-band line amplifier node with OSC-CSM cards installed on both Side B and Side A of the shelf by looping a single wavelength through the shelf.
Tools/Equipment	One of the following: • A tunable laser • TXP_MR_10E_L card An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 If you are using TXP_MR_10E_L cards, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25. If not, continue with Step 3.

Step 3 From the View menu, choose **Go to Home View**.

Step 4 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note The OSC terminations created during node turn-up will generate an LOS alarm on the OSC-CSM card.

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If any are not, complete the following:

a. Delete the two OSC channels using the "DLP-G186 Delete an OSC Termination" task.

b. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

c. Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 6 Create a physical loopback on the Side A OSC-CSM by connecting the LINE TX port to the LINE RX port with a fiber and 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 7 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the Side A OSC-CSM card has cleared. The clearing of the LOS alarm indicates that the OSC link is active on Side A.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback, and an LOS alarm will appear for the Side B OSC-CSM card, Port 1 (OSC).

If the alarm clears, continue with Step 8. If not, perform the following steps:

a. Remove the 10-dB bulk attenuator on the OSC-CSM LINE TX and LINE RX ports and reconnect using only the patchcord.

b. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the Side A OSC-CSM card clears, continue with Step 8. If not, continue with Step c.

c. Display the OSC-CSM card in card view.

d. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

e. In the Types area, click **Alarm**, then click **Refresh.**

f. Locate the Port 3 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

g. Locate the Port 6 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

h. Click **Apply**, and then **Yes**.

i. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the Side A OSC-CSM card clears, continue with Step 8. If not, replace the OSC-CSM card.

Step 8 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_L card, continue with Step 9.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength under test, then continue with Step 10.

Step 9 If you are using a TXP_MR_10E_L card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the wavelength you will test.

Step 10 Connect the tunable laser transmitter or the TXP_MR_10E_L card DWDM TX port to the Side B OSC-CSM LINE RX port using a 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 11 If an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on Side B, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26. If not, continue with Step 12.

Step 12 Display the Side A OSC-CSM card in card view.

Step 13 Click the **Provisioning > Optical Line > Parameters** tabs. Locate the Port 3 Power value. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 14 If an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on Side A of the shelf, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26. If not, continue with Step 15.

Step 15 Display the Side B OSC-CSM card in card view.

Step 16 Click the **Provisioning > Optical Line > Parameters** tabs. Locate the Port 2 Power value. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 17 Disconnect the TXP card or tunable laser from the Side B OSC-CSM card.

Step 18 Remove the physical loopback created on the Side A OSC-CSM card in Step 6.

Step 19 Create a loopback on the Side B OSC-CSM by connecting the LINE TX port with LINE RX port using a patchcord and 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 20 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the Side B OSC-CSM card has cleared. The clearing of the LOS alarm indicates that the OSC link is active on Side B.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback, and an LOS alarm will appear for the Side A OSC-CSM card, Port 1 (OSC).

If the alarm clears, continue with Step 21. If not, perform the following steps:

a. Remove the 10-dB bulk attenuator on the OSC-CSM LINE TX and LINE RX ports and reconnect using only the patchcord.

b. Wait 90 to 100 seconds then, in node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the Side B OSC-CSM card clears, continue with Step 21. If not, continue with Step c.

c. Display the OSC-CSM card in card view.

d. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

e. In the Types area, click **Alarm**, then click **Refresh.**

f. Locate the Port 3 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

g. Locate the Port 6 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

h. Click **Apply**, and then **Yes**.

i. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the Side B OSC-CSM card clears, continue with Step 21. If not, replace the OSC-CSM card.

Step 21 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_L card, continue with Step 22.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength under test, then continue with Step 23.

Step 22 If you are using a TXP_MR_10E_L card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the wavelength you will test.

Step 23 Connect the tunable laser transmitter or the TXP_MR_10E_L card DWDM TX port to the Side A OSC-CSM LINE RX port using a 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 24 If an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on Side A, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26. If not, continue with Step 25.

Step 25 Display the Side B OSC-CSM card in card view.

Step 26 Click the **Provisioning > Optical Line > Parameters** tabs. Locate the Port 3 Power value. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 27 If an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on Side B, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26. If not, continue with Step 28.

Step 28 Display the Side A OSC-CSM card in card view.

Step 29 Click the **Provisioning > Optical Line > Parameters** tabs and locate the Power value for Port 2. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 30 Disconnect the TXP card or tunable laser from the Side A OSC-CSM card.

Step 31 Remove the loopback created on the Side B OSC-CSM card in Step 19.

Step 32 Delete both OSC channels. See the "DLP-G186 Delete an OSC Termination" task.

Step 33 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 34 Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Stop. **You have completed this procedure**.

NTP-G47 Perform the C-Band Line Amplifier Node with OSCM and OSC-CSM Cards Acceptance Test

Purpose	This procedure tests a C-band line amplifier node provisioned with an OSC-CSM card installed on one side of the shelf and an OSCM card installed on the other. This test verifies that a line amplifier node provisioned is operating properly before you connect it to the network. The test verifies the operation of the amplifiers and checks the power levels at each transmit and receive port to ensure that power loss in the cabling is within tolerance.
Tools/Equipment	One of the following: • A tunable laser or • TXP_MR_10E_C card An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Note Because the node is isolated and no line-side fibers are connected during the test, the power levels going into the line-side cards will not be the same as the levels when the node is connected to the network. Therefore, if the line amplifier shelf does not contain OPT-BST or OPT-BST-E amplifiers and OPT-PRE amplifiers on both Side B and Side A, you must lower the OPT-PRE power thresholds so that it turns on properly. At the end of the test, you will run ANS to configure the node with the correct parameters for the network acceptance test.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 If you are using TXP_MR_10E_C cards, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25. If not, continue with Step 3.

Step 3 Display the terminal node in node view (single-shelf mode) or multishelf view (multishelf mode).

Step 4 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

> **Note** The OSC terminations created during node turn-up will generate two alarms for each side of the shelf, one for an LOS on the OPT-BST or OPT-BST-E card, and the other for an LOS on the OSC-CSM or OSCM card.

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If any are not, complete the following:

a. Delete the two OSC channels using the "DLP-G186 Delete an OSC Termination" task.

b. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

c. Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 6 Create a loopback on the OSC-CSM card by connecting the LINE TX port to the LINE RX port using a patchcord and 10-dB bulk attenuator.

> **Caution** Failure to use proper attenuation might damage the equipment.

Step 7 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the OSC-CSM card has cleared. The clearing of the LOS alarm indicates that the OSC link is active for this side of the shelf.

> **Note** For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

If the alarm clears, continue with Step 8. If not, perform the following steps:

a. Remove the 10-dB bulk attenuator on the OSC-CSM LINE TX and LINE RX ports and reconnect using only the patchcord.

b. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the OSC-CSM card clears, continue with Step 8. If not, continue with Step c.

c. Display the OSC-CSM card in card view.

d. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

e. In the Types area, click **Alarm**, then click **Refresh.**

f. Locate the Port 3 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

g. Locate the Port 6 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

h. Click **Apply**, and then **Yes**.

i. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the OSC-CSM card clears, continue with Step 8. If not, replace the OSC-CSM card.

Step 8 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_C card, continue with Step 9.

a. Set the output power to a nominal value, such as –3 dBm.

b. Set the tuner to the wavelength under test, then continue with Step 10.

Step 9 If you are using a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the TXP containing the wavelength you will test. Refer to Table 21-1 on page 21-42, if needed.

Step 10 Measure the TXP output power by connecting the TXP DWDM TX port to a test meter. Record the results for future reference.

Step 11 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the OPT-BST or OPT-BST-E LINE RX port using a fiber patchcord and 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 12 If an OPT-PRE card is installed on the side opposite the OSC-CSM, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 13.

Step 13 Display the OSC-CSM card in card view.

Step 14 Click the **Provisioning > Optical Line > Parameters** tabs and locate the Port 2 (COM-RX) Power value. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 15 If an OPT-PRE card is installed on the same Side As the OSC-CSM, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 16.

Step 16 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the OPT-BST or OPT-BST-E card.

Step 17 Disconnect the TXP or tunable laser from the OPT-BST or OPT-BST-E card.

Step 18 Remove the loopback fiber on the OSC-CSM card.

Step 19 Delete both OSC channels. See the "DLP-G186 Delete an OSC Termination" task.

Step 20 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 21 Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 22 Create a loopback on the OPT-BST or OPT-BST-E card by connecting the LINE TX port with LINE RX port using a patchcord and 10-dB bulk attenuator.

Step 23 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the OPT-BST or OPT-BST-E card and the OSCM card have cleared. The clearing of the LOS alarms indicates that the OSC link is active for this side of the shelf.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

If the alarms clear, continue with Step 24. If not, perform the following steps:

a. Display the OPT-BST or OPT-BST-E card in card view.

b. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

c. In the Types area, click **Alarms**, then click **Refresh**.

d. Locate the Port 2 (COM-TX) Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

e. Locate the Port 4 (OSC-TX) Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

f. Click **Apply**, and then **Yes**.

g. Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the OPT-BST or OPT-BST-E card has cleared. If so, continue with Step 24. If not, disconnect the OSCM card from the OPT-BST or OPT-BST-E card.

h. Create a loopback on the OSCM card by connecting a patch cable from the OSC TX port to the OSC RX port using a 10-dB bulk attenuator.

i. Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the OSCM card has cleared. If not, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 24 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the OSC-CSM LINE RX port using a fiber patchcord and 10-dB bulk attenuator.

Step 25 If an OPT-PRE is installed on the same side of the shelf as the OSC-CSM, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 26.

Step 26 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the OPT-BST or OPT-BST-E card.

Step 27 Display the OSC-CSM card in card view.

Step 28 Click the **Provisioning > Optical Line > Parameters** tabs. Verify that the power value on Port 3 (COM-TX) is equal to the optical power from the tunable laser or TXP_MR_10E_C card (measured in Step 10) –10 dB, +/– 2 dB. If not, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 29 If an OPT-PRE card is installed on the side opposite the OSC-CSM, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If not, continue with Step 30.

Step 30 Disconnect the TXP or tunable laser from the OSC-CSM card.

Step 31 Remove the loopback fiber on the OPT-BST or OPT-BST-E amplifier card.

Step 32 Delete both OSC channels. See the "DLP-G186 Delete an OSC Termination" task.

Step 33 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 34 Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Stop. You have completed this procedure.

NTP-G157 Perform the L-Band Line Amplifier Node with OSCM and OSC-CSM Cards Acceptance Test

Purpose	This procedure tests a L-band line amplifier node with an OSC-CSM card installed on one side of the shelf and an OSCM card installed on the other.
Tools/Equipment	One of the following: • A tunable laser or • TXP_MR_10E_L card An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 If you are using TXP_MR_10E_L cards, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25. If not, continue with Step 3.

Step 3 From the View menu, choose **Go to Home View**.

Step 4 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Note The OSC terminations created during node turn-up will generate two alarms for each side of the shelf, one for an LOS on the OPT-BST-L card, and the other for an LOS on the OSC-CSM or OSCM card. If OSCM cards are installed on ANSI shelves, EOC DCC Termination Failure alarms will appear.

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are listed as Success - Changed or Success - Unchanged. If any are not, complete the following:

a. Delete the two OSC channels using the "DLP-G186 Delete an OSC Termination" task.

b. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

c. Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 6 Create a loopback on the OSC-CSM card by connecting the LINE TX port to the LINE RX port using a fiber patchcord and 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 7 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarm on the OSC-CSM card has cleared. The clearing of the LOS alarm indicates that the OSC link is active for this side of the shelf.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

If the alarm clears, continue with Step 8. If not, perform the following steps:

a. Remove the 10-dB bulk attenuator on the OSC-CSM LINE TX and LINE RX ports and reconnect using only the patchcord.
b. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the OSC-CSM card clears, continue with Step 8. If not, continue with Step c.
c. Display the OSC-CSM card in card view.
d. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.
e. In the Types area, click **Alarm**, then click **Refresh.**
f. Locate the Port 3 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.
g. Locate the Port 6 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.
h. Click **Apply**, and then **Yes**.
i. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. If the LOS alarm on the OSC-CSM card clears, continue with Step 8. If not, replace the OSC-CSM card.

Step 8 If you are using a tunable laser, follow the manufacturer's instructions to complete the following steps. If you are using a TXP_MR_10E_L card, continue with Step 9.

a. Set the output power to a nominal value, such as –3 dBm.
b. Set the tuner to the wavelength under test, then continue with Step 10.

Step 9 If you are using a TXP_MR_10E_L card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25 for the wavelength you will test.

Step 10 Measure the TXP card output power by connecting the TXP card DWDM TX port to a test meter. Record the results for future reference.

Step 11 Connect the tunable laser transmitter or the TXP_MR_10E_L card DWDM TX port to the OPT-BST-L LINE RX port using a 10-dB bulk attenuator.

Caution Failure to use proper attenuation might damage the equipment.

Step 12 Display the OPT-BST-L card in card view.

Step 13 Click the **Provisioning > Optical Line > Parameters** tabs. Verify that the power value on Port 2 (Out Com) is equal to the optical power from the tunable laser or TXP_MR_10E_L card (measured in Step 10), +/– 1.0 dBm.

Step 14 If an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on the side opposite the OSC-CSM card, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26. If not, continue with Step 15.

Step 15 Display the OSC-CSM card in card view.

Step 16 Click the **Provisioning > Optical Line > Parameters** tabs and locate the Port 3 Power value. Verify that the value is higher than –30 dBm. If the power value is not higher than –30 dBm, check your connections and clean the fibers using the "NTP-G115 Clean Fiber Connectors" procedure in the *Cisco ONS 15454 Hardware Installation Guide*. If this does not change the power value, consult your next level of support.

Step 17 If an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on the same Side As the OSC-CSM, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26. If not, continue with Step 18.

Step 18 Complete the "DLP-G359 Verify the OPT-BST-L or OPT-AMP-L (OPT-Line Mode) Amplifier Laser and Power" task on page 21-26 for the OPT-BST-L card.

Step 19 Disconnect the TXP card or tunable laser from the OPT-BST-L card.

Step 20 Remove the loopback fiber on the OSC-CSM card.

Step 21 Delete both OSC channels. See the "DLP-G186 Delete an OSC Termination" task.

Step 22 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 23 Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 24 Create a loopback on the OPT-BST-L card by connecting the LINE TX port with LINE RX port using a patchcord and 10-dB bulk attenuator.

Step 25 Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the OPT-BST-L and OSCM cards have cleared. The clearing of the LOS alarms indicates that the OSC link is active for this side of the shelf.

Note For ANSI shelves, an EOC DCC Termination Failure alarm will continue to appear due to the OSC signal loopback.

If the alarms clear, continue with Step 26. If not, perform the following steps:

a. Display the OPT-BST-L card in card view.

b. Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

c. In the Types area, click **Alarms**, then click **Refresh**.

d. Locate the Port 2 Power Failure Low parameter. Double-click the table cell and change the value to **–30 dBm**.

e. Locate the Port 4 Power Failure Low parameter. Double-click the table cell and change the value to **–40 dBm**.

f. Click **Apply**, and then **Yes**.

g. Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode) click the **Alarms** tab. Verify that the LOS alarms on the OPT-BST-L card has cleared. If so, continue with Step 26. If not, disconnect the OSCM card from the OPT-BST-L card.

h. Create a loopback on the OSCM card by connecting a patch cable from the OSC TX port to the OSC RX port using a 10-dB bulk attenuator.

i. Wait 90 to 100 seconds, then in node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab. Verify that the LOS alarm on the OSCM card has cleared. If so, replace the OPT-BST-L card. If not, replace the OSCM card. See the "NTP-G30 Install the DWDM Cards" procedure on page 14-64.

Step 26 Connect the tunable laser transmitter or the TXP_MR_10E_L card DWDM TX port to the OSC-CSM LINE RX port using a 10-dB bulk attenuator.

Step 27 If an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on the same side of the shelf as the OSC-CSM, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26. If not, continue with Step 28.

Step 28 Complete the "DLP-G359 Verify the OPT-BST-L or OPT-AMP-L (OPT-Line Mode) Amplifier Laser and Power" task on page 21-26 for the OPT-BST-L card.

Step 29 Display the OSC-CSM card in card view.

Step 30 Click the **Provisioning > Optical Line > Parameters** tabs. Verify that the power value on Port 3 (Out Com) is equal to the optical power from the tunable laser or TXP_MR_10E_L card (measured in Step 10), +/– 1.0 dBm.

Step 31 If an OPT-AMP-L card (provisioned in OPT-PRE mode) is installed on the side opposite the OSC-CSM, complete the "DLP-G360 Verify the OPT-AMP-L (OPT-PRE Mode) Amplifier Laser and Power" task on page 21-26. If not, continue with Step 32.

Step 32 Disconnect the TXP card or tunable laser from the OSC-CSM card.

Step 33 Remove the loopback fiber on the OPT-BST-L amplifier card.

Step 34 Delete both OSC channels. See the "DLP-G186 Delete an OSC Termination" task.

Step 35 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to restore the original configuration.

Step 36 Create the OSC channels using the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Stop. **You have completed this procedure**.

NTP-G48 Perform the OADM Node Acceptance Test on a Symmetric Node with OSCM Cards

Purpose	This procedure checks the integrity of all the optical connections inside an OADM node with OSCM cards installed on both Side B and Side A of the shelf. Three connection types are tested: • Express • Pass-through • Add/Drop
Tools/Equipment	A tunable laser or a TXP_MR_10E_C card An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the OADM node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are Success - Changed or Success - Unchanged. If not, complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 5 Check your Cisco TransportPlanner site configuration file to verify the presence of added and dropped bands (including four channels at 100 GHz) configured in pass-through mode in either direction.

Note Configuring a band in pass-through mode means that the band is dropped in one direction by an AD-xB-xx.x card on one side (Side B or Side A) of the node, then added by another AD-xB-x.xx card on the opposite side in the same direction. The band is not terminated inside the node.

Step 6 If no bands are configured in pass-through mode, continue with Step 7. If a band is configured in pass-through mode, mark it and skip the related optical test for the express, add, and drop sections. Band pass-through connections are verified separately.

Step 7 Check the site configuration file from Cisco TransportPlanner to verify the presence of dropped or added channels configured in pass-through mode in either direction.

Note Configuring a channel in pass-through mode means that the channel is dropped in one direction by an AD-xC-xx.x card on one side (Side B or Side A) of the node, then added by another AD-xC-x.xx card on the opposite side in the same direction. The channel is not terminated inside the node.

Step 8 If no channels are configured in pass-through mode, continue with Step 9. If a channel is configured in pass-through mode, mark it and skip the related optical test for the express, add, and drop sections. Channel pass-through connections are verified separately.

Step 9 Create a loopback on the Side A OPT-BST or OPT-BST-E card by connecting the LINE TX port to the LINE RX port using a patchcord and 10-dB bulk attenuator.

Step 10 Verify that the OSC link becomes active on the Side A OSCM card. (The OSC termination must be already provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.) If the OSC link becomes active, continue with Step 11. If the OSC link does not turn up, complete the following steps:

a. Modify the OSC Fail Low thresholds. Click the **Provisioning > Optical Line > Optics Thresholds** tabs and change the Port 4 opwrMin (minimum power) to **–40 dBm**.

b. Modify the COM TX Fail Low Threshold. Change the Port 2 opwrMin (minimum power) to **–30 dBm**.

c. If the OSC link turns up, continue with Step 11. If the OSC link is still down, disconnect the OSCM card from the OPT-BST or OPT-BST-E card.

d. Create a loopback on the OSCM card by connecting patch cable from the OSC TX port to the OSC RX port using a 10-dB bulk attenuator.

e. If the OSC link turns up, replace the OPT-BST or OPT-BST-E card. If the OSC link does not turn up, replace the OSCM card.

Note Due to the OSC signal loopback, an EOC DCC Termination Failure alarm might be raised on ANSI shelves.

Step 11 If the node has express bands or channels, complete the "DLP-G85 Verify Express Channel Connections on an OADM Node with OSCM Cards" task on page 21-97. If the node does not have express bands or channels, continue with Step 12.

Step 12 If connections configured in pass-through mode are present (noted in Steps 6 and 8), complete the "DLP-G89 Verify OADM Node Pass-Through Channel Connections" task on page 21-100. If not, continue with Step 13.

Step 13 If connections have add/drop connections, complete the "DLP-G93 Verify Add and Drop Connections on an OADM Node with OSCM Cards" task on page 21-105.

Stop. You have completed this procedure.

DLP-G85 Verify Express Channel Connections on an OADM Node with OSCM Cards

Purpose	This task verifies the express channel connections during an OADM node acceptance test.
Tools/Equipment	A tunable laser or a TXP_MR_10E_C
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 If you are using a tunable laser, set the output power to a nominal value, such as –3 dBm. If not, continue with Step 2.

Step 2 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the Side B OPT-BST or OPT-BST-E LINE RX port.

Step 3 Based on the Cisco TransportPlanner site configuration file, tune the tunable laser of the TXP_MR_10E_C card to a wavelength (on the 100-GHz ITU-T grid) that runs on the express path of all AD-xB-xx.x and AD-xC-xx.x cards on the Side B-to-Side A and Side A-to-Side B directions. Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 4 If an OPT-PRE card is installed on Side B, insert a 10-dB bulk attenuator on the COM RX port and complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If an OPT-PRE card is not installed on Side B, continue with Step 5.

Step 5 If AD-xB-xx.x cards are installed on Side B, complete the "DLP-G87 Verify the AD-xB-xx.x Output Express Power" task on page 21-98 for each Side B card. If not, continue with Step 6.

Note If AD-xB-xx.x and AD-xC-xx.x cards are both installed in one direction, the received express channels will go into the AD-xB-xx.x cards first, then into the AD-xC-xx.x cards.

Step 6 If AD-xC-xx.x cards are installed on Side B, complete the "DLP-G88 Verify the AD-xC-xx.x Output Express Power" task on page 21-98 for each Side B card. If not, continue with Step 7.

Step 7 If AD-xC-xx.x cards are installed on Side A, complete the "DLP-G271 Verify the AD-xC-xx.x Output Common Power" task on page 21-99 for each Side A card. If not, continue with Step 8.

Step 8 If AD-xB-xx.x cards are installed on Side A, complete the "DLP-G272 Verify the AD-xB-xx.x Output Common Power" task on page 21-99 for each Side A card. If not, continue with Step 9.

Step 9 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the OPT-BST or OPT-BST-E card installed on Side B.

Step 10 If an OPT-PRE card is installed on Side A, complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6. If an OPT-PRE card is not installed, continue with Step 11.

Step 11 Repeat Steps 5 through 8 for the AD-xB-xx.x and AD-xC-xx.x cards along the Side A-to-Side B direction.

Step 12 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 for the OPT-BST or OPT-BST-E card installed on Side A.

Step 13 Return to the originating procedure (NTP).

DLP-G87 Verify the AD-xB-xx.x Output Express Power

Purpose	This task verifies the output express power of AD-xB-xx.x cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the AD-xB-xx.x card in card view.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Change the Output Express port administrative state to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

Step 4 Verify that the Output Express port Power value is greater than the default no-power value of –28 dBm.

Step 5 Return to your originating procedure (NTP).

DLP-G88 Verify the AD-xC-xx.x Output Express Power

Purpose	This task verifies the output express power of the AD-xC-xx.x cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the AD-xC-xx.x card in card view.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Change the Output Express port administrative state to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

Step 4 Verify that the Output Express port Power value is greater than the default no-power value of –30 dBm.

Step 5 Return to your originating procedure (NTP).

DLP-G271 Verify the AD-xC-xx.x Output Common Power

Purpose	This task verifies the common power of the AD-xC-xx.x cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the AD-xC-xx.x card in card view.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Verify that the Output Com port Power value is greater than the default no-power value of –30 dBm.

Step 4 Return to your originating procedure (NTP).

DLP-G272 Verify the AD-xB-xx.x Output Common Power

Purpose	This task verifies the output common power of the AD-xB-xx.x cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the AD-xB-xx.x card in card view.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Verify that the Output Com port Power value is greater than the default no-power value of –28 dBm.

Step 4 Return to your originating procedure (NTP).

DLP-G89 Verify OADM Node Pass-Through Channel Connections

Purpose	This task verifies the pass-through channel connections during an OADM node acceptance test.
Tools/Equipment	A tunable laser or a TXP_MR_10E_C
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 Identify the first band connection configured in pass-through mode in both directions.

Step 2 Set the tunable laser or TXP_MR_10E_C card to the wavelength of the band to be tested. Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 3 Complete the "DLP-G90 Verify an AD-xB-xx.x Pass-Through Connection Power" task on page 21-102 for the first pass-through connection.

Step 4 Complete one of the following:

- If OSCM cards are installed, connect a power meter to the Side B OPT-BST or OPT-BST-E LINE TX port and verify that the Side B amplifier is turned on by the pass-through wavelength.
- If OSC-CSM cards are installed, complete the "DLP-G84 Verify the OSC-CSM Incoming Power" task on page 21-104 for the Side B OSC-CSM card.

Step 5 Complete Steps 2 through 4 for each band connection configured in pass-through mode in both directions.

Step 6 If channel pass-through connections are not present, continue with Step 15. If channel pass-through connections are present, continue with one of the following steps:

- If the pass-through channel connections use an AD-xC-xx.x card, continue with Step 7.
- If the pass-through channel connections use a 4MD-xx.x card, continue with Step 11.

Step 7 Tune the tunable laser on a wavelength (1 of 4) belonging to the channel to be tested.

Step 8 Complete the "DLP-G91 Verify an AD-xC-xx.x Pass-Through Connection" task on page 21-103 for the first pass-through connection.

Step 9 Complete one of the following:

- If an OSCM card is installed, connect a power meter to LINE TX port on the front-pane and verify that the Side B OPT-BST or OPT-BST-E amplifier is turned on by the pass-through wavelength.
- If an OSC-CSM card is installed, complete the "DLP-G84 Verify the OSC-CSM Incoming Power" task on page 21-104 for the Side B OSC-CSM card.

Step 10 If the pass-through connections use a 4MD-xx.x card, continue with Step 11. If not, continue with Step 15.

Step 11 Identify the first channel connection that is configured in pass-through mode using the 4MD-xx.x cards in both directions.

Step 12 Tune the tunable laser on the corresponding wavelength.

Step 13 Complete the "DLP-G92 Verify 4MD-xx.x Pass-Through Connection Power" task on page 21-101.

Step 14 Perform one of the following:

- If an OSCM card is installed, connect a power meter to LINE TX port on the card front panel and verify that the Side B OPT-BST or OPT-BST-E amplifier is turned on by the pass-through wavelength.
- If an OSC-CSM card is installed, complete the "DLP-G84 Verify the OSC-CSM Incoming Power" task on page 21-104 for the Side B OSC-CSM card.

Step 15 Return to your originating procedure (NTP).

DLP-G92 Verify 4MD-xx.x Pass-Through Connection Power

Purpose	This task verifies 4MD-xx.x pass-through connection power.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Verify the TX band power on the related Side B AD-xB-xx.x card:

a. Display the Side B AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

c. Change the administrative state of the BAND TX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength selected on the tunable laser.

d. Verify that the BAND TX Power value is higher than the default no-power value of –30 dBm.

Step 2 Verify the TX power on the Side B 4MD-xx.x card (Side B-to-Side A):

a. Display the Side B 4MD-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Verify that the Power value on the CHAN TX port is higher than the default no-power value of –35 dBm.

Step 3 Verify the RX band power on the related Side A AD-xB-xx.x card (Side B-to-Side A):

a. Display the Side A AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

c. Verify that the BAND RX Power value is higher than the default no-power values of –30 dBm.

Step 4 Verify the Side A 4MD-xx.x card (Side B-to-Side A):

a. Display the Side A 4MD-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Change the administrative state of the CHAN RX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength selected on the tunable laser.

d. Verify that the Power value of the CHAN RX port reaches the provisioned set point (VOA Power Ref).

Step 5 Verify the TX band power on the Side A AD-xB-xx.x card (Side A-to-Side B):

a. Display the Side A AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

c. Change the administrative state of the BAND TX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength selected on the tunable laser.

d. Verify that the BAND TX Power value is higher than the default no-power value of –30 dBm.

Step 6 Verify the Side A 4MD-xx.x card (Side A-to-Side B):

a. Display the Side A 4MD-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Verify that the Power value on the CHAN TX port is higher than the default no-power value of –35 dBm.

Step 7 Verify the Side B 4MD-xx.x card (Side A-to-Side B):

a. Display the Side B 4MD-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Change the administrative state of the CHAN RX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength selected on the tunable laser.

d. Verify that the Power value of the CHAN RX port reaches the provisioned set point (VOA Power Ref).

Step 8 Return to your originating procedure (NTP).

DLP-G90 Verify an AD-xB-xx.x Pass-Through Connection Power

Purpose	This task verifies an AD-xB-xx.x pass-through connection.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Verify the Side B AD-xB-xx.x band TX power:

a. Display the Side B AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

c. Change the administrative state of the BAND TX (Side B-to-Side A) port related to the wavelength selected on the tunable laser to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

d. Verify that the BAND TX port Power value is higher than the default no-power value of –30 dBm.

Step 2 Verify the Side A AD-xB-xx.x card RX and TX power:

a. Display the Side A AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

c. Verify that the Power value of the BAND RX (Side B-to-Side A) port is higher than the default no-power value of –30 dBm.

d. Change the administrative state of the BAND TX (Side A-to-Side B) port related to the wavelength selected on the tunable laser to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

e. Verify that the BAND TX port Power value is higher than the default no-power value of –30 dBm.

Step 3 Verify the BAND RX port on the Side B AD-xB-xx.x card:

a. Display the Side B AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

c. Verify that the Power value of the BAND RX (Side A-to-Side B) port is higher than the default no-power value of –30 dBm.

Step 4 Return to your originating procedure (NTP).

DLP-G91 Verify an AD-xC-xx.x Pass-Through Connection

Purpose	This task verifies an AD-xC-xx.x pass-through connection.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Verify the Side B AD-xC-xx.x channel TX power:

a. Display the Side B AD-xC-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Verify that the power value for the CHAN TX port is higher than the default no-power value of –35 dBm.

d. If the AD-xC-xx.x card is an AD-4C-xx.x card, a VOA (applied to all four channels) is installed along the drop path and needs to be activated in Step e.

e. Change the administrative state of the CHAN TX port related to the wavelength selected on the tunable laser to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

f. Verify that the power value of the CHAN TX port is higher than the default no-power value of –35 dBm.

Step 2 Verify the channel power for the corresponding Side A AD-xC-xx.x card:

a. Display the Side A AD-xC-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Verify that the power value of the CHAN TX port is higher than the default no-power value of –35 dBm.

d. Verify that the Power value of the CHAN RX port reaches the provisioned set point (VOA Power Ref).

e. Change the administrative state of the CHAN TX port related to the wavelength selected on the tunable laser to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

f. If the AD-xC-xx.x is an AD-4C-W card, a VOA (applying to all four channels) is installed along the drop path and needs to be activated in Step g.

g. Change the administrative state of the CHAN TX port related to the wavelength selected on the tunable laser to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

h. Verify that the power value of the CHAN TX port is higher than the default no-power value of –35 dBm.

Step 3 Verify the Side B AD-xC-xx.x channel RX power:

a. Display the Side B AD-xC-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Change the administrative state of the CHAN RX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength selected on the tunable laser.

d. Verify that the Power value of the CHAN RX port reaches the provisioned set point (VOA Power Ref).

Step 4 Return to your originating procedure (NTP).

DLP-G84 Verify the OSC-CSM Incoming Power

Purpose	This task verifies the OSC-CSM card incoming power.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the OSC-CSM card in card view.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Verify that the Power value for Port 2 is higher than the default no-power value of –30 dBm. The calculated expected power for Port 2 is the OPT-PRE card Pout COM TX value. Normally, this is + 2 dBm.

Note Actual output power is affected by many factors. Always consider the calculated expected power to be a general guideline and not a precise value.

Step 4 Return to your originating procedure (NTP).

DLP-G93 Verify Add and Drop Connections on an OADM Node with OSCM Cards

Purpose	This task verifies the add and drop channel connections for an OADM node with OSCM cards installed.
Tools/Equipment	A tunable laser or a TXP_MR_10E_C card
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note In this task, you will verify add and drop connections in the following order: Side B-to-Side A add and Side A-to-Side B drop, Steps 1 through 15; Side A-to-Side B add and Side B-to-Side A drop, Steps 16 through 17.

Step 1 Based on the Cisco TransportPlanner site configuration file, tune the tunable laser or TXP_MR_10E_C card to a wavelength (belonging to the 100-GHz ITU-T grid) of the channel running on the first add path of the first Side A AD-xC-xx.x or Side A 4MD-xx.x card in the Side B-to-Side A direction. Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 2 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the corresponding 15xx.x RX port (on the card front panel) of the Side A AD-xC-xx.x or 4MD-xx.x card.

Step 3 Verify the Side A AD-xC-xx.x or 4MD-xx.x card (Side B-to-Side A):

a. Display the Side A AD-xC-xx.x or 4MD-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Change the administrative state of the CHAN RX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength chosen on the tunable laser.

d. Verify that the Power value of the CHAN RX port reaches the provisioned set point (VOA Power Ref).

Step 4 Complete the "DLP-G79 Verify the OPT-BST, OPT-BST-E, or OPT-BST-L Amplifier Laser and Power" task on page 21-5 on the Side A OPT-BST or OPT-BST-E amplifier to verify that the added wavelength turns on the laser.

Step 5 If the add connection uses a 4MD-xx.x card, continue with Step 6. If the add connection uses an AD-xC-xx.x card, move to Step 10.

Step 6 Verify the RX band port on the Side A AD-xB-xx.x card:

a. Display the Side A AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

Step 7 Verify that the BAND RX Power value is higher than the default no-power value of –30 dBm.

Step 8 Verify the band TX port on the Side A AD-xB-xx.x (Side A-to-Side B):

a. Display the Side A AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

c. Change the administrative state of the BAND TX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength selected on the tunable laser or TXP_MR_10E_C card.

d. Verify that the Power value of the BAND TX port is higher than the default no-power value of –30 dBm.

Step 9 Verify the Side A 4MD-xx.x card (Side A-to-Side B):

a. Display the Side A 4MD-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Verify that the Power value of the CHAN TX port is higher than the default no-power value of –30 dBm.

Step 10 Verify the Side A AD-xC-xx.x (Side A-to-Side B) card:

a. Display the Side A AD-xC-xx.x card in card view.

b. If the AD-xC-xx.x card is an AD-4C-xx.x card, a VOA (applied to all four channels) is installed along the drop path and needs to be activated according to Step g.

c. Click the **Provisioning > Optical Chn > Parameters** tabs.

d. Verify that the Power value of the CHAN TX port is higher than the default no-power value of –35 dBm.

e. Display the Side B AD-xC-xx.x card in card view.

f. Click the **Provisioning > Optical Chn > Parameters** tabs.

g. Change the administrative state of the CHAN TX port related to the wavelength selected on the tunable laser or TXP_MR_10E_C card to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

h. Verify that the power value for the CHAN TX port is higher than the default no-power value of –35 dBm.

i. Perform the output power check.

Step 11 Connect a power meter to the proper 15xx.x TX port on the front panel (the dual port compared with the port where the tunable laser or TXP_MR_10E_C card is connected). Verify that the physical optical power value from that port is consistent with the value displayed on the Provisioning > Optical Chn > Parameters tab for the proper CHAN TX power value +/– 0.5 dB.

Step 12 Repeat Steps 5 through 11 for all add paths of any Side A AD-xC-xx.x or 4MD-xx.x cards along the Side B-to-Side A direction.

Step 13 Remove the loopback on the Side A OPT-BST or OPT-BST-E amplifier and create a loopback on the Side B OPT-BST or OPT-BST-E amplifier.

Step 14 Verify that the OSC link becomes active on the Side B OSCM card. (The OSC termination must be already provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.) If the OSC link becomes active, continue with Step 15. If the OSC link does not become active, perform the following steps:

a. Modify the OSC Fail Low thresholds by clicking the **Provisioning > Optical Line > Optics Thresholds** tabs and changing the Port 2 opwrMin (minimum power) to –40 dBm.

b. If the OSC link turns up, continue with Step 15. If the OSC link remains down, disconnect the OSCM card from the OPT-BST or OPT-BST-E card.

c. Create a loopback on the OSCM card by connecting patch cable from the OSC TX port to the OSC RX port using a 10-dB bulk attenuator.

d. If the OSC link turns up, replace the OPT-BST or OPT-BST-E card. If the OSC link does not turn up, replace the OSCM card. See the "NTP-G30 Install the DWDM Cards" procedure on page 14-64.

Note Due to the OSC signal loopback, an EOC DCC Termination Failure might be raised on ANSI shelves.

Step 15 Based on the Cisco TransportPlanner site configuration file, tune the tunable laser or TXP_MR_10E_C card to a wavelength (belonging to the 100-GHz ITU-T grid) of the channel running on the first add path of the first add path of the first AD-xC-xx.x or 4MD-xx.x card on the Side A-to-Side B direction. Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 16 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the correspondent 15xx.x RX port (on the card front panel) of the Side B AD-xC-xx.x or Side B 4MD-xx.x card.

Step 17 Repeat Steps 3 through 15, applying the steps to the Side A-to-Side B direction.

Step 18 Remove the loopback connection and restore the default administrative state (IS,AINS or Unlocked,automaticInService) on all the ports previously set to OOS,MT (ANSI) or Locked,maintenance (ETSI).

Step 19 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to recover the correct node configuration.

Step 20 Return to your originating procedure (NTP).

NTP-G49 Perform the Active OADM Node Acceptance Test on a Symmetric Node with OSC-CSM Cards

Purpose	This procedure checks the integrity of all the optical connections in an OADM node with OSC-CSM cards and OPT-BST or OPT-BST-E cards installed on both Side B and Side A of the shelf. Three connection types are tested: • Express • Pass-through • Add/Drop
Tools/Equipment	A tunable laser or a TXP_MR_10E_C card An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the OADM node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are Success - Changed or Success - Unchanged. If not, complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 5 Check the Cisco TransportPlanner site configuration file to verify the presence of added and dropped bands (including four channels at 100 GHz) configured in pass-through mode in either direction.

Note Configuring a band in pass-through mode means that the band is dropped in one direction by an AD-xB-xx.x card on one side (Side B or Side A) of the node, then added by another AD-xB-x.xx card on the opposite side in the same direction. The band is not terminated inside the node.

Step 6 If no bands are configured in pass-through mode, continue with Step 7. If a band is configured in pass-through mode, mark it and skip the related optical test for the express, add, and drop sections. Band pass-through connections are verified separately.

Step 7 Check the site configuration file from Cisco TransportPlanner to verify the presence of dropped or added channels configured in pass-through mode in either direction.

Note Configuring a channel in pass-through mode means that the channel is dropped in one direction by an AD-xC-xx.x card on one side (Side B or Side A) of the node, then added by another AD-xC-x.xx card on the opposite side in the same direction. The channel is not terminated inside the node.

Step 8 If no channels are configured in pass-through mode, continue with Step 9. If a channel is configured in pass-through mode, mark it and skip the related optical test for the express, add, and drop sections. Channel pass-through connections are verified separately.

Step 9 Create a loopback on the Side A OSC-CSM card by connecting the LINE TX port to the LINE RX port using a patchcord and a 10-dB bulk attenuator.

Step 10 Verify that the OSC link becomes active on the Side A OSC-CSM card. (The OSC termination must be already provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

> **Note** Due to the OSC signal loopback, an EOC Termination Failure alarm might be raised on ANSI shelves.

Step 11 If the OSC link becomes active, continue with Step 12. If the OSC link does not turn up, perform the following troubleshooting steps:

a. Remove the 10-dB bulk attenuator between the LINE TX and LINE RX connection. If the OSC link becomes active, continue with Step 12. If not, continue with Step b.

b. Modify the OSC Fail Low thresholds. Click the **Provisioning > Optical Line > Optics Thresholds** tabs and change the Port 6 opwrMin (minimum power) to **–40 dBm**.

c. Modify the COM TX Fail Low Threshold. Change the Port 3 opwrMin (minimum power) to **–30 dBm**.

d. If the OSC link turns up, continue with Step 12. If it does not turn up, replace the OSC-CSM card.

Step 12 If the node has express bands or channels, complete the "DLP-G86 Verify Express Channel Connections on an OADM Node with OSC-CSM Cards" task on page 21-109. If the node does not have express bands or channels, continue with Step 13.

Step 13 If connections configured in pass-through mode are present (noted in Steps 6 and 8), complete the "DLP-G89 Verify OADM Node Pass-Through Channel Connections" task on page 21-100. If not, continue with Step 14.

Step 14 If connections have add/drop connections, complete the "DLP-G94 Verify Add and Drop Connections on an OADM Node with OSC-CSM Cards" task on page 21-111.

Stop. **You have completed this procedure**.

DLP-G86 Verify Express Channel Connections on an OADM Node with OSC-CSM Cards

Purpose	This task verifies the express channel connections for an OADM node with OSC-CSM cards during a node acceptance test.
Tools/Equipment	A tunable laser or a TXP_MR_10E_C card
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 If you are using a tunable laser, set the output power to a nominal value, such as –3 dBm. If not, continue with Step 2.

Step 2 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the LINE RX port of the Side B OSC-CSM card.

Step 3 If an OPT-PRE amplifier card is installed on Side B, install a 10-dB bulk attenuator on the COM RX port.

Step 4 Based on the Cisco TransportPlanner site configuration file, tune the tunable laser or TXP_MR_10E_C card to a wavelength (on the 100-GHz ITU-T grid) that runs on the express path of all AD-xB-xx.x and AD-xC-xx.x cards on the Side B-to-Side A and Side A-to-Side B directions. Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 5 Complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 for the OPT-PRE amplifier card installed on Side A.

Step 6 If AD-xB-xx.x cards are installed on Side B, complete the "DLP-G87 Verify the AD-xB-xx.x Output Express Power" task on page 21-98 for each Side B card. If not, continue with Step 7.

Note If AD-xB-xx.x and AD-xC-xx.x cards are both installed in one direction, the received express channels will go into the AD-xB-xx.x cards first, then into the AD-xC-xx.x cards.

Step 7 If AD-xC-xx.x cards are installed on Side B, complete the "DLP-G88 Verify the AD-xC-xx.x Output Express Power" task on page 21-98 for each Side B card. If not, continue with Step 8.

Step 8 If AD-xC-xx.x cards are installed on Side A, complete the "DLP-G271 Verify the AD-xC-xx.x Output Common Power" task on page 21-99 for each Side A card. If not, continue with Step 9.

Step 9 If AD-xB-xx.x cards are installed on Side A, complete the "DLP-G272 Verify the AD-xB-xx.x Output Common Power" task on page 21-99 for each Side A card. If not, continue with Step 10.

Step 10 Complete the "DLP-G83 Verify the OSC-CSM Power on OADM Nodes" task on page 21-110 for the OSC-CSM card installed on Side A.

Step 11 Complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 for the OPT-PRE card installed on Side B.

Step 12 Repeat Steps 6 through 11 for the AD-xB-xx.x and AD-xC-xx.x cards along the Side A-to-Side B direction.

Step 13 Return to your originating procedure (NTP).

DLP-G83 Verify the OSC-CSM Power on OADM Nodes

Purpose	This task verifies the OSC-CSM card power on OADM nodes.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Display the OSC-CSM card in card view.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Verify that the Power value for Port 3 is higher than the default no-power value of –30 dBm. The calculated expected power value for Port 3 is:

Pout COM TX of last AD-xy-xx.x – IL02 OSC-CSM (COM RX > LINE TX) – 10 dB (bulk attenuator)

Step 4 Double-check the value.

> **Note** Actual output power is affected by many factors. Always consider the calculated expected power to be a general guideline and not a precise value.

Step 5 Return to your originating procedure (NTP).

DLP-G94 Verify Add and Drop Connections on an OADM Node with OSC-CSM Cards

Purpose	This task verifies the add and drop channel connections for an OADM node with OSC-CSM cards installed.
Tools/Equipment	A tunable laser or a TXP_MR_10E_C card
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 Based on the Cisco TransportPlanner site configuration file, tune the tunable laser or TXP_MR_10E_C card to a wavelength (belonging to the 100-GHz ITU-T grid) of the channel running on the first add path of the first Side A AD-xC-xx.x or Side A 4MD-xx.x card on the Side B-to-Side A direction. Refer to the tunable laser manufacturer's documentation or the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25.

Step 2 Connect the tunable laser transmitter or the TXP_MR_10E_C card DWDM TX port to the corresponding 15xx.x RX port (on the card front panel) of the Side A AD-xC-xx.x or 4MD-xx.x card.

Step 3 Verify the Side A AD-xC-xx.x or 4MD-xx.x card (Side B-to-Side A):

a. Display the Side A AD-xC-xx.x or 4MD-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Change the administrative state of the CHAN RX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength selected on the tunable laser.

d. Verify that the Power value of the CHAN RX port reaches the provisioned set point (VOA Power Ref).

Step 4 Complete the "DLP-G80 Verify the OPT-PRE Amplifier Laser and Power" task on page 21-6 on the Side A OPT-PRE amplifier to verify that the added wavelength turns on the laser.

Step 5 If the add connection uses a 4MD-xx.x card, continue with Step 6. If the add connection uses an AD-xC-xx.x card, move to Step 10.

Step 6 Verify the Side A AD-xB-xx.x card:

a. Display the Side A AD-xB-xx.x card in card view.

b. Click the **Provisioning > Optical Band > Parameters** tabs.

c. Change the administrative state of the BAND TX port to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) for the channel related to the wavelength selected on the tunable laser.

d. Verify that the Power value of the BAND TX port is higher than the default no-power value of –30 dBm.

Step 7 Display the related AD-xB-xx.x card (Side A-to-Side B direction) in card view.

Step 8 Change the administrative state of the drop BAND TX port related to the wavelength selected on the tunable laser to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI).

Step 9 (Optional) Connect a power meter to the proper 15xx.xx TX port on the front panel (the dual port compared with the port where the tunable laser is connected). Verify that the physical optical power value from that port is consistent with the value displayed on the Provisioning > Optical Chn > Parameters tab for the proper CHAN TX power value, +/– 0.5 dB.

Step 10 Verify the Side A AD-xC-xx.x (Side A-to-Side B) card:

a. Display the Side A AD-xC-xx.x card in card view.

b. Click the **Provisioning > Optical Chn > Parameters** tabs.

c. Verify that the Power value of the CHAN TX port is higher than the default no-power value of **–35 dBm**.

d. Display the Side B AD-xC-xx.x card in card view.

e. Click the **Provisioning > Optical Chn > Parameters** tabs.

f. Verify that the power value for the CHAN TX port is higher than the default no-power value of **–35 dBm**.

g. If the AD-xC-xx.x card is an AD-4C-xx.x card, a VOA (applied to all four channels) is installed along the drop path and needs to be activated in Step h.

h. Change the administrative state of the CHAN TX port related to the wavelength selected on the tunable laser to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI). Click **Apply**.

i. Perform the output power check.

Step 11 (Optional) Connect a power meter to the proper 15xx.xx TX port on the front panel (the dual port compared with the port where the tunable laser is connected). Verify that the physical optical power value from that port is consistent with the value on Provisioning > Optical Chn > Parameters tab for the proper CHAN TX power value, +/– 0.5 dB.

Step 12 Repeat Steps 10 through 11 for all add paths of any Side A AD-xC-xx.x cards along the Side B-to-Side A direction.

Step 13 Remove the loopback on the Side A OSC-CSM card.

Step 14 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs.

Step 15 Click **Launch ANS**.

Step 16 Create a loopback on the Side B OSC-CSM card by connecting the OSC-CSM LINE RX and LINE TX ports using a patchcord and 10-dB bulk attenuator.

Step 17 Verify that the OSC link becomes active on the Side A OSC-CSM card. (The OSC termination must be already provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Note Due to the OSC signal loopback, an EOC Termination Failure alarm might be raised on ANSI shelves.

Step 18 If the OSC link becomes active, continue with Step 19. If the OSC link does not turn up, perform the following troubleshooting steps:

a. Remove the 10-dB bulk attenuator between the LINE TX and LINE RX connection. If the OSC link becomes active, continue with Step 19. If not, continue with Step b.

b. Modify the OSC Fail Low thresholds. Click the **Provisioning > Optical Line > Optics Thresholds** tabs and change the Port 6 opwrMin (minimum power) to –40 dBm.

c. Modify the COM TX Fail Low Threshold. Change the Port 3 opwrMin (minimum power) to –30 dBm.

d. If the OSC link turns up, continue with Step 19. If it does not turn up, replace the OSC-CSM card.

Step 19 Check the site configuration file from Cisco TransportPlanner and identify the wavelength (belonging to the 100 Ghz ITU-T grid) of the channel running on the first add path of the first AD-xC-xx.x or 4MD-xx.x card on the Side A-to-Side B direction.

Step 20 Connect the tunable laser to the corresponding 15xx.x RX port (on the card front panel) of the Side B AD-xC-xx.x or Side B 4MD-xx.x card.

Step 21 Repeat Steps 3 through 20, applying the steps to the Side B-to-Side A direction.

Step 22 Restore the default administrative state (IS,AINS/Unlocked,automaticInService) on all the ports previously set to **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI).

Step 23 Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 to recover the correct node configuration.

Step 24 Return to your originating procedure (NTP).

NTP-G50 Perform the Passive OADM Node Acceptance Test on a Symmetric Node with OSC-CSM Cards

Purpose	This procedure checks the integrity of all the optical connections inside an OADM node with OSC-CSM cards and no OPT-BST or OPT-BST-E cards installed on Side B and Side A of the shelf. Three connection types are tested: • Express • Pass-through • Add/Drop
Tools/Equipment	A tunable laser or a TXP_MR_10E_C card An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the OADM node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning** > **WDM-ANS** > **Port Status** tabs. Verify that all statuses under Link Status are Success - Changed or Success - Unchanged. If not, complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 5 Check the Cisco TransportPlanner site configuration file to verify the presence of a dropped or added bands (including four channels at 100 GHz) configured in pass-through mode in either direction.

Note Configuring a band in pass-through mode means that the band is dropped in one direction by an AD-xB-xx.x card on one side (Side B or Side A) of the node, then added by another AD-xB x.xx card on the opposite side in the same direction. The band is not terminated inside the node.

Step 6 If no bands are configured in pass-through mode, continue with Step 7. If a band is configured in pass-through mode, mark it and skip the related optical test for the express, add, and drop sections. Band pass-through connections are verified separately.

Step 7 Check the site configuration file from Cisco TransportPlanner to verify the presence of dropped or added channels configured in pass-through mode in either direction.

Note Configuring a channel in pass-through mode means that the channel is dropped in one direction by an AD-xC-xx.x card on one side (Side B or Side A) of the node, then added by another AD-xC-x.xx card on the opposite side in the same direction. The channel is not terminated inside the node.

Step 8 If no channels are configured in pass-through mode, continue with Step 9. If a channel is configured in pass-through mode, mark it and skip the related optical test for the express, add, and drop sections. Channel pass-through connections are verified separately.

Step 9 Create a loopback on the Side A OSC-CSM card by connecting the LINE TX port to the LINE RX port using a patchcord and 10-dB bulk attenuator.

Step 10 Verify that the OSC link becomes active on the Side A OSC-CSM card. (The OSC termination must be already provisioned. If not, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.)

Note Due to the OSC signal loopback, an EOC Termination Failure alarm might be raised on ANSI shelves.

Step 11 If the OSC link becomes active, continue with Step 12. If the OSC link does not turn up, perform the following troubleshooting steps:

a. Remove the 10-dB bulk attenuator between the LINE TX and LINE RX connection. If the OSC link becomes active, continue with Step 12. If not, continue with Step b.

b. Modify the OSC Fail Low thresholds. Click the **Provisioning > Optical Line > Optics Thresholds** tabs and change the Port 6 opwrMin (minimum power) to **–40 dBm**.

c. Modify the COM TX Fail Low Threshold. Change the Port 3 opwrMin (minimum power) to **–30 dBm**.

d. If the OSC link turns up, continue with Step 12. If it does not turn up, replace the OSC-CSM card.

Step 12 If the node has express bands or channels, complete the "DLP-G86 Verify Express Channel Connections on an OADM Node with OSC-CSM Cards" task on page 21-109. If the node does not have express bands or channels, continue with Step 13.

Step 13 If connections configured in pass-through mode are present (noted in Steps 5 through 8), complete the "DLP-G89 Verify OADM Node Pass-Through Channel Connections" task on page 21-100. If not, continue with Step 14.

Step 14 If connections have add/drop connections, complete the "DLP-G94 Verify Add and Drop Connections on an OADM Node with OSC-CSM Cards" task on page 21-111.

Stop. **You have completed this procedure**.

NTP-G186 Perform the Four-Degree and Eight-Degree Mesh Patch Panel Acceptance Test

Purpose	This procedure checks the insertion loss for a four-degree or eight-degree patch panel.
Tools/Equipment	1 fully-tunable transponder or tunable laser source with an LC patchcord 1 optical power meter with LC input connector 1 MPO-LC multicable (LC if the optical power meter has LC input)
Prerequisite Procedures	• The mesh patch panel must be installed. See the "DLP-G28 Install the Fiber Patch-Panel Tray" in the *Cisco ONS 15454 Hardware Installation Guide*.
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 4 If you are installing a TXP_MR_10E_C card, complete the "DLP-G358 Provision TXP_MR_10E_L and TXP_MR_10E_C Cards for Acceptance Testing" task on page 21-25. Refer to Table 21-1 on page 21-42, if needed.

Step 5 Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder to a wavelength not used in any of the sides already carrying traffic (1530.33 nm, for example).

Step 6 Complete the "DLP-G433 Record Transponder Optical Power" task on page 21-126.

Step 7 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 8 Connect the transponder to the COM-RX A port of the four-degree or eight-degree patch panel.

Step 9 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 10 Verify the COM-RX port power results for Side A (Table 21-3).

Table 21-3 From COM-RX Side A Verification

Connect MPO Connector to Patch Panel Port	Refer to...
EXP A TX	Table 21-11 on page 21-121
EXP B TX	Table 21-13 on page 21-122
EXP C TX	Table 21-14 on page 21-123
EXP D TX	Table 21-15 on page 21-123
EXP E TX (eight-degree patch panel only)	Table 21-16 on page 21-123
EXP F TX (eight-degree patch panel only)	Table 21-17 on page 21-124
EXP G TX (eight-degree patch panel only)	Table 21-18 on page 21-124
EXP H TX (eight-degree patch panel only)	Table 21-19 on page 21-125
TEST ACCESS TX	Table 21-12 on page 21-122

Step 11 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 12 Connect the transponder to the COM-RX B port of the four-degree or eight-degree patch panel.

Step 13 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 14 Verify the COM-RX port power results for Side B (Table 21-4).

Table 21-4 From COM-RX Side B Verification

Connect MPO Connector to Patch Panel Port	Refer to...
EXP A TX	Table 21-12 on page 21-122
EXP B TX	Table 21-11 on page 21-121
EXP C TX	Table 21-14 on page 21-123
EXP D TX	Table 21-15 on page 21-123
EXP E TX (eight-degree patch panel only)	Table 21-16 on page 21-123
EXP F TX (eight-degree patch panel only)	Table 21-17 on page 21-124
EXP G TX (eight-degree patch panel only)	Table 21-18 on page 21-124
EXP H TX (eight-degree patch panel only)	Table 21-19 on page 21-125
TEST ACCESS TX	Table 21-13 on page 21-122

Step 15 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 16 Connect the transponder to the COM-RX C port of the four-degree or eight-degree patch panel.

Step 17 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 18 Verify the COM-RX port power results for Side C (Table 21-5).

Table 21-5 From COM-RX Side C Verification

Connect MPO Connector to Patch Panel Port	Refer to...
EXP A TX	Table 21-12 on page 21-122
EXP B TX	Table 21-13 on page 21-122
EXP C TX	Table 21-11 on page 21-121
EXP D TX	Table 21-15 on page 21-123
EXP E TX (eight-degree patch panel only)	Table 21-16 on page 21-123
EXP F TX (eight-degree patch panel only)	Table 21-17 on page 21-124
EXP G TX (eight-degree patch panel only)	Table 21-18 on page 21-124
EXP H TX (eight-degree patch panel only)	Table 21-19 on page 21-125
TAP TX	Table 21-14 on page 21-123

Step 19 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 20 Connect the transponder to the COM-RX D port of the four-degree or eight-degree patch panel.

Step 21 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 22 Verify the COM-RX port power results for Side D (Table 21-6).

Table 21-6 From COM-RX Side D Verification

Connect MPO Connector to Patch Panel Port	Refer to...
EXP A TX	Table 21-12 on page 21-122
EXP B TX	Table 21-13 on page 21-122
EXP C TX	Table 21-14 on page 21-123
EXP D TX	Table 21-11 on page 21-121
EXP E TX (eight-degree patch panel only)	Table 21-16 on page 21-123
EXP F TX (eight-degree patch panel only)	Table 21-17 on page 21-124
EXP G TX (eight-degree patch panel only)	Table 21-18 on page 21-124
EXP H TX (eight-degree patch panel only)	Table 21-19 on page 21-125
TEST ACCESS TX	Table 21-15 on page 21-123

Step 23 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 24 If you are testing a four-degree patch panel, continue with Step 77. If you are testing an eight-degree patch panel, continue with Step 25.

Step 25 Connect the transponder to the COM-RX E port of the eight-degree patch panel.

Step 26 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 27 Verify the COM-RX port power results for Side E (Table 21-7).

Table 21-7 From COM-RX Side E Verification

Connect MPO Connector to Patch Panel Port	Refer to...
EXP A TX	Table 21-12 on page 21-122
EXP B TX	Table 21-13 on page 21-122
EXP C TX	Table 21-14 on page 21-123
EXP D TX	Table 21-15 on page 21-123
EXP E TX (eight-degree patch panel only)	Table 21-11 on page 21-121
EXP F TX (eight-degree patch panel only)	Table 21-17 on page 21-124
EXP G TX (eight-degree patch panel only)	Table 21-18 on page 21-124
EXP H TX (eight-degree patch panel only)	Table 21-19 on page 21-125
TEST ACCESS TX	Table 21-16 on page 21-123

Step 28 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 29 Connect the transponder to the COM-RX F port of the eight-degree patch panel.

Step 30 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 31 Verify the COM-RX port power results for Side F (Table 21-8).

Table 21-8 From COM-RX Side F Verification Table

Connect MPO Connector to Patch Panel Port	Refer to...
EXP A TX	Table 21-12 on page 21-122
EXP B TX	Table 21-13 on page 21-122
EXP C TX	Table 21-14 on page 21-123
EXP D TX	Table 21-15 on page 21-123
EXP E TX (eight-degree patch panel only)	Table 21-16 on page 21-123
EXP F TX (eight-degree patch panel only)	Table 21-11 on page 21-121
EXP G TX (eight-degree patch panel only)	Table 21-18 on page 21-124
EXP H TX (eight-degree patch panel only)	Table 21-19 on page 21-125
TEST ACCESS TX	Table 21-17 on page 21-124

Step 32 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 33 Connect the transponder to the COM-RX G port of the eight-degree patch panel.

Step 34 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 35 Verify the COM-RX port power results for Side G (Table 21-9).

Table 21-9 From COM-RX Side G Verification

Connect MPO Connector to Patch Panel Port	Refer to...
EXP A TX	Table 21-12 on page 21-122
EXP B TX	Table 21-13 on page 21-122
EXP C TX	Table 21-14 on page 21-123
EXP D TX	Table 21-15 on page 21-123
EXP E TX (eight-degree patch panel only)	Table 21-16 on page 21-123
EXP F TX (eight-degree patch panel only)	Table 21-17 on page 21-124
EXP G TX (eight-degree patch panel only)	Table 21-11 on page 21-121
EXP H TX (eight-degree patch panel only)	Table 21-19 on page 21-125
TEST ACCESS TX	Table 21-18 on page 21-124

Step 36 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 37 Connect the transponder to the COM-RX H port of the eight-degree patch panel.

Step 38 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 39 Verify the COM-RX port power results for Side H (Table 21-10).

Table 21-10 From COM-RX Side H Verification

Connect MPO Connector to Patch Panel Port	Refer to...
EXP A TX	Table 21-12 on page 21-122
EXP B TX	Table 21-13 on page 21-122
EXP C TX	Table 21-14 on page 21-123
EXP D TX	Table 21-15 on page 21-123
EXP E TX (eight-degree patch panel only)	Table 21-16 on page 21-123
EXP F TX (eight-degree patch panel only)	Table 21-17 on page 21-124
EXP G TX (eight-degree patch panel only)	Table 21-18 on page 21-124
EXP H TX (eight-degree patch panel only)	Table 21-11 on page 21-121
TEST ACCESS TX	Table 21-19 on page 21-125

Step 40 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 41 Connect the transponder to the test access RX port of the four- or eight-degree patch panel.

Note There are two local access RX ports on the 8-degree patch panel. Select the left Local Access port for testing.

Step 42 In card view for the transponder card, click the **Provisioning** > **Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 43 Connect the MPO connector of the MPO-LC (FC or SC) multifiber fan-out to EXP A TX port of the four- or eight-degree patch-panel.

Step 44 Connect the optical power meter to the fan-out cable 1.

Step 45 Collect the actual reading from the optical power meter.

Step 46 Verify the IL is less than 11dB for an 8-degree patch panel or less than 8dB for a 4-degree patch panel.

Step 47 Connect the MPO connector of the MPO-LC (FC or SC) multifiber fan-out to EXP B TX port of the four- or eight-degree patch panel.

Step 48 Connect the optical power meter to the fan-out cable 2.

Step 49 Collect the actual reading from the optical power meter.

Step 50 Verify the IL is less than 11dB for an 8-degree patch panel or less than 8dB for a 4-degree patch panel.

Step 51 Connect the MPO connector of the MPO-LC (FC or SC) multifiber fan-out to EXP C TX port of the four- or eight-degree patch panel.

Step 52 Connect the optical power meter to the fan-out cable 3.

Step 53 Collect the actual reading from the optical power meter.

Step 54 Verify the IL is less than 11dB for an 8-degree patch panel or less than 8dB for a 4-degree patch panel.

Step 55 Connect the MPO connector of the MPO-LC (FC or SC) multifiber fan-out to EXP D TX port of the four- or eight-degree patch panel.

Step 56 Connect the optical power meter to the fan-out cable 4.

Step 57 Collect the actual reading from the optical power meter.

Step 58 Verify the IL is less than 11dB for an 8-degree patch panel or less than 8dB for a 4-degree patch panel.

Step 59 Connect the MPO connector of the MPO-LC (FC or SC) multifiber fan-out to EXP E TX port of the four- or eight-degree patch panel.

Step 60 Connect the optical power meter to the fan-out cable 5.

Step 61 Collect the actual reading from the optical power meter.

Step 62 Verify the IL is less than 11dB for an 8-degree patch panel.

Step 63 Connect the MPO connector of the MPO-LC (FC or SC) multifiber fan-out to EXP F TX port of the four- or eight-degree patch panel.

Step 64 Connect the optical power meter to the fan-out cable 6.

Step 65 Collect the actual reading from the optical power meter.

Step 66 Verify the IL is less than 11dB for an 8-degree patch panel.

Step 67 Connect the MPO connector of the MPO-LC (FC or SC) multifiber fan-out to EXP G TX port of the four- or eight-degree patch panel.

Step 68 Connect the optical power meter to the fan-out cable 7.

Step 69 Collect the actual reading from the optical power meter.

Step 70 Verify the IL is less than 11dB for an 8-degree patch panel.

Step 71 Connect the MPO connector of the MPO-LC (FC or SC) multifiber fan-out to EXP H TX port of the four- or eight-degree patch panel.

Step 72 Connect the optical power meter to the fan-out cable 8.

Step 73 Collect the actual reading from the optical power meter.

Step 74 Verify the IL is less than 11dB for an 8-degree patch panel.

Step 75 In card view for the transponder card, click the **Provisioning** > **Line** tabs and choose **OOS**,**DSBLD** (ANSI) or **Locked**,**disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 76 Repeat Steps 41 through 75 for the right side Local Access RX port.

Step 77 Complete the "NTP-G188 Perform the Native Mesh Node Acceptance Test" procedure on page 21-135.

The tables below are used for verification in Steps 10 through 39 of this procedure.

Table 21-11 Same Side Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	No power	No power
Cable 2	No power	No power
Cable 3	No power	No power
Cable 4	No power	No power
Cable 5 (eight-degree patch panel only)	No power	—
Cable 6 (eight-degree patch panel only)	No power	—

Table 21-11 Same Side Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 7 (eight-degree patch panel only)	No power	—
Cable 8 (eight-degree patch panel only)	No power	—

Table 21-12 Side A Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	IL < 11 dB	IL < 8 dB
Cable 2	No power	No power
Cable 3	No power	No power
Cable 4	No power	No power
Cable 5 (eight-degree patch panel only)	No power	—
Cable 6 (eight-degree patch panel only)	No power	—
Cable 7 (eight-degree patch panel only)	No power	—
Cable 8 (eight-degree patch panel only)	No power	—

Table 21-13 Side B Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	No power	No power
Cable 2	IL < 11 dB	IL < 8 dB
Cable 3	No power	No power
Cable 4	No power	No power
Cable 5 (eight-degree patch panel only)	No power	—
Cable 6 (eight-degree patch panel only)	No power	—
Cable 7 (eight-degree patch panel only)	No power	—
Cable 8 (eight-degree patch panel only)	No power	—

Table 21-14 Side C Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	No power	No power
Cable 2	No power	No power
Cable 3	IL < 11 dB	IL < 8 dB
Cable 4	No power	No power
Cable 5 (eight-degree patch panel only)	No power	—
Cable 6 (eight-degree patch panel only)	No power	—
Cable 7 (eight-degree patch panel only)	No power	—
Cable 8 (eight-degree patch panel only)	No power	—

Table 21-15 Side D Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	No power	No power
Cable 2	No power	No power
Cable 3	No power	No power
Cable 4	IL < 11 dB	IL < 8 dB
Cable 5 (eight-degree patch panel only)	No power	—
Cable 6 (eight-degree patch panel only)	No power	—
Cable 7 (eight-degree patch panel only)	No power	—
Cable 8 (eight-degree patch panel only)	No power	—

Table 21-16 Side E Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	No power	No power
Cable 2	No power	No power
Cable 3	No power	No power
Cable 4	No power	No power

Table 21-16 Side E Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 5 (eight-degree patch panel only)	IL < 11 dB	—
Cable 6 (eight-degree patch panel only)	No power	—
Cable 7 (eight-degree patch panel only)	No power	—
Cable 8 (eight-degree patch panel only)	No power	—

Table 21-17 Side F Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	No power	No power
Cable 2	No power	No power
Cable 3	No power	No power
Cable 4	No power	No power
Cable 5 (eight-degree patch panel only)	No power	—
Cable 6 (eight-degree patch panel only)	IL < 11 dB	—
Cable 7 (eight-degree patch panel only)	No power	—
Cable 8 (eight-degree patch panel only)	No power	—

Table 21-18 Side G Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	No power	No power
Cable 2	No power	No power
Cable 3	No power	No power
Cable 4	No power	No power
Cable 5 (eight-degree patch panel only)	No power	—
Cable 6 (eight-degree patch panel only)	No power	—

Table 21-18 Side G Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 7 (eight-degree patch panel only)	IL < 11 dB	—
Cable 8 (eight-degree patch panel only)	No power	—

Table 21-19 Side H Power Verification

Optical Power Meter Connected to Fan Out	Power Result for Eight-Degree Patch Panel	Power Result for Four-Degree Patch Panel
Cable 1	No power	No power
Cable 2	No power	No power
Cable 3	No power	No power
Cable 4	No power	No power
Cable 5 (eight-degree patch panel only)	No power	—
Cable 6 (eight-degree patch panel only)	No power	—
Cable 7 (eight-degree patch panel only)	No power	—
Cable 8 (eight-degree patch panel only)	IL < 11 dB	—

Stop. **You have completed this procedure**.

DLP-G432 Set the Transponder Wavelength

Purpose	This task tunes transponder wavelength.
Tools/Equipment	Fully C-band tunable transponder or tunable laser source with an LC patchcord
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 In card view, display the transponder card.

Step 2 Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

Step 3 In the Wavelength field, choose the desired wavelength (C-Band, odd) from the drop-down list.

Step 4 Click **Apply**.

Step 5 Click the **Provisioning > Pluggable Port Module > Pluggable Port Module** tabs and click **Create** to preprovision a pluggable port module (PPM), if necessary.

Step 6 Click **Ok**, then **Apply**.

Step 7 Return to your originating procedure (NTP).

DLP-G433 Record Transponder Optical Power

Purpose	This task checks and records optical power.
Tools/Equipment	Fully C-band tunable transponder or tunable laser source with an LC patchcord Optical power meter
Prerequisite Procedures	DLP-G46 Log into CTC ANS successfully completed All sides completely wired (including patch panels)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 Connect the optical power meter to the transponder output.

Step 2 Display card view for the transponder card.

Step 3 Click the **Provisioning > Line** tabs, and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the Admin State drop-down list.

Step 4 Record the optical power meter value.

Step 5 Choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list.

Step 6 Disconnect the optical power meter from the TX port of the transponder card.

Step 7 Return to your originating procedure (NTP).

NTP-G187 Perform the Multiring Site Acceptance Test

Purpose	This procedure checks the connections and the output power values for a multiring node. A multiring node connects two existing in-service two-sides ROADM nodes with two sides (each equipped with MMU cards).
Tools/Equipment	Fully C-band tunable transponder or tunable laser source 1 15-dB LC attenuator 1 optical power meter with LC input connector 1 MPO-LC multicable (LC if the optical power meter has LC input) 3 LC-LC adapters
Prerequisite Procedures	Chapter 14, "Turn Up a Node" All sides must be completely wired (including patch panels), except the connections with the MMU cards in the existing in-service ROADM node; for more information, see Chapter 14, "Turn Up a Node" NTP-G186 Perform the Four-Degree and Eight-Degree Mesh Patch Panel Acceptance Test, page 21-115 (as needed)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Note Optical power measurements require either a tunable laser or a multirate transponder to generate the proper optical wavelength. If multirate transponders were installed during completion of Chapter 14, "Turn Up a Node," they can be used for this procedure. No additional cabling changes are needed.

Step 1 Complete the "DLP-G46 Log into CTC" task at the multiring node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 4 Insert a full C-band tunable transponder card into an available slot.

Step 5 Plug a 15 dB LC attenuator to the TX port of the transponder card.

Step 6 Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder to a wavelength *yyyy.yy* (1530.33 nm, for example).

Step 7 Complete the "DLP-G433 Record Transponder Optical Power" task on page 21-126.

Step 8 Disconnect the optical power meter from the TX port of the transponder card.

Step 9 Make the following connections:

a. Connect the transponder card output port (with the 15 dB attenuator) to the COM-RX port of the 40-WXC-C card on Side A.

b. Connect the optical power meter to the COM-TX port of the 40-WXC-C card on Side A.

c. Connect, using an LC-LC adapter, the patchcord from the COM-TX port to the patchcord in the COM-RX port of the Side B 40-WXC-C card.

d. Connect, using an LC-LC adapter, the patchcord from the COM-TX port to the patchcord in the COM-RX port of the Side C 40-WXC-C card.

e. Connect, using an LC-LC adapter, the patchcord from the COM-TX port to the patchcord in the COM-RX port of the Side D 40-WXC-C card.

Step 10 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs. Complete the following:

a. Record the values of the following parameters:
   - Power on the COM-TX port of the preamplifier on Side A
   - Power on the COM-RX port of the 40-WXC-C card on Side A
   - Power on the COM-TX port of the 40-WXC-C card on Side A
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side A
   - Power on the COM-TX port of the preamplifier on Side B
   - Power on the COM-RX port of the 40-WXC-C card on Side B
   - Power on the COM-TX port of the 40-WXC-C card on Side B
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side B
   - Power on the COM-TX port of the preamplifier on Side C
   - Power on the COM-RX port of the 40-WXC-C card on Side C
   - Power on the COM-TX port of the 40-WXC-C card on Side C
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side C
   - Power on the COM-TX port of the preamplifier on Side D
   - Power on the COM-RX port of the 40-WXC-C card on Side D
   - Power on the COM-TX port of the 40-WXC-C card on Side D
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side D

b. Change the values of the parameters as follows:
   - Power on the COM-TX port of the preamplifier on Side A = **1 dBm**
   - Power on the COM-RX port of the 40-WXC-C card on Side A = **–15 dBm**
   - Power on the COM-TX port of the 40-WXC-C card on Side A = **–15 dBm**
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side A = **–30 dBm**
   - Power on the COM-TX port of the preamplifier on Side B = **1 dBm**
   - Power on the COM-RX port of the 40-WXC-C card on Side B = **–15 dBm**
   - Power on the COM-TX port of the 40-WXC-C card on Side B = **–15 dBm**
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side B = **–30 dBm**
   - Power on the COM-TX port of the preamplifier on Side C = **1 dBm**

- Power on the COM-RX port of the 40-WXC-C card on Side C = **–15 dBm**
- Power on the COM-TX port of the 40-WXC-C card on Side C = **–15 dBm**
- Power Fail Low Th on the COM-RX port of the preamplifier on Side C = **–30 dBm**
- Power on the COM-TX port of the preamplifier on Side D = **1 dBm**
- Power on the COM-RX port of the 40-WXC-C card on Side D = **–15 dBm**
- Power on the COM-TX port of the 40-WXC-C card on Side D = **–15 dBm**
- Power Fail Low Th on the COM-RX port of the preamplifier on Side D = **–30 dBm**

Step 11 In card view, display the transponder card and click the **Provisioning > Line** tabs. Choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list.

Step 12 In card view, display the 40-WXC-C card for Side A and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs. Record the Power value of the COM-RX port.

b. Verify that the COM-RX value matches the transponder card optical power meter value recorded in the "DLP-G433 Record Transponder Optical Power" task on page 21-126 (+\–1dB).

c. Click the **Inventory > Info** tabs and record the CRX -> EXP insertion loss.

d. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the EXP-TX port.

e. Verify that the EXP-TX port power value = (COM-RX port power value in Step a) – (CRX -> EXP insertion loss value in Step d) (+\– 1dB).

Step 13 In card view, display the OPT-AMP-17 card for Side A and complete the "DLP-434 Record the OPT-AMP-17-C Power Value" task on page 21-132.

Step 14 In card view, display the 40-WXC-C card for Side B and complete the following:

a. Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **1**.

b. Complete the "DLP-436 Record the 40-WXC-C Power Value" task on page 21-134.

Step 15 In card view, display the OPT-AMP-17 card for Side B and complete the "DLP-434 Record the OPT-AMP-17-C Power Value" task on page 21-132.

Step 16 In card view, display the 40-WXC-C card for Side C and complete the following:

a. Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **1**.

b. Complete the "DLP-436 Record the 40-WXC-C Power Value" task on page 21-134.

Step 17 In card view, display the OPT-AMP-17 card for Side C and complete the "DLP-434 Record the OPT-AMP-17-C Power Value" task on page 21-132.

Step 18 In card view, display the 40-WXC-C card for Side D and complete the following:

a. Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **1**.

b. Complete the "DLP-436 Record the 40-WXC-C Power Value" task on page 21-134.

Step 19 In card view, display the OPT-AMP-17 card for Side D and complete the "DLP-434 Record the OPT-AMP-17-C Power Value" task on page 21-132.

Step 20 In card view, display the 40-WXC-C card for Side A and complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **2**.

Step 21 In card view, display the OPT-AMP-17 card for Side A and complete the "DLP-434 Record the OPT-AMP-17-C Power Value" task on page 21-132.

Step 22 Record the optical power meter value and verify that the optical power meter value matches the value recorded in the "DLP-G433 Record Transponder Optical Power" task on page 21-126 (+\– 1dB).

Step 23 In card view, display the 40-WXC-C card for Side A. Click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**. Repeat for Sides B, C, and D of the 40-WXC-C card.

Step 24 To test all wavelengths, repeat Steps 6, 11, 18, and 20 for all supported wavelengths.

Step 25 In card view, display the transponder card and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list.

Step 26 Disconnect the patchcord in the COM-TX port from the patchcord in the COM-RX port for Side B of the 40-WXC-C card.

Step 27 Connect, using an LC-LC adapter, the patchcord from the COM-TX port with the patchcord in the COM-RX port for Side A of the 40-WXC-C card.

Step 28 Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder card to the wavelength set in Step 6.

Step 29 Connect the transponder card output port (with the 15-dB-attenuator) to the COM-RX port of the 40-WXC-C card for Side B.

Step 30 In card view, display the transponder card. Click the **Provisioning > Line** tabs, and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list.

Step 31 Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133 for Sides C and D of the 40-WXC-C card. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **2**.

Step 32 Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133 for Side B of the 40-WXC-C card. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **3**.

Step 33 In card view, display the 40-WXC-C card for Side B. Click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**. Repeat for Sides A, C, and D.

Step 34 To test all wavelengths, repeat Steps 28 through 33 (omit Step 29) for all supported wavelengths.

Step 35 In card view, display the transponder card. Click the **Provisioning > Line** tabs, and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list.

Step 36 Disconnect the patchcord in the COM-TX port from the patchcord in the COM-RX port of Side C of the 40-WXC-C card.

Step 37 Connect, using an LC-LC adapter, the patchcord from the COM-TX port to the patchcord in the COM-RX port for Side B of the 40-WXC-C card.

Step 38 Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder card to the wavelength set in Step 6.

Step 39 Connect the transponder card output port (with the 15-dB attenuator) to the COM-RX port of the 40-WXC-C card for Side C.

Step 40 In card view for the transponder card, click the **Provisioning > Line** tabs and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list.

Step 41 Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133 for Sides A and D of the 40-WXC-C card. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **3**.

Step 42 Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133 for Side C of the 40-WXC-C card. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **4**.

Step 43 In card view, display the 40-WXC-C card and click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**. Repeat for Sides A, B, and D.

Step 44 To test all wavelengths, repeat Steps 38 through 43 (omit Step 39) for all supported wavelengths.

Step 45 Disconnect the patchcord in the COM-TX port from the patchcord in the COM-RX port of Side D of the 40-WXC-C card.

Step 46 Connect, using an LC-LC adapter, the patchcord from the COM-TX port to the patchcord in the COM-RX of Side C of the 40-WXC-C card.

Step 47 Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder card to the desired wavelength for testing.

Step 48 Connect the transponder card output port (with the 15-dB attenuator) to the COM-RX port of the 40-WXC-C card of Side D.

Step 49 In card view, display the transponder card. Click the **Provisioning > Line** tabs, and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list.

Step 50 Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133 for Sides A and B of the 40-WXC-C card. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **4**.

Step 51 Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133 for Side C of the 40-WXC-C card. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **1**.

Step 52 In card view, display the 40-WXC-C card for Side D. Click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**. Repeat for Sides A, B, and C of the 40-WXC-C card.

Step 53 To test all wavelengths, repeat Steps 47 through 52 for all supported wavelengths, except Step 48.

Step 54 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs. Restore the values recorded in Step 10a for the following parameters:

- Power on the COM-TX port of the preamplifier on Side A
- Power on the COM-RX port of the 40-WXC-C card on Side A
- Power on the COM-TX port of the 40-WXC-C card on Side A
- Power Fail Low Th on the COM-RX port of the preamplifier on Side B
- Power on the COM-TX port of the preamplifier on Side B
- Power on the COM-RX port of the 40-WXC-C card on Side B
- Power on the COM-TX port of the 40-WXC-C card on Side B
- Power Fail Low Th on the COM-RX port of the preamplifier on Side B
- Power on the COM-TX port of the preamplifier on Side C
- Power on the COM-RX port of the 40-WXC-C card on Side C
- Power on the COM-TX port of the 40-WXC-C card on Side C
- Power Fail Low Th on the COM-RX port of the preamplifier on Side C
- Power on the COM-TX port of the pre-amplifier on Side D
- Power on the COM-RX port of the 40-WXC-C card on Side D
- Power on the COM-TX port of the 40-WXC-C card on Side D

- Power Fail Low Th on the COM-RX port of the preamplifier on Side D

Step 55 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs. Click **Launch ANS**.

Step 56 Disconnect the patchcord in the COM-TX port from the patchcord in the COM-RX port of Side A of the 40-WXC-C card.

Step 57 Disconnect the patchcord in the COM-TX port from the patchcord in the COM-RX port of Side B of the 40-WXC-C card.

Step 58 Disconnect the patchcord in the COM-TX port from the patchcord in the COM-RX port of Side C of the 40-WXC-C card.

Step 59 Restore the connections to the MMU cards of the eight sides using the patchcords tested in this procedure:

a. Connect the patchcord from the COM-TX port of the 40-WXC-C card on Side A to the EXP-A-RX port of the MMU in the lowest slot of the upgraded ROADM Node 1.

b. Connect the patchcord from the COM-RX port of the 40-WXC-C card on Side A to the EXP-A-TX port of the MMU in the lowest slot of the upgraded ROADM Node 1.

c. Connect the patchcord from the COM-TX port of the 40-WXC-C card on Side B to the EXP-A-RX port of the MMU in the highest slot of the upgraded ROADM Node 1.

d. Connect the patchcord from the COM-RX port of the 40-WXC-C card on Side B to the EXP-A-TX port of the MMU in the highest slot of the upgraded ROADM Node 1.

e. Connect the patchcord from the COM-TX port of the 40-WXC-C card on Side C to the EXP-A-RX port of the MMU in the lowest slot of the upgraded ROADM Node 2.

f. Connect the patchcord from the COM-RX port of the 40-WXC-C card on Side C to the EXP-A-TX port of the MMU in the lowest slot of the upgraded ROADM Node 2.

g. Connect the patchcord from the COM-TX port of the 40-WXC-C card on Side D to the EXP-A-RX port of the MMU in the highest slot of the upgraded ROADM Node 2.

h. Connect the patchcord from the COM-RX port of the 40-WXC-C card on Side D to the EXP-A-TX port of the MMU in the highest slot of the upgraded ROADM Node 2.

Stop. **You have completed this procedure**.

DLP-434 Record the OPT-AMP-17-C Power Value

Purpose	This task records the power value of the OPT-AMP-17 card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC DLP-436 Record the 40-WXC-C Power Value, page 21-134 ANS successfully completed All sides completely wired (including patch panels)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 In card view for the OPT-AMP-17 card for Side *x*, complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Verify the COM-RX port power value matches the value of the EXP-TX port of the 40-WXC-C card in the "DLP-436 Record the 40-WXC-C Power Value" task on page 21-134 (+\– 1 dB).

c. Click the **Provisioning > Op. Ampli. Line > Parameters** tabs and record the Total Output Power value of the COM-TX port.

d. Verify that the value is 1 dBm (+\– 1 dB).

Step 2 Return to your originating procedure (NTP).

DLP-435 Set the 40-WXC-C OCHNC Parameters

Purpose	This task sets the OCHNC parameters for the 40-WXC-C card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
	ANS successfully completed
	All sides completely wired (including patch panels)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 In the 40-WXC-C card view for Side *x*, complete the following:

a. Click the **Maintenance > OCHNC > Insert Value** tabs and set the parameters as follows:

– Target Power (dBm) = **–15.0**

Note The target power is not set if the power value is higher than the channel power that is allocated and equalized.

– Input Port = *x* (EXP-RX) (for *x*, refer to the step in the originating procedure)

– VOA Attenuation (dB) = **13**

– Wavelength = Value set in the originating procedure

b. Click **Apply**.

c. Click **Refresh**. In the Return Value COM-TX on selected Wavelength field, verify that the Actual Power (dBm) is –15 +\– 0.5dB.

Step 2 Return to your originating procedure (NTP).

DLP-436 Record the 40-WXC-C Power Value

Purpose	This task records the power value of the 40-WXC-C card for a multiring configuration.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G433 Record Transponder Optical Power, page 21-126 DLP-435 Set the 40-WXC-C OCHNC Parameters, page 21-133 ANS successfully completed All sides completely wired (including patch panels)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 In card view for the 40-WXC-C card for Side *x*, complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

b. Verify that the COM-TX port value matches Return Value COM-TX on selected Wavelength value retrieved in the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133 (+\– 1 dB).

c. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the EXP-TX port.

d. Click the **Inventory > Info** tabs and record the CRX -> EXP insertion loss value.

e. Verify that the EXP-TX port power value = (COM-TX port power value) – (CRX -> EXP insertion loss value) (+\– 1 dB).

Step 2 Return to your originating procedure (NTP).

NTP-G188 Perform the Native Mesh Node Acceptance Test

Purpose	This procedure checks the power values and the optical connections for a native mesh node. Use this test for both new installations and directional upgrades of native mesh nodes. Use this to also test the installation of a new side *n* to a node.
Tools/Equipment	• Fully C-band tunable transponder or tunable laser source with an LC patchcord • 1 MPO-LC multicable (LC if the optical power meter has LC input) • 1 LC-LC adapter
Prerequisite Procedures	• All sides must be completely fibered (including mesh patch panels); for more information, see Chapter 14, "Turn Up a Node" • NTP-G186 Perform the Four-Degree and Eight-Degree Mesh Patch Panel Acceptance Test, page 21-115 (optional)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 Identify the sides that are already carrying traffic and which sides are going to be tested.

Step 2 Complete the "DLP-G46 Log into CTC" task at the mesh native node where you want to perform the acceptance test. If you are already logged in, continue with Step 3.

Step 3 From the View menu, choose **Go to Network View**.

Step 4 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (An equipment alarm is indicated in the Alarms tab, Cond column as EQPT.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 5 Insert a full C-band tunable transponder into an available slot of the side that you want to test (Side A through H, referred to as Side *x* in this procedure).

Step 6 Plug a 15-dB LC attenuator into the trunk TX port of the transponder card.

Step 7 Select a wavelength that is not used on any of the sides for carrying traffic (or 1530.33 nm if it is a new installation). Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder for the selected wavelength *yyyy.yy*.

Step 8 Connect the optical power meter to the trunk TX port of the transponder card.

Step 9 Complete the "DLP-G433 Record Transponder Optical Power" task on page 21-126.

Step 10 Disconnect the optical power meter from the TX port of the transponder card.

Step 11 In card view, display the OSC-CSM or OSCM card for Side x and complete the following:

a. Click the **Maintenance > ALS** tabs and from the OSRI pull-down menu, select **OFF**.

b. From the ALS Mode pull-down menu, select **Disable**.

Step 12 Make the following connections:

a. Connect the transponder output port (with the 15-dB attenuator) to the Line RX port of the booster amplifier (OPT-BST, OPT-BST-E, OPT-AMP-C, OPT-AMP-17-C, or OSC-CSM) of Side *x*.

b. Connect the optical power meter to the LINE-TX port of the booster amplifier (OPT-BST, OPT-BST-E, OPT-AMP-C, OPT-AMP-17-C, or OSC-CSM) of Side *x*.

c. Use a fiber to connect the 40-DMX-C TX port to the 40-MUX-C RX port for the selected wavelength *yyyy.yy* in the 15454-PP-80-LC patch panel for Side x.

Step 13 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs. Complete the following:

a. Record the actual values of the following parameters:

- Power on the COM-TX port of preamplifier on Side X
- Power on the COM-RX port of the 40-WXC-C card on Side X
- Power on the COM-TX port of the 40-WXC-C card on Side X
- Power on the LINE-TX port of the booster amplifier on Side X

b. Set the previous values of the parameters as follows:

- Power on the COM-TX port of preamplifier on Side X = **+8 dBm**
- Power on the COM-RX port of the 40-WXC-C card on Side X = **+8 dBm**
- Power on the COM-TX port of the 40-WXC-C card on Side X = **–18 dBm**
- Power on the LINE-TX port of the booster amplifier on Side X = **–1 dB**m

c. Click **Apply**.

Step 14 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs. Click **Launch ANS**.

Step 15 In card view, display the 40-DMX-C card for Side *x* and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the VOA Attenuation Ref. value *y*.

b. Set the VOA Attenuation Calib. to *–y*.

c. Choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the Admin State drop-down list.

d. Click **Apply**.

Step 16 In card view, display the 40-MUX-C card for Side *x*. Click the **Provisioning > Optical Line > Parameters** tabs, and choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 17 In card view, display the booster amplifier card for Side x. Click the **Inventory > Info** tabs and record the IL02 (LINE RX->COM TX) insertion loss value.

Step 18 In card view, display the transponder card and click the **Provisioning > Line** tabs. For trunk port, choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 19 In card view, display the booster amplifier card for Side *x*, and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

b. Verify the power value of the COM-TX port = (Optical power meter value in Step 9) – (LINE RX->COM TX insertion loss value read in Step 17) (+\– 1 dB).

Step 20 In card view, display the preamplifier card (OPT-PRE, OPT-AMP-C, or OPT-AMP-17C) for Side *x* and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Verify that the COM-RX power value matches the value in Step 19b (+\– 1 dB).

c. Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs and record the Total Output Power value of the COM-TX port.

d. Verify that the value is +8 dBm (+\– 1 dB).

Step 21 In card view, display the 40-WXC-C card for Side *x* and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Verify that the value matches the COM-TX port power value in Step 20c (+/- 1dB).

c. Click the **Inventory > Info** tabs and record the CRX -> EXP insertion loss.

d. Record the CRX -> DROP insertion loss.

e. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the EXP-TX port.

f. On the same screen, record the Power value of the DROP-TX port.

g. Verify that the EXP-TX Power value in Step 21e = (COM-RX value in Step 21a) – (CRX -> EXP value in Step 21c) (+\– 1 dB).

h. Verify that the DROP-TX value in Step 21f = (COM-RX value in Step 21a) – (CRX -> DROP value in Step 21d) (+\– 1 dB).

Step 22 In card view, display the 40-DMX-C card for Side *x* and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Verify that the COM-RX power value in Step a matches the value in Step 21f (+\– 1 dB).

c. Click the **Inventory > Info** tabs and record the 1RX -> xTX insertion loss (where *x* is the channel number associated with *yyyy.yy* wavelength).

d. Click the **Provisioning > Optical Chn > Parameters** tabs and record the Power value of the CHAN-TX port associated with *yyyy.yy* wavelength.

e. Verify that the CHAN-TX port Power value = (COM-RX power value in Step 22a) – (1RX -> *x*TX insertion loss value in Step 22c) (+\– 1 dB).

Step 23 In card view, display the 40-MUX-C card for Side *x* and complete the following:

a. Click the **Provisioning > Optical Chn > Parameters** tabs and record the Power value of the CHAN-RX port associated with the selected *yyyy.yy* wavelength.

b. Verify that the CHAN-RX value in Step 23a = (CHAN-TX value in Step 22d) (+\– 1.5 dB).

c. Click the **Inventory > Info** tabs and record the *x*RX -> 1TX insertion loss (where *x* is the channel number associated with *yyyy.yy* wavelength).

d. Click the **Provisioning > Optical Line > Parameters** tabs, record the Power value of the COM-TX port.

e. Verify that the COM-TX Power value = (CHAN-RX value in Step 23a) – (*y*RX -> 1TX value in Step 23c) (+\– 1 dB).

Step 24 In card view, display the 40-WXC-C card for Side *x* and complete the following:

a. Click the **Maintenance > OCHNC** tabs, and in the Insert Value section, set the available parameters as follows:

- Target Power (dBm) = **–18.0**

> **Note** The target power is not set if the power value is higher than the channel power that is allocated and equalized.

- Input port = **9** (ADD-RX)
- VOA Attenuation (dB) = **13**
- Wavelength = *yyyy.yy* (wavelength selected in Step 7)

b. Click **Apply**.

c. In the Return Value COM-TX section on selected Wavelength area, click **Refresh** and verify that the Actual Power (dBm) is the Target Power from Step 24a +\– 0.5 dB. If the channel does not come up, reduce VOA Attenuation by 5dB in Step 24a until the target power is reached.

d. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

e. Verify that the COM-TX Power value matches the Actual Power value in Step 24c (+\– 1 dB).

Step 25 In card view, display the booster amplifier card for Side *x*, and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Verify COM-RX Power value matches the COM-TX Power value in Step 24d (+\– 1 dB).

c. Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs and record the Power value of the LINE-TX port.

d. Verify that the LINE-TX value matches the power on the LINE-TX port of the booster amplifier on Side *x* recorded in Step 13b (+\– 1 dB).

e. Record the optical power meter value.

f. Verify that the optical power meter value matches the LINE-TX value in Step 25c (+\– 1 dB).

Step 26 Select the 40-WXC-C card on Side *n* where *n* is A, B, C, D, E, F, G, or H but *n* is not equal to *x*, go to the card view and complete the following:

a. Click the **Maintenance > OCHNC** tabs, and in the Insert Values section, set the available parameters as follows:

- Target Power (dBm) = **–22.0**

> **Note** The target power is not set if the power value is higher than the channel power that is allocated and equalized.

- Input port = *x* (EXP-RX)
- VOA Attenuation (dB) = **20**
- Wavelength = *yyyy.yy* (wavelength selected in Step 7)

b. Click **Apply**.

c. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and verify that the Actual Power (dBm) is Target Power of Step 26a +\– 0.5 dB. If the channel does not come up, reduce VOA Attenuation by 5dB in Step 26a until the target power is reached.

d. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

e. Verify that the value of the COM-TX port matches the Actual Power value in Step 26c (+\– 1 dB).

f. Click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**.

Step 27 Repeat Step 26 for all the others of Side *n*, where *n* is A, B, C, D, E, F, G, or H but *n* not equal to *x*.

Step 28 In card view, display the 40-WXC-C card for Side *x* and click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**.

Step 29 In card view, display the transponder card and click the **Provisioning > Line** tabs. For trunk port, choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list. Click **Apply**.

Step 30 To test all wavelengths, repeat Step 7 through Step 29 for each wavelength. In Step 7, set the wavelength to the next odd wavelength.

Step 31 Disconnect the optical power meter from the LINE-TX port of the booster amplifier of the Side *x*.

Step 32 Disconnect the transponder output port (with the 15-dB attenuator) from the LINE-RX port of the booster amplifier of the Side *x*.

Step 33 In card view, display the 40-DMX-C card for Side *x* and click the **Provisioning > Optical Line > Parameters** tabs. Complete the following:

a. Choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the Admin State drop-down list.

b. Change the VOA Attenuation Calib. from the existing value to 0 (zero).

c. Click **Apply**.

Step 34 In card view, display the 40-MUX-C card for Side *x* and click the **Provisioning > Optical Line > Parameters** tabs. Choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 35 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs and restore the values recorded in Step 13a for the following parameters:

- Power on the COM-TX port of preamplifier on Side X
- Power on the COM-RX port of the 40-WXC-C on Side X
- Power on the COM-TX port of the 40-WXC-C on Side X
- Power on the LINE-TX port of the booster amplifier on Side X

Step 36 Repeat Steps 5 through 35 for all the others sides that are being installed.

Step 37 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs. Click **Launch ANS**.

Stop. **You have completed this procedure**.

NTP-G189 Perform the Node Upgrade Acceptance Test

Purpose	This procedure checks the connections and the output power values for a node in an upgraded ring. The upgraded node connects an existing in-service ROADM node with two sides (each equipped with MMU cards) to a native mesh node with two sides.
Tools/Equipment	Fully C-band tunable transponder or tunable laser source with an LC patchcord 1 15-dB LC attenuator 1 optical power meter with LC input connector 2 LC-LC patchcords (or at least one for each native side) 1 LC-LC adapter
Prerequisite Procedures	Chapter 14, "Turn Up a Node" All sides completely wired (including patch panels), except the connections with the MMU cards in the existing in-service ROADM node; for more information, see Chapter 14, "Turn Up a Node" NTP-G186 Perform the Four-Degree and Eight-Degree Mesh Patch Panel Acceptance Test, page 21-115
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 Complete the "DLP-G46 Log into CTC" task at the upgrade node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Alarms** tab.

a. Verify that the alarm filter is not on. Complete the "DLP-G128 Disable Alarm Filtering" task as necessary.

b. Verify that no equipment alarms appear indicating equipment failure or other hardware problems. (Equipment alarms are indicated by an EQPT in the Alarms tab Cond column.) If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 4 Insert a full C-band tunable transponder into an available slot for the node that you want to test.

Step 5 Plug a 15-dB LC attenuator to the TX port of the transponder.

Step 6 Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder to a wavelength *yyyy.yy* that is not used in any of the sides already carrying traffic (or 1530.33 nm if it is a new installation).

Step 7 Complete the "DLP-G433 Record Transponder Optical Power" task on page 21-126.

Step 8 Disconnect the optical power meter from the TX port of the transponder card.

Step 9 Make the following connections:

a. Connect the transponder card output port (with the 15-dB attenuator) to the COM-RX port of the 40-WXC-C card on Side A.

b. Connect the optical power meter to the COM-TX port of the 40-WXC-C card on Side A.

c. Connect, using the LC-LC adapter, the patchcord from the COM-TX port with the patchcord from the COM-RX port of the Side B 40-WXC-C card.

Step 10 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs. Complete the following:

a. Record the values of the following parameters:
   - Power on the COM-TX port of the preamplifier on Side A
   - Power on the COM-RX port of the 40-WXC-C card on Side A
   - Power on the COM-TX port of the 40-WXC-C card on Side A
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side A
   - Power on the COM-TX port of the preamplifier on Side B
   - Power on the COM-RX port of the 40-WXC-C card on Side B
   - Power on the COM-TX port of the 40-WXC-C card on Side B
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side B

b. Change the values of the parameters as follows:
   - Power on the COM-TX port of the preamplifier on Side A = **1 dBm**
   - Power on the COM-RX port of the 40-WXC-C card on Side A = **–15 dBm**
   - Power on the COM-TX port of the 40-WXC-C card on Side A = **–15 dBm**
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side A = **–30 dBm**
   - Power on the COM-TX port of the preamplifier on Side B = **1 dBm**
   - Power on the COM-RX port of the 40-WXC-C card on Side B = **–15 dBm**
   - Power on the COM-TX port of the 40-WXC-C card on Side B = **–15 dBm**
   - Power Fail Low Th on the COM-RX port of the preamplifier on Side B = **–30 dBm**

c. Click **Apply**.

d. In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs. Click **Launch ANS**.

Step 11 Display card view for the OPT-AMP-17 card on Side A and click the **Provisioning > Card** tabs. From the Working Card Mode drop-down list, verify that OPT-PRE appears and if not, choose it. Click **Apply**. Repeat for Side B.

Step 12 Display card view for the transponder card and click the **Provisioning > Line** tabs. Choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 13 In card view, display the 40-WXC-C card of Side A and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs. Record the Power value of the COM-RX port.

b. Verify that the COM-RX value matches the transponder card optical power meter value recorded in Step 7 (+\– 1 dB).

c. Click the **Inventory > Info** tabs and record the CRX -> EXP insertion loss.

d. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the EXP-TX port.

e. Verify that the EXP-TX port power value = (COM-RX port power value in Step a) - (EXP-TX Power value in Step d) (+\– 1 dB).

Step 14 In card view, display the OPT-AMP-17 card for Side A and complete the "DLP-434 Record the OPT-AMP-17-C Power Value" task on page 21-132.

Step 15 In card view, display the 40-WXC-C card for Side B and complete the following:

a. Complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **1**.

b. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

c. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

d. Verify that the COM-RX Power value matches the COM-TX port Power value in b (+\– 1 dB).

e. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the EXP-TX port.

f. Click the **Inventory > Info** tabs and record the CRX -> EXP insertion loss value.

g. Verify that the EXP-TX port power value = (COM-RX port power value) - (CRX -> EXP insertion loss value) (+\– 1 dB)

Step 16 In card view, display the OPT-AMP-17 card for Side B and complete the "DLP-434 Record the OPT-AMP-17-C Power Value" task on page 21-132.

Step 17 In card view, display the 40-WXC-C for Side A and complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **2**.

Step 18 In card view, display the 40-WXC-C for Side C and complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **1**.

Step 19 In card view, display the 40-WXC-C for Side D and complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the Maintenance > OCHNC > Insert Value tabs to **1**.

Step 20 In card view, display the 40-WXC-C for Side A and click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**. Repeat for Sides B, C, and D of the 40-WXC-C card.

Step 21 Display card view for the transponder card and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list.

Step 22 Disconnect the patchcord in the COM-TX port from the patchcord in the COM-RX port of Side B of the 40-WXC-C card.

Step 23 Connect, using the LC-LC adapter, the patchcord from the COM-TX port with the patchcord in the COM-RX port for Side A of the 40-WXC-C card.

Step 24 Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder to the wavelength set in Step 6.

Step 25 Connect the transponder card output port (with the 15-dB attenuator) to the COM-RX port of the 40-WXC-C card on Side B.

Step 26 Display card view for the transponder card. Click the **Provisioning > Line** tabs, and choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list.

Step 27 In card view, display the 40-WXC-C card for Side A and complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **2**.

Step 28 In card view, display the 40-WXC-C for Side B and complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **1**.

Step 29 In card view, display the 40-WXC-C for Side C and complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **2**.

Step 30 In card view, display the 40-WXC-C for Side D and complete the "DLP-435 Set the 40-WXC-C OCHNC Parameters" task on page 21-133. Set the Input Port on the **Maintenance > OCHNC > Insert Value** tabs to **2**.

Step 31 In card view, display the 40-WXC-C for Side B and click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**. Repeat for Sides A, C, and D of the 40-WXC-C card.

Step 32 Display the card view for the transponder card. Click the **Provisioning > Line** tabs, and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list.

Step 33 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs. Restore the values recorded in Step 10a for the following parameters:

- Power on the COM-TX port of the preamplifier on Side A
- Power on the COM-RX port of the 40-WXC-C card on Side A
- Power on the COM-TX port of the 40-WXC-C card on Side A
- Power Fail Low Th on the COM-RX port of the preamplifier on Side A
- Power on the COM-TX port of the preamplifier on Side B
- Power on the COM-RX port of the 40-WXC-C card on Side B
- Power on the COM-TX port of the 40-WXC-C card on Side B
- Power Fail Low Th on the COM-RX port of the preamplifier on Side B

Step 34 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs. Click **Launch ANS**.

Step 35 Disconnect the patchcord in the COM-TX port from the patchcord in the COM-RX port of Side A of the 40-WXC-C card.

Step 36 Make the following connections:

a. Connect the transponder output port (with the 15-dB attenuator) to the LINE-RX port of the booster amplifier of Side C.

b. Connect the optical power meter to the LINE-TX port of the booster amplifier of Side C.

c. Connect the client TX of lambda *yyyy.yy* to the client RX of lambda *yyyy.yy* on the Side C patch panel.

Step 37 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs and complete the following:

a. Record the actual values of the following parameters:

  – Power on the COM-TX port of the preamplifier on Side X
  – Power on the COM-RX port of the 40-WXC-C card on Side X
  – Power on the COM-TX port of the 40-WXC-C card on Side X

- Power on the LINE-TX port of the booster amplifier on Side X

b. Set the values of the parameters as follows:

- Power on the COM-TX port of the preamplifier on Side X = **8 dBm**
- Power on the COM-RX port of the 40-WXC-C card on Side X = **8 dBm**
- Power on the COM-TX port of the 40-WXC-C card on Side X = **–18 dBm**
- Power on the LINE-TX port of the booster amplifier on Side X = **–8 dBm**

c. Click **Apply**.

Step 38 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs. Click **Launch ANS**.

Step 39 In card view, display the 40-DMX-C card for Side C and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the VOA Attenuation Ref. value *y*.

b. Set the VOA Attenuation Calib. to **–*y***.

c. Choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the Admin State drop-down list.

d. Click **Apply**.

Step 40 In card view, display the 40-MUX-C card for Side C and click the **Provisioning > Optical Line > Parameters** tabs. Choose **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 41 In card view, display the booster amplifier card for Side C. Click the **Inventory > Info** tabs and record the LINE-RX -> COM TX insertion loss.

Step 42 Display the transponder card in card view and click the **Provisioning > Line** tabs. Choose **IS** (ANSI) or **Unlocked** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 43 In card view, display the booster amplifier card for Side C and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

b. Verify the COM-TX Power value = (Optical power meter value) – (LINE RX -> COM TX insertion loss value in Step 41) (+\– 1 dB).

Step 44 In card view, display the preamplifier card for Side C and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Verify that the COM-RX Power value matches the COM-TX port Power value in Step 43a (+\– 1 dB).

c. Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs and record the Total Output Power value of the COM-TX port.

d. Verify that the COM-TX Total Output Power value is 8 dBm (+\– 1 dB).

Step 45 In card view, display the 40-WXC-C card for Side C and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Verify that the COM-RX power value matches the Total Output Power value of the COM-TX port value in Step 44c (+\– 1 dB).

c. Click the **Inventory > Info** tabs and record the CRX -> EXP insertion loss.

d. Record the CRX -> DROP insertion loss.

e. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the EXP-TX port.

f. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the DROP-TX port.

g. Verify that the EXP-TX Power value in Step e = (COM-RX value in Step a) - (CRX -> EXP value in Step c) (+\– 1 dB).

h. Verify that the DROP-TX value in Step f = (COM-RX value in Step a) - (CRX -> DROP value in Step d) (+\– 1 dB).

Step 46 In card view, display the 40-DMX-C card for Side C and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Verify that the COM-RX port Power value in Step a matches the COM-TX port Power value in Step 45b (+\– 1 dB).

c. Click the **Inventory > Info** tabs and record the 1RX -> *y*TX insertion loss (where *y* is the channel number associated with *yyyy.yy* wavelength).

d. Click the **Provisioning > Optical Chn > Parameters** tabs and record the Power value of the CHAN-TX port associated with *yyyy.yy* wavelength.

e. Verify that the CHAN-TX Power value = (COM-RX Power value in Step a) - (1RX -> *y*TX insertion loss value in Step c) (+\– 1 dB).

Step 47 In card view, display the 40-MUX-C card for Side C and complete the following:

a. Click the **Provisioning > Optical Chn > Parameters** tabs and record the Power value of the CHAN-RX port associated with *yyyy.yy* wavelength.

b. Verify that the CHAN-RX value matches the CHAN-TX Power value in Step 46d (+\– 1.5 dB).

c. Click the **Inventory > Info** tabs and record the *y*RX -> 1TX insertion loss (where *y* is the channel number associated with *yyyy.yy* wavelength).

d. In the **Provisioning > Optical Line > Parameters** tabs, record the Power value of the COM-TX port.

e. Verify that the COM-TX Power value = (CHAN-RX Power value in Step a) – (*y*RX -> 1TX insertion loss value in Step c) (+\– 1 dB).

Step 48 In card view, display the 40-WXC-C card for Side C, and complete the following:

a. Click the **Maintenance > OCHNC > Insert Value** tabs, and set the available parameters as follows:

   – Target Power (dBm) = **–18.0**

> **Note** The target power is not set if the power value is higher than the channel power that is allocated and equalized.

   – Input port = **9** (ADD-RX)

   – VOA Attenuation (dB) = **13**

   – Wavelength = *yyyy.yy* (value set in Step 6)

b. Click **Apply**.

c. Click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and verify that the Actual Power (dBm) is –18 +\– 0.5 dB.

d. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

e. Verify that the COM-TX Power value matches the Actual Power value in Step c (+\– 1 dB).

Step 49 In card view, display the booster amplifier card for Side C, and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-RX port.

b. Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs and record the Power value of the LINE-TX port.

c. Verify that the LINE-TX value matches the Side C Tx Amplifier Ch Power recorded in Step 37a (+\– 1 dB).

d. Record the optical power meter value.

e. Verify that the optical power meter value matches the LINE-TX Power value in Step b (+\– 1 dB).

Step 50 In card view, display the 40-WXC-C card for Side C, and click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**.

Step 51 Display Side A of the 40-WXC-C card in card view, and complete the following:

a. Click the **Maintenance > OCHNC > Insert Value** tabs, and set the available parameters as follows:

- Target Power (dBm) = **–18.0**

Note The target power is not set if the power value is higher than the channel power that is allocated and equalized.

- Input port = **3** (EXP-RX)
- VOA Attenuation (dB) = **13**
- Wavelength = *yyyy.yy* (value set in Step 6)

b. Click **Apply**.

c. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and verify that the Actual Power (dBm) is –18 +\– 0.5 dB.

d. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

e. Verify that the value of the COM-TX port matches the Actual Power value in Step c (+\– 1 dB).

f. Click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**.

Step 52 Repeat Step 51 for the 40-WXC-C card of Side B.

Step 53 Repeat Step 51 for the 40-WXC-C card of Side D.

Step 54 Display card view for the transponder card and choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI) from the Admin State drop-down list.

Step 55 Connect the transponder output port (with the 15-dB attenuator) to the Line RX port of the booster amplifier of Side D.

Step 56 Complete the "DLP-G432 Set the Transponder Wavelength" task on page 21-125 to tune the transponder to the next odd wavelength after *yyyy.yy* nm.

Step 57 Disconnect the patchcord between the client TX of lambda *yyyy.yy* from the client RX of lambda *yyyy.yy* on the Side C patch panel. Use this patchcord to connect the client TX of lambda *yyyy.yy* to the client RX of lambda *yyyy.yy* on the Side D patch panel. Note that *yyyy.yy* was recorded in Step 6.

Step 58 Repeat Steps 37 to 51 for Side D.

Step 59 Display Side A of the 40-WXC-C card in card view, and complete the following:

a. Click the **Maintenance > OCHNC > Insert Value** tabs, and set the available parameters as follows:
   - Target Power (dBm) = **–18.0**

> **Note** The target power is not set if the power value is higher than the channel power that is allocated and equalized.

   - Input port = **4** (EXP-RX)
   - VOA Attenuation (dB) = **13**
   - Wavelength = *yyyy.yy* (value set in Step 6)

b. Click **Apply**.

c. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and verify that the Actual Power (dBm) is –18 +\– 0.5 dB.

d. Click the **Provisioning > Optical Line > Parameters** tabs and record the Power value of the COM-TX port.

e. Verify that the value of the COM-TX port matches the Actual Power value in Step c (+\– 1 dB).

f. Click the **Maintenance > OCHNC** tabs. In the Return Value COM-TX on selected Wavelength area, click **Refresh** and then **Delete**.

Step 60 Repeat Step 59 for the 40-WXC-C card of Side B.

Step 61 Repeat Step 59 for the 40-WXC-C card of Side C.

Step 62 Disconnect the optical power meter from the LINE-TX port of the booster amplifier of Side D.

Step 63 Disconnect the transponder output port (with the 15-dB attenuator) from the LINE-RX port of the booster amplifier of the Side *x*.

Step 64 In card view, display the 40-DMX-C card for Side C, and complete the following:

a. Click the **Provisioning > Optical Line > Parameters** tabs.

b. Choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the Admin State drop-down list.

c. Set the VOA Attenuation Calib to 0 (zero).

d. Click **Apply**.

Step 65 In card view, display the 40-MUX-C card for Side C and click the **Provisioning > Optical Line > Parameters** tabs. Choose **IS,AINS** (ANSI) or **Unlocked,automaticInService** (ETSI) from the Admin State drop-down list and click **Apply**.

Step 66 Repeat Steps 64 and 65 for Side D.

Step 67 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Provisioning** tabs and restore the values recorded in Step 37a for the following parameters for Sides C and D:

- Power on the COM-TX port of the preamplifier on Side X

- Power on the COM-RX port of the 40-WXC-C card on Side X
- Power on the COM-TX port of the 40-WXC-C card on Side X

Step 68 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > WDM-ANS > Port Status** tabs. Click **Launch ANS**.

Step 69 Restore the connections to the MMU cards of the four sides using the patchcords tested in this procedure:

a. Connect the patchcord from the COM-TX port of the 40-WXC-C card on Side A to the EXP-A-RX port of the MMU in the lowest slot of the upgraded ROADM node.

b. Connect the patchcord from the COM-RX port of the 40-WXC-C card on Side A to the EXP-A-TX port of the MMU in the lowest slot of the upgraded ROADM node.

c. Connect the patchcord from the COM-TX port of the 40-WXC-C card on Side B to the EXP-A-RX port of the MMU in the highest slot of the upgraded ROADM node.

d. Connect the patchcord from the COM-RX port of the 40-WXC-C card on Side B to the EXP-A-TX port of the MMU in the highest slot of the upgraded ROADM node.

Stop. **You have completed this procedure**.

NTP-G243 Perform the Two-Degree ROADM Node with 40-SMR-1-C and OPT-AMP-17-C Cards Acceptance Test

Purpose	This procedure tests a two-degree ROADM node with 40-SMR-1-C and OPT-AMP-17-C cards installed.
Tools/Equipment	One of the following: • A tunable laser • TXP_DME_10E_C An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	"NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47 "NTP-G30 Install the DWDM Cards" procedure on page 14-64 "NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs" procedure on page 14-78 "NTP-G37 Run Automatic Node Setup" procedure on page 14-128
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 On the 40-SMR-1-C card on Side A, do the following steps:

a. Remove the LC connectors between the ADD/DROP ports of the 40-SMR-1-C card and the MUX and DMX units.

b. Create a physical loopback by connecting a fiber optic jumper between the ADD and DROP ports.

Step 3 Retrieve the power set point of the DROP-TX port of the 40-SMR-1-C card on Side A. To view this set point, do the following:

a. Go to node view (single-shelf mode) or multishelf view (multishelf mode) and click the **Provisioning** > **WDM-ANS** > **Provisioning** tabs.

b. In the Selector window on the left, expand the 40-SMR-1-C card on Side A.

c. Expand the Port DROP-TX category.

d. Select Power.

e. Record the value of the Shelf *i* Slot *i* (40-SMR-1-C).Port DROP-TX.Power parameter in the right pane.

f. If the value of the Power set point is greater than -6dBm, continue with Step 4, else edit the Power set point to -6dBm and complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

This will ensure there is enough power to perform the optical validation procedure.

Step 4 Display the OPT-AMP-17-C on Side A in card view, and complete the following steps:

a. Click the **Maintenance** > **ALS** tabs.

b. From the ALS Mode pull-down menu, select **Disable**.

Step 5 Connect a tunable laser or a fully tunable TXP_DME_10E_C card to the LINE RX port of the OPT-AMP-17-C card on Side A. Connect a 10dB bulk attenuator to the fiber or regulate the output power of the tunable laser to -10dBm.

Step 6 Create an OCHNC DCN for channel 1 on Side A related to the ADD-DROP path using the "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41. The circuit must be bidirectional connecting the ADD-RX port of the 40-SMR-1-C card to the LINE-TX port of the OPT-AMP-17-C card and vice-versa (LINE-RX port of the OPT-AMP-17-C card to the DROP-TX port of the 40-SMR-1-C card)

Step 7 Set the tunable laser or the TXP_DME_10E_C card to the first wavelength of the 100-GHz ITU-T C-band grid (1530.33 nm) and place the trunk port of the TXP_DME_10E_C card in the In-Service (IS) state.

Step 8 Verify the power levels of channel 1 by performing the following steps:

a. Check the optical connection between the OPT-AMP-17-C and 40-SMR-1-C cards. The power difference between the COM-TX port of OPT-AMP-17-C and the LINE-RX port of 40-SMR-1-C must not exceed of +/- 1.5dB.

b. Check the following parameters of the RX-amplifier in the 40-SMR-1-C card:

- The Working mode on the EXP-TX port must be the same as the ANS set point value that is set to Gain.
- The total power on the EXP-TX port must be equal to Channel Power Ref. with a tolerance +/-1.5dB.
- The DCU insertion loss must be equal to the power difference between the DC-TX and DC-RX ports and the absolute value of the DCU insertion loss must be less than 11dB.

c. Check the parameters of the drop VOA in the 40-SMR-1-C card. The value of the VOA Attenuation parameter on the DROP-TX port must be equal to the value of the VOA Attenuation Ref. parameter with a tolerance of +/-1.0dB.

d. Check the following parameters of the add VOA in the 40-SMR-1-C card:

- In the card view, click the **Provisioning** > **OCH** > **Parameters** tabs.
- Select the first channel from the Wavelength drop-down list and click **Retrieve**. The optical path from the ADD-RX port to the LINE-TX port is highlighted.
- Verify if the value of the Power To parameter is the same as that of the VOA Power Ref. parameter with a tolerance +/-1.0dB.

e. Check the optical connection between the 40-SMR-1-C and OPT-AMP-17-C card. The power difference between the LINE-TX port of the 40-SMR-1-C card and the COM-RX port of the OPT-AMP-17-C card must not exceed +/- 1.5dB.

f. Check the following parameters of the OPT-AMP-17-C card:

- The Working mode on the LINE-TX port must be the same as the ANS set point value that is set to Gain.
- The value of the Gain parameter must be equal to the Gain set point +/-1.0dB. The gain set point for the OPT-AMP-17-C card is 17dB.

Step 9 Delete the OCHNC DCN circuit for channel 1 on Side A that is related to the ADD-DROP path created in Step 6 using the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46.

Step 10 Create an OCHNC DCN circuit for channel 1 on Side A related to the EXP path using the "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41. The circuit must be bidirectional and connects the LINE-RX port of the OPT-AMP-17-C card on Side A to the LINE-TX port of the OPT-AMP-17-C card on Side B.

Step 11 Verify the power levels of channel 1 by performing the following steps:

a. Check the optical connection between the OPT-AMP-17-C and 40-SMR-1-C card on Side A. The power difference between the COM-TX port of OPT-AMP-17-C and the LINE-RX port of 40-SMR-1-C must not exceed +/- 1.5dB.

b. Check the following parameters of the RX-amplifier in the 40-SMR-1-C card:

- The Working mode on the EXP-TX port must be the same as the ANS set point value that is set to Gain.
- The total power on the EXP-TX port must be equal to Channel Power Ref. with a tolerance +/-1.5dB.
- The DCU insertion loss must be equal to the power difference between the DC-TX and DC-RX ports and the absolute value of the DCU insertion loss must be less than 11dB.

c. Check the optical connection between 40-SMR-1-C on Side A and 40-SMR-1-C on Side B. The power difference between the EXP-TX port and the EXP-RX port must not exceed +/- 1.5dB.

d. Check the parameters of the pass-through VOA in the 40-SMR-1-C card on Side B:

- In the card view, click the **Provisioning** > **OCH** > **Parameters** tabs.
- Select the first channel from the Wavelength drop-down list and click **Retrieve**. The optical path from the EXP-RX port to the LINE-TX port is highlighted.
- Verify if the value of the Power To parameter is the same as the value of the VOA Power Ref. parameter with a tolerance +/-1.0dB.

e. Check the optical connection between the 40-SMR-1-C and OPT-AMP-17-C card on Side B. The power difference between the LINE-TX port of the 40-SMR-1-C card and the COM-RX port of the OPT-AMP-17-C card must not exceed +/- 1.5dB.

f. Check the following parameters of the OPT-AMP-17-C card on Side B:

- The Working mode on the LINE-TX port must be the same as the ANS set point value that is set to Gain.

  - The value of the Gain parameter must be equal to the Gain set point +/-1.0dB. The gain set point for the OPT-AMP-17-C card is 17dB.

Step 12 Turn off the laser or place the trunk port of the TXP card in OutofService (OOS) state and delete the OCHNC DCN circuit on Side A related to channel 1 created in Step 10 using the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46.

Step 13 Set the tunable laser or the TXP_DME_10E_C card to the second wavelength of the 100-GHz ITU-T C-band grid and place the trunk port of the TXP_DME_10E_C card in the In-Service (IS) state. Repeat Step 6 through Step 12 for the second wavelength.

Step 14 Repeat Step 13 for the remaining 38 wavelengths on Side A.

Step 15 Delete the OCHNC DCN circuit related to channel 40 using the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46 and turn off the laser or place the trunk port of the TXP_DME_10E_C card in OutofService (OOS) state.

Step 16 On the 40-SMR-1-C card on Side A, do the following steps:

a. Remove the physical loopback between the ADD and DROP ports on the 40-SMR-1-C card created in Step 2.

b. Reconnect the DROP-TX port to the RX port on the DMX side of the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD patch panel.

Step 17 On the15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit on Side A, do the following steps:

a. Create a physical loopback between the MUX and DMX ports on the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit.

b. Connect the TX port on the MUX side of the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit to a power meter. If the power meter is not available, reconnect the TX port of the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit to the ADD-RX port of the 40-SMR-1-C card on Side A.

Step 18 Create an OCHNC DCN for channel 1 on Side A related to the ADD-DROP path as done in Step 6.

Step 19 Set the tunable laser or the TXP_DME_10E_C card to the first wavelength of the 100-GHz ITU-T C-band grid (1530.33 nm) and place the trunk port of the TXP_DME_10E_C card in the In-Service (IS) state.

Step 20 To verify the insertion loss on the optical path of the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit, do the following steps:

a. Retrieve the power value on the DROP-TX port of the 40-SMR-1-C card and record it as Pin.

b. Measure the optical power on the power meter or the ADD-RX port and record it as Pout.

c. Verify that the power difference between the power values obtained in step 21 a.and step 21 b. does not exceed the insertion loss value specified for the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit. (Pin - Pout must be less than 13dB with a tolerance of 1dB).

Step 21 Turn off the laser or place the trunk port of the TXP card in OutofService (OOS) state and delete the OCHNC DCN circuit on Side A related to channel 1 using the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46.

Step 22 Set the tunable laser or the TXP_DME_10E_C card to the next wavelength of the 100-GHz ITU-T C-band grid (1530.33 nm) and place the trunk port of the TXP_DME_10E_C card in the In-Service (IS) state and repeat Step 18 through Step 21 for the new wavelength.

Step 23 Restore the initial configuration after checking all the 40 available wavelengths:

a. Remove the power meter and reconnect the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit to the ADD-RX port of the 40-SMR-1-C card.

b. Remove the physical loopbacks between the MUX and DMX ports on the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD unit on Side A.

c. Reset the ALS parameter on the 40-SMR-1-C card. Complete the following:

- In card view, display the 40-SMR-1-C card on Side A and click the **Maintenance** > **ALS** tabs.
- From the ALS Mode pull-down menu, select **Auto Restart**.

d. Import the CTP XML file again using the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47 to overwrite any manual settings.

e. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 and verify that there are no errors.

Step 24 Repeat all the steps from Step 2 through Step 23 related to Side B.

Stop. **You have completed this procedure**.

NTP-G244 Perform the Four Degree ROADM Node with 40-SMR-2-C Cards Acceptance Test

Purpose	This procedure tests a four-degree ROADM node with 40-SMR-2-C cards installed.
Tools/Equipment	One of the following: • A tunable laser • TXP_DME_10E_C An optical power meter or optical spectrum analyzer Two bulk attenuators (10 dB) with LC connectors
Prerequisite Procedures	"NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" task on page 14-47 "NTP-G30 Install the DWDM Cards" procedure on page 14-64 "NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs" procedure on page 14-78 "NTP-G37 Run Automatic Node Setup" procedure on page 14-128
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to perform the acceptance test. If you are already logged in, continue with Step 2.

Step 2 On the 40-SMR-2-C card on Side A, do the following steps:

a. Remove the LC connectors between the ADD/DROP ports of the 40-SMR-2-C card and the MUX and DMX units.

b. Create a physical loopback by connecting a fiber optic jumper between the ADD and DROP ports.

Step 3 Retrieve the power set point of the DROP-TX port of the 40-SMR-2-C card on Side A. To view this set point, do the following:

a. Go to the multishelf view (multishelf mode) and click the **Provisioning** > **WDM-ANS** > **Provisioning** tabs.

b. In the Selector window on the left, expand the shelf.

c. Expand the 40-SMR-2-C card on Side A.

d. Expand the Port DROP-TX category.

e. Select Power.

f. Record the value of the Shelf *i* Slot *i* (40-SMR-2-C).Port DROP-TX.Power parameter in the right pane.

g. If the value of the Power set point is greater than -6dBm, continue with Step 4, else edit the Power set point to -6dBm and complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

This will ensure there is enough power to perform the optical validation procedure.

Step 4 Display the 40-SMR-2-C card for Side A in card view and complete the following steps:

a. Click the **Maintenance** > **ALS** tabs.

b. From the ALS Mode pull-down menu, select **Disable** for port 8 (LINE-TX).

c. Click **Apply**.

Step 5 Connect a tunable laser or a fully tunable TXP_DME_10E_C to the LINE RX port of the 40-SMR-2-C card on Side A. Connect a bulk attenuator to the fiber or regulate the output power of the tunable laser to -10dBm.

Step 6 Create an OCHNC DCN on Side A related to the ADD-DROP path of channel 1 using the "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41. The circuit must be bidirectional connecting the ADD-RX port to the LINE-TX port of the 40-SMR-2-C card and vice-versa (LINE-RX port to the DROP-TX port of the 40-SMR-2-C card)

Step 7 Set the tunable laser or the TXP_DME_10E_C card to the first wavelength of the 100-GHz ITU-T C-band grid (1530.33 nm) and place the trunk port of the TXP_DME_10E_C card in the In-Service (IS) state.

Step 8 Verify the power levels of channel 1 by performing the following steps:

a. Check the parameters of the RX-amplifier in the 40-SMR2-C card:

- In the 40-SMR2-C card view, click the **Provisioning > Opt.Ampli.Line > Parameters** tabs.
- Verify that the working mode on the EXP-TX port is set to Gain.
- Record the values of the Total Output Power and Channel Power Ref. parameters.
- Verify that the value of the Total Output Power is within +/-1.0 dB of the Channel Power Ref. value.
- Record the value of the DCU insertion loss parameter and verify that the value is less than 11 dB.

b. Check the parameters of the drop VOA in the 40-SMR-2-C card:

- Go to the multishelf view (multishelf mode) and click the **Provisioning** > **WDM-ANS** > **Port Status** tabs.
- In the Selector window on the left, expand shelf *i,* where *i* is the shelf you are working on.
- Expand Slot *i* (40-SMR2-C)*,* where *i* is the slot where the 40-SMR2-C card is located.

- Expand the Port DROP-TX category.
- Click the VOA Target Attenuation parameter.
- Record the VOA target attenuation displayed in the Value field.
- In the 40-SMR2-C card view, click the **Provisioning > Optical Line > Parameters** tabs.
- Record the VOA Attentuation Ref. value on Port 6 (DROP-TX).
- Verify that the value of the VOA Target Attenuation parameter recorded above is equal to the value of the VOA Attenuation Ref. parameter on the DROP-TX port with a tolerance +/-1.0 dB.

c. Check the parameters of the add VOA in the 40-SMR-2-C card:

- In the 40-SMR-2-C card view, click the **Provisioning** > **OCH** > **Parameters** tabs.
- Select the required channel from the Wavelength drop-down list and click **Retrieve**. The optical path from the ADD-RX port to the LINE-TX port is displayed in the table.
- Record the values of the Power To and VOA Power Ref. parameters for the ADD-RX to LINE-TX row.
- Verify that the value of the VOA Power Ref. parameter is equal to the value of the Power To parameter with a tolerance +/-1.0dB.
- In the 40-SMR-2-C card view, click the **Provisioning > Opt.Ampli.Line > Parameters** tabs.
- Record the working mode of Port 8 (LINE-TX).
- Verify that the working mode on the LINE-TX port is set to Gain.
- Go to the multishelf view (multishelf mode) and click the **Provisioning** > **WDM-ANS** > **Port Status** tabs.
- In the Selector window on the left, expand shelf *i,* where *i* is the shelf you are working on.
- Expand Slot *i* (40-SMR2-C), where *i* is the slot where the 40-SMR2-C card is located.
- Expand the Port LINE-TX category.
- Click the Gain parameter.
- Record the gain displayed in the Value field.
- Verify that the gain is equal to 17 dB.

Step 9 Delete the OCHNC DCN circuit for channel 1 on Side A related to the ADD-DROP path that was created in Step 6 using the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46.

Step 10 Create an OCHNC DCN circuit for channel 1 on Side A related to the EXP-TX path towards Side B using the "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41. The circuit must be bidirectional and connects the LINE-RX port of the 40-SMR-2-C card on Side A to the LINE-TX port of the 40-SMR-2-C card on Side B.

Step 11 Verify the power levels of channel 1 by performing the following steps:

a. Check the parameters of the RX-amplifier in the 40-SMR-2-C card:

- In the 40-SMR2-C card view on Side A, click the **Provisioning > Opt.Ampli.Line > Parameters** tabs.
- Verify that the working mode on the EXP-TX port is set to Gain.
- Record the values of the Total Output Power and Channel Power Ref. parameters.
- Verify that the value of the Total Output Power is within +/-1.0 dB of the Channel Power Ref. value.

b. Check the optical connection between Side A and Side B through the 15454-PP-4-SMR patch panel. Depending on the source side, the EXP-*i*-RX port of the destination side varies. Verify the connectivity among the different sides using the 15454-PP-4-SMR patch panel block diagram in the “Node Reference” chapter of the *Cisco ONS 15454 DWDM Reference Manual*. For example, on Side A, EXP-TX is connected to Side B on EXP-1-RX, Side C on EXP-2-RX, and Side D on EXP-3-RX. The power difference between the EXP-TX port and the EXP-*i*-RX port must be less than 7 dB.
   - In the 40-SMR2-C card view on Side B, click the **Provisioning > Optical Line > Parameters** tabs.
   - Record the express RX power on Port 10 (EXP-RX 1-2).
   - Compare the express RX power to the total output power recorded in Step 11a.
   - Verify that the absolute value of the total output power minus the express RX power is less than 7 dB.

c. Check the parameters of the pass-through VOA and TX-amplifier in the 40-SMR-2-C card on Side B:
   - In the card view, click the **Provisioning** > **OCH** > **Parameters** tabs.
   - Select the first channel from the Wavelength drop-down list and click **Retrieve**.
   - View the optical path from the EXP-*i*-RX port to the LINE-TX port that is displayed in the table.
   - Verify that the value of the Power To parameter is the same as the value of the Channel Power Ref. parameter with a tolerance +/-1.0dB.
   - Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs.
   - Verify that the working mode on Port 8 (LINE-TX) is set to Gain.
   - Ensure that the value of the gain parameter on Port 8 (LINE-TX) must be equal to 17 dB.
   - The Working mode on the LINE-TX port must be the same as the ANS set point value that is set to Gain.
   - The value of the Gain parameter on the LINE-TX port must be equal to the Gain set point +/-1.0dB. The gain set point for the 40-SMR-2-C card is 17dB.

Step 12 Delete the OCHNC DCN circuit towards Side B related to channel 1 created in Step 10 using the “DLP-G106 Delete Optical Channel Network Connections” task on page 16-46.

Step 13 Create the OCHNC DCN circuit for channel 1 on Side A related to EXP-TX path towards Side C using the “DLP-G105 Provision Optical Channel Network Connections” task on page 16-41. Repeat Step 11 and Step 12 for the circuit that is created.

Step 14 Repeat Step 13 towards Side D, turn off the laser or place the trunk port of the TXP_DME_10E_C card in OutofService (OOS) state.

Step 15 Set the tunable laser or the TXP_DME_10E_C card to the second wavelength of the 100-GHz ITU-T C-band grid and place the trunk port of the TXP_DME_10E_C card in the In-Service (IS) state. Repeat Step 6 through Step 14 for the second wavelength.

Step 16 Repeat Step 15 for the remaining 38 wavelengths on Side A.

Step 17 Delete the OCHNC DCN circuit related to channel 40 using the “DLP-G106 Delete Optical Channel Network Connections” task on page 16-46 and turn off the laser or place the trunk port of the TXP_DME_10E_C card in OutofService (OOS) state.

Step 18 On the 40-SMR-2-C card on Side A, do the following steps:

a. Remove the physical loopback between the ADD and DROP ports on the 40-SMR-2-C card created in Step 2.

b. Reconnect the DROP-TX port on the 40-SMR2-C card to the COM-RX port on the DMX side of the 15216-MD-40-ODD patch panel.

c. Reconnect the ADD-RX port on the 40-SMR2-C card to the COM-TX port on the MUX side of the 15216-MD-40-ODD patch panel.

Step 19 On the15216-MD-40-ODD unit on Side A, do the following steps:

a. Create a physical loopback between the MUX and DMX ports of the 15216-MD-40-ODD unit that are related to the same wavelength. Perform this step for all the 40 wavelengths on the 15216-MD-40-ODD patch panel on the side you are working on.

Step 20 Create an OCHNC DCN for channel 1 on Side A related to the ADD-DROP path as done in Step 6.

Step 21 Set the tunable laser or the TXP_DME_10E_C card to the first wavelength of the 100-GHz ITU-T C-band grid (1530.33 nm) and place the trunk port of the TXP_DME_10E_C card in the In-Service (IS) state.

Step 22 To verify the insertion loss on the optical path of the 15216-MD-40-ODD unit on Side A, do the following steps:

a. In the 40-SMR2-C card view, click the **Provisioning > Optical Line > Parameters** tabs.

b. Retrieve the power value on Port 6 (DROP-TX) of the 40-SMR-2-C card and record it as Pin.

c. Retrieve the power value on Port 5 (ADD-RX) port and record it as Pout.

d. Verify that the power difference between the power values obtained in step 22 b. and step 22 c. do not exceed the insertion loss value specified for the 15216-MD-40-ODD unit. (Pin - Pout must be less than 13dB with a tolerance of 1dB).

Step 23 Turn off the laser or place the trunk port of the TXP_DME_10E_C card in OutofService (OOS) state and delete the OCHNC DCN circuit on Side A related to channel 1 using the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46.

Step 24 Set the tunable laser or the TXP_DME_10E_C card to the next wavelength of the 100-GHz ITU-T C-band grid (1530.33 nm) and place the trunk port of the TXP_DME_10E_C card in the In-Service (IS) state and repeat Step 20 through Step 23 for the new wavelength.

Step 25 Restore the initial configuration after checking all the 40 available wavelengths:

a. Remove the power meter and reconnect the 15216-MD-40-ODD unit to the ADD-RX port of the 40-SMR-2-C card.

b. Remove the physical loopbacks between the MUX and DMX ports on the 15216-MD-40-ODD unit on Side A.

c. Reset the ALS parameter on the 40-SMR-2-C card. Complete the following:

– In card view, display the 40-SMR-2-C and click the **Maintenance** > **ALS** tabs.

– From the ALS Mode pull-down menu, select **Auto Restart**.

d. Import the CTP XML file again using the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" task on page 14-47 to overwrite any manual settings.

e. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128 and verify no errors are present.

Step 26 Repeat all the steps from Step 2 through Step 25 related to Side B.

Step 27 Repeat all the steps from Step 2 through Step 25 related to Side C.

Step 28 Repeat all the steps from Step 2 through Step 25 related to Side D.

Stop. **You have completed this procedure**.

CHAPTER 15

Turn Up a Network

This chapter explains how to turn up and test a Cisco ONS 15454 dense wavelength division multiplexing (DWDM) network. For DWDM topology reference information and span loss tables, see Chapter 13, “Network Reference.”

There are two main DWDM network types: metro core, where the channel power is equalized and dispersion compensation is applied, and metro access, where the channels are not equalized and dispersion compensation is not applied. The DWDM network topologies supported are hubbed rings, multihubbed rings, meshed rings, linear configurations, and single-span links. The DWDM node types supported are hub, terminal, optical add/drop multiplexing (OADM), reconfigurable optical add/drop multiplexing (ROADM), anti-amplified spontaneous emissions (anti-ASE), and line amplifier. For DWDM and hybrid node turn-up procedures, see Chapter 14, “Turn Up a Node.”

Note The procedures and tasks described in this chapter for the Cisco ONS 15454 platform is applicable to the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, unless noted otherwise.

Note Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Note In this chapter, “RAMAN-CTP” refers to the 15454-M-RAMAN-CTP card and “RAMAN-COP” refers to the 15454-M-RAMAN-COP card.

Before You Begin

This section lists the chapter procedures (NTPs). Turn to a procedure for applicable tasks (DLPs).

1. NTP-G51 Verify DWDM Node Turn Up, page 15-2—Complete this procedure before beginning network turn-up.
2. NTP-G52 Verify Node-to-Node Connections, page 15-3—Complete this procedure next.
3. NTP-G201 Configure the Raman Pump on an MSTP Link, page 15-4—Complete this procedure to set the Raman total power and Raman ratio.
4. NTP-G53 Set Up Timing, page 15-27—Complete this procedure next.
5. NTP-G54 Provision and Verify a DWDM Network, page 15-33—Complete this procedure next.
6. NTP-G56 Verify the OSNR, page 15-37—Complete as needed.

7. NTP-G142 Perform a Protection Switch Test, page 15-38—Complete as needed.
8. NTP-G164 Configure Link Management Protocol, page 15-40—Complete as needed.
9. NTP-G233 Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 15-47—Complete as needed.
10. NTP-G303 Configure Virtual links on the Cisco 7600 and Cisco ONS 15454 DWDM Node, page 15-66—Complete as needed.
11. NTP-G57 Create a Logical Network Map, page 15-69—Complete as needed.
12. NTP-G325 View the Power Levels of Cisco ONS 15454 MSTP Nodes, page 15-69—Complete as needed.
13. NTP-G326 Provision SRLG on the Cisco ONS 15454 MSTP Network, page 15-70—Complete as needed.

NTP-G51 Verify DWDM Node Turn Up

Purpose	This procedure verifies that each ONS 15454 is ready for DWDM network turn-up before adding nodes to a network. This procedure applies to all ROADM, OADM, and line-amplifier nodes.
Tools/Equipment	Network plan provided by your network administrator
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Log in to an ONS 15454 node on the network that you will test. See the DLP-G46 Log into CTC task for instructions. If you are already logged in, continue with Step 2.

Step 2 Click the **Alarms** tab.

a. Verify that the alarm filter is not turned on. See the DLP-G128 Disable Alarm Filtering task as necessary.

b. Verify that no equipment alarms appear (EQPT in the Cond column) indicating equipment failure or other hardware problems. If equipment failure alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 3 Verify that the software version shown in the node view (single-shelf mode) or multishelf view (multishelf mode) status area matches the version required by your network. (The status area is located to the left of the shelf graphic.) If the software is not the correct version, perform one of the following procedures:

- Perform a software upgrade using a Cisco ONS 15454 software CD or Cisco ONS 15454 SDH software CD. Refer to the release-specific software upgrade document.
- Replace TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards with cards containing the correct release.

Step 4 Click the **Provisioning > General** tabs. Verify that all general node information settings are correct according to documentation provided by the network administrator. If not, see the NTP-G80 Change Node Management Information procedure.

Step 5 Click the **Provisioning > Network** tabs. Ensure that the IP settings and other Cisco Transport Controller (CTC) network access information is correct according to documentation provided by the network administrator. If not, see the NTP-G81 Change CTC Network Access procedure.

Step 6 Click the **Provisioning > Protection** tabs. Verify that all required protection groups have been created according to documentation provided by the network administrator. If not, see the "NTP-G33 Create a Y-Cable Protection Group" procedure on page 11-162 or the NTP-G83 Modify or Delete Card Protection Settings procedure.

Step 7 Click the **Provisioning > Security** tabs. Verify that all users have been created and that their security levels are correct according to documentation provided by the network administrator. If not, see the NTP-G88 Modify Users and Change Security procedure.

Step 8 If Simple Network Management Protocol (SNMP) is provisioned on the node, click the **Provisioning > SNMP** tabs. Verify that all SNMP settings are correct according to documentation provided by the network administrator. If not, see the NTP-G89 Change SNMP Settings procedure.

Step 9 Repeat this procedure at each node in the network.

Stop. You have completed this procedure.

NTP-G52 Verify Node-to-Node Connections

Purpose	This procedure verifies optical service channel (OSC) terminations between nodes and checks span attenuation. This procedure applies to all ROADM, OADM, and line-amplifier locations.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 15-2
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note In this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Step 1 Check to see if the fibers coming from the adjacent nodes are connected to the OPT-BST, OPT-BST-E, OPT-AMP-17-C (operating in the booster amplifier mode), or OSC-CSM card LINE RX and TX ports. If yes, continue with Step 2. If adjacent node fibers are not connected to the LINE RX and TX ports, do not continue. Install the cabling to the adjacent nodes using the "NTP-G34 Install Fiber-Optic Cables on DWDM Cards and DCUs" procedure on page 14-78.

Step 2 Verify the following network fiber connections:

- The node's Side A ports (LINE TX and RX) are connected to the Side B ports (LINE RX and TX) of the adjacent node.
- The node's Side B ports (LINE RX and TX) are connected to the Side A ports (LINE TX and RX) of the adjacent node.

Step 3 Complete the DLP-G46 Log into CTC task at the network node that you want to verify.

Step 4 Click the **Provisioning > Comm Channels > OSC** tabs. Verify that OSC terminations appear under the OSC Terminations area for the Side B and Side A OSC-CSM or OSCM cards and that the port state is In-Service and Normal (IS-NR [ANSI]/Unlocked-enabled [ETSI]). If so, continue with Step 5. If OSC terminations are not created, complete the "NTP-G38 Provision OSC Terminations" procedure on page 14-126.

Step 5 Complete the NTP-G76 Verify Optical Span Loss Using CTC procedure for all OSC-CSM cards. If the measured span loss is within the minimum and maximum expected span loss values, continue with Step 6. If not, clean the fiber connected to the OPT-BST, OPT-BST-E, OPT-AMP-17-C (operating in the booster amplifier mode), or OSC-CSM cards on both ends of the span, then repeat the NTP-G76 Verify Optical Span Loss Using CTC procedure. If the span loss is within the minimum and maximum expected span loss values, continue with Step 6. If not, contact your next level of support.

Step 6 Repeat Steps 2 through 5 at each network node.

Stop. You have completed this procedure.

NTP-G201 Configure the Raman Pump on an MSTP Link

Purpose	This procedure configures the Raman pump on an Multiservice Transport Platform (MSTP) link.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 The Raman pump can be configured in the following ways:

- DLP-G468 Configure the Raman Pump Using the Installation Wizard, page 15-5—This procedure is the preferred and recommended installation process.
- DLP-G690 Configure the Raman Pump Using Manual Day-0 Installation, page 15-19—Use this procedure to configure and tune RAMAN-CTP and RAMAN-COP cards, using manual day-0 installation.
- DLP-G474 Configure the Raman Pump by Importing the CTP XML File, page 15-25—Use this procedure when the span is longer than 42 dB (expand on span). This procedure is not recommended for spans of 42 dB or less.
- DLP-G489 Configure the Raman Pump by Setting the ANS Parameters Manually, page 15-25—Use this procedure if the Raman installation wizard fails and expert intervention is required.

Stop. You have completed this procedure.

DLP-G468 Configure the Raman Pump Using the Installation Wizard

Purpose	This procedure configures the Raman Pump on an MSTP link using the installation wizard.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC • NTP-G30 Install the DWDM Cards, page 14-64 • NTP-G51 Verify DWDM Node Turn Up, page 15-2 • NTP-G37 Run Automatic Node Setup, page 14-128. • Create an optical service channel (OSC) termination link by completing the "NTP-G38 Provision OSC Terminations" procedure on page 14-126 or create an optical transport section (OTS) provisionable patchcord terminations on line ports by completing "NTP-G184 Create a Provisionable Patchcord" procedure on page 16-72, as required.
Required/As Needed	Required
Onsite/Remote	Onsite and remote
Security Level	Provisioning or higher

Note The installation wizard performs optical measurements and data exchange between the nodes. Make sure that the data communications network (DCN) is stable.

Note Running the installation wizard without setting the automatic node setup (ANS) parameters causes the wizard to fail. Complete the "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Note Running the installation wizard can impact traffic. Make sure that nobody is working on the nodes before continuing with this procedure.

Caution To perform optical measurements, the installation wizard automatically turns on hardware resources installed on the nodes. Alarms can occur during the installation process. Following the recommendations is critical to the success of installation.

Note Make sure that a Muxponder, a WSS, or a tunable transponder is present before you run the Raman installation wizard.

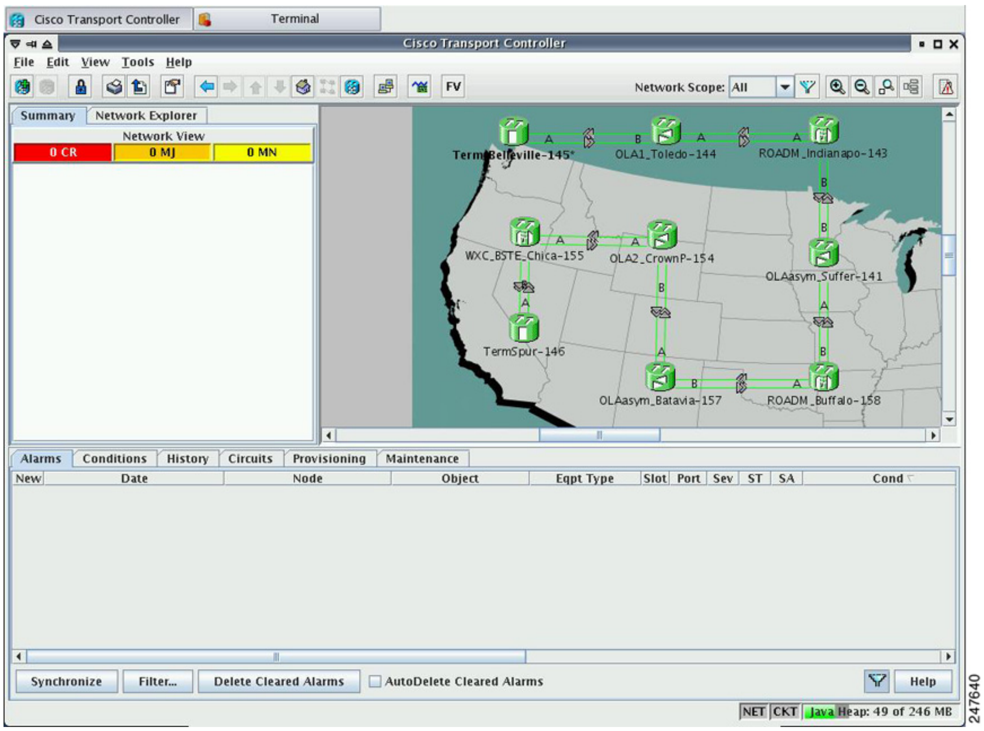
Note When the span is longer than 42 dB, do not use the Raman installation wizard.

Note A bulk attenuator is not required between the transponder and the OPT-RAMP-C or OPT-RAMP-CE card if the Raman installation wizard is started from a Raman only node (line amplifier node equipped with OPT-RAMP-C or OPT-RAMP-CE card without post-amplifier).

Step 1 From the CTC View menu, choose Go to Network View.

Step 2 Figure 15-1 shows a sample network view of nodes (terminal or ROADM) connected in the network.

Figure 15-1 Network View of Nodes (Terminal or ROADM)



The Raman pump on the OPT-RAMP-C or OPT-RAMP-CE card can be configured on a single span or multiple spans.

Step 3 To start the Raman installation wizard, complete one of the following steps:

- To configure Raman amplification on a single span, go to Network view, right-click on a span and choose **Raman Installation Day0** from the shortcut menu. (Figure 15-2). Go to Step 5.
- To configure Raman amplification on multispans, go to Network view, right-click on a specific node, and choose **Raman Installation Day0 Multi-span** from the shortcut menu (Figure 15-3).

Figure 15-2 Installing the Raman Pump on a Single Span

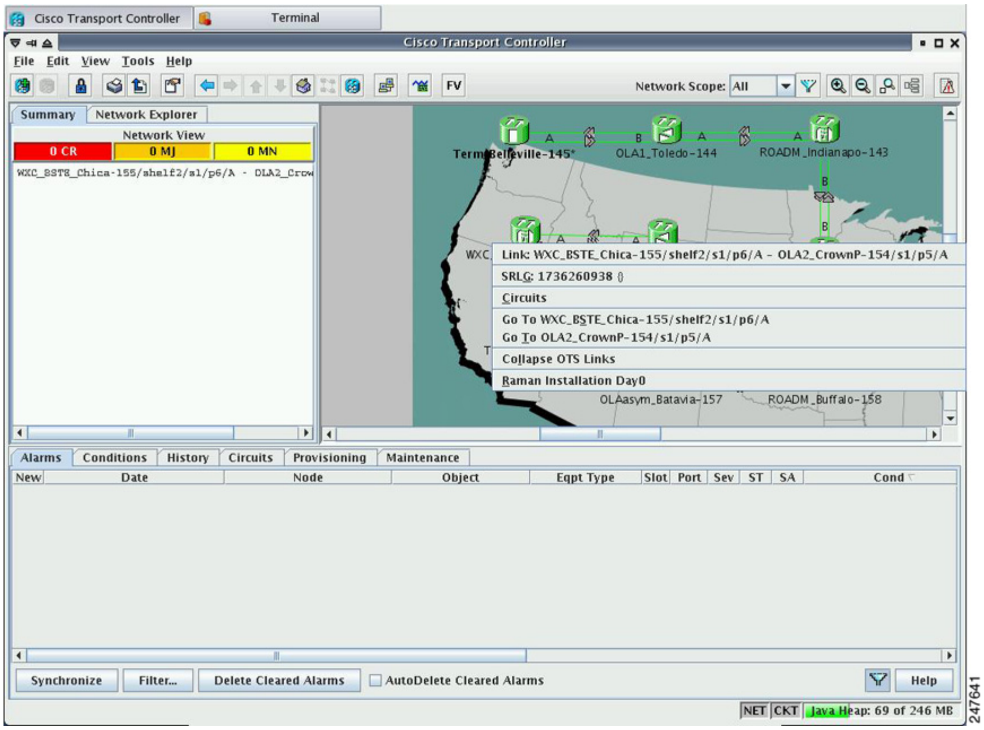
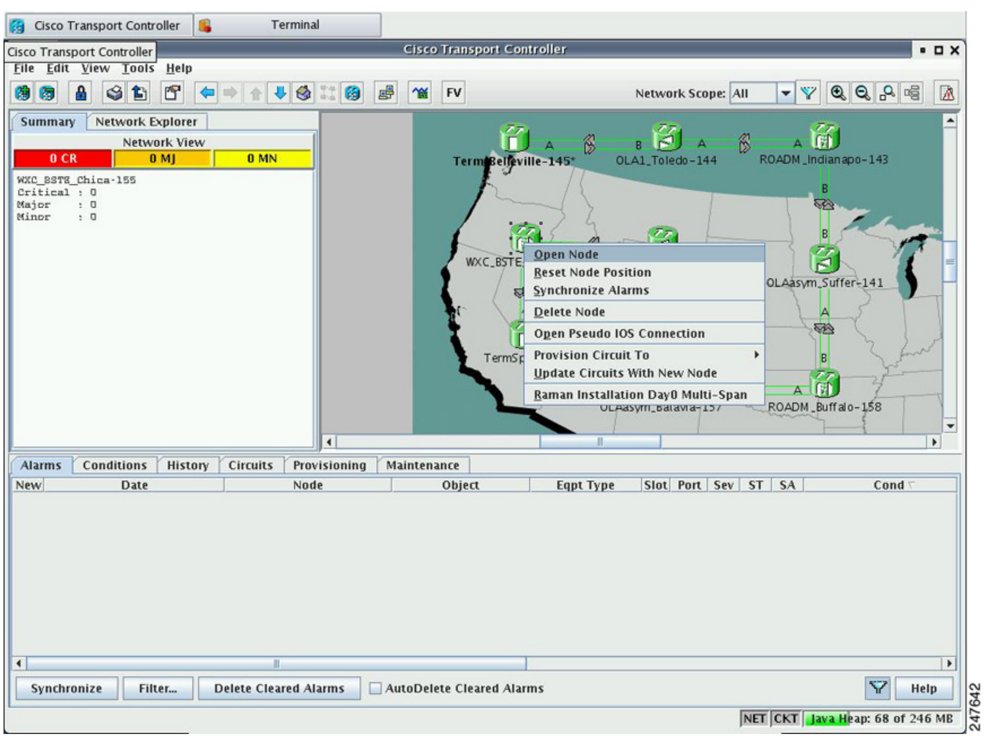
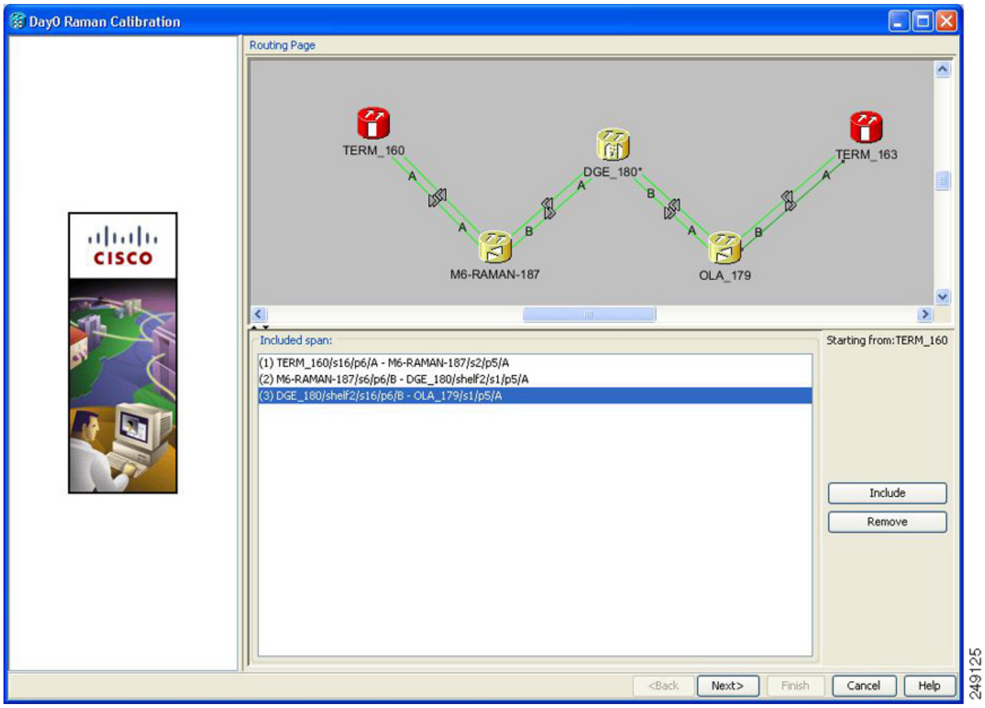


Figure 15-3 Installing the Raman Pump on Multiple Spans



The Routing page is displayed (Figure 15-4).

Figure 15-4 Selecting Spans for Raman Amplification



The Included Span list box lists all spans that are selected in the network.

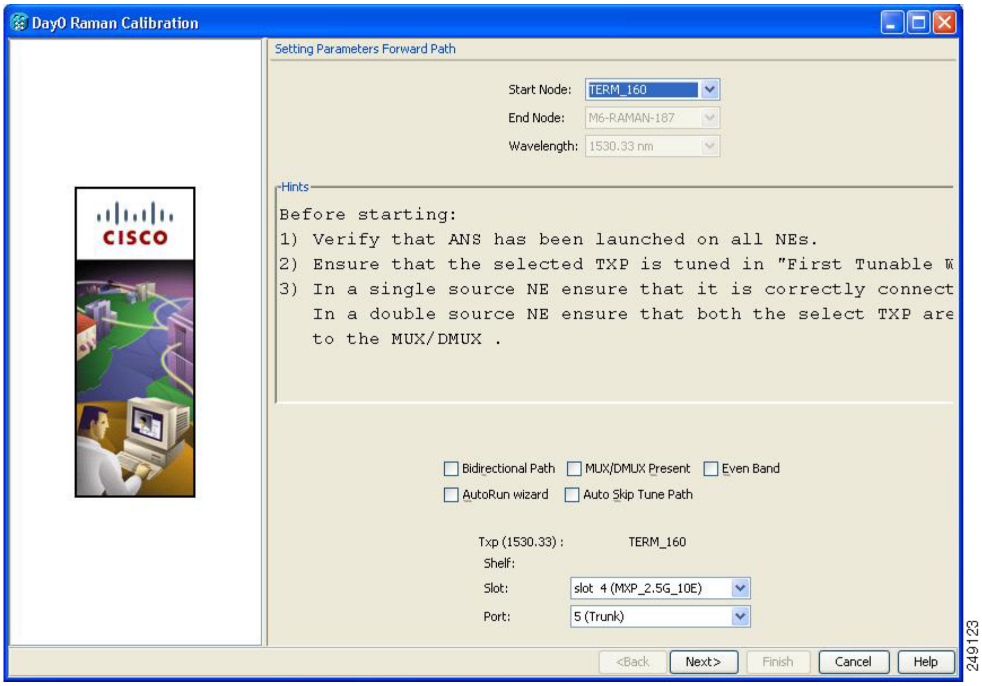
Step 4 Select a span from the network to add a span.

If you are setting up multispans, make sure that the span selection is made in a sequence; otherwise, an error message is displayed. For example, in Figure 15-4, begin with the span between the nodes WXC_BSTE_Chica-155 and OLA2_CrownP-154, and then the span between OLA2_CrownP-154 and OLAasym_Batavia-157, and so on.

Step 5 When you have selected the span or spans, click **Next**.

The Setting Parameters page is displayed (see Figure 15-5).

Figure 15-5 Setting Raman Calibration Parameter



Note The Hints area displays the status of internal operations.

Note If multiple spans are selected, the applicable nodes are displayed on the left side of the page.

Step 6 Select one or more check boxes as applicable:

- **Autorun wizard**—The Installation wizard tunes the selected span automatically, requiring no user intervention. However, if the wizard displays errors, the wizard requests for user acknowledgements.
- **Even Band**—This option is used for optical networks that support only even band channels. If the network supports odd and even channels, the Raman Installation wizard tunes the transponder to the first tunable odd band channel.
- **Auto Skip Tune Path**—The Raman Installation wizard skips spans that have been previously tuned by the wizard.
- **Bidirectional Path**—This configures the OPT-RAMP-C or OPT-RAMP-CE cards in both directions (source to destination and destination to source)
- **MUX/DMUX Present**—This option is used if the optical network has transponders connected to the A/D stage (MUX or WSS).

Several scenarios are discussed in the following section. Select as applicable:

- Check box Bidirectional Path is unchecked and check box MUX/DMUX Present is checked. See Figure 15-6 and Step 7a.
- Check box Bidirectional Path is unchecked and check box MUX/DMUX Present is unchecked. See Figure 15-7 and Step 7b.

- Check box Bidirectional Path is checked and check box MUX/DMUX Present is checked. See Figure 15-8 and Step 7c.
- Check box Bidirectional Path is checked and check box MUX/DMUX Present is unchecked. See Figure 15-9 and Step 7d.

Note Before you check the MUX/DMUX Present check box, ensure that the following prerequisites are completed:

- At least one source node is a terminal node or a ROADM node.
- Two transponders/muxponders supporting wavelength of 1530.33 nm and 1560.61 nm, used as probe signals, are available on the source node for odd channels or wavelengths of 1530.72 nm and 1561.01 nm for even channels.
- Trunk ports are connected to the correct ADD ports.

Note The Raman Wizard does not verify if the selected TXP connections are properly connected. The calibration process is terminated if a LOS-P alarm is detected on the MUX input port when the trunk port is turned on.

Note If you do not use the MUX/DMUX Present check box, ensure that the following prerequisites are completed:

- Connect a UT2-based trunk port (from a transponder/muxponder card) to the COM-RX port of the booster amplifier connected to the OPT-RAMP-C or OPT-RAMP-CE card on the source node.

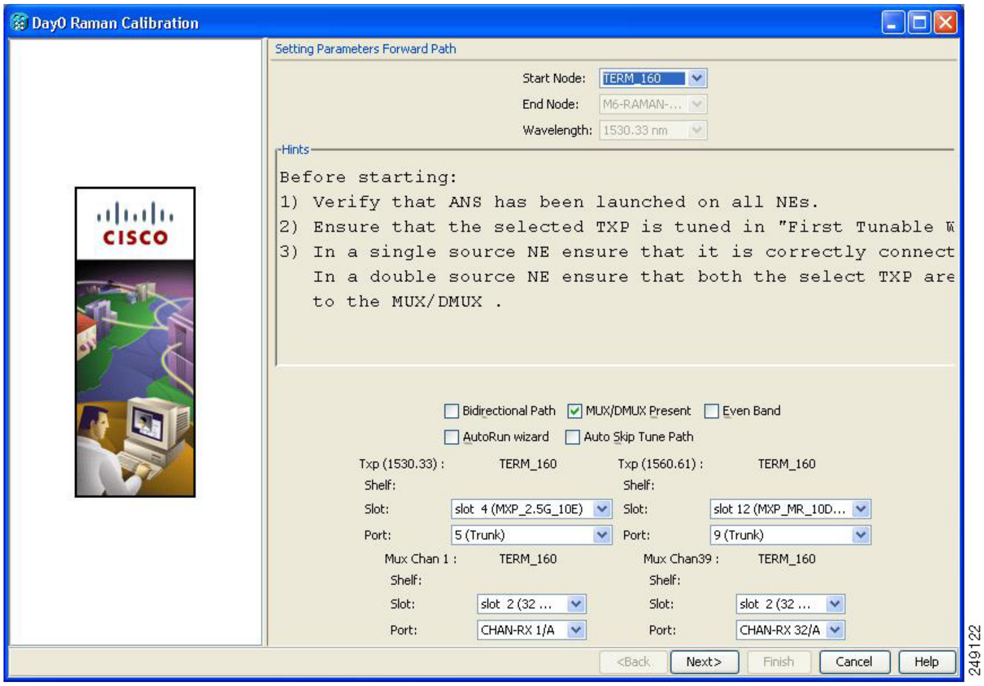
  A full-spectrum, tunable interface allows the system to tune the signal on two required wavelengths without any human intervention.
- A 10-dB bulk attenuator must be connected between the TXP trunk port and the COM-RX port of the booster amplifier.

Caution Make sure that the bulk attenuator is removed as soon as installation finishes and the correct fiber is reconnected to the COM-RX port of the booster amplifier.

Step 7 Perform any one of the following steps, based on your selection in Step 6.

a. Select the two transponders on the source node from the Slot drop-down list. The installation wizard tunes the transponders to the required wavelengths. (Figure 15-6).

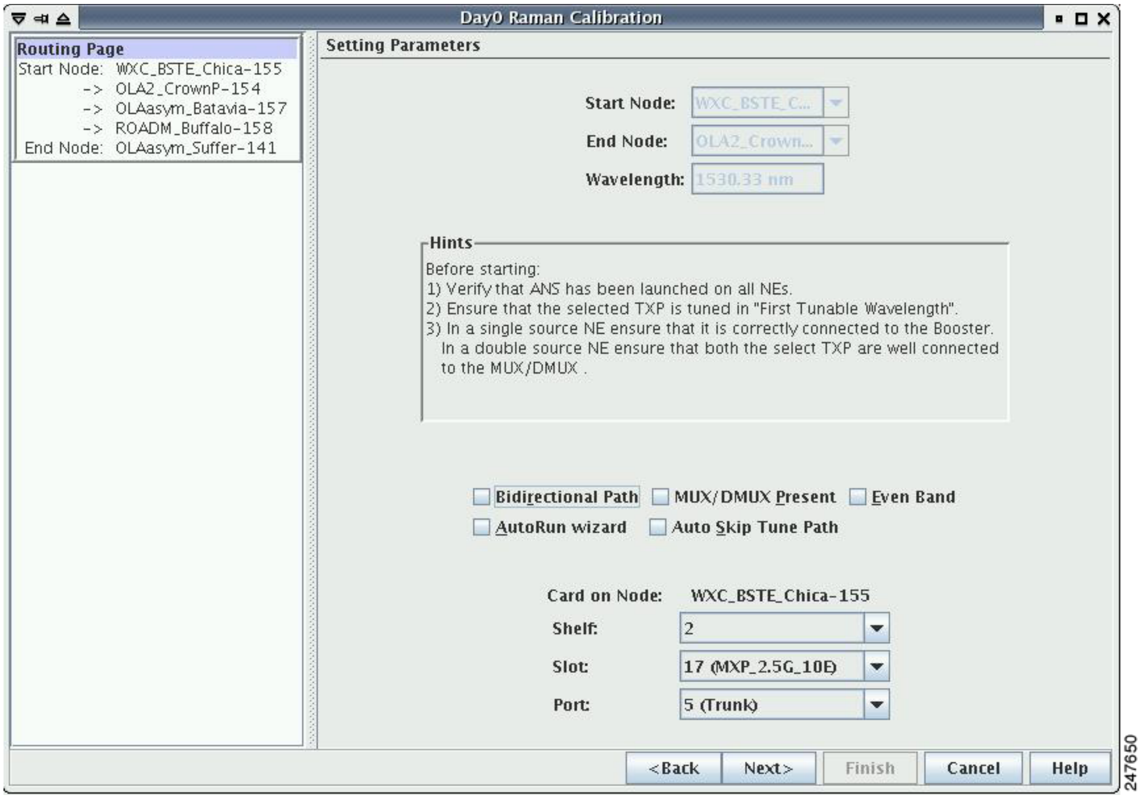
Figure 15-6 Bidirectional Path Is Unchecked and MUX/DMUX Present Is Checked



b. Select one transponder on the source node from the Slot drop-down list. The installation wizard verifies if the transponder can tune on the first tunable wavelength. Make sure that the card used is a tunable C-band transponder and set the transponder to the "first tunable wavelength". Otherwise, the wizard fails and the installation must be repeated using a correctly configured tunable transponder (Figure 15-7).

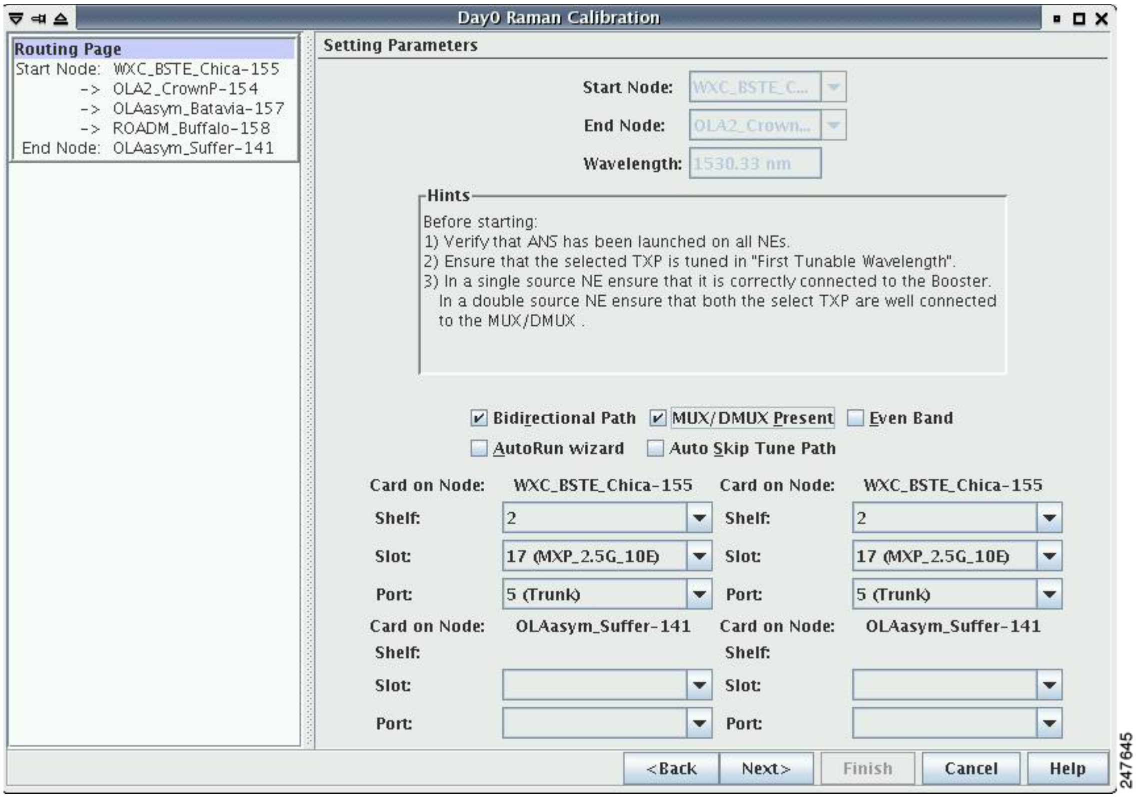
Note The wizard uses a pre-installed UT-2 based transponder.

Figure 15-7 Bidirectional Path Is Unchecked and MUX/DMUX Present Is Unchecked



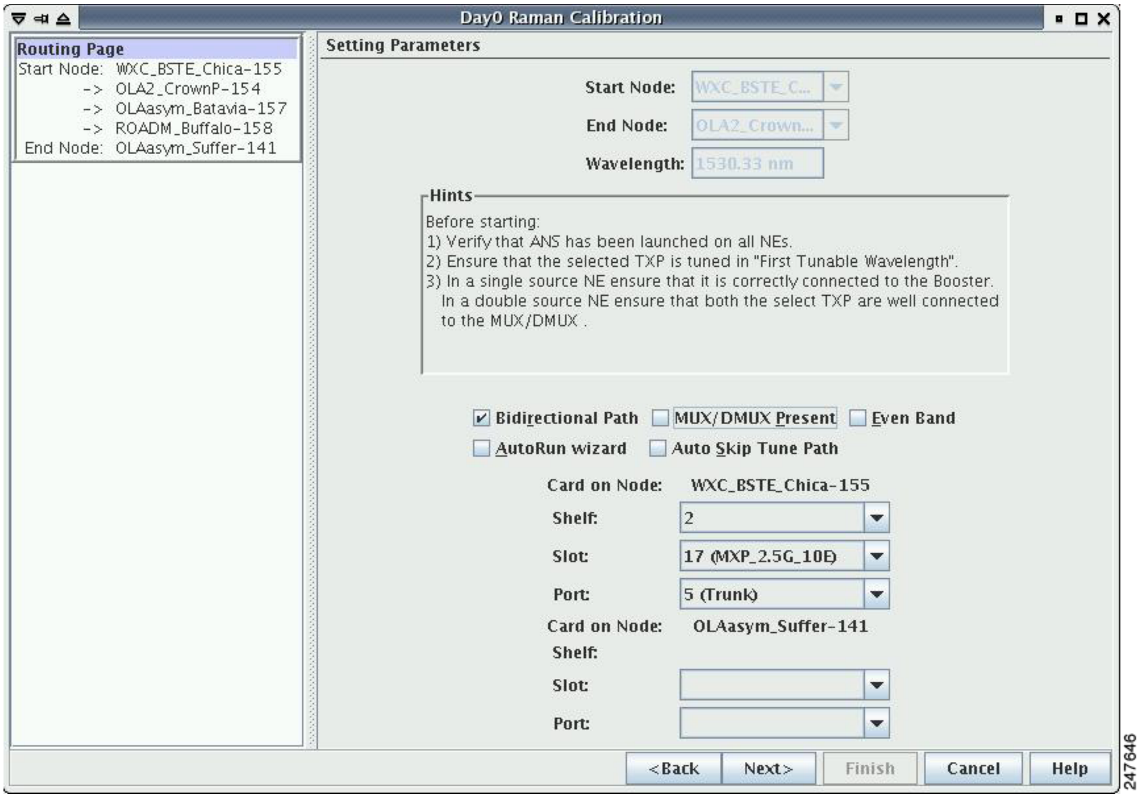
c. Select the two transponders on the source and destination nodes from the Slot drop-down list. The installation wizard verifies if the transponders are tuned to the expected wavelengths or on the first tunable wavelength. Otherwise, the wizard fails and the installation must be repeated (Figure 15-8).

Figure 15-8 Bidirectional Path Is Checked and MUX/DMUX Present Is Checked



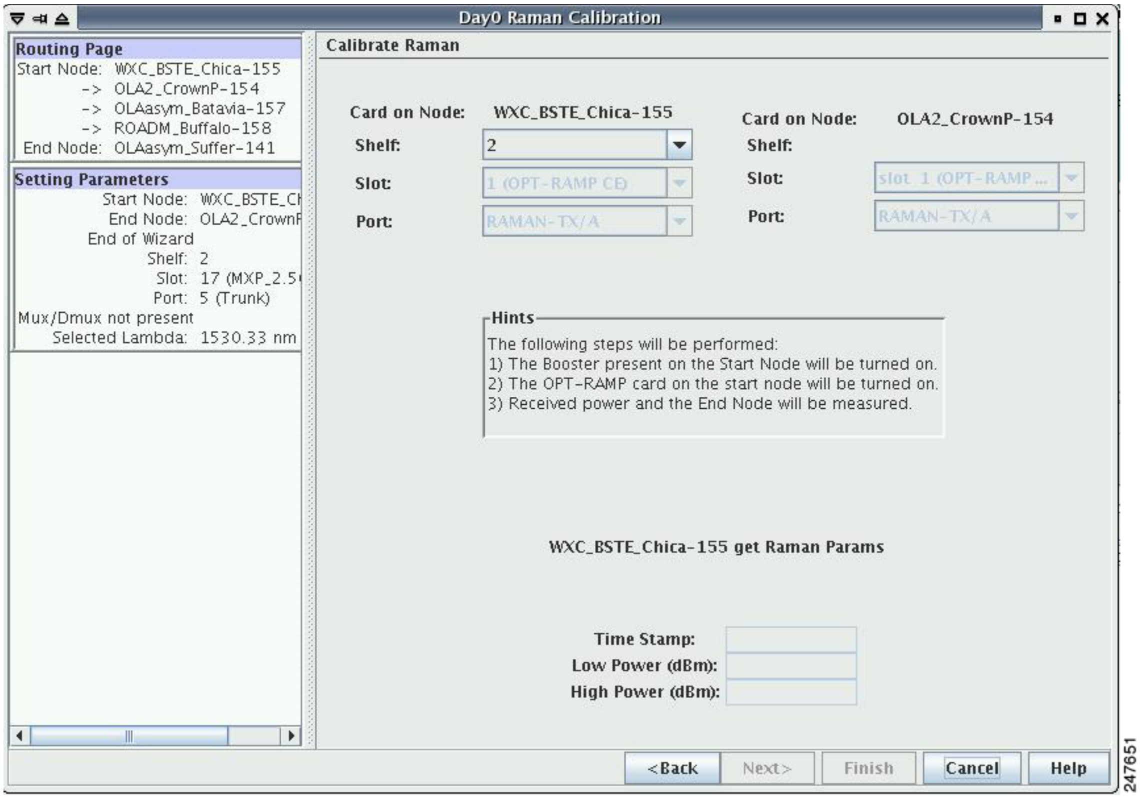
d. Select a transponder on the source and destination nodes from the Slot drop-down list. The installation wizard verifies if the transponder can be tuned on the first tunable wavelength. Make sure that the transponder is a tunable C-band transponder. Otherwise, the wizard fails and the installation must be repeated (Figure 15-9).

Figure 15-9 Bidirectional Path Is Checked and MUX/DMUX Present Is Unchecked



Step 8 Click **Next**. The Calibrate Raman Page is displayed (Figure 15-10).

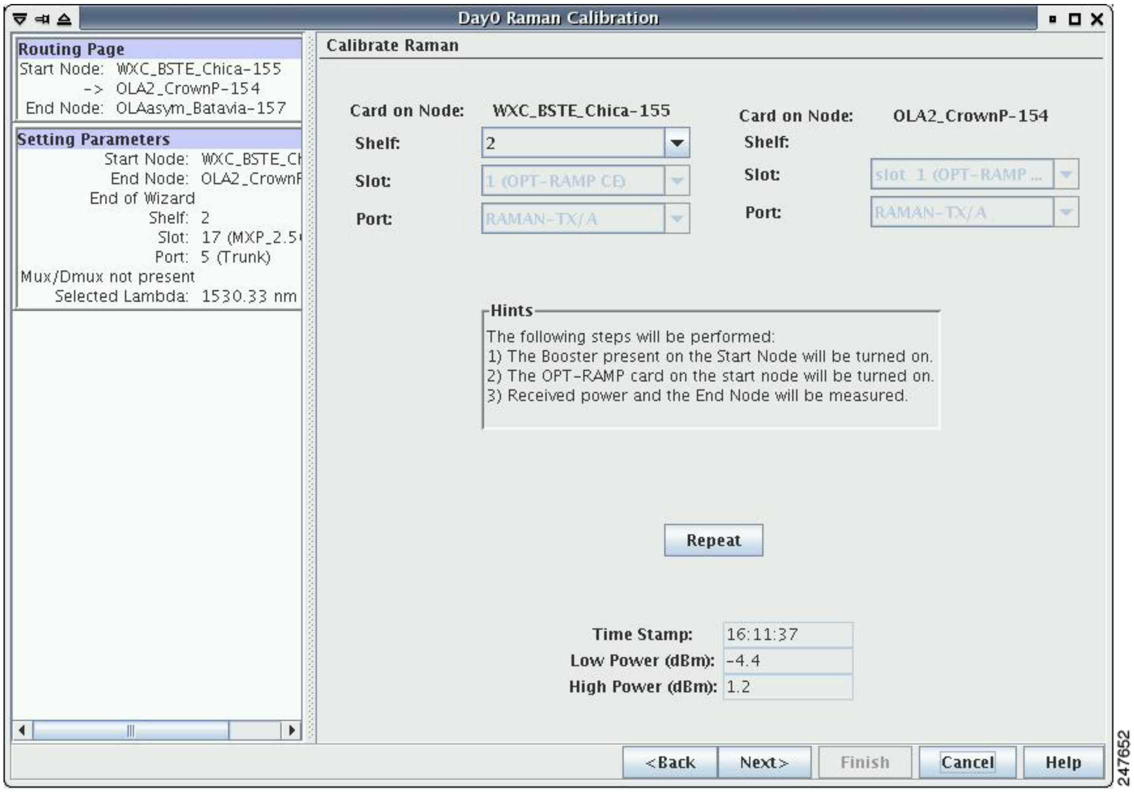
Figure 15-10 Calibrating Raman Amplification



The installation wizard changes the trunk port to the In-Service (IS) state and turns on all the amplifiers. All the OTS and optical channel (OCH) ports in the span are changed to IS state.

Step 9 As soon as the Raman calibrations are complete, the Next button is enabled. Click **Next**.

Figure 15-11 Calibrating Raman Amplification



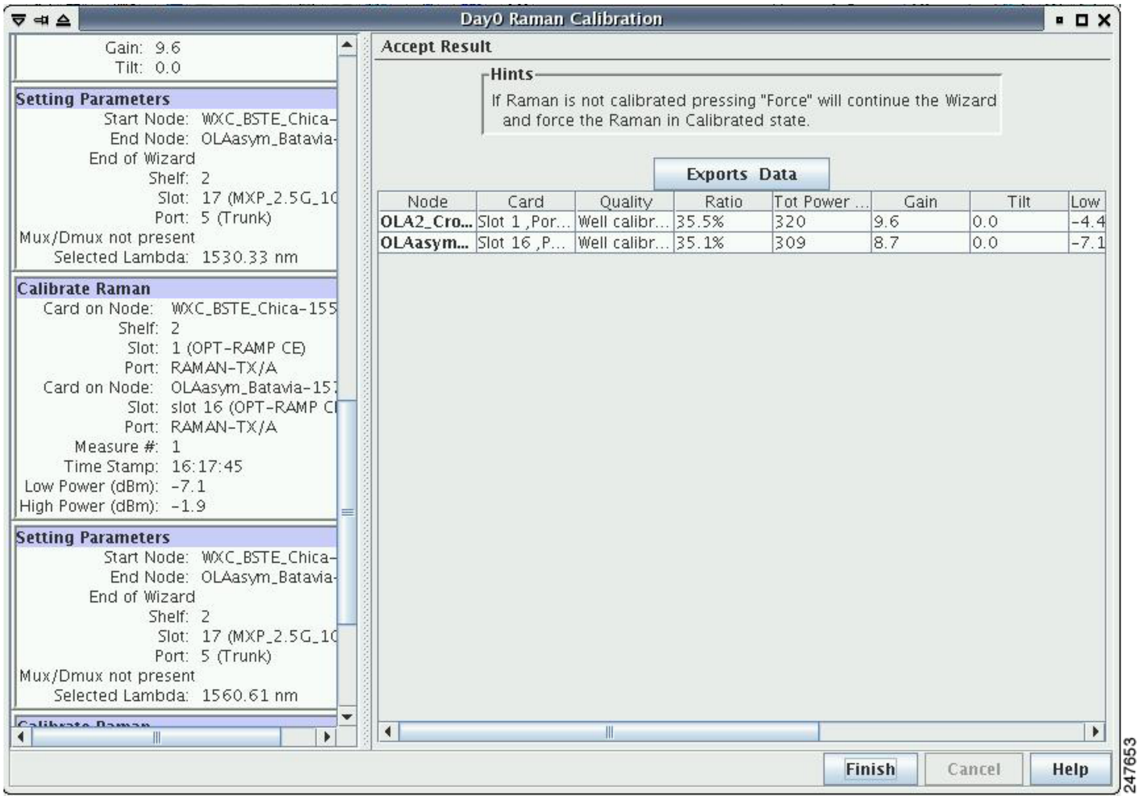
Step 10 The power received on the destination node when wavelength on the source is turned on is shown. If you installed Raman amplification on multiple spans, click **Next** to view results of other spans.

Step 11 If the installation wizard fails, click the **Repeat** button. The Raman installation wizard recalibrates the values on the destination node.

Note If you have repeated the calibration several times and the wizard fails, press **Cancel** to abort the installation process. Log in to the Cisco Technical Support Website at http://www.cisco.com/cisco/web/support/index.html for more information or call Cisco Technical Support at (800) 553-2447.

Step 12 Click **Next**. The Accept Results page is displayed (Figure 15-12).

Figure 15-12 Raman Amplification Results



The calculated Raman power and Raman gain are displayed. (Figure 15-12.)

Step 13 The wizard compares the calculated Raman gain value with the expected results. Your action depends on the Raman gain values:

- Expected gain (Gt) – 0.5 dB <= (gain) <= (expected gain) + 0.5 dB—If the Raman gain is within this range, it means that the setup procedure was successful. Go to Step 14.
- (Expected gain) - 3.0 dB <= (gain) <= (expected gain) – 0.5 dB—If the Raman gain is within this range, it means that the values are slightly outside the range. The wizard recommends that you verify the span length and cabling, and repeat the installation wizard procedure. If the Raman gain values are still not within the expected value range even after repeating the installation process, you can choose to forcibly apply these values by clicking **Force Calibration.**

Note After you have forced the new calibration, the new value of the Raman gain is applied to the OPT-RAMP-C or OPT-RAMP-CE card as the set point; However, the new value does not update the value of the ANS set point for Raman gain. After the installation is complete, reanalyze the network in Cisco Transport Planner using this new value for the Raman gain set point and verify that it results in a good network design. After the CTP analysis is successful, import the updated CTP XML file again into CTC by completing the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47. Launch, run, and apply the ANS parameters by completing "NTP-G37 Run Automatic Node Setup" procedure on page 14-128. This resolves the discrepancy between the values of the ANS parameters and the card parameters.

However, we recommend that you log in to the Cisco Technical Support Website at http://www.cisco.com/cisco/web/support/index.html for more information if the Raman gain values are still not within the expected value range or call Cisco Technical Support at (800) 553-2447.

- (gain) < (expected gain) – 3.0 dB or if (gain) < (expected gain) + 0.5 dB—If the Raman gain is within this range and the values calculated are far from the targeted results, the installation fails and the wizard recommends repeating the installation. If the results do not improve, it means that the installation process has failed. The Force Calibration option is not available. Click **Cancel** to abort the installation and log in to the Cisco Technical Support Website at http://www.cisco.com/cisco/web/support/index.html for more information or call Cisco Technical Support at (800) 553-2447.

Note The reason that the calculated values are not within the range may be due to installation issues (for example, the actual fiber type is different than the one used by Cisco Transport Planner to design the link) or procedural issues.

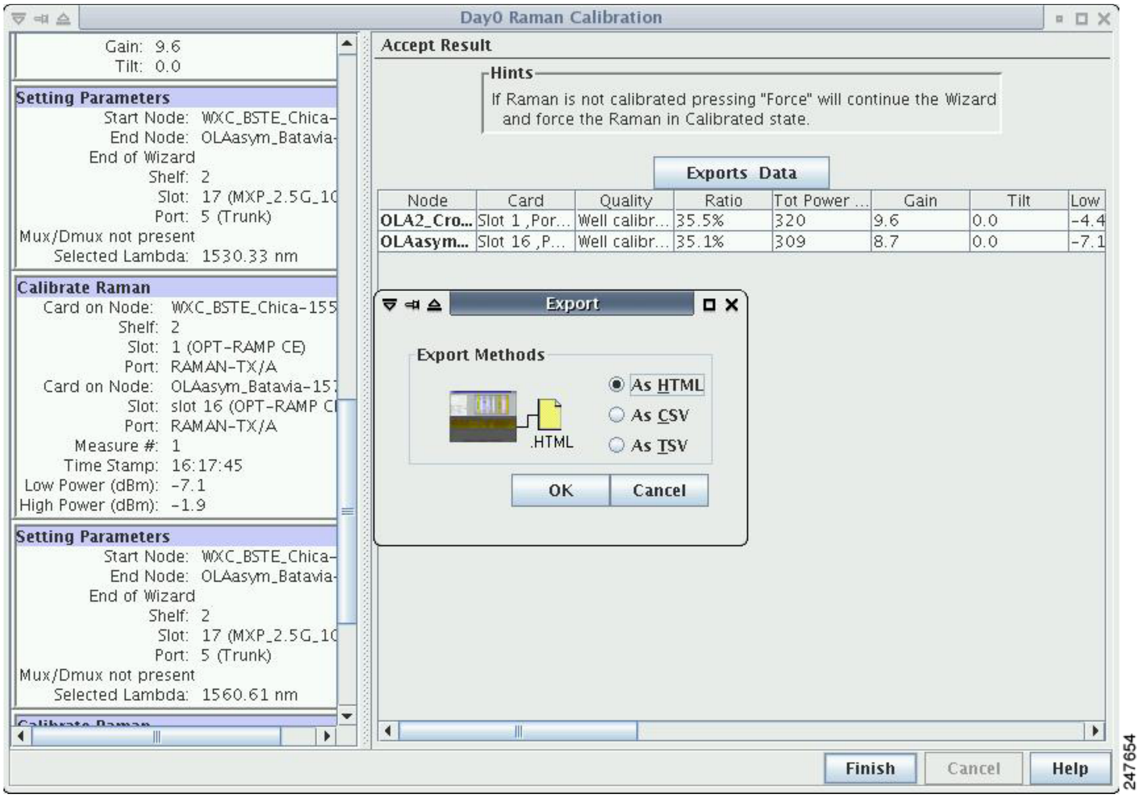
Step 14 Click **Exports Data** to export the Raman setup tuning data in text format (Figure 15-13).

Step 15 Click **Finish**.

Note When an error occurs during calibration of multiple spans, the calibration process stops and the Force Calibration button becomes visible.

Note If an error occurs during calibration of multiple spans when using the AutoRun wizard, the calibration stops and the Force Calibration button becomes visible. Click **Force Calibration** to force the results.

Figure 15-13 Exporting Raman Tuning Data



Step 16 Return to your originating procedure (NTP).

DLP-G690 Configure the Raman Pump Using Manual Day-0 Installation

Purpose	This task tunes the RAMAN-CTP and RAMAN-COP cards manually during day-0 installation.
Tools/Equipment	• An optical spectrum analyzer (OSA) must be available at both the local and remote nodes. • A 15 dB bulk attenuator
Prerequisite Procedures	• DLP-G46 Log into CTC • Create an optical service channel (OSC) termination link by completing the "NTP-G38 Provision OSC Terminations" procedure on page 14-126 or create optical transport section (OTS) provisionable patchcord terminations on line ports by completing "NTP-G184 Create a Provisionable Patchcord" procedure on page 16-72, as required. The ONS-SC-OSC-18.0= SFP is supported.
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Provisioning or higher

> **Note** Perform the tuning procedure on one fiber at a time. Tune the RAMAN-COP module on the remote node followed by RAMAN-CTP of the local node.

> **Note** The RAMAN-COP card needs RAMAN-CTP card to operate.

> **Note** If a 40-SMR1-C or 40-SMR2-C card is connected to the COM port of the RAMAN-CTP card, the ADD-RX port of the 40-SMR1-C or 40-SMR2-C card must be set to the OOS,MT (ANSI) or locked, maintenance (ETSI) state to enable the probe signals. Change the administrative state of the ADD-RX port to IS,AINS (ANSI) or unlocked,automaticInService (ETSI) after the tuning procedure is complete. See the "DLP-G532 Change Optical Line Settings for 40-SMR1-C and 40-SMR2-C Cards" task on page 20-95.

> **Note** If an OPT-EDFA-17, OPT-EDFA-24, OPT-AMP-C, or OPT-BST-E amplifier is used as a line amplifier during the tuning procedure, the COM-RX port of the amplifier must be set to the OOS,MT (ANSI) or locked, maintenance (ETSI) state. Change the administrative state of the COM-RX port to IS,AINS (ANSI) or unlocked,automaticInService (ETSI) after the tuning procedure is complete.

Step 1 To tune the RAMAN-COP card on the remote node, complete Steps 3 through 14.

Step 2 To tune the RAMAN-CTP card on the local node, complete Steps 14 through 22.

Step 3 On the local node, perform the following steps:

a. In the node view (single-shelf mode) or shelf view (multishelf mode), double-click the RAMAN-CTP card.

b. Click the **Maintenance** > **ALS** tabs.

c. Choose **On** from the OSRI drop-down list for the RAMAN-TX port.

d. Click **Apply** and then click **Yes**. This forces both the Raman pumps of the RAMAN-CTP card to shut down.

> **Note** The DFB signal is not affected by the Raman noise because the Raman pumps of the RAMAN-CTP card are shut down. The Optical Signal to Noise Ratio (OSNR) value remains above the failure threshold during the RAMAN-COP card tuning procedure, when the Raman ratio is forced to 100%.

e. Connect the OSA to the COM-TX port of the RAMAN-CTP card using physical patch cords.

f. Set the OSA Resolution Bandwidth (RBW) to 0.2 nm and the OSA Video Bandwidth (RBV) to 100 Hz.

Step 4 On the remote node, perform the following steps:

a. Connect a tunable C-band transponder or muxponder to the COM-RX port of the line amplifier that is connected to the COM-RX port of the RAMAN-CTP card.

b. Connect a 15 dB bulk attenuator between the TXP trunk port and the COM-RX port of the line amplifier so that the input power of the line amplifier does not exceed -7 dBm.

c. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP or MXP card.

d. Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

e. Select the wavelength as 1530.33 nm for odd band or 1530.73 nm for even band from the wavelength field.

f. Click **Apply** to save the changes.

g. Click the **Provisioning > Line > SONET** tabs.

h. Choose the **IS** option from the Admin State drop-down field and click **Apply**.

i. Click the **Maintenance > ALS** tabs, and set the ALS mode to **Disable**. This enables the line amplifier or the 40-SMR1-C or 40-SMR2-C card to detect a valid input power on the COM-RX or ADD-RX port respectively. The line amplifier starts up in control power mode and reaches the per channel power set point. A valid signal flows from the node into the fiber.

Step 5 On the remote node, perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the RAMAN-COP card.

b. Click **Maintenance > Manual Setup** tabs.

c. Select the **High Power First Lambda** option.

d. Click the **Pump On** button. The High Power First Lambda field becomes editable.

Note The Raman pumps at 1428 nm on the RAMAN-COP card are automatically set to a high power level of 450 mW.

Step 6 On the local node, record the peak optical power level at 1530.33 nm manually. The OSA detects a single channel at 1530.33 nm.

Step 7 On the remote node, perform the following

a. Enter the peak optical power value recorded in Step 6 in the High Power First Lambda field.

b. Select the **Low Power First Lambda** option.

c. Click the **Pump On** button. The Low Power First Lambda field becomes editable.

Note The Raman pumps at 1428 nm on the RAMAN-COP card are automatically set to a low power level of 200 mW.

Step 8 On the local node, record the peak optical power level at 1530.33 nm manually. The OSA detects a single channel at 1530.33 nm. The peak optical power level has reduced significantly.

Step 9 On the remote node, enter the peak optical power value recorded in Step 8 in the Low Power First Lambda field.

Step 10 Switch off the transponder or muxponder card on the remote node and select the last lambda values using the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP or MXP card.

b. Click the **Provisioning > Line > SONET** tabs.

c. Choose the **OOS,DSBLD** option from the Admin State drop-down field and click **Apply**.

d. Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

e. Select 1560.61 nm for odd band or 1561.1 nm for even band wavelength from the wavelength field and then click **Apply**.

f. Click **Provisioning > Line > SONET** tabs.

g. Choose the **IS** option from the Admin State drop-down field and click **Apply**.

Step 11 Repeat Steps 5 through 10 to edit the High Power Last Lambda and Low Power Last Lambda settings.

Step 12 On the remote node, click **Tune** to calculate the power, ratio, and actual gain on the RAMAN-COP card. The results are displayed in the result panel in the Manual Setup > Maintenance tab.

- Power—Displays the optimum total pump power value provisioned on the RAMAN-COP card to reach the target Raman installation gain.
- Ratio—Displays the optimum pumps ratio value provisioned on the card to reach the target Raman gain.

Note The newly calculated set points for the power and ratio can be viewed in the Maintenance > Installation Report tab in the RAMAN-COP card view after the successful execution of Raman tuning procedure. The newly provisioned values overwrite the values for the power and ratio ANS parameters and the Origin field displays the value, "AUTOMATIC" in the Provisioning > WDM-ANS > Provisioning tab.

- Actual Gain—Displays the current Raman gain calculated using the power and ratio values. If the calculated gain is less than the Raman installation gain setpoint, a warning message is displayed, prompting the user to accept the reduced calculated gain.

Step 13 Click the **Force** button to force the new gain setpoint.

Step 14 On the local node, perform the following:

a. In the node view (single-shelf mode) or shelf view (multishelf mode), double-click the RAMAN-CTP card.

b. Click the **Maintenance** > **ALS** tabs.

c. Choose **Off** from the OSRI drop-down list for the RAMAN-TX port.

d. Click **Apply** and then click **Yes**.

Step 15 On the local node, perform the following steps:

a. Connect the OSA to the COM-TX port of the RAMAN-CTP card using physical patchcords.

b. Set the OSA Resolution Bandwidth (RBW) to 0.2 nm and the OSA Video Bandwidth (RBV) to 100 Hz.

Step 16 On the remote node, perform the following steps:

a. Connect a tunable C-band transponder or muxponder to the COM-RX port of the line amplifier that is connected to the COM-RX port of the RAMAN-CTP card.

b. Connect a 15 dB bulk attenuator between the TXP trunk port and the COM-RX port of the line amplifier so that the input power of the line amplifier does not exceed -7 dBm.

c. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP or MXP card.

d. Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

e. Select the wavelength as 1530.33 nm for odd bands or 1530.73 nm for even bands from the wavelength field.

f. Click **Apply** to save the changes.

g. Click the **Provisioning > Line > SONET** tabs.

h. Choose the **IS** option from the Admin State drop-down field and click **Apply**.

i. Click the **Maintenance > ALS** tabs and set the ALS mode to **Disable**. This enables the line amplifier to detect a valid input power on the COM-RX port. The line amplifier starts up in control power mode and reaches the per channel power setpoint. A valid signal flows from the node into the fiber.

Step 17 On the local node, perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the RAMAN-CTP card.

b. Click the **Maintenance > Manual Start** tabs.

c. Select the **High Power First Lambda** option. Raman pump P1 is activated.

d. Click the **Pump On** button. The High Power First Lambda field becomes editable.

Note The Raman pumps at 1428 nm on the RAMAN-CTP card are automatically set to a high power level of 450 mW.

e. Record the peak optical power level at 1530.33 nm manually. The OSA detects a single channel at 1530.33 nm.

f. Enter the peak optical power value recorded in Step 17e in the High Power First Lambda field.

g. Select the **Low Power First Lambda** option.

h. Click the **Pump On** button. The Low Power First Lambda field becomes editable.

Note The Raman pumps at 1428 nm on the RAMAN-CTP card are automatically set to a high power level of 200 mW.

i. Record the peak optical power level at 1530.33 nm manually. The OSA detects a single channel at 1530.33 nm. The peak optical power level has reduced significantly.

j. Enter the peak optical power value recorded in Step 17i in the Low Power First Lambda field.

Step 18 Switch off the transponder or muxponder card on the remote node and select the last lambda values using the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf view), double-click the TXP or MXP card.

b. Click the **Provisioning > Line > SONET** tabs.

c. Choose the **OOS,DSBLD** option from the Admin State drop-down field and click **Apply**.

d. Click the **Provisioning > Line > Wavelength Trunk Settings** tabs.

e. Select the wavelength as 1560.61 nm for odd bands and 1561.1 nm for even bands from the wavelength field and click **Apply**.

f. Click the **Provisioning > Line > SONET** tabs.

g. Choose the **IS** option from the Admin State drop-down field and click **Apply**.

Step 19 Repeat Steps 17 and 18 to edit the High Power Last Lambda and Low Power Last Lambda settings. The Raman pump P2 is activated and the Raman ratio is 0%.

Step 20 On the local node, click the **Tune** button to calculate the power, ratio, and actual gain on the RAMAN-CTP card. The results are displayed in the result panel in the Manual Setup > Maintenance tab.

- Power—Displays the calculated optimum total pump power value provisioned on the RAMAN-CTP card to reach the target Raman installation gain.
- Ratio—Displays the optimum pumps ratio value provisioned on the RAMAN-CTP card to reach the target Raman gain.

Note The newly calculated setpoints for the power and ratio can be viewed in the Maintenance > Installation Report tab in the RAMAN-CTP card view after the successful execution of Raman tuning procedure. The newly provisioned values overwrite the values for the power and ratio ANS parameters and the Origin field displays the value, "AUTOMATIC" in the Provisioning > WDM-ANS > Provisioning tab.

- Actual Gain—Displays the current Raman gain calculated using the power and ratio values. The calculated gain (G) is compared with the expected Raman gain setpoint (G^{STP}). Your actions depends on the value of the calculated gain:
  - G^{STP} – 0.5 dB <= G <= G^{STP} + 0.5 dB—If the calculated gain is within this range, it means that the tuning procedure was successful.
  - G^{STP} – 2 dB < G < G^{STP}—A warning message is displayed, prompting you to accept the reduced calculated gain. Go to Step 21.
  - G < G^{STP} – 2 dB—A failure message is displayed. Go to Step 22.

Step 21 Click the **Force** button to force the new gain setpoint.

Note After you have forced the new calibration, the new value of the Raman gain is applied to the RAMAN-CTP card as the set point. The newly provisioned gain setpoint can be viewed in the Maintenance > Installation Report tab in the RAMAN-CTP card view. However, the newly provisioned gain setpoint does not automatically change the values of the Value and Origin fields of the ANS gain setpoint in the Provisioning > WDM-ANS > Provisioning tab. After the installation is complete, reanalyze the network in Cisco Transport Planner using the new value for the Raman gain set point and verify that it results in a good network design. After the CTP analysis is successful, import the updated CTP XML file again into CTC by completing the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47. Launch, run, and apply the ANS parameters by completing "NTP-G37 Run Automatic Node Setup" procedure on page 14-128. This resolves the discrepancy between the values of the ANS parameters and the card parameters.

Step 22 Repeat the Steps 14 through 21 again after cleaning the fibers and checking the node connections.

Note The status field in the Maintenance > Installation Report tab displays the value, "Raman tuned by WIZARD" after the tuning procedure is complete.

Step 23 Repeat Steps 1 and 2 to complete the tuning procedure in the opposite fiber.

Step 24 Return to your originating procedure (NTP).

DLP-G474 Configure the Raman Pump by Importing the CTP XML File

Purpose	This procedure configures the Raman pump by importing the Cisco Transport Planner XML file.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Install the ANS parameters calculated using Cisco Transport Planner, by completing the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" procedure on page 14-47.

Step 2 Launch, run, and apply ANS parameters by completing "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 3 Verify if the Raman pump was configured successfully. Perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-RAMP-C or OPT-RAMP-CE amplifier to display the card view.

b. Click the **Maintenance** > **Installation** tabs.

c. Verify the value of the Raman Ratio and Raman Total Power parameters are consistent with the ANS set points.

d. Verify if the status of the Raman configuration displays the value as "Tuned by ANS". If not, go to Step 1 to repeat the procedure again.

Step 4 Return to your originating procedure (NTP).

DLP-G489 Configure the Raman Pump by Setting the ANS Parameters Manually

Purpose	This procedure configures the Raman pump by setting the ANS parameters manually.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed, when the wizard fails and expert intervention is required.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure can be performed only on a per span basis and not on multiple spans. To configure multiple spans, repeat this procedure on each span that you want to configure.

Step 1 Provision the ANS parameters manually, by completing the "DLP-G541 Add an ANS Parameter" task on page 14-60. The ANS parameters are:

- (Slot *i*.OPT-RAMP-CE).Port RAMAN-TX.Amplifier Gain

- (Slot *i*.OPT-RAMP-CE).Port RAMAN-TX.Raman Ratio
- (Slot *i*.OPT-RAMP-CE).Port RAMAN-TX.Raman Total Power

ANS parameters are displayed in the Provisioning > WDM-ANS > Provisioning tab. For more information, see Chapter 12, "Node Reference."

Step 2 Launch, run, and apply ANS parameters by completing "NTP-G37 Run Automatic Node Setup" procedure on page 14-128.

Step 3 Verify if the Raman pump was configured successfully. Perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-RAMP-C or OPT-RAMP-CE amplifier to display the card view.

b. Click the **Maintenance** > **Installation** tabs.

c. Verify the values of the Raman Ratio and Total Pump Power parameters are consistent with the ANS set points.

d. Verify the status of the Raman configuration displays the value, "Tuned by ANS". If not, go to Step 1 to repeat the procedure again.

Step 4 Return to your originating procedure (NTP).

DLP-490 Restore Raman Link After a Fiber Cut Occurs

Purpose	This procedure tunes Raman set points after a fiber cut has been repaired. The Raman total power value is calculated again, and the original Raman gain is restored.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed.
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure does not calculate the Raman pump ratio. The Raman pump ratio is not expected to change after the fiber cut is repaired.

Caution This procedure affects traffic. Ensure that nobody is working on the nodes before you begin.

Step 1 Complete the "NTP-G54 Provision and Verify a DWDM Network" procedure on page 15-33.

Ensure that the network traffic is restored.

Step 2 Verify if the restore procedure was successful. Perform the following steps:

a. In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-RAMP-C or OPT-RAMP-CE amplifier to display the card view.

b. Click the **Maintenance** > **Installation** tabs.

c. Verify the value of the Fiber Cut Recovery column. The possible values are:

- Executed— The restore procedure was completed successfully.

- Pending—The restore procedure is incomplete.
- Failed —The system failed to execute the procedure.

d. If the status is Pending or Failed in Step 2c., perform the following steps:

- Click the **Maintenance** > **APC & Restore** tabs.
- Click **Restore from Fiber Cut**. This recalculates the Raman gain on the span and verifies if this value is consistent with the ANS set point for Raman gain.

Step 3 Return to your originating procedure (NTP).

NTP-G53 Set Up Timing

Purpose	This procedure provisions Cisco ONS 15454 timing.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 15-2
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you will set up timing. If you are already logged in, continue with Step 2.

Step 2 Complete the "DLP-G95 Set Up External or Line Timing" task on page 15-27 if an external building integrated timing supply (BITS) source is available. This is the most common ONS 15454 timing setup method.

Step 3 If an external BITS source is not available, complete the "DLP-G96 Set Up Internal Timing" task on page 15-30. This task can provide only Stratum 3 timing.

Step 4 Repeat this procedure at each node in the network.

Step 5 Return to your originating procedure (NTP).

DLP-G95 Set Up External or Line Timing

Purpose	This task defines the ONS 15454 timing source (external or line).
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	Required
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-node mode) or shelf view (multishelf mode), click the **Provisioning > Timing > General** tabs.

Step 2 In the General Timing area, complete the following information:

- Timing Mode—Choose **External** if the ONS 15454 derives its timing from a BITS source wired to the backplane pins (ANSI) or a MIC-C/T/P front-mount electrical connection (FMEC) (ETSI); choose **Line** if timing is derived from an OSC-CSM or OSCM card that is optically connected to the timing node. A third option, Mixed, allows you to set both external and line timing references. Because Mixed timing might cause timing loops, we do not recommend its use. Use this mode with care.

  Note In ONS 15454 M6 the BITS is connected to ECU or ECU2 BITS Connectors. Refer to "DLP-G296 Install Timing Wires on ONS 15454 M6 - ANSI" in the *Cisco ONS 15454 Hardware Installation Guide*. In ONS 15454 M2 the BITS is connected to BITS connectors on the Power Unit.

- SSM Message Set—Choose the Generation 2 synchronization status messaging (SSM) option. See Timing Reference for more information about SSM, including definitions of the SONET timing levels.

  Note Generation 1 is used only by SONET or SDH ONS 15454 nodes that are connected to equipment that does not support Generation 2.

- Quality of RES—Sets the timing quality for the user-defined, reserved (RES) S1 byte if your timing sources supports RES. Most timing sources do not use RES. If it does not support RES, choose RES=DUS (do not use for timing reference). Qualities are displayed in descending quality order as ranges. For example, in Generation 1 SSM, ST3<RES<ST2 means that the timing reference RES is higher than a Stratum 3 (ST3) and lower than a Stratum 2 (ST2).
- Revertive—Select this check box if you want the ONS 15454 to revert to a primary reference source after the conditions that caused it to switch to a secondary timing reference are corrected.
- Reversion Time—If Revertive is checked, choose the amount of time that the ONS 15454 will wait before reverting to its primary timing source. Five minutes is the default.

Step 3 In the Reference Lists area, complete the following information:

Note You can define up to three timing references for the node and up to six BITS Out references. BITS Out references define the timing references used by equipment that can be attached to the node's BITS Out pins on the backplane (ANSI) or the MIC-C/T/P FMEC (ETSI). If you attach equipment to BITS Out pins, you normally attach it to a node with Line mode, because equipment near the external timing reference can be directly wired to the reference.

- NE Reference—Allows you to define three timing references (Ref 1, Ref 2, Ref 3). The node uses Reference 1 unless a failure occurs to that reference, in which case the node uses Reference 2. If Reference 2 fails, the node uses Reference 3, which is typically set to Internal Clock. Reference 3 is the Stratum 3 clock provided on the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card. The options that appear depend on the Timing Mode setting.
  - If the Timing Mode is set to External, your options are BITS-1, BITS-2, and Internal Clock.

- If the Timing Mode is set to Line, your options are the node's working OSCM cards, OSC-CSM cards, transponder (TXP) cards, muxponder (MXP) cards, and Internal Clock. Choose the cards or ports that are directly or indirectly connected to the node wired to the BITS source. Set Reference 1 to the card that is closest to the BITS source. For example, if Slot 5 is connected to the node wired to the BITS source, choose Slot 5 as Reference 1.
- If the Timing Mode is set to Mixed, both BITS references and the OSCM, OSC-CSM, TXP, or MXP cards are available, allowing you to set a mixture of external BITS clocks and OSCM, OSC-CSM, TXP, or MXP cards as timing references.

- BITS-1 Out/BITS-2 Out—Sets the timing references for equipment wired to the BITS Out backplane (ANSI) or MIC-C/T/P FMEC (ETSI) pins. BITS-1 Out and BITS-2 Out are enabled when BITS-1 Out and BITS-2 Out facilities are put in service. If Timing Mode is set to external, choose the OSCM, OSC-CSM, TXP, or MXP card used to set the timing. If Timing Mode is set to Line, you can choose an OSCM, OSC-CSM, TXP, or MXP card or choose NE Reference to have the BITS-1 Out, BITS-2 Out, or both, follow the same timing references as the network element (NE).

Note All TXP or MXP card client ports are available for timing regardless of the card's termination mode. TXP or MXP trunk ports can be a timing reference when ITU-T G.709 is set to OFF and the Termination Mode is set to LINE. You cannot choose TXP_MR_2.5G and OTU2_XP card client ports as a timing reference.

Note The system prevents BITS In and BITS Out timing to be set on the same node.

Step 4 Click **Apply**.

Step 5 Click the **BITS Facilities** tab.

Note The BITS Facilities section sets the parameters for your BITS-1 and BITS-2 timing references. Many of these settings are determined by the timing source manufacturer. If equipment is timed through BITS Out, you can set timing parameters to meet the requirements of the equipment.

Step 6 In the BITS In area, complete the following information:

- Facility Type—(TCC2P/TNC/TNCE/TSC/TSCE only) Choose the BITS signal type supported by your BITS clock, either DS1 or 64KHz+8KHz.
- BITS In State—If Timing Mode is set to External or Mixed, set the BITS In state for BITS-1, BITS-2, or both, to **IS** (in service) depending on whether one or both BITS input pin pairs are connected to the external timing source. If Timing Mode is set to Line, set the BITS In state to **OOS** (out of service).

Step 7 If the BITS In state is set to OOS, continue with Step 8. If the BITS In state is set to IS, complete the following information:

- Coding—Choose the coding used by your BITS reference, either B8ZS (binary 8-zero substitution) or AMI (alternate mark inversion).
- Framing—Choose the framing used by your BITS reference, either ESF (Extended Super Frame) or SF (D4) (Super Frame).
- Sync Messaging—Check this check box to enable SSM. SSM is not available if Framing is set to Super Frame.

- Admin SSM—If the Sync Messaging check box is not checked, you can choose the SSM Generation 2 type from the drop-down list. Choices are PRS (Primary reference source; Stratum 1), ST2 (Stratum 2), TNC (Transit Node Clock), ST3E (Stratum 3E), ST3 (Stratum 3), SMC (SONET minimum clock), and ST4 (Stratum 4).

Step 8 In the BITS Out area, complete the following information, as needed:

- Facility Type—(TCC2P/TNC/TNCE/TSC/TSCE only) Choose the BITS Out signal type, either DS1 or 64KHz+8KHz for ANSI and E1, 2Mhz, or 64Khz for ETSI.
- BITS Out state—If equipment is connected to the node's BITS output pins on the backplane (ANSI) or MIC-C/T/P FMEC (ETSI) and you want to time the equipment from a node reference, set the BITS Out state for BITS-1, BITS-2, or both, to **IS**, depending on which BITS Out pins are used for the external equipment. If equipment is not attached to the BITS output pins, set the BITS Out state to **OOS**.

Step 9 If the BITS Out state is set to OOS, continue with Step 10. If the BITS Out state is set to IS, complete the following information:

- Coding—Choose the coding used by your BITS reference, either B8ZS, AMI, or HDB3.
- Framing—Choose the framing used by your BITS reference, either ESF, SF (D4), or FAS+CAS+CRC.
- AIS Threshold—If SSM is disabled or Super Frame is used, choose the quality level where a node sends an alarm indication signal (AIS) from the BITS 1 Out and BITS 2 Out backplane pins (ANSI) or MIC-C/T/P FMEC (ETSI). An AIS alarm is raised when the optical source for the BITS reference falls to or below the SSM quality level defined in this field.
- LBO—If an external device is connected to the BITS Out pins, set the line build-out (LBO) distance between the ONS 15454 and an external device. If an external device is connected to BITS Out, choose the distance between the device and the ONS 15454. Options are: 0-133 ft (default), 134-266 ft, 267-399 ft, 400-533 ft, and 534-655 ft. Line build out (LBO) relates to the BITS cable length. If an external device is not connected to BITS Out, leave this field set to the default.

Step 10 Click **Apply**.

Note Refer to *Cisco ONS 15454 DWDM Troubleshooting Guide* for timing-related alarms.

Step 11 Return to your originating procedure (NTP).

DLP-G96 Set Up Internal Timing

Purpose	This task sets up internal timing (Stratum 3) for an ONS 15454.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed (use only if a BITS source is not available)
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

> **Caution** Internal timing is Stratum 3 and is not intended for permanent use. All ONS 15454 SONET (ANSI) or SDH (ETSI) nodes should be timed to a Stratum 2 (or better) primary reference source. Internal timing is appropriate for DWDM nodes.

Step 1 In node view (single-node mode) or shelf view (multishelf mode), click the **Provisioning > Timing > General** tabs.

Step 2 In the General Timing area, enter the following:

- Timing Mode—Set to **External**.
- SSM Message Set—Set to **Generation 1**.
- Quality of RES—Does not apply to internal timing.
- Revertive—Does not apply to internal timing.
- Reversion Time—Does not apply to internal timing.

Step 3 In the Reference Lists area, enter the following information:

- NE Reference
  - Ref 1—Set to **Internal Clock**.
  - Ref 2—Set to **Internal Clock**.
  - Ref 3—Set to **Internal Clock**.
- BITS-1 Out/BITS-2 Out—Set to **None**.

Step 4 Click **Apply**.

Step 5 Click the **BITS Facilities** tab.

Step 6 In the BITS Facilities area, change the BITS In state and BITS Out state to **OOS** for BITS 1 and BITS 2. Disregard the other BITS Facilities settings; they are not relevant to internal timing.

Step 7 Click **Apply**.

Step 8 Return to your originating procedure (NTP).

DLP-G350 Use the Cisco Transport Planner Traffic Matrix Report

Purpose	This task describes how to use the Cisco Transport Planner traffic matrix report to provision and verify a DWDM network.
Tools/Equipment	None
Prerequisite Procedures	NTP-G139 Verify Cisco Transport Planner Reports and Files, page 14-3
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 Display a printed copy of the Cisco Transport Planner Traffic Matrix report for your network. The report can be exported in Microsoft Excel (.xls) or HTML format.

Step 2 View the following information:

- Service Demand—Lists the general service demand from site to site.
- Service Circuit—Lists the service circuit.
- OCH-CC Src—Lists the optical channel client connection (OCHCC) source site and the shelf direction, either Side B or Side A.
- OCH-CC Src Position—Lists the OCHCC source rack, shelf, and slot.
- OCH-CC Src Unit—Lists the OCHCC source TXP, MXP, or ITU-T line card.
- OCH-CC Src Port—Lists the OCHCC source port.
- A/D Src Position—Lists the optical channel add/drop card source rack, shelf, and slot.
- A/D Src Unit—Lists the optical channel add/drop card source TXP, MXP, or ITU-T line card.
- A/D Src Port—Lists the optical channel add/drop card source port.
- OCH-CC Dst—Lists the OCHCC destination site and shelf direction, either Side B or Side A.
- OCH-CC Dst Position—Lists the OCHCC destination rack, shelf, and slot.
- OCH-CC Dst Unit—Lists the OCHCC destination TXP, MXP, or ITU-T line card.
- OCH-CC Dst Port—Lists the OCHCC destination port.
- A/D Dst Position—Lists the optical channel add/drop card destination rack, shelf, and slot
- A/D Dst Unit—Lists the optical channel add/drop card destination TXP, MXP, or ITU-T line card.
- A/D Dst Port—Lists the optical channel add/drop card destination port.
  - Dest Unit is the product ID of the optical path source card.
  - Dest Port is the port label reported on the front panel of the optical path destination card.
- Cl Service Type—Identifies the service type of the optical channel.
- Protection—Identifies the type of protection used for the optical channel:
  - Optical paths for unprotected-Side B and unprotected-Side A optical channels are routed along one direction only in the network.
  - Optical paths for Y-cable, fiber-switched, and client 1+1 optical channels are routed along two independent directions in the network.
- Op Bypass Site Name—Identifies where the optical channel is dropped and reinserted when it is not terminated on a TXP or MXP card (optical bypass).

  Note If the word *None* appears in the Op Bypass Site Name column, no optical bypass is defined for the optical channel.

- Wavelength—Identifies the wavelength used for the optical channel. Table 16-6 on page 16-20 lists the thirty-two available wavelengths.
- DWDM Interface Type—Identifies the DWDM interface type that is used for the optical channel:
  - *Transponder* indicates that a transponder (TXP), muxponder (MXP), or DWDM pluggable port module is used for the optical channel.
  - *Line Card* indicates that an ITU line card is used for the optical channel.
- DWDM Card Type—Identifies the type of TXP or line card that is used for the optical channel. For information about card types supported by Cisco Transport Planner, see *Cisco Transport Planner DWDM Operations Guide*.

Step 3 Return to your originating procedure (NTP).

NTP-G54 Provision and Verify a DWDM Network

Purpose	This procedure describes how to turn-up an optical service in MSTP networks. It also provides a guidance to perform an entry-level optical performances verification of an optical circuit (OCH-NC/OCH-CC/OCHTrail) created on the MSTP networks.
Tools/Equipment	Test set or protocol analyzer Cisco Transport Planner Traffic Matrix
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards. Provisioning procedures of these cards are provided in Chapter 11, "Provision Transponder and Muxponder Cards"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note In this procedure, Side A refers to Slots 1 through 6, and Side B refers to Slots 12 through 17.

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 node on the network.

Step 2 Click the **Alarms** tab:

a. Verify that the alarm filter is not turned on. See the DLP-G128 Disable Alarm Filtering task, as necessary.

b. Verify that no equipment (EQPT) alarms appear. If equipment failure alarms appear, investigate and resolve them before continuing. Refer to *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 3 Using the Cisco Transport Planner Traffic Matrix (see Table 14-1 on page 14-4) for your site, identify the first channel (ITU wavelength) to be provisioned. Use the TXP, MXP, or line card that corresponds to the selected wavelength.

Step 4 For the ITU wavelength identified in Step 3, create an optical channel client connection (OCHCC) circuit or optical channel network connection (OCHNC) circuit, or optical channel trail circuit using one of the following tasks:

- DLP-G346 Provision Optical Channel Client Connections, page 16-17.
- DLP-G105 Provision Optical Channel Network Connections, page 16-41.
- DLP-G395 Create an Optical Channel Trail, page 16-34.

.After creating the OCHCC or OCHNC circuit, return to this procedure and continue with Step 5.

Note Every time a channel is created in the DWDM network, the amplifiers automatically calculate the optical output power needed to maintain a constant power level on each channel when working in Gain Control. If the amplifier is working in power control, APC tool is used for amplifiers power level calculation and setting. Automatic power control (APC) runs when you create new circuits. APC also runs periodically (every 60 minutes) to check and monitor power levels in all the significant sections of the network. If the span length changes, APC modifies amplifier gains and modifies express variable optical attenuation (VOA). For more information about APC, see the Chapter 13, "Network Reference."

Step 5 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Circuits** tab. Verify that the OCHCC or OCHNC created in Step 4 has a DISCOVERED status and an IS state. If so, continue with Step 6. If not, complete "NTP-G183 Diagnose and Fix OCHNC and OCH Trail Circuits" task on page 16-63.

Step 6 Click the circuit and click **Edit**.

Step 7 In the Edit Circuit dialog box, click the **State** tab.

Step 8 In the Cross-Connections table, verify that the circuit path is correct and record all the nodes that appear in the Node column. The first node is the circuit source, and the last node is the circuit destination. If the circuit path is incorrect, delete the circuit and go back to Step 4 to create a new circuit.

Step 9 Perform the entry-level performance verification of the optical power levels matching with expected setpoints for the OCH-circuit identified in Step 8.

Optical verification is done for cards in the OCH-circuit. The verification must be done node by node, following the logical signal flow from source to destination node.

Verify the power levels on the following:

a. Fixed or reconfigurable add/drop cards.

b. Amplifiers, including the raman cards.

Note You need to verify the power setpoint for OPT-PSM cards in the path protection configuration.

Step 10 Display the circuit source node in node view (single-shelf mode), or shelf view (multishelf mode). Following the signal flow from the TXP, MXP, or line card Trunk ports, if an fixed or reconfigurable add/drop card is installed, complete the following steps. If not, continue with Step 11.

Note Use of Node Functional View to identify at a glance, the logical signal flow in complex nodes.

a. In node view (single-node mode) or multishelf view (multishelf mode) click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector area, select the first fixed or reconfigurable add/drop card to be checked. Identify the power parameter and record the corresponding port and active value from the parameter list.

c. Check the power setpoint on the ports displayed in the Port field in CTC. The add/drop cards must meet this output power setpoint per channel.

d. Display the selected fixed or reconfigurable add/drop module in card view:

e. Click the **Provisioning** tabs.

f. Locate the port selected in step b in the CTC menu.

Note The CTC displays the name according to the card installed.

g. Identify the row associated to the Port. Check the value reported in Power or Power To column in CTC.

   – If the card value matches the VOA Power Ref. cell or the recorded Power value, with +/- 1 dB of tolerance, continue with Step 11.

Note VOA Power Ref at card level must be equal to the Power Active Value recorded in step b. If not, go back to Node view and click the ANS button. Then repeat this procedure.

   – If the value is out of tolerance range from the VOA Power Ref, contact your next level of support.

Step 11 Display the circuit source node in node view (single-shelf mode), or shelf view (multishelf mode). Following the signal flow, if an amplifier card is installed, complete the following steps.

Note Use of Node Functional View to identify the logical signal flow in complex nodes at a glance.

If not, continue with Step 12.

a. In node view (single-node mode) or multishelf view (multishelf mode) click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector area, click the amplifier card to be checked. Identify the power parameter and record the corresponding port and active value from the parameter list.

c. Check the power setpoint on the ports displayed in the Port field in CTC. The add/drop cards must meet this output power setpoint per channel.

d. Display the selected amplifier in card view.

e. Click the **Provisioning > Opt.Ampli.Line > Parameters** tabs. Identify the row associated to the Port selected in step b. Check the signal output power value.

   – If the value is equal to or greater (due to ASE accumulation) than the value shown in the Channel Power Ref cell, continue with Step 12.

Note Channel Power Reference at card level must be equal to the Power Active Value noted in step b. If not, go back to Node view and click the ANS button. Then repeat this procedure.

   – If the value is lower than the value shown in the Channel Power Reference cell, contact your next level of support.

Step 12 Go to the Edit Circuit dialog box and move to the next intermediate node in node view (single-shelf mode), or shelf view (multishelf mode). Following the signal flow, repeat Step 10 and Step 11 in order to check fixed or reconfigurable add/drop cards and amplifiers cards.
When all the intermediate nodes have been checked, move to Step 13 to verify the destination node.

Step 13 Display the Destination node in node view (single-shelf mode), or shelf view (multishelf mode). Following the signal flow, if an amplifier card is installed, complete the power levels check according with Step 11.

Complete the power level verification on the fixed or reconfigurable add/drop card that is dropping the signal using the following steps:

a. In node view (single-node mode) or multishelf view (multishelf mode) click the **Provisioning > WDM-ANS > Provisioning** tabs.

b. In the Selector area, click the last fixed or reconfigurable drop card to be checked. Identify the drop power parameter among the optical parameters and record the correspondent Port and Active Value.

c. Check the power setpoint on the ports displayed in the Port field in CTC. The cards must meet this Drop Power setpoint per channel.

d. Display the selected fixed or reconfigurable add/drop module in card view.

e. Click the **Provisioning** tabs.

f. Locate the port selected in step b in the CTC menu.

Note The CTC displays the name according to the card installed.

g. Identify the row associated to the Port. Check the value reported in Power or Power To column in CTC.

 – If the card value matches the VOA Power Ref. cell (when present) or the recorded Power Drop value, with +/- 2 dB of tolerance, continue with Step 14.

Note VOA Power Ref at card level must be equal to the Power Drop Active Value recorded in step b. If not, go back to Node view and click the ANS button. Then repeat this procedure.

 – If the value is out of tolerance range from the VOA Power Ref, contact your next level of support.

Step 14 Check the received power range on TXP, MXP, or line cards:

a. Navigate to the node where the first TXP, MXP, or line card is installed.

b. Display the TXP, MXP, or line card in card view.

c. Complete the DLP-G136 Clear Selected PM Counts.

d. Click the **Performance > Optics PM** tabs.

e. Record the values shown in the RX Optical Pwr field.

f. Click the **Provisioning > Optics Thresholds** tabs.

g. Verify that the value in Step e falls between the values shown for the RX Power High and RX Power Low. If so, continue with Step 15. If not, complete one of the following.

 – Power lower than range—Clean the trunk fiber at the patch panel and on the TXP or MXP card. Repeat Steps e through g. If the power is still too low, contact your next level of support.

 – Power higher than range—Add attenuation to the fiber and repeat Steps e through g. If the power still does not fall within the range, contact your next level of support.

Step 15 Perform a short-term bit error rate (BER) test:

a. Complete the DLP-G136 Clear Selected PM Counts for the TXP, MXP, or line card.

b. Display the TXP, MXP, or line card in card view.

c. Click the **Performance > Payload PM** tabs, or, if OTN is provisioned, the **Performance > OTN PM** tabs.

d. Perform a short-term BER test using a test signal from a test set or protocol analyzer.

e. Monitor the payload performance monitoring (PM) for at least 10 minutes for errors.

Note To see an accurate PM count, the BER test results must be consistent with the transmitted bit rate for at least 10 minutes.

Note For information about using a test set or protocol analyzer, see the test set or protocol analyzer user guide.

Step 16 Create a new OCHNC or OCHCC circuit for the next ITU wavelength listed in the Cisco Transport Planner Traffic Matrix and perform one of the following tasks:

- If the new circuit optical path is not including nodes different from those the first circuits belongs to, perform only steps from Step 13 to Step 15.
- If the new circuit optical path includes new nodes, do the proper optical checks:
  - Step 10 and Step 11 if the new node is the Source node
  - Step 12 if the new nodes are intermediate nodes
  - Step 13 if the new node is the destination node

Stop. You have completed this procedure.

NTP-G56 Verify the OSNR

Purpose	This procedure verifies the optical signal-to-noise ratio (OSNR). The OSNR is the ratio between the signal power level and the noise power level.
Tools/Equipment	Optical spectrum analyzer
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at an ONS 15454 on the network.

Step 2 Using an optical spectrum analyzer, check the received OSNR for each transmitted channel on both ends of the span. Identify the last OSC-CSM, OPT-PRE, or OPT-BST MON port that the channel passes through before it is dropped.

Note The OPT-PRE reference also applies to the OPT-AMP-17-C card operating in OPT-PRE mode and the OPT-BST reference also applies to the OPT-AMP-17-C card operating in OPT-LINE mode.

Step 3 If OPT-PRE cards are installed with an OPT-BST, OPT-BST-E, or OSC-CSM card, use the OPT-PRE MON port.

Note For OSNR values for each card class, see Chapter 4, "Optical Amplifier Cards."

Step 4 If the OSNR is too low, check the following, depending on your node configuration:

Note The purpose of this step is not to improve the signal-to-noise ratio (SNR), but to match the per-channel power level within the RX port power range.

- Check the fiber connections between the OPT-BST, OPT-BST-E, or OSC-CSM card and the OPT-PRE amplifier. If needed, clean the connectors. See the NTP-G115 Clean Fiber Connectors procedure.
- On the near-end OPT-BST amplifier, check the equalization of the added channels at the monitor output.
- On the OPT-PRE amplifier, check the output power on both COM TX and DC TX ports.
- On the far-end OPT-PRE amplifier, check the amplifier gain tilt at the monitor output.

If the OSNR is still too low, contact your next level of support.

Step 5 Repeat Steps 2 and 4 for all traffic in the network.

Stop. You have completed this procedure.

NTP-G142 Perform a Protection Switch Test

Purpose	This procedure tests the optical path, client TXP, MXP, GE_XP and GE_XPE (when provisioned in 10GE or 20GE MXP mode), 10GE_XP and 10GE_XPE (when provisioned in 10GE TXP mode), and OTU2_XP (when provisioned in TXP mode) cards and the Y-cable protection groups in your network for proper operation. The test signals can be generated by either the actual client device or a test set (whichever is available). We recommend that you repeat this test at each node in the network where protection group traffic is dropped.
Tools/Equipment	A list of protection groups. This information is provided in the Cisco Transport Planner Traffic Matrix. A test set or actual client device that provides the required payload for the circuits that are provisioned.
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite; personnel are required to be on site at each end of the circuit under test.
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at an ONS 15454 on the network.

Step 2 Identify the Y-cable circuit to be tested by viewing the Traffic Matrix for your site. Locate the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards in the ONS 15454 node that will be used for the protection group.

Step 3 Verify that the Y-cable protection group is provisioned:

a. In node view (single-node mode) or multishelf view (multishelf mode), click the **Provisioning > Protection** tabs.

b. In the Protect and Working areas, confirm that the correct TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP cards are in the Y-cable protection group by viewing the slot number and card type.

c. If the required protection group is not provisioned, stop and perform the "NTP-G33 Create a Y-Cable Protection Group" procedure on page 11-162. Otherwise, continue with Step 4.

Step 4 Repeat Step 3 for each Y-cable protection group at the node. When all protection groups are verified, continue with the next step.

Step 5 Physically connect the transmitter of the client or test set to either Port 10 or Port 12 of the Y-cable module protecting the test circuit. (See Table 14-7 on page 14-109 and Table 14-8 on page 14-109.)

Step 6 If you connected the transmitter to Port 10, connect the client or test set receiver to Port 5 on the Y-cable module. If not, connect the client or test set receiver to Port 11 on the Y-cable module.

Step 7 At the far-end site for the test circuit, physically loop the Y-cable module as follows:

a. If this is the first client on the Y-cable module, loop Port 10 to Port 5 on the far-end Y-cable module.

b. If this is the second client on the Y-cable module, loop Ports 11 and 12 on the far-end Y-cable module.

Step 8 At the near-end site for the test circuit, place the client device or test set into service and begin transmitting the required payload.

Step 9 In CTC, display the near-end site in node view (single-node mode) or multishelf view (multishelf mode).

Step 10 Click the **Maintenance > Protection** tabs.

Step 11 In the Protection Groups area, highlight the protection group to be tested.

Step 12 In the Selected Group area, identify the active slot and the standby slot.

Step 13 Verify that the LED s on the physical cards in the shelf match the following:

a. For the active TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card, record the slot number: _____. Verify that the port LEDs appear as follows:

- DWDM port is green.
- Client port is green.

b. For the standby TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card, record the slot number: _____. Verify that the port LEDs appear as follows:

- DWDM port is green.
- Client port is not illuminated or amber, depending on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card.

Step 14 In the Selected Group area, highlight the active TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP slot.

Step 15 From the Switch Commands area below the Selected Group area, click **Manual**, then click **YES**.

Step 16 From the Selected Group area, record the following information and verify that the active and standby TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP slot numbers are the opposite of Step 13.

a. For the active TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card, record the slot number: _____. Verify that the port LEDs appear as follows:
   - DWDM port is green.
   - Client port is green.

b. For the standby TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card, record the slot number: _____. Verify that the port LEDs appear as follows:
   - DWDM port is green.
   - Client port is not illuminated or amber, depending on the TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP card.

Step 17 Verify that the LEDs on the physical cards in the shelf match the following:

a. For the active TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP slot LEDs:
   - DWDM port is green.
   - Client port is green.

b. For the standby TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or OTU2_XP slot LEDs:
   - DWDM port is green.
   - Client port is not illuminated.

Step 18 Confirm that the client or test set at the local site is operating normally without alarms. If the test set is reporting active alarms, contact your next level of support.

Note It is normal to see a traffic hit on the test set during a protection switch.

Step 19 From the Switch Commands area below the Selected Group area, click **Clear**, then click **YES** to return the protection group to the original state.

Step 20 Repeat Steps 5 through 19 for each protection group at your site.

Stop. **You have completed this procedure**.

NTP-G164 Configure Link Management Protocol

Purpose	This procedure configures Link Management Protocol (LMP). LMP manages the channels and links that are required between nodes for routing, signaling, and link management.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 15-2
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure is normally required only when the Cisco ONS 15454 must run traffic to and from a Calient PXC, a Cisco CRS-1 router, or a Cisco ASR 9000 router.

Note Cisco ONS Software Release 9.4 supports Cisco CRS-1 routers using Cisco IOS XR Software Release 3.9.0 and Cisco ASR 9000 routers using Cisco IOS XR Software Release 4.1.0. If you have an earlier version of the Cisco IOS XR software, you cannot configure LMP on the Cisco CRS-1 or Cisco ASR 9000 router, and the router will be visible as an unknown node in the CTC network view.

Step 1 Complete the DLP-G46 Log into CTC task to log in to the ONS 15454 on the network.

Step 2 To enable LMP, complete the "DLP-G372 Enable LMP" task on page 15-41.

Step 3 To set up one or more control channels, complete the "DLP-G373 Create, Edit, and Delete LMP Control Channels" task on page 15-42.

Step 4 To set up one or more traffic engineering (TE) links, complete the "DLP-G374 Create, Edit, and Delete LMP TE Links" task on page 15-45.

Step 5 To set up one or more data links, complete the "DLP-G378 Create, Edit, and Delete LMP Data Links" task on page 15-46.

Stop. You have completed this procedure.

DLP-G372 Enable LMP

Purpose	This task enables the LMP function on the ONS 15454 node.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning > Comm Channels > LMP > General** tabs.

Step 2 In the Configuration area, click the **Enable LMP** check box to enable the LMP function.

Step 3 In the Local Node Id text entry box, enter the local node ID in the form of an IP address.

Note Do not set the LMP Local Node ID to another IP address in use on the network. This introduces a duplicate IP address in the network for traffic going to the IP address that is used as the LMP Local Node ID. We recommended to you set the LMP Local Node ID to the node's IP address, because this does not introduce a duplicate IP address in the network.

Step 4 If you are going to use LMP to manage a control channel between a Calient PXC node and a Cisco ONS 15454 DWDM node or between a Cisco CRS-1 or Cisco ASR 9000 router and Cisco ONS 15454 DWDM node, ensure that the LMP-WDM check box is unchecked.

Step 5 If you are going to use LMP to manage a control channel between the ONS 15454 nodes, check the LMP-WDM check box and use the Role field to choose one of the following roles:

- PEER, to use LMP to manage links between two nodes where the other node is configured as OLS.
- OLS, to use LMP to manage links between two nodes where the other node is configured as PEER.

The role selection is available only when LMP-WDM is enabled on the local node. Both the local and remote nodes must be configured with LMP-WDM enabled.

Step 6 Click **Apply**.

Step 7 In the Status area, verify that the Operational State is Up. This indicates that LMP is enabled and the link is active.

Step 8 Return to your originating procedure (NTP).

DLP-G373 Create, Edit, and Delete LMP Control Channels

Purpose	This task creates, edits, or deletes one or more LMP control channels between pairs of Cisco ONS 15454 nodes, between a Calient PXC and a Cisco ONS 15454, or between a Cisco CRS-1 or Cisco ASR 9000 router and a Cisco ONS 15454 node.
Tools/Equipment	None
Prerequisite Procedures	DLP-G372 Enable LMP, page 15-41
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning > Comm Channels > LMP > Control Channels** tabs.

Step 2 To create a control channel, click **Create**. The Create LMP Control Channel dialog box appears.

Note The values of the Admin State, Requested Hello Interval, Min Hello Interval, Max Hello Interval, Requested Hello Dead Interval, Min Hello Dead Interval, and Max Hello Dead Interval fields correspond to the values specified for these fields in the NODE > lmp section of the node view Provisioning > Defaults tabs. If you change the NODE > lmp values, those values are reflected as defaults in the Create LMP Control Channel dialog box. You can change the default values using the dialog box. However, the NODE > lmp values are always used as the initial defaults.

Step 3 In the Create LMP Control Channel dialog box, complete the following:

- Admin State—Select **unlocked** (if you are using an ETSI shelf) or **IS** (if you are using an ANSI shelf) to establish the control channel; otherwise, select **locked, disabled** (ETSI) or **OOS-DSBLD** (ANSI) to set the control channel to out of service.
- Local Port—Select **Routed** if the control channel is to be sent over the control plane or management network; otherwise, if the control channel is to be sent over the same fiber as the traffic (either in the payload or in the overhead), select one of the available traffic ports.
- Local Port Id—(Display only) Displays the local port identifier assigned by the node.

- Remote Node Type—Select **15454 or non-CRS1** if you are creating a control channel between two Cisco ONS 15454 nodes or between a Calient PXC and a Cisco ONS 15454 node; select **CRS-1** if you are creating a control channel between a Cisco CRS-1 router and a Cisco ONS 15454 node; otherwise, select **ASR9K** if you are creating a control channel between a Cisco ASR 9000 router and a Cisco ONS 15454 node.
- Remote Node Address—In dotted-decimal format, enter the number that identifies the IP address of the remote node (either a Calient PXC peer node, a Cisco CRS-1 router, Cisco ASR 9000 router, or a Cisco ONS 15454 node) where the control channel will be established.
- Remote Node ID—Initially, CTC autopopulates this value to the remote node IP address that you just assigned. However, you can change the identifier to any nonzero 32-bit integer in dotted decimal format (for example, 10.92.29.10).
- Requested Hello Interval—Enter the Requested Hello Interval in milliseconds (ms). Before sending Hello messages, the Hello Interval and Hello Dead Interval parameters must be established by the local and remote nodes. These parameters are exchanged in the Config message. The Hello Interval indicates how frequently LMP Hello messages will be sent; the interval must be in the 300 ms to 5000 ms range. The Min Hello Interval must be less than or equal to the Requested Hello Interval, and the Requested Hello Interval must be less than or equal to the Max Hello Interval.
- Min Hello Interval—Enter the minimum Hello Interval in milliseconds. When the two nodes negotiate for the Hello Interval, the value that you enter here will be the minimum Hello Interval acceptable for the local node. The Min Hello Interval must be in the 300 ms to 5000 ms range. The Min Hello Interval must be less than or equal to the Requested Hello Interval and the Requested Hello Interval must be less than or equal to the Max Hello Interval.
- Max Hello Interval—Enter the maximum Hello Interval in milliseconds. When the two nodes negotiate for the Hello Interval, the value that you enter here will be the maximum Hello Interval acceptable for the local node. The Max Hello Interval must be in the 300 ms to 5000 ms range. The Min Hello Interval must be less than or equal to the Requested Hello Interval and the Requested Hello Interval must be less than or equal to the Max Hello Interval.
- Requested Hello Dead Interval—Enter the Requested Hello Dead Interval in milliseconds. The Requested Hello Dead Interval indicates how long a device should wait to receive a Hello message before declaring a control channel dead. The Requested Hello Dead interval must be in the 2000 ms to 20000 ms range. The Min Hello Dead Interval must be less than or equal to the Requested Hello Dead Interval and the Requested Hello Dead Interval must be less than or equal to the Max Hello Dead Interval.

  Note The Requested Hello Dead Interval must be at least three times greater than the Requested Hello Interval.

- Min Hello Dead Interval—Enter the minimum Hello Dead Interval in milliseconds. The minimum Hello Dead Interval must be in the 2000 ms to 20000 ms range. The minimum Hello Dead Interval must be less than or equal to the Requested Hello Dead Interval and the Requested Hello Dead Interval must be less than or equal to the Max Hello Dead Interval. When the two nodes negotiate for the Hello Dead Interval, the value that you enter here will be the minimum Hello Dead Interval acceptable for the local node.

  Note The value of the Min Hello Dead Interval must be greater than the Min Hello Interval.

- Max Hello Dead Interval—Enter the maximum Hello Dead Interval in milliseconds. This interval must be in the 2000 ms to 20000 ms range. The Min Hello Dead Interval must be less than or equal to the Requested Hello Dead Interval and the Requested Hello Dead Interval must be less than or equal to the Max Hello Dead Interval. When the two nodes negotiate for the Hello Dead Interval, the value that you enter here will be the maximum Hello Dead Interval acceptable for the local node.

Note The Max Hello Dead Interval must be greater than the Max Hello Interval.

Step 4 Click **OK** to accept the parameters that you have entered, or click **Cancel** to return to the Control Channels tab without creating a control channel.

Step 5 If you have chosen the Remote Node Type as CRS-1 or ASR9K in Step 3 and if you have chosen that automatic LMP configuration in the "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 15-50, a confirmation dialog box is displayed to indicate that this operation will also change the configuration of the Cisco CRS-1 or Cisco ASR 9000 router. Click **Yes**.

Step 6 If you created a control channel, verify that the parameters for the new Control Channel appear properly in the Control Channels tab.

Note The Actual Hello Interval and Actual Hello Dead Interval parameters reflect the values of these parameters as a result of the negotiated agreement of the local and remote nodes. They may be different than the requested values.

Step 7 After the LMP control channel has been created, observe the status of the channel in the Operational State column of the Control Channels tab, and take the appropriate action as shown in the following list:

- Up—The control channel contacted the far-end node and successfully negotiated a control channel.
- Down—LMP is enabled and the link is inactive. Ensure that the Admin State of the control channel is unlocked (ETSI) or IS (ANSI) and not disabled (ETSI) or OOS-DSBLD (ANSI). If the state still does not transition to Up, the far-end control channel might have disjointed Hello negotiation times that prevent a control channel from transitioning to the Up state. For example, the local ONS 15454 Min Hello Interval and Max Hello Interval might be 900 to 1000, while the remote Min Hello Interval and Max Hello Interval is 1100 to 1200.
- Config Send—The connection could not be made to the remote node. Check to make sure that the remote node address and remote node ID addresses are correct.
- Config Received—The local node sent a configuration request to the remote node and received a response of either ConfigNack or ConfigAck.
- Unknown

Step 8 To delete a control channel, click the channel row to highlight it and click **Delete**. A confirmation dialog box appears that allows you to click **OK** or **Cancel**.

Step 9 To edit a control channel, click the channel row to highlight it and click **Edit**. A dialog box appears that allows you to change the control channel parameters. You can then click **OK** or **Cancel**. If you are editing a control channel that involves a Cisco CRS-1 or Cisco ASR 9000 router, a confirmation dialog box is displayed. Click **Yes**.

Step 10 Return to your originating procedure (NTP).

DLP-G374 Create, Edit, and Delete LMP TE Links

Purpose	This task creates, edits, or deletes TE links and their association to neighboring LMP nodes.
Tools/Equipment	None
Prerequisite Procedures	DLP-G372 Enable LMP, page 15-41
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view, click the **Provisioning > Comm Channels > LMP > TE Links** tabs.

Step 2 To create a TE link, click **Create**. The Create LMP TE Link dialog box appears.

Step 3 In the Create LMP TE Link dialog box, complete the following:

- Admin State—Select **unlocked** (for ETSI shelves) or **IS** (for ANSI shelves) to put the TE link in service; otherwise, select **locked, disabled** (ETSI) or **OOS-DSBLD** (ANSI) to set the TE link to out of service.
- Remote Node Id—Select a remote node (either a Calient PXC peer node, a Cisco CRS-1 router, a Cisco ASR 9000 router, or a Cisco ONS 15454 node) for the other end of the TE link.
- Remote TE Link Id—Enter an unsigned 32-bit value (such as 0x00000001) to identify the remote node identifier for the other end of the TE link. This option is not available if you have chosen the automatic LMP configuration in "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 15-50.
- MUX Capability—Select the MUX capability. This option is not available if you are creating a TE link that involves a Cisco CRS-1 or Cisco ASR 9000 router.

Step 4 Click **OK** to accept the parameters that you have entered and create the TE link, or click **Cancel** to return to the Control Channels tab without creating a TE link.

Step 5 If you created a TE link, verify that the parameters for the new TE link now appear properly in the TE Links tab.

Step 6 After the TE link has been created, observe the status of the TE link in the Operational State column of the TE Links pane, and take the appropriate action as shown in the following list:

- Up—The TE link is active.
- Down—Ensure that the Admin State of the TE link is unlocked (ETSI) or IS (ANSI) and not disabled (ETSI) or OOS-DSBLD (ANSI). The TE link does not transition to the Up state until a data link has been provisioned.
- Init—Verify that the Remote Node ID and Remote TE Link ID values are correct for the remote node. Verify that the remote node is using the Cisco ONS 15454 or the Cisco CRS-1 or Cisco ASR 9000 router IP address for its remote node IP and that the remote node is using the local TE link index for its remote TE link index.

Step 7 To delete a TE link, click the link row to highlight it and click **Delete**. A confirmation dialog box appears that allows you to click **OK** or **Cancel**.

Step 8 To edit a TE link, click the link row to highlight it and click **Edit**. A dialog box appears that allows you to change the TE link parameters. You can then click **OK** or **Cancel**.

Step 9 Return to your originating procedure (NTP).

DLP-G378 Create, Edit, and Delete LMP Data Links

Purpose	This task creates, edits, or deletes one or more data links, which define the node's transport parameters. CTC supports up to 256 LMP data links.
Tools/Equipment	None
Prerequisite Procedures	NTP-G54 Provision and Verify a DWDM Network, page 15-33 DLP-G372 Enable LMP, page 15-41
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note A port cannot be deleted if it is being used by a data link. A card cannot be deleted if any of its ports are being used by data links. Changing the state of the port impacts the state of a data link using the port.

Step 1 In node view, click the **Provisioning > Comm Channels > LMP > Data Links** tabs.

Step 2 To create a data link, click **Create**. The Create LMP Data Link dialog box appears.

Step 3 In the Create LMP Data Link dialog box, complete the following:

- Local Port—Select one of the available local ports for the data link.
- Local Port Id—(Display only) Displays the local port identifier.
- Data Link Type—Select **Port** or **Component**. A data link is considered to be either a port or a component link on each node where it terminates, depending on the multiplexing capability of the endpoint on that link; component links are multiplex capable, whereas ports are not multiplex capable.
- Local TE Link Id—Select an identifier for one of the local TE links that has already been created.
- Remote CRS Port Id—Select one of the available remote Cisco CRS-1 or Cisco ASR 9000 ports for the data link. This option is not available if you are creating a data link between two Cisco ONS 15454 nodes.
- Remote Port Id—Enter an unsigned 32-bit value (such as 0x00000001) to identify the remote node identifier for the other end of the data link. This option is not available if you have chosen the automatic LMP configuration in the "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 15-50.

Step 4 Click **OK** to accept the parameters you have entered and create the data link, or click **Cancel** to return to the Data Links tab without creating a data link.

Step 5 If you are creating a data link that involves a Cisco CRS-1 or Cisco ASR 9000 router and if you have chosen the automatic LMP configuration in the "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 15-50, a confirmation dialog box is displayed to indicate that this operation will also change the configuration of the Cisco CRS-1 or Cisco ASR 9000 router. Click **Yes**.

Step 6 If you created a data link, verify that the parameters for the new data link now appear properly in the Data Links tab.

Step 7 After the data link has been created, observe its status in the Operational State column of the Data Links tab, and take the appropriate action as shown in the following list:

- Up–Alloc or Up–Free—If the data link state does not transition to Up–Alloc or Up–Free, verify that the port is in service. Verification must be done using the CTC card view > Provisioning tab for the cards. (The difference between Up–Alloc and Up–Free is that an Up–Alloc data link is allocated for data traffic. An Up–Free data link is not allocated for traffic. The far end is either not ready to receive traffic through this port, or the path is being used as a backup in case some other allocated data link goes down).
- Down—The data link will be in the Down state if the port is not unlocked or not in-service. Verify that the remote port ID for the far-end data link is correct. On the far end, verify that the data link is using the local port ID as its remote port ID.

Step 8 To delete a data link, click the data link row to highlight it and click **Delete**. A confirmation dialog box appears that allows you to click **OK** or **Cancel**.

Step 9 To edit a data link, click the data link row to highlight it and click **Edit**. A dialog box appears that allows you to change the data link parameters. You can then click **OK** or **Cancel**. If you are editing a data link that involves a Cisco CRS-1 or Cisco ASR 9000 router, a confirmation dialog box is displayed. Click **Yes**.

Step 10 Return to your originating procedure (NTP).

NTP-G233 Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node

Purpose	This procedure configures LMP on the Cisco ONS 15454 DWDM node and on the corresponding Cisco CRS-1 or Cisco ASR 9000 physical layer interface module (PLIM) port.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 15-2
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure is normally required only when the Cisco ONS 15454 DWDM node must run traffic to and from a Cisco CRS-1 or Cisco ASR 9000 router.

Step 1 Complete the DLP-G46 Log into CTC task to log in to a DWDM node on the network.

Step 2 Complete the "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 15-50 to configure the Cisco CRS-1 or Cisco ASR 9000 router parameters.

Step 3 Complete the "DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration" task on page 15-51 to establish a Telnet session with the Cisco CRS-1 or Cisco ASR 9000 router.

Step 4 Complete the "DLP-G510 Create a Task Group, User Group, and User Account on the Cisco CRS-1 or Cisco ASR 9000 Series Router" task on page 15-52 to create task groups, user groups, and user accounts on the Cisco CRS-1 or Cisco ASR 9000 router.

Step 5 If you have chosen the automatic LMP configuration in Step 2, complete the "NTP-G234 Automatically Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node" procedure on page 15-48.

If you have chosen the manual LMP configuration in Step 2, complete the "NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node" procedure on page 15-49.

Stop. You have completed this procedure.

NTP-G234 Automatically Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node

Purpose	This procedure automatically configures LMP on the Cisco ONS 15454 DWDM node and on the corresponding Cisco CRS-1 or Cisco ASR 9000 PLIM port.
Tools/Equipment	None
Prerequisite Procedures	NTP-G233 Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 15-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G372 Enable LMP, page 15-41 to enable the LMP function on the DWDM node.

Step 2 Complete the DLP-G373 Create, Edit, and Delete LMP Control Channels, page 15-42 to create the LMP control channel between the Cisco CRS-1 or Cisco ASR 9000 router and the DWDM node.

Step 3 Complete the DLP-G374 Create, Edit, and Delete LMP TE Links, page 15-45 to create TE links between the Cisco CRS-1 or Cisco ASR 9000 router and the DWDM node.

Step 4 Complete the DLP-G378 Create, Edit, and Delete LMP Data Links, page 15-46 to create a data link, which define the node's transport parameters.

Stop. You have completed this procedure.

NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node

Purpose	This procedure manually configures LMP on the Cisco ONS 15454 DWDM node and on the corresponding Cisco CRS-1 or Cisco ASR 9000 PLIM port.
Tools/Equipment	None
Prerequisite Procedures	NTP-G233 Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 15-47
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note For more information about the Cisco IOS XR commands used in the DLPs, see the *Cisco IOS XR Command Reference* publication at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

Step 1 Complete the DLP-G372 Enable LMP, page 15-41 to enable the LMP function on the DWDM node.

Step 2 Complete the DLP-G373 Create, Edit, and Delete LMP Control Channels, page 15-42 to create the LMP control channel between the Cisco CRS-1 or Cisco ASR 9000 router and the DWDM node.

Step 3 Complete the DLP-G374 Create, Edit, and Delete LMP TE Links, page 15-45 to create TE links between the Cisco CRS-1 or Cisco ASR 9000 router and the DWDM node.

Step 4 In node view, click the **Provisioning > Comm Channels > LMP > TE Links** tab and write down the value of the **Local TE Link** field so that it can be used later.

Step 5 Complete the DLP-G378 Create, Edit, and Delete LMP Data Links, page 15-46 to create a data link, which define the node's transport parameters.

Step 6 In node view, click the **Provisioning > Comm Channels > LMP > Data Links** tab and write down the value of the **Local Port Id** field so that it can be used later.

Step 7 Complete the DLP-G482 Configure a Static Route, page 15-55 to configure a static route.

Step 8 Complete the DLP-G483 Configure Local and Remote TE Links, page 15-56 to configure the local and remote TE links.

Step 9 Complete the DLP-G484 Enable the LMP Message Exchange, page 15-58 to enable LMP message exchange with the LMP neighbor.

Step 10 In node view, click the **Provisioning > Comm Channels > LMP > Data Links** tab and from the **Local Port** field**,** write down the card and the port involved in the LMP link. Double-click the card involved in the LMP link. In card view, click the **Provisioning > Optical Chn > Parameters** tabs and write down the value of the **Actual Wavelength** field for the port involved in the LMP link.

Step 11 Complete the DLP-G511 Configure the Wavelength on the Cisco CRS-1 or Cisco ASR 9000 Router, page 15-59 to configure the wavelength on the PLIM port of the Cisco CRS-1 or Cisco ASR 9000 router.

Step 12 If you need RADIUS AAA services, complete the DLP-G494 Configure the RADIUS Server, page 15-61 to configure a RADIUS server.

Step 13 Complete the DLP-G485 Enable Index Persistency on an SNMP Interface, page 15-62 to enable index persistency on an SNMP interface.

Step 14 Complete the DLP-G486 Configure the LMP Router ID, page 15-63 to configure LMP router ID.

Step 15 Complete the DLP-G487 Configure the 10 Gigabit Ethernet (GE) or POS Interface, page 15-64 to configure an interface and specify the IPv4 address for the interface.

Note Only users with proper task privileges, or a system administrator, can perform DLP-G482, DLP-G483, DLP-G484, DLP-G494, DLP-G485, and DLP-G486. The task privileges required to perform these DLPs are similar to the privileges required for automatic LMP configuration.

Step 16 Complete the DLP-G488 Display Summary of Link Management Information, page 15-65 to display the interface resource or a summary of link management information.

Step 17 Complete the DLP-G374 Create, Edit, and Delete LMP TE Links, page 15-45 to edit the TE link created in Step 3. Change the Remote TE Link ID value to the value (Local TE Link ID) noted in Step 1 of the DLP-G488 Display Summary of Link Management Information, page 15-65.

Step 18 Complete the DLP-G378 Create, Edit, and Delete LMP Data Links, page 15-46 to edit the data link created in Step 5. Change the Remote Port Id value to the value (Local Data Link ID) noted in Step 1 of the DLP-G488 Display Summary of Link Management Information, page 15-65.

Stop. You have completed this procedure.

DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters

Purpose	This task configures the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router.
Tools/Equipment	None
Prerequisite Procedures	• NTP-G54 Provision and Verify a DWDM Network, page 15-33. • (Cisco CRS-1 and Cisco ASR 9000 series routers only) DLP-G372 Enable LMP, page 15-41. • DLP-G46 Log into CTC.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the Edit menu, choose **Preferences**. The Preferences dialog box is displayed.

Step 2 In the Preferences dialog box, click the **Router** tab.

Step 3 (Cisco CRS-1 and Cisco ASR 9000 series routers only) Leave the Skip automatic LMP configuration on routers check box unchecked if you want CTC to automatically configure an interface on the Cisco CRS-1 or Cisco ASR 9000 series router for the data link. Check this check box if you want to manually configure an interface on the Cisco CRS-1 or Cisco ASR 9000 series router.

Step 4 In the Router login area, enter the following:

- Username—Specify the name of the user on the Cisco CRS-1, Cisco ASR 9000, or Cisco 7600 router.
- Password—Specify the user password.
- Confirm Password—Specify the password again to confirm it.

Note If you leave the Username and Password fields blank, the CTC login information (username and password) will be used for the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router.

Step 5 Click **OK**.

Step 6 Return to your originating procedure (NTP).

DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration

Purpose	This task establishes a Telnet session with the Cisco CRS-1 or Cisco ASR 9000 router and verifies the node configuration, SSH, and/or XML module configuration.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

	Command or Action	Purpose

Step 1	`telnet {ip-address | host-name}`
	
	Example:
	`router# telnet 10.58.41.169`
		Establishes a Telnet session with the Cisco CRS-1 or Cisco ASR 9000 router. When the session is established, you can log in with the root-system username and password. After you log in, the router displays the CLI prompt for the Cisco IOS XR software.

Step 2	`show install active summary`
	
	Example:
	`router# show install active summary`
		Displays a summary of the active packages in a system or secure domain router. Ensure that the output of the **show install active summary** command includes the following lines:
		`hfr-mpls-3.9.x`
		`hfr-k9sec-3.9.x`
		`hfr-mgbl-3.9.x`

	Command or Action	Purpose

Step 3	**show running-config**
	
	Example:
	`router# show running-config`
		Displays the contents of the currently running configuration and verifies that Extensible Markup Language (XML) agent service and Secure Shell (SSH) client are installed on the Cisco CRS-1 or Cisco ASR 9000 router. Ensure that the output of the **show running-config** command includes the following lines:
		`ssh server v2`
		`ssh server session-limit` *`sessions`*
		`ssh server rate-limit` *`maxsessions_per_minute`*
		`vty-pool default` *`first-vty last-vty`* `line-template default`
		`xml agent tty`
		
		If the output does not contain the above lines, check the SSH and/or XML module configuration. Refer to *Cisco IOS XR System Security Command Reference* and *Cisco IOS XR System Management Command Reference* for details about SSH and XML configuration.

Step 4	Return to your originating procedure (NTP).	—

DLP-G510 Create a Task Group, User Group, and User Account on the Cisco CRS-1 or Cisco ASR 9000 Series Router

Purpose	This task creates task groups, user groups, and user accounts on the Cisco CRS-1 or Cisco ASR 9000 series router.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users who have permission to create new task groups and configure required task privileges, or a system administrator, can perform this task.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**taskgroup** *taskgroup-name* **Example:** `router# taskgroup ipodwdmop`	Creates a new task group and enters task group configuration submode. If you have chosen the automatic LMP configuration in the DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters, page 15-50, perform Step 3. If you have chosen the manual LMP configuration in the DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters, page 15-50, perform Step 4.

Step 3	**task {read | write | execute | debug}** *taskid-name*
	
	Example:
	`router(config-tg)# task read cef`
		Specifies a task ID to be associated with the task group named in Step 2. Task IDs grant permission to perform certain tasks.
		
		Ensure that you specify the following task IDs to set up required privileges for the automatic LMP configuration:
		
		`task read cef`
		`task read dwdm`
		`task read ouni`
		`task read snmp`
		`task read static`
		`task read sysmgr`
		`task read logging`
		`task read mpls-te`
		`task read network`
		`task read interface`
		`task read basic-services`
		`task write dwdm`
		`task write ipv4`
		`task write ouni`
		`task write snmp`
		`task write static`
		`task write mpls-te`
		`task write network`
		`task write interface`

Step 4	**task {read | write | execute | debug}** *taskid-name*
	
	Example:
	`router(config-tg)# task read cef`
		Specifies a task ID to be associated with the task group named in Step 2. Task IDs grant permission to perform certain tasks.
		
		Ensure that you specify the following task IDs to set up required privileges for the manual LMP configuration:
		
		`task read cef`
		`task read dwdm`
		`task read ouni`
		`task read snmp`
		`task read static`
		`task read sysmgr`
		`task read logging`
		`task read mpls-te`
		`task read network`
		`task read interface`
		`task read basic-services`
		`task write interface`

	Command or Action	Purpose
Step 5	**end** **Example:** `router(config-tg)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 7	**usergroup** *usergroup-name* **Example:** `router# usergroup ipodwdmop`	Creates a new user group and enters user group configuration submode.
Step 8	**taskgroup** *taskgroup-name* **Example:** `router(config-ug)# taskgroup ipodwdmop`	Associates the user group named in Step 7 with the task group named in this step. The user group takes on the configuration attributes (task ID list and permissions) already defined for the entered task group.
Step 9	**end** **Example:** `router(config-ug)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 10	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 11	**username** *user-name* **Example:** `router# username user123`	Creates a name for a new user (or identifies a current user) and enters username configuration submode. The *user-name* argument can be only one word. Spaces and quotation marks are not allowed. **Note** The user that you specify for this command must be the user you have specified in the DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters, page 15-50.
Step 12	**password {0 | 7}** *password* **Example:** `router(config-un)# password 0 passwd`	Specifies a password for the user named in Step 11. Entering 0 following the **password** command specifies that an unencrypted (clear-text) password follows. Entering 7 following the **password** command specifies that an encrypted password follows.
Step 13	**group** *group-name* **Example:** `router(config-un)# group ipodwdmop`	Assigns the user named in Step 11 to a user group that has already been defined through the **usergroup** command in Step 7. • The user takes on all attributes of the user group, as defined by that user group's association to various task groups. • Each user must be assigned to at least one user group. A user may belong to multiple user groups.

	Command or Action	Purpose
Step 14	**end** **Example:** `router(config-ug)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 15	Return to your originating procedure (NTP).	—

DLP-G482 Configure a Static Route

Purpose	This task explains how to configure a static route.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the DWDM node is 10.58.41.22 and the IP address of the Cisco CRS-1 or Cisco ASR 9000 router is 10.58.41.169. To remove the static route configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**router static** **Example:** `router(config)# router static`	Enters static router configuration mode.
Step 3	**address-family ipv4 unicast** **Example:** `router(config-static)# address-family ipv4 unicast`	Enters address family configuration mode while configuring static routes.

	Command or Action	Purpose
Step 4	*destination-prefix prefix-mask* {*ip-address* | *interface-type interface-instance*} **Example:** `router(config-static-afi)# 10.58.41.22/32 MgmtEth 0/RP0/CPU0/0`	Establishes static routes in address family configuration mode. Specify the following options for this command: • *destination-prefix*—IP route prefix for the destination (that is, DWDM node involved in the LMP link). • *prefix-mask*—Prefix mask for the destination. The network mask can be specified as either a four-part, dotted-decimal address or can be indicated as a slash (/) and number. • *ip-address*—(Optional) IP address of the next hop that can be used to reach that network. The IP address is required, not optional, if the interface type and number are not specified. You can specify an IP address and an interface type and interface number. • *interface-type*—(Optional) Interface type. • *interface-instance*—(Optional) Either a physical interface instance or a virtual interface instance. **Note** The interface that you specify for this command must be the management interface that connects the CRS-1 or ASR 9000 router to the DWDM node.
Step 5	**end** **Example:** `router(config-static-afi)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	Return to your originating procedure (NTP).	—

DLP-G483 Configure Local and Remote TE Links

Purpose	This task explains how to configure the local and remote TE links.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the DWDM node is 10.58.41.22 and the IP address of the Cisco CRS-1 or Cisco ASR 9000 router is 10.58.41.169. To remove the local and remote TE link configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**mpls traffic-eng interface** *interface-type interface-instance* **Example:** `router(config)# mpls traffic-eng interface TenGigE 0/1/0/1`	Enables Multiprotocol Label Switching-Traffic Engineering (MPLS-TE) on an interface and enters MPLS-TE interface submode. **Note** The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
Step 3	**lmp data-link adjacency** **Example:** `router(config-mpls-te-if)# lmp data-link adjacency`	Enters the LMP neighbor adjacency configuration mode.
Step 4	**neighbor** *neighbor-name* **Example:** `router(config-mpls-ouni-if-adj)# neighbor 10.58.41.22`	Associates an interface with a given LMP neighbor.
Step 5	**remote te-link-id unnum** *identifier* **Example:** `router(config-mpls-te-if-adj)# remote te-link-id unnum 1`	Configures the LMP neighbor remote TE link ID. **Note** Specify the value (converted to decimal format) noted in Step 4 of NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 15-49 for the **te-link-id unnum** *identifier* keywords and argument.
Step 6	**remote interface-id unnum** *identifier* **Example:** `router(config-mpls-te-if-adj)# remote interface-id unnum 57410`	Configures the LMP neighbor remote interface identifier. **Note** Specify the value (converted to decimal format) noted in Step 6 of NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 15-49 for the **interface-id unnum** *identifier* keywords and argument.
Step 7	**remote switching-capability fsc** **Example:** router(config-mpls-te-if-adj)# remote `switching-capability fsc`	Configures the LMP neighbor remote TE interface switching capability.
Step 8	**end** **Example:** `router(config-mpls-te-if-adj)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 9	Return to your originating procedure (NTP).	—

DLP-G484 Enable the LMP Message Exchange

Purpose	This task explains how to enable the LMP message exchange with the LMP neighbor.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the DWDM node is 10.58.41.22 and the IP address of the Cisco CRS-1 or Cisco ASR 9000 router is 10.58.41.169. To remove the LMP message exchange configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**mpls traffic-eng signalling advertise explicit-null** **Example:** `router(config)# mpls traffic-eng signalling advertise explicit-null`	Specifies that tunnels terminating on a router use explicit-null labels.
Step 3	**mpls traffic-eng lmp neighbor** *neighbor-name* **Example:** `router(config)# mpls traffic-eng lmp neighbor 10.58.41.22`	Configures or updates a new or existing LMP neighbor.
Step 4	**ipcc routed** **Example:** `router(config-mpls-te-nbr-10.58.41.22)# ipcc routed`	Configures a routed Internet Protocol Control Channel (IPCC) for the LMP neighbor.

	Command or Action	Purpose
Step 5	**remote node-id** *ip-address* **Example:** `router(config-mpls-te-nbr-10.58.41.22)# remote node-id 10.58.41.22`	Configures the remote node ID for the LMP neighbor (DWDM node).
Step 6	**end** **Example:** `router(config-mpls-te-nbr-10.58.41.22)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 7	Return to your originating procedure (NTP).	—

DLP-G511 Configure the Wavelength on the Cisco CRS-1 or Cisco ASR 9000 Router

Purpose	This task explains how to configure the wavelength on the PLIM port of the Cisco CRS-1 or Cisco ASR 9000 router.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note To remove the wavelength setting, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* at http://www.cisco.com/en/US/products/ps5845/products_product_indices_list.html.

	Command or Action	Purpose

Step 1	**show controllers dwdm** *interface-instance* **wavelength-map**
	
	Example:
	`router# show controllers dwdm 0/1/0/0 wavelength-map`
		Displays the wavelength information of an interface.
		
		Note The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
		
		The output of the **show** command will include the following lines:
		`Wavelength band: C-band`
		`MSA ITU channel range supported: 3~84`
		
		`03        196.00            1529.553`
		`----------------------------------------`
		`04        195.95            1529.944`
		`----------------------------------------`
		`05        195.90            1530.334`
		`----------------------------------------`
		`06        195.85            1530.725`
		`----------------------------------------`
		
		From the output of the **show** command, write down the channel number of the wavelength that matches that of the wavelength noted in Step 10 of NTP-G207 Manually Configure Link Management Protocol on the Cisco CRS-1 or Cisco ASR 9000 Router and the Cisco ONS 15454 DWDM Node, page 15-49.

Step 2	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 3	**controller dwdm** *interface-instance* **Example:** `router(config)# controller dwdm 0/1/0/0`	Configures the DWDM controller. **Note** The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
Step 4	**wavelength** *channel-number* **Example:** `router(config)# wavelength 04`	Configures a specific wavelength to the DWDM controller. **Note** The channel number that you specify for this command must be the value noted down in Step 1.
Step 5	**end** **Example:** `router(config-mpls-te-nbr-10.58.41.22)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	Return to your originating procedure (NTP).	—

DLP-G494 Configure the RADIUS Server

Purpose	This task explains how to configure the RADIUS server.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51 For details on configuring a node for RADIUS authentication, see the DLP-G281 Configure the Node for RADIUS Authentication task. See the *User Guide for Cisco Secure ACS for Windows Server* for more information about configuring the RADIUS server.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the RADIUS server is 10.58.39.57. To remove the RADIUS server configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* document.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**radius-server host** *ip-address* [**auth-port** *port-number*] [**acct-port** *port-number*] [**key** *string*] **Example:** `router(config)# radius-server host 10.58.39.57 auth-port 1812 acct-port 1813 key 7 12485043475F`	Specifies the RADIUS server host.
Step 3	**aaa group server radius** *group-name* **Example:** `router(config)# aaa group server radius radgroup1`	Groups different RADIUS server hosts into distinct lists and enters server group configuration mode.
Step 4	**server** *ip-address* [**auth-port** *port-number*] [**acct-port** *port-number*] **Example:** `router(config-sg-radius)# server 10.58.39.57 auth-port 1812 acct-port 1813`	Associates a particular RADIUS server with a defined server group.

	Command or Action	Purpose
Step 5	**end** **Example:** `router(config-sg-radius)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 7	**aaa authentication login** {{**console** | **default**} {**group** *group_name* | **local** | **none**}} **Example:** `router(config)# aaa authentication login default group radgroup1 local`	Configures the authentication method used for login to the Virtual Firewall (VFW) application CLI.
Step 8	**end** **Example:** `router(config-if)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 9	Return to your originating procedure (NTP).	—

DLP-G485 Enable Index Persistency on an SNMP Interface

Purpose	This task explains how to enable index persistency on a Simple Network Management Protocol (SNMP) interface.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note To remove the index persistency configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* document.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**snmp-server interface** *interface-type interface-instance* **Example:** `router(config)# snmp-server interface TenGigE 0/1/0/1`	Enables an interface to send SNMP trap notifications and enters SNMP interface configuration mode. **Note** The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
Step 3	**index persistence** **Example:** `router(config-snmp-if)# index persistence`	Enables index persistency on an SNMP interface. This command must be performed to ensure that the LMP IDs are persistent even after a system reload.
Step 4	**end** **Example:** `router(config-snmp-if)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 5	Return to your originating procedure (NTP).	—

DLP-G486 Configure the LMP Router ID

Purpose	This task explains how to configure the LMP router ID.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note In the examples shown in this task, the IP address of the DWDM node is 10.58.41.22 and the IP address of the Cisco CRS-1 or Cisco ASR 9000 router is 10.58.41.169. To remove the LMP router ID configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* document.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**mpls traffic-eng lmp router-id** *ip-address* **Example:** `router(config)# mpls traffic-eng lmp router-id 10.58.41.169`	Configures the LMP router ID.
Step 3	**end** **Example:** `router(config)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 4	Return to your originating procedure (NTP).	—

DLP-G487 Configure the 10 Gigabit Ethernet (GE) or POS Interface

Purpose	This task explains how to configure the 10 GE or POS interface.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Only users with proper task privileges, or a system administrator, can perform this task.

Note To remove the POS interface configuration, use the **no** form of the Cisco IOS XR command. For more information about the Cisco IOS XR commands, see the *Cisco IOS XR Command Reference* document.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode.
Step 2	**interface** *interface-type interface-instance* **Example:** `router(config)# interface TenGigE 0/1/0/1`	Enters interface configuration mode. **Note** The interface that you specify for this command must be the optical interface related to the PLIM port involved in the LMP link.
Step 3	**ipv4 point-to-point** **Example:** `router(config-if)# ipv4 point-to-point`	Configures a 10 GE interface to act as a point-to-point interface. **Note** For a POS interface, skip this step and continue with Step 4.
Step 4	**ipv4 unnumbered** *interface-type interface-instance* **Example:** `router(config-if)# ipv4 unnumbered MgmtEth 0/RP0/CPU0/0`	Specifies the MPLS-TE tunnel IPv4 address for the interface. **Note** The interface that you specify for this command must be the management interface that connects the CRS-1 or ASR 9000 router to the DWDM node.
Step 5	**end** **Example:** `router(config-if)# end`	Saves configuration changes. When you enter the **end** command, the system prompts you to commit the changes. Enter **yes** to save the configuration changes to the running configuration file and return to the EXEC mode.
Step 6	Return to your originating procedure (NTP).	—

DLP-G488 Display Summary of Link Management Information

Purpose	This task displays the interface resource or a summary of link management information.
Tools/Equipment	None
Prerequisite Procedures	DLP-G481 Establish Telnet Session with the Cisco CRS-1 or Cisco ASR 9000 Series Router and Verify Configuration, page 15-51
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

	Command or Action	Purpose
Step 1	**show mpls traffic-eng lmp interface** [*interface-type interface-instance*] **Example:** `router(config-if)# show mpls traffic-eng lmp interface TenGigE 0/1/0/1`	Displays the interface resource or a summary of link management information. From the output of the **show** command, write down the value of the Local TE Link ID and the Local Data Link ID parameters.
Step 2	Return to your originating procedure (NTP).	—

NTP-G303 Configure Virtual links on the Cisco 7600 and Cisco ONS 15454 DWDM Node

Purpose	This procedure configures virtual links on the Cisco 7600 and the Cisco ONS 15454 DWDM node.
Tools/Equipment	None
Prerequisite Procedures	NTP-G51 Verify DWDM Node Turn Up, page 15-2
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure is normally required only when the Cisco ONS 15454 DWDM node must run traffic to and from a Cisco 7600 router.

Step 1 Complete the "DLP-G711 Configure SSH Server on Cisco 7600 Series Nodes" task on page 15-67.

Step 2 To enable IPoDWDM using the Cisco 7600 series router, add the attribute "**ctc.isC7600Supported=1**" in the */users/<username>/***.ctcrc** file. This should be done prior to launching CTC. By default, IPoDWDM using the Cisco 7600 series router is disabled.

Step 3 If you need RADIUS AAA services, configure a RADIUS server. For more information, see "Configuring RADIUS".

Step 4 Complete the DLP-G46 Log into CTC task to log in to a DWDM node on the network.

Step 5 Configure the Cisco 7600 series router parameters in CTC. See "DLP-G508 Configure the Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Parameters" task on page 15-50".

Step 6 Add a Cisco 7600 series node to the DWDM network in CTC. See DLP-G49 Add a Node to the Current Session or Login Group.

Step 7 Repeat Step 1 through Step 5 to bring up the second Cisco 7600 series node in the network.

Step 8 Create Provisionable Patchcords between the Cisco 7600 series and DWDM nodes. See "NTP-G184 Create a Provisionable Patchcord" task on page 16-72."

Step 9 Create an Optical Channel (OCH) trail between the two Cisco 7600 series nodes. See "DLP-G395 Create an Optical Channel Trail" task on page 16-34". After creating the OCH trails, traffic can be transmitted between the Cisco 7600 nodes.

Stop. You have completed this procedure.

DLP-G711 Configure SSH Server on Cisco 7600 Series Nodes

Purpose	This procedure configures the Secure Shell (SSH) server and performs node authentication for Cisco 7600 series nodes.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The user ID and password configured on the ONS 15454 and Cisco 7600 nodes must be the same.

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `router# configure terminal`	Enters global configuration mode. • Enter your password if prompted.
Step 2	**shell processing full** **Example:** `router(config)# shell processing full`	Enables shell processing.
Step 3	**hostname** *host-name* **Example:** `router(config)# hostname test124`	Configures the host name on the Cisco 7600 series router.
Step 4	**aaa new-model** **Example:** `router(config)# aaa new-model`	Enables authentication, authorization, and accounting (AAA).
Step 5	**username** *username* **password** *password* **Example:** `router(config)# username cisco password cisco123`	Enables the local username and password on the Cisco 7600 series router to be used in the absence of other AAA statements.

	Command or Action	Purpose
Step 6	**username** *username* **privilege** *privilege-level* **Example:** `router(config)# username cisco privilege 1`	Assigns user name and privilege levels to the CTC user.
Step 7	**ip domain-name** *domain-name* **Example:** `router(config)# ip domain-name rtp.cisco.com`	Configures the DNS domain of the Cisco 7600 series router.
Step 8	**crypto key generate rsa** **Example:** `router(config)# crypto key generate rsa`	Generates the SSH key that is used with the SSH server.
Step 9	**ip ssh version 2** **Example:** `router(config)# ip ssh version 2`	Specifies that version 2 of SSH is configured on the Cisco 7600 series router.
Step 10	**ip ssh time-out** *seconds* **Example:** `router(config)# ip ssh time-out 60`	Indicates the time interval that the Cisco 7600 series router waits for the SSH client to respond. This setting applies to the SSH negotiation phase. When the EXEC session starts, the standard timeouts configured for the vty apply. The value can range from 1 to 120 seconds.
Step 11	**ip ssh authentication-retries** *integer* **Example:** `router(config)#ip ssh authentication-retries 2`	Indicates the number of attempts after which the interface is reset. The number of retries can range from 0 to 5.
Step 12	**line vty 0 4** **Example:** `router(config)#line vty 0 4`	Indicates that five terminal sessions are possible.
Step 13	**transport input ssh** **Example:** `router(config-line)# transport input ssh`	Disables telnet mode and enables the SSH mode to login to the Cisco 7600 series router.

NTP-G57 Create a Logical Network Map

Purpose	This procedure allows a Superuser to create a consistent network view for all nodes on the network, meaning that all users see the same network view on their login nodes.
Tools	None
Prerequisite Procedures	This procedure assumes that network turn-up is complete.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Complete the DLP-G46 Log into CTC task at a node on the network where you want to create the network map. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Change the position of the nodes in the network view according to your site plan:

a. Click a node to select it, then drag and drop the node icon to a new location.

b. Repeat Step a for each node that you need to position.

Step 4 On the network view map, right-click and choose **Save Node Position** from the shortcut menu.

Step 5 Click **Yes** in the Save Node Position dialog box.

CTC opens a progress bar and saves the new node positions.

Note Retrieve, Provisioning, and Maintenance users can move nodes on the network map, but only Superusers can save new network map configurations. To restore the view to a previously saved version of the network map, right-click the network view map and choose **Reset Node Position**.

Stop. You have completed this procedure.

NTP-G325 View the Power Levels of Cisco ONS 15454 MSTP Nodes

Purpose	This procedure displays the power levels of the ports of the ONS 15454 MSTP nodes that traverse through an OCH or OCHNC trail using the Photonic Path Trace (PPT). The results are displayed in a histogram.
Tools	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 MSTP node on the network.

Step 2 In the network view, node view (single-node mode), multishelf view (multishelf mode), or card view click the **Circuits** tab.

> **Note** An OCHNC or OCH trail circuit must exist on the optical path on which PPT is launched.

Step 3 Select the OCH trail and click **Edit**. The Edit Circuit window appears.

Step 4 In the Edit Circuit window, click the **Photonic Path Trace** tab.

Step 5 Click **Start** to start the PPT. The PPT creates a histogram that displays the power levels of the nodes versus the threshold levels.

> **Note** The circuit must be in the DISCOVERED state to start the PPT.

Step 6 Click **Export** to export the data in the form of HTML.

Stop. You have completed this procedure.

NTP-G326 Provision SRLG on the Cisco ONS 15454 MSTP Network

Purpose	This procedure provisions Shared Risk Link Groups (SRLGs) for MSTP nodes and spans of the currently managed network using the SRLG management wizard. The SRLG information can be synchronized on Cisco CRS-1 or Cisco ASR 9000 routers and viewed as reports.
Tools	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 MSTP node on the network.

Step 2 To assign, modify, delete, or reset the SRLG attributes for the nodes or links, perform the following steps:

a. Click the **Manage SRLGs** option in the Tools > Manage IPoDWDM menu. The SRLG Management wizard appears.

b. Choose one of the following options from the Select Type drop-down list:

   – **Manage Node SRLG**—To add or update the node SRLGs.

   – **Manage Link SRLG**—To add or update the link SRLGs.

c. Click **Next**.

d. In the Manage SRLG page, complete the following fields:
   - If you chose the **Manage Node SRLG** option in Step b., select the node from the Node drop-down list. If you the chose **Manage Link SRLG** option in Step b., select the span from the Link drop-down list.
   - In the Unique SRLG field, an SRLG number is displayed. You can edit the value. If the SRLG value already exists, a message is displayed.

     To reset the SRLG value, click **Set Default**. A confirmation box is displayed. Click **Yes**.

Note The unique SRLG range is from 0 to 4294967294.

   - To add an additional SRLG, type a numeric value in the Additional SRLG field and click **Add**.

     If the SRLG value already exists, a message is displayed.

Note A maximum of 20 SRLGs can be added to the SRLG list.

   - To delete an additional SRLG, choose the value from the SRLG list and click **Delete**. To reset the value, click **Set Default**. A confirmation box is displayed. Click **Yes**.

e. Click **Finish** to exit the wizard.

Step 3 To view the SRLG values of the nodes and links, perform the following steps:
- To view the SRLG values for the OTS, OSC, or PPC links, go to the Network view and right-click the link, or place the mouse pointer over the link to see the SRLG value as a tooltip.
- To view the node SRLG values, click the **Provisioning > General** tab in the node view (single-shelf mode) or shelf view (multishelf view).

Step 4 To synchronize the SRLG information on the Cisco CRS-1 or Cisco ASR 9000 router, go to Network view, right-click the router and choose **Synchronise IPoDWDM** from the shortcut menu.

Step 5 Complete the "DLP-G540 View SRLG Reports" section on page 15-71 to view SRLG reports.

Stop. You have completed this procedure.

DLP-G540 View SRLG Reports

Purpose	This task explains how to view SRLG reports.
Tools	None
Prerequisite Procedures	NTP-G326 Provision SRLG on the Cisco ONS 15454 MSTP Network, page 15-70
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task to log in to an ONS 15454 MSTP node on the network.

Step 2 To view the SRLG reports, perform the following steps:

- To view the consolidated SRLG report, click the **Consolidated SRLG Report** option in the Tools > Manage IPoDWDM > SRLG Report menu. The report displays the following information:
  - Resource Name—Displays the node name or link name.
  - Resource Type—Displays the resource type (node or link).
  - Unique SRLG—Displays the unique SRLG value.
  - Additional SRLG—Displays additional SRLG values.
- To view the detailed SRLG report, click the **Detailed SRLG Report** option in the Tools > Manage IPoDWDM > SRLG Report menu. The report displays the following information:
  - Resource Name—Displays the node name or link name.
  - Resource Type—Displays the resource type (node or link).
  - SRLG Id—Displays the SRLG value.
  - SRLG Type—Displays the SRLG type (unique or additional).

Step 3 Return to your originating procedure (NTP).

CHAPTER 16

Create Optical Channel Circuits and Provisionable Patchcords

This chapter explains the Cisco ONS 15454 dense wavelength division multiplexing (DWDM) optical channel (OCH) circuit types and virtual patchcords that can be provisioned on the ONS 15454. Circuit types include the OCH client connection (OCHCC), the OCH trail, and the OCH network connection (OCHNC). Virtual patchcords include internal patchcords and provisionable (external) patchcords (PPCs). This chapter also describes 16.3 End-to-End SVLAN Circuit that can be created between GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.

This chapter explains how to create Cisco ONS 15454 dense wavelength division multiplexing (DWDM) optical channel client connections (OCHCCs), optical channel network connections (OCHNCs), optical trail circuits, and STS circuits. The chapter also tells you how to create provisionable patchcords, upgrade OCHNCs to OCHCCs, manage SVLANs for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, and manage overhead circuits.

Note Unless otherwise specified, “ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Note In this chapter, “RAMAN-CTP” refers to the 15454-M-RAMAN-CTP card. “RAMAN-COP” refers to the 15454-M-RAMAN-COP card.

Note In this chapter, the “NFV view” refers to the “DWDM Network Functional View (NFV)”. The “GMPLS view” refers to the “DWDM Network Functional View (GMPLS)”.

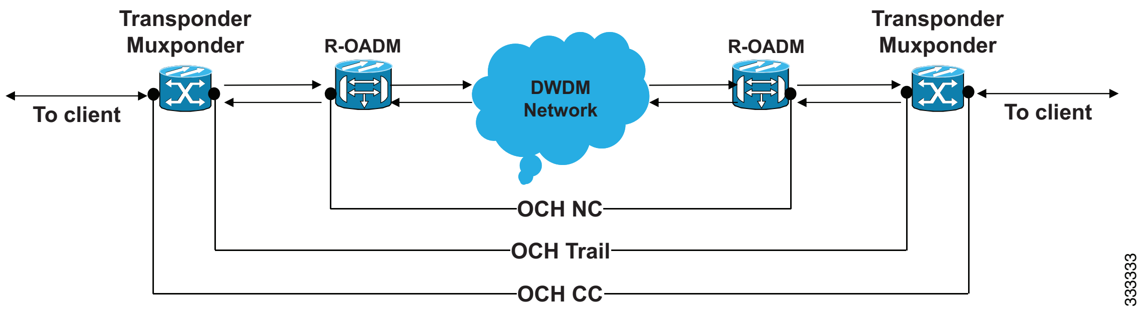
16.1 Optical Channel Circuits

The ONS 15454 DWDM optical circuits provide end-to-end connectivity using three OCH circuit types:

- Optical Channel Network Connections (OCHNC)
- Optical Channel Client Connections (OCHCC)
- Optical Channel Trails (OCH Trails)

A graphical representation of OCH circuits is shown in Figure 16-1.

Figure 16-1 Optical Channel Circuits



16.1.1 OCHNC Circuits

OCHNC circuits establish connectivity between two optical nodes on a specified C-band wavelength. The connection is made through the ports present on the wavelength selective switches, multiplexers, demultiplexer, and add/drop cards. In an OCHNC circuit, the wavelength from a source OCH port ingresses to a DWDM system and then egresses from the DWDM system to the destination OCH port. The source and destination OCH port details are listed in Table 16-1.

Table 16-1 OCHNC Ports

Card	Source Ports	Destination Ports
32WSS 32WSS-L 40-WSS-C 40-WSS-CE	ADD-RX	—
32MUX-O 40-MUX-C	CHAN-RX	—
32DMX-O 32DMX 32DMX-L 40-DMX-C 40-DMX-CE	—	CHAN-TX
4MD AD-1C-xx.x AD-4C-xx.x	CHAN-RX	CHAN-TX
40-SMR1-C 40-SMR2-C	ADD-RX	DROP-TX
15216-MD-40-ODD 15216-MD-40-EVEN	CHAN-RX	CHAN-TX

Table 16-1 OCHNC Ports (continued)

Card	Source Ports	Destination Ports
15216-EF-40-ODD 15216-EF-40-EVEN	CHAN-RX	CHAN-TX
15216-MD-48-ODD 15216-MD-48-EVEN	CHAN-RX	CHAN-TX
15216-FLD-4	CHAN-RX	CHAN-TX

Note When the 40-SMR1-C or 40-SMR2-C card operates along with the 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD (ONS 15216 40 or 48-channel mux/demux) patch panel, the OCH ports on the patch panel are the endpoints of the OCHNC circuit.

When the 40-SMR1-C or 40-SMR2-C card operates along with the 40-MUX-C and 40-DMX-C cards, the endpoints of the OCHNC circuit are on the MUX/DMX cards.

16.1.2 OCHCC Circuits

OCHCC circuits extend the OCHNC to create an optical connection from the source client port to the destination client port of the TXP/MXP cards. An OCHCC circuit represents the actual end-to-end client service passing through the DWDM system.

Each OCHCC circuit is associated to a pair of client or trunk ports on the transponder (TXP), muxponder (MXP), GE_XP (in layer-1 DWDM mode), 10GE_XP (in layer-1 DWDM mode), or ITU-T line card.

The OCHCCs can manage splitter protection as a single protected circuit. However, for the Y-Cable protection, two OCHCC circuits and two protection groups are required.

16.1.3 OCH Trail Circuits

OCH trail circuits transport the OCHCCs. The OCH trail circuit creates an optical connection from the source trunk port to the destination trunk port of the Transponder (TXP), Muxponder (MXP), GE_XP, 10GE_XP, or ITU-T line card. The OCH trail represents the common connection between the two cards, over which all the client OCHCC circuits, SVLAN circuits or STS circuits are carried.

Once an OCHCC is created, a corresponding OCH Trail is automatically created. If the OCHCC is created between two TXP, MXP, GE_XP, or 10GE_XP cards, two circuits are created in the CTC. These are:

One OCHCC (at client port endpoints)

One OCH trail (at trunk port endpoints)

If the OCHCC is created between two TXPP or two MXPP cards, three circuits are created in the CTC. These are:

- One OCHCC (at client port endpoints)
- Two OCH Trails (at trunk port endpoints)
  One for the working and other for the protect trunk.

Note On a TXP, MXP, and GE_XP card (in layer 1 DWDM mode), additional OCHCC circuits are created over the same OCH trail.

Note On a TXP, MXP, GE_XP (in layer 1 DWDM mode), and 10GE_XP (in layer 1 DWDM mode) card, the OCH trail cannot be created independently, and is created along with the first OCHCC creation on the card. However, on a GE_XP card (in layer-2 DWDM mode), 10GE_XP card (in layer-2 DWDM mode), and ADM_10G card, an OCH trail can be created between the trunk ports for the upper layer circuits (SVLAN in GE_XP/10GE_XP and STS in ADM_10G). No OCHCC is supported in these cases.

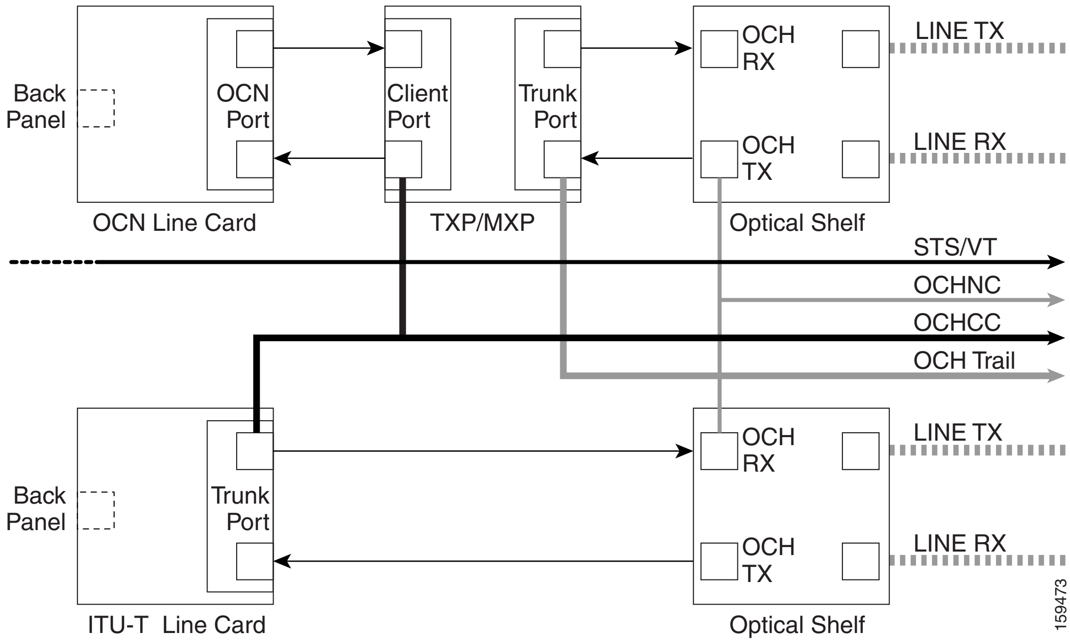
If the OCHCC is created between two ITU-T line cards, only one trunk port belongs to the OCHCC at each end of the circuit. Table 16-2 lists the ports that can be OCHCC and OCH trail endpoints.

Table 16-2 OCHCC and OCH Trail Ports

Card	OCHCC	OCH Trail
TXPs MXPs GE_XP 10GE_XP ADM-10G	Any client port	Any trunk port
ITU-T line cards: • OC48/STM64 EH • OC192 SR/STM64 • MRC-12 • MRC-2.5-12 • MRC-2.5G-4	Any trunk port	Any trunk port

Figure 16-2 shows the relationships and optical flow between the OCHCC, OCH trail, and OCHNC circuits.

Figure 16-2 Optical Channel Management



16.1.4 Administrative and Service States

OCHCCs, OCH trails, and OCHNCs occupy three different optical layers. Each OCH circuit has its own administrative and service states. The OCHCCs impose additional restrictions on changes that can be made to client card port administrative state.

The OCHCC service state is the sum of the OCHCC service state and the OCH trail service state. When creating an OCHCC circuit, you can specify an initial state for both the OCHCC and the OCH trail layers, including the source and destination port states. The ANSI/ETSI administrative states for the OCHCC circuits and connections are:

- IS/Unlocked
- IS,AINS/Unlocked,AutomaticInService
- OOS,DSBLD/Locked,disabled

OCHCC service states and source and destination port states can be changed independently. You can manually modify client card port states in all traffic conditions. Setting an OCHCC circuit to OOS,DSBLD/Locked,disabled state has no effect on OCHCC client card ports.

An OCH trail is created automatically when you create an OCHCC. OCH trails can be created independently between OCH-10G cards and GE_XP and 10GE_XP when they are provisioned in Layer 2 Over DWDM mode. The OCH trail ANSI/ETSI administrative states include:

- IS/Unlocked
- IS,AINS/Unlocked,automaticInService
- OOS,DSBLD/Locked,disabled

You can modify OCH trail circuit states from the Edit Circuit window. Placing an OCH trail OOS,DSBLD/Locked,disabled causes the following state changes:

- The state of the OCH trail ports changes to OOS,DSBLD/Locked,disabled.
- The OCHNC state changes to OOS,DSBLD/Locked,disabled.

Changing the OCH trail state to IS,AINS/Unlocked,automaticInService causes the following state changes:

- The state of the OCH trail trunk ports changes to IS/Unlocked.
- The OCHNC state changes to IS,AINS/Unlocked,automaticInService.

The OCH trail service state is the sum of the OCHCC trunk port state and the OCHNC (if applicable) state. Changing the client card trunk ports to OOS,DSBLD/Locked,disabled when the OCH trail state IS/Unlocked will cause the OCH trail state to change to OOS,DSBLD/Locked,disabled and its status to change to Partial.

The OCHNC circuit states are not linked to the OCHCC circuit states. The administrative states for the OCHNC circuit layer are:

- IS,AINS/Unlocked,AutomaticInService
- OOS,DSBLD/Locked,disabled

When you create an OCHNC, you can set the target OCHNC circuit state to IS/Unlocked or OOS,DSBLD/Locked,disabled. You can create an OCHNC even if OCHNC source and destination ports are OOS,MT/Locked,maintenance. The OCHNC circuit state will remain OOS-AU,AINS/Unlocked-disabled,automaticInService until the port maintenance state is removed. During maintenance or laser shutdown, the following behavior occurs:

- If OCHNCs or their end ports move into an AINS/AutomaticInService state because of user maintenance activity on an OCHCC circuit (for example, you change an optical transport section (OTS) port to OOS,DSBLD/Locked,disabled), Cisco Transport Controller (CTC) suppresses the loss of service (LOS) alarms on the TXP, MXP, GE_XP, 10GE_XP, or ITU-T line card trunk ports and raises a Trail Signal Fail condition. Line card trunk port alarms are not changed, however.
- If TXP client or trunk port are set to OOS,DSBLD/Locked,disabled state (for example, a laser is turned off) and the OCH trunk and OCH filter ports are located in the same node, the OCH filter LOS alarm is demoted by a Trail Signal Fail condition.

OCHCCs are associated with the client card end ports. Therefore, the following port parameters cannot be changed when they carry an OCHCC:

- Wavelength
- Service (or payload type)
- Splitter protection
- ITU-T G.709
- Forward error correction (FEC)
- Mapping

Certain OCHCC parameters, such as service type, service size, and OCHNC wavelength can only be modified by deleting and recreating the OCHCC. If the OCHCC has MXP end ports, you can modify services and parameters on client ports that are not allocated to the OCHCC. Some client port parameters, such as Ethernet frame size and distance extension, are not part of an OCHCC so they can be modified if not restricted by the port state. For addition information about administrative and service states, see the *Administrative and Service States* document.

16.1.5 Creating and Deleting OCHCCs

To create an OCHCC, you must know the client port states and their parameters. If the client port state is IS/Unlocked, OCHCC creation will fail if the OTN line parameters (ITU-T G.709, FEC, signal fail bit error rate (SF BER), and signal degrade bit error rate (SD BER) on the OCHCC differ from what is provisioned on the trunk port. The port state must be changed to OOS-DSLB/Locked,disabled in order to complete the OCHCC.

If you delete an OCHCC, you can specify the administrative state to apply to the client card ports. For example, you can have the ports placed in OOS,DSBLD/Locked,disabled state after an OCHCC is deleted. If you delete an OCHCC that originates and terminates on MXP cards, the MXP trunk port states can only be changed if the trunk ports do not carry other OCHCCs.

16.1.6 OCHCCs and Service and Communications Channels

Although optical service channels (OSCs), generic communications channels (GCCs), and data communications channels (DCCs) are not managed by OCHCCs, the following restrictions must be considered when creating or deleting OCHCCs on ports with service or communication channels:

- Creating an OCHCC when the port has a service or a communications channel is present—OCHCC creation will fail if the OCHCC parameters are incompatible with the GCC/DCC/GCC. For example, you cannot disable ITU-T G.709 on the OCHCC if a GCC carried by the port requires the parameter to be enabled.
- Creating a service or communications channel on ports with OCHCCs—OCHCC creation will fail if the GCC/DCC/GCC parameters are incompatible with the OCHCC.
- Deleting an OCHCC on ports with service or communications channels—If an OSC/GCC/DCC is present on a TXP, MXP, GE_XP, 20GE_XP, or ITU-T line card client or trunk port, you cannot set these ports to the OOS,DSBLD/Locked,disabled state after the OCHCC circuit is deleted.

16.1.7 Related Procedures

- NTP-G151 Create, Delete, and Manage Optical Channel Client Connections, page 16-15
- NTP-G178 Create, Delete, and Manage Optical Channel Trails, page 16-33
- NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40
- NTP-G58 Locate and View Optical Channel Circuits, page 16-65

16.2 Virtual Patchcords

The TXP, MXP, TXPP, MXPP, GE_XP, 10GE_XP, and ADM-10G client ports and DWDM filter ports can be located in different nodes or in the same single-shelf or multishelf node. ITU-T line card trunk ports and the corresponding DWDM filter ports are usually located in different nodes.

OCHCC provisioning requires a virtual patchcord between the client card trunk ports and the DWDM filter ports. Depending on the physical layout, this can be an internal patchcord or a provisionable (external) patchcord (PPC). Both patchcord types are bidirectional. However, each direction is managed as a separate patchcord.

Internal patchcords provide virtual links between the two sides of a DWDM shelf, either in single-shelf or multishelf mode. They are viewed and managed in the Provisioning > WDM-ANS > Internal Patchcords tab.

When the NE update file is imported in CTC, the Provisioning > WDM-ANS > Internal Patchcord tab is populated with the internal patchcords. When you create an internal patchcord manually, the Internal Patchcord Creation wizard prompts you to choose one of the following internal patchcord types:

- Trunk to Trunk (L2)—Creates an internal patchcord between two trunk ports (in NNI mode) of a GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE card provisioned in the L2-over-DWDM mode.
- OCH-Trunk to OCH-Filter—Creates an internal patchcord between the trunk port of a TXP, MXP, GE_XP, 10GE_XP, or ITU-T line card, and an OCH filter card (wavelength selective switch, multiplexer, or demultiplexer).
- OCH-Filter to OCH-Filter—Creates an internal patchcord between a MUX input port and a DMX output port.
- OTS to OTS—Creates an internal patchcord between two OTS ports.
- Optical Path—Creates an internal patchcord between two optical cards, or between an optical card and a passive card.

Note If a Side-to-Side PPC is created between nodes, it will no longer function if the node Security Mode mode is enabled (see the "DLP-G264 Enable Node Security Mode" procedure on page 14-24). When the Secure mode is enabled, it is no longer possible for the DCN extension feature to use the LAN interface to extend the internal network (due to the network isolation in this configuration mode). The result is that the topology discovery on the Side-to-Side PPC no longer operates.

Table 16-3 shows the internal patchcord Trunk (L2), OCH trunk, OCH filter, and OTS/OCH ports.

Table 16-3 Internal Patchcord Ports

Card	Trunk (L2) Port	OCH Trunk Ports	OCH Filter Ports	OTS/OCH Ports
GE_XP 10GE_XP GE_XPE 10GE_XPE	Trunk port in NNI mode	Any trunk port	—	—
TXPs MXPs ADM-10G ITU-T line cards	—	Any trunk port	—	—
OPT-BST OPT-BST-E OPT-BST-L	—	—	—	COM-TX COM-RX OSC-TX OSC-RX

Table 16-3 Internal Patchcord Ports (continued)

Card	Trunk (L2) Port	OCH Trunk Ports	OCH Filter Ports	OTS/OCH Ports
OPT-AMP-17-C OPT-AMP-L	—	—	—	COM-TX COM-RX OSC-TX[1] OSC-RX[1] DC-TX[1] DC-RX[1]
OPT-PRE	—	—	—	COM-TX COM-RX DC-TX DC-RX
OSCM OSC-CSM	—	—	—	COM-TX COM-RX OSC-TX OSC-RX
32MUX 32MUX-O 40-MUX-C	—	—	Any CHAN RX port	COM-TX
32DMX 32DMX-L 32DMX-O 40-DMX-C 40-DMX-CE	—	—	Any CHAN TX port	COM-RX
32WSS 32WSS-L 40-WSS-C 40-WSS-CE	—	—	Any ADD port	COM-TX COM-RX EXP-TX EXP-RX DROP-TX
40-WXC-C	—	—	—	ADD-RX DROP-TX COM TX COM RX

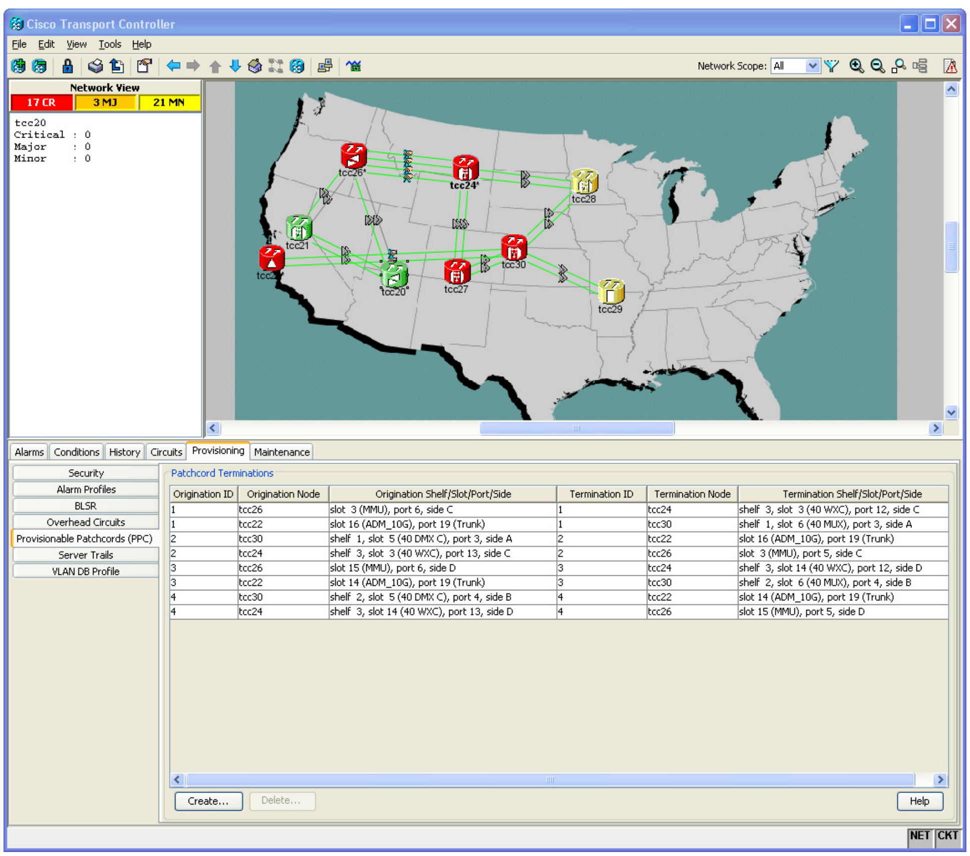
Table 16-3 Internal Patchcord Ports (continued)

Card	Trunk (L2) Port	OCH Trunk Ports	OCH Filter Ports	OTS/OCH Ports
80-WXC-C	—	—	—	EAD *i*, *i*=1 to 8 AD COM COM-RX DROP-TX EXP-TX
MMU	—	—	—	EXP A TX EXP A RX

1. When provisioned in OPT-PRE mode.

PPCs are created and managed from the network view Provisioning > Provisionable Patchcord (PPC) tab (Figure 16-3), or from the node view (single-shelf mode) or multiself view (multishelf mode) Provisioning > Comm Channel > PPC tab.

Figure 16-3 Network View Provisionable Patchcords Tab



PPCs are required when the TXP, MXP, GE_XP, 10GE_XP, ADM-10G, or ITU-T line card is installed in a different node than the OCH filter ports. They can also be used to create OTS-to-OTS links between shelves that do not have OSC connectivity. PPCs are routable and can be used to discover network topologies using Open Shortest Path First (OSPF). GCCs and DCCs are not required for PPC creation. When you create a PPC, the PPC Creation wizard asks you to choose one of the following PPC types:

- Client/Trunk to Client/Trunk (L2)—Creates a PPC between two client or trunk ports (in NNI mode) on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards provisioned in the L2-over-DWDM mode.
- Client/Trunk to Client/Trunk—Creates a PPC between two client or trunk ports on TXP, MXP, GE_XP, 10GE_XP, ADM_10G, or ITU-T line cards.
- Side to Side (OTS)—Creates a PPC between two OTS ports that belong to a Side. This option establishes data communications network (DCN) connectivity between nodes that do not have OSCM or OSC-CSM cards installed and therefore do not have OSC connectivity. CTC selects the OTS ports after you choose the origination and termination sides.
- OCH Trunk to OCH Filter—Creates a PPC between a OCH trunk port on a TXP, MXP, GE_XP, 10GE_XP, ADM-10G, or ITU-T line card and an OCH filter port on a multiplexer, demultiplexer, or wavelength selective switch card.

Table 16-4 shows the PPC Client/Trunk (L2), Client/Trunk, OTS, and OCH Filter ports.

Table 16-4 Provisionable Patchcord Ports

Card	Client/Trunk (L2) Port	Client/Trunk Port	OTS Port	OCH Filter Port
GE_XP 10GE_XP GE_XPE 10GE_XPE	Client or trunk port in NNI mode	Any trunk port	—	—
TXPs MXPs ADM-10G ITU-T line cards	—	Any trunk port	—	—
OPT-BST OPT-BST-E OPT-BST-L	—	—	COM RX[1] LINE RX LINE TX	—
OPT-AMP-17-C OPT-AMP-L	—	—	COM RX[2] COM TX[3] LINE RX[3] LINE TX[3]	—
OPT-PRE	—	—	COM RX[4] COM TX[4]	—
OSC-CSM	—	—	COM RX[1] LINE RX LINE TX	—

Table 16-4 Provisionable Patchcord Ports (continued)

Card	Client/Trunk (L2) Port	Client/Trunk Port	OTS Port	OCH Filter Port
32MUX 32MUX-O 40-MUX-C	—	—	—	Any CHAN RX port
32DMX 32DMX-L 32DMX-O 40-DMX-C 40-DMX-CE	—	—	—	Any CHAN TX port
32WSS 32WSS-L 40-WSS-C 40-WSS-CE	—	—	—	Any ADD port
40-WXC-C	—	—	COM RX COM TX	—
80-WXC-C	—	—	EAD *i*, *i*=1 to 8 AD COM COM-RX DROP-TX EXP-TX	—
40-SMR1-C 40-SMR2-C	—	—	LINE RX LINE TX	—
MMU	—	—	EXP A RX EXP A TX	—

1. Line nodes only.
2. When card mode is OPT-PRE.
3. When card mode is OPT-LINE.
4. Line nodes with two OPT-PRE cards and no BST cards installed.

For related procedure, see NTP-G184 Create a Provisionable Patchcord, page 16-72

16.2.1 PPC Provisioning Rules

For Client/Trunk to Client/Trunk (L2) PPCs, the following provisioning rules and conditions apply:

- The card must be provisioned in the L2-over-DWDM mode.
- The client or trunk ports must be in the NNI mode.

- PPCs can be created only between NNI ports of the same size (1GE-1GE or 10GE-10GE).
- A wavelength check is not performed during L2 trunk-to-trunk patchcord provisioning. The source and destination wavelengths of a L2 trunk-to-trunk PPC can be different.

For Client/Trunk to Client/Trunk PPCs, the following provisioning rules and conditions apply:

- Patchcords can be created on preprovisioned or physically installed cards.
- Trunk-to-trunk connections require the same wavelength if the port is equipped. A wavelength check is automatically performed during patchcord provisioning.
- For connections involving one or more preprovisioned ports, no compatibility check is performed.

For OCH Trunk to OCH Filter PPCs, the following provisioning rules and conditions apply:

- GCC and DCC links are not required to create a PPC.
- PPCs can be created for preprovisioned or physically installed cards.
- OCH trunk and OCH filter ports must be on the same wavelength. CTC checks the ports for wavelength compatibility automatically during PPC provisioning.
- For OC-48/STM-16 and OC-192/STM-64 ITU-T line cards, the wavelength compatibility check is performed only when the cards are installed. The check is not performed for preprovisioned cards.
- For all other preprovisioned cards, a wavelength compatibility check is not performed if card is set to first tunable wavelength. The wavelength is automatically provisioned on the port, according to the add/drop port that you chose when you created the PPC.

For related procedures, see NTP-G200 Create, Delete, and Manage STS or VC Circuits for the ADM-10G Card, page 16-49

16.3 End-to-End SVLAN Circuit

An end-to-end SVLAN circuit can be created between GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards through a wizard in CTC. SVLAN circuits created this way are only a snapshot of the SVLAN settings (NNI and QinQ) of each card in the network. If an end-to-end SVLAN circuit is created via CTC and the SVLAN settings of the cards are changed manually, CTC does not update the SVLAN circuit created with the new settings. To update the SVLAN circuit in CTC, the circuit must be refreshed.

However, any changes made to subtended OCH trail circuits are reflected in the SVLAN circuit in CTC. If an OCH trail becomes incomplete and the current SVLAN circuit snapshot has some SVLAN circuits that are using it, they remain incomplete. If the snapshot contains incomplete SVLAN circuits and an OCH trail circuit becomes available, the incomplete SVLAN circuit snapshot in CTC appears to be complete.

When the destination port of the SVLAN circuit facing the router is configured as a NNI client port, the outgoing ethernet packets do not drop the SVLAN tag when they exit the MSTP network allowing the router to determine the origin of the ethernet packet.

SVLAN circuits are stateless circuits; an administrative or service state need not be set.

Note During SVLAN provisioning, if a SVLAN circuit span using UNI ports in transparent mode is over subscribed, a warning message is displayed. However, the circuit is created. This is supported on channel groups on GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards.

For related procedure, see:

- NTP-G181 Manage GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card SVLAN Databases, page 16-78
- NTP-G203 Create End-to-End SVLAN Circuits, page 16-90

16.3.1 End-to-End SVLAN Provisioning Rules

The following provisioning rules and conditions apply to end-to-end SVLAN circuits:

- GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards must be provisioned in L2-over-DWDM mode.
- SVLAN database must be loaded with the SVLAN.
- SVLAN circuits are routed through OCH trail circuits or PPC; Client/Trunk to Client/Trunk (L2). Therefore, before creating an SVLAN circuit, make sure that the subtended OCH trail circuits between GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards or PPC links are created.
- For protected SVLAN circuits, create a ring (through OCH trail circuits), define a master node, and enable the protection role.

For information on how to create end-to-end SVLAN circuit, see the "NTP-G203 Create End-to-End SVLAN Circuits" section on page 16-90 procedure.

16.3.2 Before You Begin

Before performing any of the following procedures, investigate all alarms and clear any trouble conditions. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* as necessary.

Note The procedures and tasks described in this section for the Cisco ONS 15454 platform is applicable to the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, unless noted otherwise.

This section lists the procedures (NTPs). Turn to a procedure for applicable tasks (DLPs).

1. NTP-G151 Create, Delete, and Manage Optical Channel Client Connections, page 16-15—Complete as needed.
2. NTP-G178 Create, Delete, and Manage Optical Channel Trails, page 16-33—Complete as needed.
3. NTP-G59 Create, Delete, and Manage Optical Channel Network Connections, page 16-40—Complete as needed.
4. NTP-G200 Create, Delete, and Manage STS or VC Circuits for the ADM-10G Card, page 16-49—Complete as needed.
5. NTP-G150 Upgrade Optical Channel Network Connections to Optical Channel Client Connections, page 16-59—Complete as needed.
6. NTP-G183 Diagnose and Fix OCHNC and OCH Trail Circuits, page 16-63—Complete as needed to verify all conditions are valid before placing OCHNC or OCH trail circuits in service.
7. NTP-G58 Locate and View Optical Channel Circuits, page 16-65—Complete as needed to find, view, and filter OCHCC, OCHNC, and OCH trail circuits.
8. NTP-G184 Create a Provisionable Patchcord, page 16-72—Complete as needed.
9. NTP-G181 Manage GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card SVLAN Databases, page 16-78—Complete as needed.

10. NTP-G60 Create and Delete Overhead Circuits, page 16-81—Complete as needed to create IP-encapsulated tunnels, firewall tunnels, and proxy tunnels; to create generic communications channel (GCC) terminations; to provision orderwire; or to create user data channel (UDC) circuits.
11. NTP-G62 Create a J0 Section Trace, page 16-89—Complete as needed to monitor interruptions or changes to traffic between two nodes.
12. NTP-G203 Create End-to-End SVLAN Circuits, page 16-90—Complete as needed to create end to end VLAN circuits.
13. NTP-G229 Provision DCN Extension for a Network Using GCC/DCC, page 16-93—Complete as needed to provision DCN extension for a network using GCC/DCC.

NTP-G151 Create, Delete, and Manage Optical Channel Client Connections

Purpose	This procedure creates, deletes, and manages OCHCC circuits. The OCHCC circuits can be created using the Circuit Creation wizard or the GMPLS view. OCHCCs create an end-to-end optical management path between TXP, MXP, GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE (when provisioned as TXPs or MXPs), OTU2_XP, AR_MXP, or AR_XP client ports, or between ITU-T trunk ports. ITU-T line cards include: OC48 ELR/STM64 EH, OC192 SR1/STM64 IO, MRC-12, MRC-2.5-12, and MRC-2.5G-4. The OCHCC circuit is transported by an OCH trail circuit that is associated to one or more OCHNC circuits (for example, an OCHCC circuit passing through a regen node).
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure is not applicable to the ADM-10G card or GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards that are provisioned in L2-over-DWDM mode.

Step 1 As needed, identify the OCHCC to be provisioned using the "DLP-G350 Use the Cisco Transport Planner Traffic Matrix Report" task on page 15-31.

Step 2 Complete the DLP-G46 Log into CTC at a node on the network where you want to manage OCHCCs. If you are already logged in, continue with Step 3.

Step 3 If you want to assign a name to the OCHCC source and destination ports before you create the circuit, complete the "DLP-G104 Assign a Name to a Port" task on page 16-16. If not, continue with Step 4.

Tip Naming the client ports help in identifying them correctly later.

Step 4 If the client TXP, MXP, or ITU-T line cards are installed in a multishelf node, continue with Step 5. If not, complete the following substeps:

a. Use the information obtained from the Cisco Transport Planner traffic matrix report in Step 1 to complete the "DLP-G344 Verify Provisionable and Internal Patchcords" task on page 16-61. If provisionable patchcords (PPCs) exist between the nodes containing the TXP/MXP/ITU-T line cards and the DWDM nodes at each end of the OCHCC, continue with Step 5. If not, continue with Step b.

b. Complete the "NTP-G184 Create a Provisionable Patchcord" task on page 16-72 to create the PPCs between the OCHCC source and destination nodes.

Step 5 If the client TXP/MXP/ITU-T line cards are installed in a multishelf node, use the information obtained from the Cisco Transport Planner traffic matrix report in Step 1 to create internal patchcords between the 32DMX, 32DMX-O, or 32DMX-L ports and the TXP/MXP trunk ports using the "NTP-G242 Create an Internal Patchcord Manually" task on page 14-114. Create the internal patchcords on both the source and destination nodes of each OCHCC path. If the TXP/MXP/ITU-T line cards are not installed in a multishelf node, continue with Step 6.

Step 6 Complete the "DLP-G345 Verify OCHCC Client Ports" task on page 16-17 to verify the port rate and service state.

Step 7 To provision the OCHCC circuit, use either of the following procedures as needed:

- "DLP-G346 Provision Optical Channel Client Connections" task on page 16-18
- "DLP-G705 Provision GMPLS Optical Channel Client Connections" task on page 16-25

Step 8 Complete the "DLP-G706 Perform Optical Validation of GMPLS Circuits" task on page 16-32, as needed.

Step 9 Complete the "DLP-G707 Upgrade a Non-GMPLS Circuit to a GMPLS Circuit" task on page 16-32, as needed.

Step 10 Complete the "DLP-G424 Edit an OCHCC Circuit Name" task on page 16-28, as needed.

Step 11 Complete the "DLP-G394 Change an OCHCC Administrative State" task on page 16-28, as needed.

Step 12 Complete the "DLP-G347 Delete Optical Channel Client Connections" task on page 16-26, as needed.

Stop. You have completed this procedure.

DLP-G104 Assign a Name to a Port

Purpose	This task assigns a name to a port on any ONS 15454 card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view, double-click the card that has the port that you want to provision. This can be any port on a traffic-carrying card. The card view opens.

Step 2 Click the **Provisioning** tab.

Step 3 Double-click the **Port Name** table cell for the port number where you are assigning a name. The cell activates and a blinking cursor indicates where you should enter the port name.

Step 4 Enter the port name.

The port name can be up to 32 alphanumeric/special characters. The field is blank by default.

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

DLP-G345 Verify OCHCC Client Ports

Purpose	This task verifies the rate and service state of the OCHCC client ports.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view, double-click the TXP, MXP, OTU2_XP, AR_MXP, AR_XP or ITU-T line card where you want to verify the client ports. The card view opens.

Step 2 Click the **Provisioning > Maintenance tabs**.

Step 3 Click the **Provisioning > Pluggable Port Modules** tabs.

Step 4 Verify that a pluggable port module has been created and that the port rate under the Pluggable Port area is provisioned. If so, continue with Step 5. If not, complete the "DLP-G277 Provision a Multirate PPM" task on page 11-152 and the "DLP-G278 Provision the Optical Line Rate" task on page 11-155.

Step 5 Repeat Steps 1 through 4 for each TXP, MXP, OTU2_XP, AR_MXP, AR_XP or ITU-T line card containing OCHCC ports that you want to verify.

Step 6 Return to your originating procedure (NTP).

DLP-G346 Provision Optical Channel Client Connections

Purpose	This task creates an OCHCC between two TXP, MXP, GE_XP and GE_XPE (when configured in TXP or MXP mode), 10GE_XP and 10GE_XPE (when configured in TXP or MXP mode), OTU2_XP, AR_MXP, or AR_XP client ports, or two ITU-T-compliant line card trunk ports.
Tools/Equipment	Cisco Transport Planner Traffic Matrix Report
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G345 Verify OCHCC Client Ports, page 16-17
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note OCHCCs can be created on preprovisioned client cards or physically installed client cards.

Note Creating an OCHCC circuit automatically creates an OCH trail circuit between the OCHCC source and destination client card trunk ports. The OCH trail circuit is created for the first OCHCC between two MXP cards. The OCH trail circuit is used by succeeding OCHCCs created between the MXP cards. When the OCH trail is created, it is assigned a system-generated name in the format *circuit-type_NE-name::unique sequence number*. To edit the OCH trail circuit name, complete the "DLP-G424 Edit an OCHCC Circuit Name" task on page 16-28.

Note If trunk ports are connected by a peer-to-peer provisionable patchcord (PPC), an OCH trail is not created.

Note The OCH Wlen (wavelength) parameter on the Circuits page can be used to determine the OCHCC and OCH trail associations.

Note If you want the OCHCC circuit to provision the client card trunk port's ITU-T G.709, FEC, SD and SF threshold settings and Mapping parameters, you must place the client card trunk ports out of service. If any of the trunk ports, including OTU2-XP regen ports, are in-service state, a warning message "Trunk settings are not applied on any of the trunk ports" is displayed with details of the trunk ports that are in in-service state.

Note In a node using OTU2_XP cards configured in the regen mode, a single OCHCC circuit can be created that passes through the OTU2_XP card. Internal patch cords must be created from the OTU2_XP regen ports to the respective add/drop cards. OCHCC circuit creation through OTU2_XP cards in regen mode is not supported if different wavelengths are used on the two OTU2_XP regen ports.

Note The OCHCC circuit creation is not supported between different payloads in the 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C cards.

Note The 40G-MXP-C card configured in the unidirectional regen mode does not support OCHCC circuit creation. Two bidirectional OCHNC circuits can be created, one on either side of the regenerator group for managing the circuit.

Note In AR_MXP and AR_XP cards, you cannot create the circuits using FICON payload option in Circuit Creation wizard. Create circuits using FC payload to bring up FICON traffic.

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** tab, then click **Create**.

Step 3 In the Circuit Creation dialog box, choose **OCHCC** from the Circuit Type list.

Step 4 Click **Next**.

Step 5 In the Circuit area of the Circuit Attributes page, provision the OCHCC circuit attributes:

- Name—Assign a name to the OCHCC. The name can be alphanumeric and up to 48 characters (including spaces). Circuit names should be 44 characters or less if you want the ability to create monitor circuits. If you leave the field blank, Cisco Transport Controller (CTC) assigns a default name to the circuit.
- Type—(Display only) OCHCC.
- Size—Defines the circuit payload type and rate. Two fields are provided. The first specifies the payload type. Choose a payload type, then choose the rate in the next field. Table 16-5 provides the OCHCC payload types and rates.

  Note The payload type and rate must match the PPM provisioning on the client cards at the source and destination nodes.

Table 16-5 OCHCC Client Rates

Payload Type	Rates
SONET/SDH	OC-192 (ANSI)/STM-64 (ETSI)—9.92 Gbps
	OC-48 (ANSI)/STM-12 (ETSI)—2.48 Gbps
	OC-12 (ANSI)/STM-4 (ETSI)—622 Mbps
	OC-3 (ANSI)/STM-1 (ETSI)—155 Mbps
Ethernet	10GE—One Gigabit Ethernet 11.25 Gbps
	1GE—One Gigabit Ethernet 1.125 Gbps

Table 16-5 OCHCC Client Rates (continued)

Payload Type	Rates
FC/FICON	10GFC—Fibre Channel 10 Gbps 4GFC—Fibre Channel 4 Gbps 2GFC—Fibre Channel 2.125 Gbps 1GFC—Fibre Channel 1.06 Gbps 4GFICON—FICON 4 Gbps 2GFICON—FICON 2.125 Gbps 1GFICON—FICON 1.06 Gbps
Data Storage	ESCON—Enterprise System Connection 200 Mbps (IBM signal) ISC Peer—Inter System Coupling Link 3 (ISC3) ISC3 Peer 1G—InterSystem Coupling Link 3 (ISC3) 1 Gbps ISC3 Peer 2G—InterSystem Coupling Link 3 (ISC3) 2 Gbps ISC COMPAT—InterSystem Coupling Link 1 (ISC1) ISC1—Inter system connect Link 1 (ISC1)
Video	HDTV—High Definition Television SDI/DI—Serial Digital Interface and Digital Video signal type 1 DV6000—Proprietary signal from video vendor DVB-ASI—Proprietary signal from video vendor
Other	Pass Through—Creates a pass-through OCHCC

- OCHNC Wavelength—Provides three fields to define the wavelength that the OCHCC will use to travel across the OCH network. Choose a wavelength from the first field. In the second field, you can change the wavelength band by choosing either **C Band** or **L Band**. In the third field, you can indicate whether odd or even C-band or L-band wavelengths appear. See Table 16-6 and Table 16-7 for C-band and L-band wavelengths.

Note The OCHNC wavelength must match the trunk wavelength provisioned on the source and destination TXP or MXP cards. If the wavelengths do not match, the card will not appear as a source or destination.

Table 16-6 OCH C-Band Channels

Channel No.	Channel ID	Frequency (GHz)	Wavelength (nm)
1	30.3	195.9	1530.33
2	31.1	195.8	1531.12
3	31.9	195.7	1531.90
4	33.4	195.5	1532.68
5	32.6	195.6	1533.47[1]
6	34.2	195.4	1534.25

Table 16-6 OCH C-Band Channels (continued)

Channel No.	Channel ID	Frequency (GHz)	Wavelength (nm)
7	35.0	195.3	1535.04
8	35.8	195.2	1535.82
9	36.1	195.1	1536.61
10	37.4	195	1537.40[1]
11	38.1	194.9	1538.19
12	38.9	194.8	1538.98
13	39.7	194.7	1539.77
14	40.5	194.6	1540.56
15	41.3	194.5	1541.35[1]
16	42.1	194.4	1542.14
17	42.9	194.3	1542.94
18	43.7	194.2	1543.73
19	44.5	194.1	1544.53
20	44.3	194	1545.32[1]
21	46.1	193.9	1546.12
22	46.9	193.8	1546.92
23	47.7	193.7	1547.72
24	48.5	193.6	1548.51
25	49.3	193.5	1549.32[1]
26	50.1	193.4	1550.12
27	50.9	193.3	1550.92
28	51.7	193.2	1551.72
29	52.5	193.1	1552.52
30	53.3	193	1553.33[1]
31	54.1	192.9	1554.13
32	54.9	192.8	1544.94
33	55.7	192.7	1555.75
34	56.5	192.6	1556.55
35	57.3	192.5	1557.36[1]
36	58.1	192.4	1558.17
37	58.9	192.3	1558.98
38	59.7	192.2	1559.79
39	60.6	192.1	1560.61
40	61.3	192	1561.42[1]

1. Requires 40-channel MUX or WSS cards, and 40-channel DMX cards.

Table 16-7 OCH L-Band Channels

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88

Table 16-7 OCH L-Band Channels (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

- Bidirectional—(Display only) OCHCCs are bidirectional. This field cannot be changed.
- Protection—Check to create a splitter-protected OCHCC (only MXPP/TXPP cards will be selectable as circuit endpoints) or a protected OCHCC when TXP is connected to a PSM card.

Step 6 In the State area of the Circuit Attributes page, provision the OCHCC state attributes:

- State—Provisions the OCHCC circuit state. The state can be **IS** (ANSI)/**Unlocked** (ETSI) or **OOS,DSBLD** (ANSI)/**Locked,Disabled** (ETSI).
- Apply to OCHCC ports—If checked, applies the state chosen in the Apply to OCHCC ports drop-down list to the OCHCC client ports. For TXP, MXP, TXPP, or MXPP cards, the administrative state will apply to the client and all trunk ports. For ITU-T-compliant line cards, the administrative state will apply to the trunk port only. The states that you can apply include: IS (ANSI)/Unlocked (ETSI), OOS,DSBLD (ANSI)/Locked,Disabled (ETSI), and IS,AINS (ANSI)/Unlocked,AutomaticInService (ETSI).

Step 7 Click **Next**.

Step 8 In the Source area, choose the source node from the Node drop-down list, then choose the source shelf (multishelf nodes only) from the Shelf drop-down list, the source slot from the Slot drop-down list, and, if needed, the source port from the Port drop-down list.

If no nodes appear in the Node drop-down list, complete the following steps:

a. Click **Back** and review your circuit attribute settings. Verify that they are set to the client attributes provisioned on the client cards. If necessary, click **Cancel** and complete the "DLP-G345 Verify OCHCC Client Ports" task on page 16-17 to verify the client settings.

b. If the source and/or destination nodes are not configured for multishelf, complete the "DLP-G344 Verify Provisionable and Internal Patchcords" task on page 16-61 to verify that the patchcords were created accurately.

If these steps do not solve the problem, refer to your next level of support.

Step 9 Click **Next**.

Step 10 In the Destination area, choose the destination node from the Node drop-down list, then choose the destination shelf (multishelf nodes only) from the Shelf drop-down list, the destination slot from the Slot drop-down list, and, if needed, the destination port from the Port drop-down list.

If no nodes appear in the Node drop-down list, complete the following steps:

a. Click **Back** and review your circuit attribute settings. Verify that they are set to the client attributes provisioned on the client cards. If necessary, click **Cancel** and complete the "DLP-G345 Verify OCHCC Client Ports" task on page 16-17 to verify the client settings.

b. If the source and/or destination nodes are not configured for multishelf, complete the "DLP-G344 Verify Provisionable and Internal Patchcords" task on page 16-61 to verify that the patchcords were created accurately.

If these steps do not solve the problem, refer to your next level of support.

Step 11 Click **Next**. If the OCHCC is between ITU-T cards, continue with Step 12. If not, skip to Step 14.

Step 12 Complete the "DLP-G437 Set OCH Circuit Attributes" task on page 16-29.

Step 13 **Click Next.**

Step 14 Complete the "DLP-G438 Set OCH Routing Preferences" task on page 16-31. Skip this step and continue with Step 16 if no constraints are needed. If the trunk ports are already connected by an existing OCH Trail (MXP case) or by a direct PPC link, the OCH Circuit Routing Preferences page appears in read-only mode; all buttons are disabled. Continue with Step 16.

Step 15 If the circuit is being created for AR_MXP or AR_XP card with MXP_MR (low or high rate) or MXPP_MR (low or high rate) operating mode, select the ODU1 and the respective time slot within the selected ODU1. Table 16-8 describes the bandwidth utilization for the selected payload.

Note For the all other cards/card modes, you cannot select the ODU1 and time slot parameters.

Table 16-8 Bandwidth Utilization for the Selected Payload

Payload	Number of ODU1s required	Number of Timeslot required/ODU1
OC3 FE	1	1
OC12	1	4
OC48	1	16
FC2 ISC3-2G	1	14
ESCON	1	2
GE FC1 ISC3-1G	1	7
FC4G	2	16

Step 16 Click **Finish**. The OCHCC and its OCH trail appear in the Circuits page. After the circuit status has been verified, the DISCOVERED status appears in the Status column.

If the OCHCC status does not change to DISCOVERED within 2 to 3 minutes, contact your next level of support.

Step 17 Return to your originating procedure (NTP).

DLP-G705 Provision GMPLS Optical Channel Client Connections

Purpose	This task creates an OCHCC circuit between two TXP, MXP, GE_XP and GE_XPE (when configured in TXP or MXP mode), 10GE_XP and 10GE_XPE (when configured in TXP or MXP mode), or OTU2_XP client ports, or two ITU-T-compliant line card trunk ports.
Tools/Equipment	Cisco Transport Planner Traffic Matrix Report
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G345 Verify OCHCC Client Ports, page 16-17
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View** and click the **FV** icon in the toolbar. The NFV view opens.

Step 2 From the Change Perspective drop-down list in the toolbar, choose **GMPLS**. The GMPLS view opens.

Step 3 In the Circuit Parameters pane, provision the OCHCC circuit attributes:

a. Name—Assign a name to the circuit. The name can be alphanumeric and up to 48 characters (including spaces).

b. Type—Choose **OCHCC**.

c. Protected—Check to route the circuit on a protected path. Select the protection type from the drop-down list. The available options are:

   – PSM—When a PSM card is connected to a TXP card.

   – Y-CABLE—The circuit is protected by a transponder or muxponder card in a Y-cable protection group.

   – Splitter—When a MXPP/TXPP card is used. The circuit source and destination are on MXPP_MR_2.5G and TXPP_MR_2.5G cards. These cards provides splitter (line-level) protection.

d. IS—Check to place the trunk ports of the TXP /MXP card in service.

e. OCHNC Wavelength—Provides three fields to define the wavelength for the OCHCC circuit. Choose a wavelength from the first field. The wavelength band in the second field is set to **C Band**. In the third field, indicate whether odd or even C-band wavelengths appear. Table 16-6 lists the C-band wavelengths.

f. Protected OCHNC Wavelength—Define the wavelength of the protected OCHCC circuit. This field is visible only when the Protected check box is checked in Step c. The options available are similar to that of OCHNC Wavelength.

g. Validation—Set the validation mode. For more information about the validation modes, see the “12.10.1.3 Validation Modes” section on page 12-110.

h. Acceptance threshold—Set the optical validation threshold value for the GMPLS circuit. The circuit is created if the actual optical validation result is greater than or equal to the value set in this field. For more information about the acceptance threshold value, see the “12.10.1.2 Acceptance Thresholds” section on page 12-110.

i. Protection Acceptance Threshold—Sets the optical validation threshold value for the protected GMPLS circuit.

Step 4 Configure the source and destination ports at the circuit endpoints in the map. For more information about configuring the source and destination ports, see the "12.10.3.3 Source and Destination Port Configuration" section on page 12-116.

> **Note** The OCHCC circuit endpoints must be selected on the TXP/MXP cards. If other ports are selected, a warning dialog box is displayed prompting you to change the circuit type.

Step 5 Define the working or protect port parameters. For more information, see the "12.10.3.3.1 Working and Protect Port Parameters" section on page 12-117. Click **Apply** in the Working Port Parameters pane and Protected Port Parameters pane, to apply the settings.

Step 6 Click **Apply** in the Circuit Parameters pane.

Step 7 Click **Yes** in the Create Circuits confirmation dialog box.
The OCHCC and its OCH trail appear in the Circuits tab in the Network Data pane. After the circuit status has been verified, the DISCOVERED status appears in the Status column. The circuit might take a few minutes to come up, depending on the size of the network.

Step 8 Return to your originating procedure (NTP).

DLP-G347 Delete Optical Channel Client Connections

Purpose	This task deletes DWDM OCHCC circuits.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

> **Note** If you are deleting more than half of all the active OCHCCs, it is recommended that you delete them two at a time to allow for proper power compensation. You do not need to delete the active OCHCCs two at a time if you are deleting all them.

Step 1 Complete the "NTP-G103 Back Up the Database" task on page 24-2 to preserve existing settings and, if you want to recreate the circuits, record the circuit information.

Step 2 Consult your network operations center (NOC) or other appropriate personnel to verify that the OCHCC can be safely deleted.

Step 3 Investigate all network alarms and resolve any problems that might be affected by the OCHCC deletion.

Step 4 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 5 Under the Type column, choose one or more OCHCCs that you want to delete, then click **Delete**.

Step 6 In the Delete Circuits confirmation dialog box, complete the following:

- Change drop port admin state—Check this box if you want to change the circuit source and destination port administrative state. After checking the box, choose one of the following administrative states:
  - **IS** (ANSI) or **Unlocked** (ETSI)—Puts the ports in service.
  - **IS,AINS** (ANSI) or **UnlockedAutomaticInService** (ETSI)—Puts the ports in automatic in service.
  - **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI)—Removes the ports from service and disables them.
  - **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI)—Removes the ports from service for maintenance.
- Notify when completed—Checked this box if you want the CTC Alerts confirmation dialog box to notify you when the OCHCC is deleted. During this time, you cannot perform other CTC functions. If you are deleting many OCHCCs, waiting for confirmation might take a few minutes. Circuits are deleted whether or not this check box is checked.

Note The CTC Alerts dialog box will not automatically open to show a deletion error unless you checked All alerts or Error alerts only in the CTC Alerts dialog box. For more information, see the DLP-G53 Configure the CTC Alerts Dialog Box for Automatic Popup. If the CTC Alerts dialog box is not set to open automatically, the red triangle inside the CTC Alerts toolbar icon indicates that a notification exists.

Step 7 (For AR_MXP and AR_XP cards) An OCHCC circuit cannot be deleted when the associated client port on the card is in IS (ANSI) or Unlocked (ETSI) state. To delete an OCHCC circuit, move the associated client port to OOS,DSBLD (ANSI) or Locked,disabled (ETSI) state and then delete the OCHCC circuit.

Step 8 Complete either of the following:

- If you checked Notify when completed, the CTC Alerts dialog box appears. If you want to save the information, continue with Step 9. If you do not want to save the information, continue with Step 10.
- If you did not check Notify when completed, the Circuits page appears. Continue with Step 11.

Step 9 If you want to save the information in the CTC Alerts dialog box, complete the following substeps. If you do not want to save it, continue with Step 10.

a. Click **Save**.

b. Click **Browse** and navigate to the directory where you want to save the file.

c. Type the file name using a TXT file extension, and click **OK**.

Step 10 Click **Close** to close the CTC Alerts dialog box.

Step 11 Complete the "NTP-G103 Back Up the Database" task on page 24-2 if you require a backup of your changes.

Step 12 Return to your originating procedure (NTP).

DLP-G424 Edit an OCHCC Circuit Name

Purpose	This task changes the name of an OCHCC circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G105 Provision Optical Channel Network Connections, page 16-41 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 2 To rename the OCHCC circuit, do either of the following.

- Network view—Select the OCHCC circuit in the Circuits tab and click **Edit**.
- NFV view or GMPLS view—Double-click the circuit in the Circuits tab.

Step 3 In the Edit Circuit dialog box, click the **General** tab.

Step 4 In the Name field, enter the new OCHCC circuit name.

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

DLP-G394 Change an OCHCC Administrative State

Purpose	This task changes the administrative state of an OCHCC circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G346 Provision Optical Channel Client Connections, page 16-18 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 2 To change the administrative state of the OCHCC circuit, do either of the following.

- Network view—Select the OCHCC circuit in the Circuits tab and click **Edit**.
- NFV view or GMPLS view—Double-click the circuit in the Circuits tab.

Step 3 In the Edit Circuit dialog box, click the **State** tab.

Step 4 Click the cell in the Admin State column for the card you want to change, and choose an administrative state from the drop-down list:

- **IS** (ANSI) or **Unlocked** (ETSI)
- **OOS** (ANSI) or **Locked** (ETSI)

Step 5 Click **Apply**.

Step 6 If you are changing the OCHCC state to OOS/Locked, click **OK** in the confirmation dialog box. (No confirmation dialog box appears when placing OCHCCs in service.)

Note For information about the OCH circuit state transitions, see the *Administrative and Service States* document.

Step 7 Return to your originating procedure (NTP).

DLP-G437 Set OCH Circuit Attributes

Purpose	This task provisions OCH trunk attributes.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
	The OCH Circuit Attributes page must be open.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In the OCH Circuit Attributes Preferences page, change the trunk settings as necessary. The settings provisioned here can only be provisioned on the ports when the ports are out of service. If the ports are in service, these parameters must be the same as the source and destination card ports. If not, the trunk settings are not editable and are retained as they are on both the trunk ports. An information pop up window is shown after the circuit creation indicating that the trunk settings are not applied on any of the trunk ports. You can view the current trunk settings (display only) in the Current Values area.

- To change any of the trunk settings, complete the following in the Provisioning Values area:
  - ITU-T G.709 OTN—Choose **Enable** or **Disable** to set or disable the IEEE G.709 monitoring on the optical transport network. If the OCHCC source or destination is an TXP_MR_10EX_C, 40E-TXP-C, 40ME-TXP-C, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_2.5G_10EX_C, MXP_MR_10DMEX_C, 40G-MXP-C, 40E-MXP-C, or 40ME-MXP-C card, the ITU-T G.709 OTN parameter must always be checked. If ITU-T G.709 OTN is checked, the MXP_MR_2.5G and MXPP_MR_2.5G cards will not appear as OCHCC source and destination options.
  - FEC—Choose the type of FEC: **Disabled**, **Standard**, or **Enhanced**. The options that appear depend on the card type. If the OCHCC source or destination is an TXP_MR_10EX_C, MXP_2.5G_10EX_C, MXP_MR_10DMEX_C, 40G-MXP-C, 40E-MXP-C, 40ME-MXP-C, 40E-TXP-C, or 40ME-TXP-C card, the ITU-T G.709 OTN parameter must always be checked.
  - SD BER—Choose the signal degrade bit error rate. The range of SD BER values supported for Cisco 7600 router is from 5 to 9.
  - (Cisco 7600 series routers only) OPU—Choose the ITU-T G.709 OPU standard. OPU-1E and OPU-2E standards are supported on the Cisco 7600 series routers.
  - SF BER—Choose the signal fail bit error rate.

  - Mapping—Sets the mapping for the TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, TXP_MR_10EX_C, MXP_MR_10DME_C, MXP_MR_DME_L, and MXP_MR_10DMEX_C cards: **Not Used**, **ODU Multiplex** (client SONET/SDH payload), **Asynchronous**, or **Synchronous**. The choices available depend on the card. If you set mapping to Synchronous, the client signal is mapped into the OTU2 signal without justification of the payload because the client signal timing (the timing source) is the same as the trunk output timing. If you set mapping to Asynchronous, the trunk timing is disconnected from the client timing (because the network element [NE] is the timing source), so justification is needed to map the client signal (OC192/STM64) to OTU2 trunk output.

Note When you create a 4xOC-48 OCHCC circuit, you need to select the G.709 and Synchronous options. A 4xOC-48 OCHCC circuit is supported by G.709 and synchronous mode. This is necessary to provision a 4xOC-48 OCHCC circuit.

Note If the OCHCC source or destination is an MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, or MXP_2.5G_10EX_C card, the Mapping parameter must always be set to Synch.

Set the proactive protection attributes. Proactive Protection Regen is supported on OTU2XP ports alone in Standard Regen and Enhanced FEC mode

Note Proactive protection regen is supported only on CRS-based OCH trails.

- Proactive Protection—Choose **Enable** or **Disable**.
- Trigger Threshold—Choose the minimum BER threshold to trigger proactive protection by sending forward defect indication (FDI).
- Trigger Window—The trigger window value must be in multiples of 10 ms for trigger thresholds between 1E-3 and 6E-6 or 100 ms for trigger threshold between 5E-6 to 1E-7. Enter the duration to monitor the BER before triggering the proactive protection. The trigger window must be less than or equal to 10000 ms.
- Revert Threshold—Choose a BER value, to indicate the threshold at which the FDI is cleared to allow traffic.
- Revert Window—Enter the duration to monitor the BER for which it should be less than the revert threshold value before removing the FDI sent to the router.
  The revert window must be less than or equal to 10000ms. The revert window value must be at least 2000ms and in multiples of 10ms for a Revert Threshold of 1E-4 to 6E-7, or 100ms for a Revert Threshold of 5E-7 to 5E-8.
- Set the protection in the Protection area, as needed. The fields in the protection area are disabled if the OCHCC is not protected and for OCH Trails. Set the following attributes:
  - Revertive—If checked, traffic reverts to the working card after failure conditions remain corrected for the amount of time entered in the Reversion Time field.
  - Reversion Time—Sets the reversion time when Revertive is checked. The range is 0.5 to 12.0 minutes. The default is 5.0 minutes. Reversion time is the amount of time that will elapse before the traffic reverts to the working card after conditions causing the switch are cleared.

Step 2 Return to your originating procedure (NTP).

DLP-G438 Set OCH Routing Preferences

Purpose	This task provisions OCH routing preferences.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
	The OCH Circuit Routing Preferences page must be open.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In the OCH Circuit Routing Preferences page, view the circuit route. The new OCH appears with blue span arrows. Moving your cursor over the arrow displays span information including source, destination, and span loss. Complete the following steps to manually provision the routing constraints.

a. In the circuit map area, click a node that you want to include or exclude from the circuit route.

b. Click **Include** or **Exclude**. The node name will appear under the Included nodes or Excluded nodes list. Include and Exclude cannot be applied to source or destination nodes.

c. Repeat Steps a and b until the circuit routing constraints are complete. To remove a node from the Included nodes or Excluded nodes list, click the node in the list and click **Remove**. To move a node up or down in the routing sequence, click the node in the list and click **Up** or **Down**.

Note Use the Reset button as needed to clear the constraints and set the default routing.

d. To force the circuit route through specific links, click **Advanced**. Select the sides where the circuit must cross this node and click **OK**:

– No Side Constraints—Uncheck.

– Side In—Choose the first side from the drop-down list.

– Side Out—Choose the second side from the drop-down list.

Note All forced links appear in yellow.

e. Click **Apply**. CTC verifies the circuit route. If the route is valid, a "Routing evaluation succeeded." message appears. If this message appears, click **OK**. If the route is not valid, a Route Error dialog box appears with an error message. If an error message appears, evaluate the error, click **Close** to close the error dialog box and repeat Steps a through e until the circuit route is successfully validated.

f. If the OCHCC is protected, repeat Steps a through e for the protect trunk ports.

Step 2 Return to your originating procedure (NTP).

DLP-G706 Perform Optical Validation of GMPLS Circuits

Purpose	This task performs revalidation of a GMPLS circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 2 Select the GMPLS circuit to be re-validated and click **Opt Val**. The optical validation is performed and its result is displayed in a pop-up window.

Step 3 Return to your originating procedure (NTP).

DLP-G707 Upgrade a Non-GMPLS Circuit to a GMPLS Circuit

Purpose	This task upgrades a non-GMPLS circuit to a GMPLS circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 If the non-GMPLS circuit was provisioned in a release older than R9.40, ensure that fiber attributes are available in the Provisioning > WDM-ANS -> GMPLS/WSON -> Fiber Attributes tab. For more information about the Fiber Attributes tab, see the "12.10.3.5 Fiber Attributes and Alien Wavelength Provisioning" section on page 12-118.

If the Fiber Attributes tab is empty, import the latest Cisco Transport Planner NE Update configuration file as described in the "NTP-G143 Import the Cisco Transport Planner NE Update Configuration File" task on page 14-47.

Step 2 Define the Alien Wavelength parameters in the Provisioning > WDM-ANS -> GMPLS/WSON -> Alien Wavelength tab if one of the following conditions exist. If not, continue with Step 3.

- In the non-GMPLS circuit, the TXP or MXP or ITU-T line cards are connected to the add/drop DWDM ports with provisionable patchcords (PPCs).
- No internal patchcords exist between the TXP/MXP and the add/drop DWDM ports (for example, in the case of a CRS connected to the add/drop DWDM ports).

For more information about the Alien Wavelength tab, see the "12.10.3.5 Fiber Attributes and Alien Wavelength Provisioning" section on page 12-118.

Step 3 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 4 Select the circuit to be upgraded and click **WSON Upgrade**.

Note The WSON Upgrade option is available only when a non-GMPLS circuit is selected.

Step 5 Click **Yes** in the Upgrade Circuits confirmation dialog box. The WSON/GMPLS Circuit Promotion dialog box is displayed.

Step 6 From the Validation drop-down list, choose the validation mode. For more information about the validation modes, see the "12.10.1.3 Validation Modes" section on page 12-110.

Step 7 From the Promotion Validation degree drop-down list, choose the optical validation value. For more information about the acceptance threshold value, see the "12.10.1.2 Acceptance Thresholds" section on page 12-110.

Step 8 Return to your originating procedure (NTP).

NTP-G178 Create, Delete, and Manage Optical Channel Trails

Purpose	This procedure creates and deletes DWDM OCH trail circuits and changes their administrative states. The OCH trail circuits can be created using the Circuit Creation wizard or the GMPLS view.
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at a node on the network where you want to manage OCHNCs. If you are already logged in, continue with Step 2.

Step 2 If you want to assign a name to the OCHNC source and destination ports before you create the circuit, complete the "DLP-G104 Assign a Name to a Port" task on page 16-16. If not, continue with the next step.

Step 3 Complete either of the following procedures as needed, between ADM-10G cards or GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards that are provisioned in L2-over-DWDM mode:

- "DLP-G395 Create an Optical Channel Trail" task on page 16-34
- "DLP-G708 Create a GMPLS Optical Channel Trail" task on page 16-36

Step 4 Complete the "DLP-G706 Perform Optical Validation of GMPLS Circuits" task on page 16-32, as needed.

Step 5 Complete the "DLP-G707 Upgrade a Non-GMPLS Circuit to a GMPLS Circuit" task on page 16-32, as needed.

Step 6 Complete the "DLP-G710 Reroute Wavelength of GMPLS Circuits" task on page 16-48, as needed.

Step 7 Complete the "DLP-G425 Edit an OCH Trail Circuit Name" task on page 16-38, as needed.

Step 8 Complete the "DLP-G419 Change an OCH Trail Administrative State" task on page 16-39, as needed.

Step 9 Complete the "DLP-G418 Delete an Optical Channel Trail" task on page 16-37, as needed.

Stop. You have completed this procedure.

DLP-G395 Create an Optical Channel Trail

Purpose	This task creates an OCH trail circuit between ADM-10G cards, CRS-1 routers, or GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards when provisioned in L2-over-DWDM mode. For OCH trails connecting ADM-10G cards, the OCH trail provides the low-layer path to route STS or VC circuits over ADM-10G cards. For OCH trails connecting GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards in L2-over-DWDM mode, the OCH trail provides the links associated to the SVLAN entities. For OCH trails connecting CRS-1 or Cisco 7600 routers, the OCH trail provides end-to-end circuit connectivity between the CRS-1 or Cisco 7600 routers passing through an MSTP network.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note OCH trail circuits are created automatically when you provision OCHCC circuits between TXP and MXP cards.

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** tab, then click **Create**. The Circuit Creation wizard is displayed.

Step 3 In the Circuit Creation wizard, choose **OCHTRAIL** from the Circuit Type list.

Step 4 Click **Next**.

Step 5 In the Circuit area of the Circuit Attributes page, provision the OCH trail circuit attributes:

- Name—Assign a name to the OCH trail. The name can be alphanumeric and up to 48 characters (including spaces). Circuit names should be 44 characters or less if you want the ability to create monitor circuits. If you leave the field blank, CTC assigns a default name to the circuit.
- Type—(Display only) Displays the OCH trail type—OCHTRAIL.
- Size—(Display only) Equipped non specific is the default.
- OCHNC Wavelength—Choose a band (either **C Band** or **L Band**) in the lower drop-down list. Then, choose the OCHNC wavelength that you want to assign to the OCH trail circuit in the upper drop-down list. See Table 16-6 on page 16-20 and Table 16-7 on page 16-22 for C-band and L-band wavelengths.
- Bidirectional—This parameter does not apply to OCH trail circuits.
- State—Provision the OCH trail circuit state. The state can be **IS,AINS** (ANSI)/**Unlocked automatic inservice** (ETSI) or **OOS,DSBLD** (ANSI)/**Locked,Disabled** (ETSI).

- Apply to trunk ports—Check this box if you want to provision the administrative state of the OCH trail trunk ports. If checked, choose the state in the next field, either **IS** (ANSI)/**Unlocked** (ETSI) or **OOS,DSBLD** (ANSI)/**Locked,Disabled** (ETSI).

Step 6 Click **Next**.

Step 7 In the Circuit Source area, choose the source node from the Node drop-down list, then choose the source shelf (multishelf nodes only) from the Shelf drop-down list, the source slot from the Slot drop-down list, and, if needed, the source port from the Port drop-down list. For most cards, the port will be automatically chosen.

If you are creating an OCH trail circuit between CRS-1 or Cisco 7600 routers, choose the source CRS-1 or Cisco 7600 router from the Node drop-down list. The Shelf, Slot, and Port fields are not available. CTC automatically selects the PLIM port depending on the OCHNC Wavelength value specified in Step 5.

The source In and Out shelf (multishelf nodes only), slot, and port appear under the OTS Lines area.

Step 8 Click **Next**.

Step 9 In the Circuit Destination area, choose the destination node from the Node drop-down list (only the source node will be available because the source and destination nodes are the same), then choose the destination shelf (multishelf nodes only) from the Shelf drop-down list, the destination slot from the Slot drop-down list, and, if needed, the destination port from Port drop-down list.

If you are creating an OCH trail circuit between CRS-1 or Cisco 7600 routers, choose the destination CRS-1 or Cisco 7600 router from the Node drop-down list. The Shelf, Slot, and Port fields are not available. CTC automatically selects the PLIM port depending on the OCHNC Wavelength value specified in Step 5.

The destination In and Out shelf (multishelf only), slot, and port appear under the OTS Lines area to show the destination in and out shelf, slots, and ports.

Step 10 Click **Next**.

Step 11 Complete the "DLP-G437 Set OCH Circuit Attributes" task on page 16-29.

Step 12 **Click Next.**

Step 13 Complete the "DLP-G438 Set OCH Routing Preferences" task on page 16-31. Skip this step and continue with Step 14 if no constraints are needed. If the trunk ports are already connected by an existing OCH Trail (MXP case) or by a direct PPC link, the OCH Circuit Routing Preferences page appears in read-only mode; all buttons are disabled. Continue with Step 14.

Step 14 Click **Finish**. The Create Circuit wizard closes and the OCH trail circuit appears in the Circuits table with a DISCOVERED status in the Status column. (The circuit might take a few minutes to come up, depending on the size of the network.)

Step 15 Return to your originating procedure (NTP).

DLP-G708 Create a GMPLS Optical Channel Trail

Purpose	This task creates a GMPLS OCH trail circuit between ADM-10G cards, CRS-1 routers, or GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards when provisioned in L2-over-DWDM mode. For OCH trails connecting ADM-10G cards, the OCH trail provides the low-layer path to route STS or VC circuits over ADM-10G cards. For OCH trails connecting GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards in L2-over-DWDM mode, the OCH trail provides the links associated to the SVLAN entities. For OCH trails connecting CRS-1 routers, the OCH trail provides end-to-end circuit connectivity between the CRS-1 routers passing through an MSTP network.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note OCH trail circuits are created automatically when you provision OCHCC circuits between TXP and MXP cards.

Step 1 From the View menu, choose **Go to Network View** and click the **FV** icon in the toolbar. The NFV View opens.

Step 2 From the Change Perspective drop-down list in the toolbar, choose **GMPLS**. The GMPLS view opens.

Step 3 In the Circuit Parameters pane, provision the OCH Trail circuit attributes:

a. Name—Assign a name to the circuit. The name can be alphanumeric and up to 48 characters (including spaces).

b. Type—Choose **OCHTrail**.

c. Bidirectional—This parameter does not apply to OCH trail circuits.

d. Protected—This parameter does not apply to OCH trail circuits.

e. IS—Check to place the trunk ports of the TXP /MXP card in service.

f. OCHNC Wavelength—Provides three fields to define the wavelength for the OCHCC circuit. Choose a wavelength from the first field. In the second field, change the wavelength band by choosing **C Band**. In the third field, indicate whether odd or even C-band wavelengths appear. Table 16-6 lists the C-band wavelengths.

g. Validation—Set the validation mode. For more information about the validation modes, see the "12.10.1.3 Validation Modes" section on page 12-110.

h. Acceptance threshold—Set the optical validation threshold value for the GMPLS circuit. The circuit is created if the actual optical validation result is greater than or equal to the value set in this field. For more information about the acceptance threshold value, see the "12.10.1.2 Acceptance Thresholds" section on page 12-110.

Step 4 Configure the source and destination ports at the circuit endpoints in the map. For more information about configuring the source and destination ports, see the "12.10.3.3 Source and Destination Port Configuration" section on page 12-116.

Step 5 Define the working or protect port parameters. For more information, see the "12.10.3.3.1 Working and Protect Port Parameters" section on page 12-117. Click **Apply** in the Working Port Parameters pane and Protected Port Parameters pane, to apply the settings.

Step 6 Click **Apply** in the Circuit Parameters pane.

Step 7 Click **Yes** in the Create Circuits confirmation dialog box.
The OCH trail appear in the Circuits tab in the Network Data pane. After the circuit status has been verified, the DISCOVERED status appears in the Status column. The circuit might take a few minutes to come up, depending on the size of the network.

Step 8 Return to your originating procedure (NTP).

DLP-G418 Delete an Optical Channel Trail

Purpose	This task deletes DWDM OCH trail circuits.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note If you are deleting more than half of all the active OCH trails, it is recommended that you delete them two at a time to allow for proper power compensation. You do not need to delete the active OCH trails two at a time if you are deleting all of them.

Step 1 Complete the "NTP-G103 Back Up the Database" task on page 24-2 to preserve existing settings and, if you want to recreate the circuits, record the circuit information.

Step 2 Consult your network operations center (NOC) or other appropriate personnel to verify that the OCH trail can be safely deleted.

Step 3 Investigate all network alarms and resolve any problems that might be affected by the OCH trail deletion.

Step 4 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 5 Under the Type column, choose one or more OCH trails that you want to delete, then click **Delete**.

Step 6 In the Delete Circuits confirmation dialog box, complete the following:

- Change drop port admin state—Check this box if you want to change the administrative state for the circuit source and destination ports. After checking the box, choose one of the following administrative states:
  - **IS** (ANSI) or **Unlocked** (ETSI)—Puts the ports in service.
  - **IS,AINS** (ANSI) or **UnlockedAutomaticInService** (ETSI)—Puts the ports in automatic in service.

  - **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI)—Removes the ports from service and disables them.
  - **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI)—Removes the ports from service for maintenance.
- Notify when completed—Check this box if you want the CTC Alerts confirmation dialog box to notify you when the OCH trail is deleted. During this time, you cannot perform other CTC functions. If you are deleting many OCH trails, waiting for confirmation might take a few minutes. Circuits are deleted whether or not this check box is checked.

Note The CTC Alerts dialog box will not automatically open to show a deletion error unless you checked All alerts or Error alerts only in the CTC Alerts dialog box. For more information, see the DLP-G53 Configure the CTC Alerts Dialog Box for Automatic Popup. If the CTC Alerts dialog box is not set to open automatically with a notification, the red triangle inside the CTC Alerts toolbar icon indicates that a notification exists.

Step 7 Complete either of the following:

- If you checked Notify when completed, the CTC Alerts dialog box appears. If you want to save the information, continue with Step 8. If you do not want to save the information, continue with Step 9.
- If you did not check Notify when completed, the Circuits page appears. Continue with Step 10.

Step 8 If you want to save the information in the CTC Alerts dialog box, complete the following steps. If you do not want to save it, continue with Step 10.

a. Click **Save**.

b. Click **Browse** and navigate to the directory where you want to save the file.

c. Type the file name using a TXT file extension, and click **OK**.

Step 9 Click **Close** to close the CTC Alerts dialog box.

Step 10 Complete the "NTP-G103 Back Up the Database" task on page 24-2 if you require a backup of your changes.

Step 11 Return to your originating procedure (NTP).

DLP-G425 Edit an OCH Trail Circuit Name

Purpose	This task changes the name of an OCH trail circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G105 Provision Optical Channel Network Connections, page 16-41
	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 2 To rename the OCH trail circuit, do either of the following.

- Network view—Select the OCHCC circuit in the Circuits tab and click **Edit**.
- NFV view or GMPLS view—Double-click the circuit in the Circuits tab.

Step 3 In the Edit Circuit dialog box, click the **General** tab.

Step 4 In the Name field, enter the new OCH trail circuit name.

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

DLP-G419 Change an OCH Trail Administrative State

Purpose	This task changes the administrative state of an OCH trail circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G395 Create an Optical Channel Trail, page 16-34 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 2 To change the administrative state of the OCH trail circuit, do either of the following.

- Network view—Select the OCHCC circuit in the Circuits tab and click **Edit**.
- NFV view or GMPLS view—Double-click the circuit in the Circuits tab.

Step 3 In the Edit Circuit dialog box, click the **State** tab.

Step 4 Click the cell in the Admin State column for the card you want to change, and choose an administrative state from the drop-down list:

- **IS,AINS** (ANSI) or **Unlocked,AutomaticInService** (ETSI)
- **OOS,DSBLD** (ANSI) or **Locked** (ETSI)

Step 5 Click **Apply**.

Step 6 If you are changing the OCH trail state to OOS/Locked, click **OK** in the confirmation dialog box. (No confirmation dialog box appears when you place OCH trails in service.)
For information about the OCH circuit state transitions, see the Administrative and Service States document.

Step 7 Return to your originating procedure (NTP).

NTP-G59 Create, Delete, and Manage Optical Channel Network Connections

Purpose	This procedure creates and deletes DWDM OCHNC channels and changes their administrative states. The OCHNC circuits can be created using the Circuit Creation wizard or the GMPLS view.
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at a node on the network where you want to manage OCHNCs. If you are already logged in, continue with Step 2.

Step 2 To provision an OCHNC circuit, use either of the following procedures as needed:

- "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41
- "DLP-G709 Provision GMPLS Optical Channel Network Connections" task on page 16-43

Step 3 Complete the "DLP-G493 Provision Protected Optical Channel Network Connections" task on page 16-44, as needed.

Step 4 Complete the "DLP-G706 Perform Optical Validation of GMPLS Circuits" task on page 16-32, as needed.

Step 5 Complete the "DLP-G707 Upgrade a Non-GMPLS Circuit to a GMPLS Circuit" task on page 16-32, as needed.

Step 6 Complete the "DLP-G710 Reroute Wavelength of GMPLS Circuits" task on page 16-48, as needed.

Step 7 Complete the "DLP-G426 Edit an OCHNC Circuit Name" task on page 16-47, as needed.

Step 8 Complete the "DLP-G420 Change an OCHNC Administrative State" task on page 16-48, as needed.

Step 9 Complete the "DLP-G106 Delete Optical Channel Network Connections" task on page 16-46, as needed.

Stop. You have completed this procedure.

DLP-G105 Provision Optical Channel Network Connections

Purpose	This task creates an OCHNC between two optical nodes upon a specified C-band or L-band wavelength through the ports residing on the 32WSS, 32WSS-L, 40-WSS-C, 40-WSS-CE, 32DMX-O, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 4MD-xx.x, AD-1C-xx.x, AD-4C-xx.x, 40-SMR1-C, 40-SMR2-C, 80-WXC-C, 15216-FLD-4, 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN, and 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD wavelength selective switches, multiplexers, demultiplexers, and add/drop cards: OCH trails, which carry OCHCC circuits, are associated to the OCHNCs.
Tools/Equipment	None
Prerequisite Procedures	• DLP-G46 Log into CTC • An OCHNC add port on the source node and an OCHNC drop port on destination node of the same wavelength • Cisco Transport Planner Traffic Matrix Report
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note In a node using OTU2_XP cards configured in the regen mode, you must create two OCHNC circuits, one on either side of the card.

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** tab, then click **Create**.

Step 3 In the Circuit Creation dialog box, choose **OCHNC** from the Circuit Type list.

Step 4 Click **Next**.

Step 5 In the Circuit area of the Circuit Attributes page, provision the OCHNC circuit attributes:

- Name—Assign a name to the OCHNC. The name can be alphanumeric and up to 48 characters (including spaces). Circuit names should be 44 characters or less if you want the ability to create monitor circuits. If you leave the field blank, CTC assigns a default name to the circuit.
- Type—(Display only) OCHNC.
- Size—(Display only) Equipped non specific is the default.
- OCHNC Wavelength—Choose a band (either **C Band** or **L Band**) and wavelength number type (**Odd** or **Even**) in the lower drop-down list. Then, choose the wavelength that you want to provision in the upper drop-down list. See Table 16-6 on page 16-20 for C-band and Table 16-7 on page 16-22 for L-band wavelengths.
- Bidirectional—Check this box to create a bidirectional OCHNC; uncheck it to create a unidirectional OCHNC.
- OCHNC DCN—Check this box to create an OCHNC DCN. The OCHNC DCN establishes preliminary connectivity between nodes that lack LAN or optical service channel (OSC) connections. After the OCHNC is created, you create a GCC termination to provide permanent communications channel between the nodes. See the "DLP-G76 Provision DCC/GCC

Terminations" task on page 16-82.

- Protection—Check to create a protected OCHNC. For more details, see the "DLP-G493 Provision Protected Optical Channel Network Connections" task on page 16-44.
- State—Provisions the OCHNC circuit state. The state can be **IS,AINS** (ANSI)/**Unlocked, automatic in-service** (ETSI) or **OOS,DSBLD** (ANSI)/**Locked,Disabled** (ETSI).

Step 6 Click **Next**.

Step 7 In the Circuit Source area, choose the source node from the Node drop-down list, then choose the source shelf (multishelf nodes only) from the Shelf drop-down list, the source slot from the Slot drop-down list, and, if needed, the source or ADD/DROP port from the Port drop-down list.

The source In and Out shelf (multishelf nodes only), slot, and port appear under the OTS Lines area.

Step 8 Click **Next**.

Step 9 In the Circuit Destination area, choose the destination node from the Node drop-down list, then choose the destination shelf (multishelf nodes only) from the Shelf drop-down list, the destination slot from the Slot drop-down list, and, if needed, the destination port from the Port drop-down list.

The destination In and Out shelf (multishelf nodes only), slot, and port appear under the OTS Lines area.

Step 10 Click **Next**.

Step 11 Skip this step and continue with Step 12 if no constraints are needed. If the trunk ports are already connected by an existing OCH Trail (MXP case) or by a direct PPC link, the OCH Circuit Routing Preferences page appears in read-only mode; all buttons are disabled. Continue with Step 12. If not, complete the "DLP-G438 Set OCH Routing Preferences" task on page 16-31.

Step 12 Click **Finish**. The Circuit Creation wizard closes and the new OCHNC appears in the Circuits table with a DISCOVERED status in the Status column. (The circuit might take a few minutes to come up, depending on the size of the network.)

Step 13 Return to your originating procedure (NTP).

DLP-G709 Provision GMPLS Optical Channel Network Connections

Purpose	This task provisions an OCHNC between two optical nodes upon a specified C-band wavelength through the ports residing on the 32WSS, 40-WSS-C, 40-WSS-CE, 32DMX, 40-DMX-C, 40-DMX-CE, 40-SMR1-C, 40-SMR2-C, 80-WXC-C, 15216-MD-40-EVEN, 15216-EF-40-EVEN, or 15216-MD-48-EVEN, and 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD wavelength selective switches, multiplexers, demultiplexers, and add/drop cards:
Tools/Equipment	Cisco Transport Planner Traffic Matrix Report
Prerequisite Procedures	• DLP-G46 Log into CTC • An OCHNC add port on the source node and an OCHNC drop port on destination node of the same wavelength • DLP-G350 Use the Cisco Transport Planner Traffic Matrix Report
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Parent View**. The Network view opens.

Step 2 Open the source node in the Network view either by double-clicking the node or right-clicking the node and choosing the **Open Node** option.

Step 3 Select the **Provisioning > WDM-ANS > GMPLS/WSON** tabs.

Step 4 Define the fiber attributes and alien wavelength parameters for the node in the Fiber Attributes and Alien Wavelength tabs, as needed. For more information about alien wavelength parameters, see the "12.10.3.5 Fiber Attributes and Alien Wavelength Provisioning" section on page 12-118.

Step 5 Repeat the Step 1 through Step 3 for the destination node.

Step 6 From the View menu, choose **Go to Network View** and click the **FV** icon in the toolbar. The NFV view opens.

Step 7 From the Change Perspective drop-down list in the toolbar, choose **GMPLS**. The GMPLS view opens.

Step 8 In the circuit parameters pane, provision the OCHNC circuit attributes:

a. Name—Assign a name to the circuit. The name can be alphanumeric and up to 48 characters (including spaces).

b. Type—Choose **OCHNC**.

c. Protected—Check to route the circuit on a protected path. Select the protection type from the drop-down list. The available option is:

  – PSM—When a PSM card is connected to a TXP card.

d. OCHNC Wavelength—Provides three fields to define the wavelength for the OCHCC circuit. Choose a wavelength from the first field. In the second field, change the wavelength band by choosing **C Band**. In the third field, indicate whether odd or even C-band wavelengths appear. Table 16-6 lists the C-band wavelengths.

e. Protected OCHNC Wavelength—Define the wavelength of the protected OCHCC circuit. This field is visible only when the Protected check box is checked in Step c. The options available are similar to that of OCHNC Wavelength.

f. Validation—Set the validation mode. For more information about the validation modes, see the "12.10.1.3 Validation Modes" section on page 12-110.

g. Acceptance threshold—Set the optical validation threshold value for the GMPLS circuit. The circuit is created if the actual optical validation result is greater than or equal to the value set in this field. For more information about the acceptance threshold value, see the "12.10.1.2 Acceptance Thresholds" section on page 12-110.

h. Protection Acceptance Threshold—Set the optical validation threshold value for the protected GMPLS circuit.

Step 9 Configure the source and destination ports in the map. For more information about configuring the source and destination ports, see the "12.10.3.3 Source and Destination Port Configuration" section on page 12-116.

Note The OCHNC circuit endpoints must be selected on channel ports, express add/drop ports, or add/drop ports. If other ports are selected, a warning dialog box is displayed prompting you to change the circuit type.

After the ports are selected, the Alien Wavelength Selection pane is displayed. This pane displays options for the RX and TX channels at the endpoints of the circuit.

Step 10 For both RX and TX channels, choose the alien class and the forward error correction (FEC) mode from the corresponding drop-down lists. For more information about FEC, see "G.9 FEC and E-FEC Modes" section on page G-16. Click **Apply** in the Alien Wavelength Selection pane.

Step 11 Click **Apply** in the Circuit Parameters pane.

Step 12 Click **Yes** in the Create Circuits confirmation dialog box.
The OCHNC circuit appears in the Circuits tab in the Network Data pane. After the circuit status has been verified, the DISCOVERED status appears in the Status column. The circuit might take a few minutes to come up, depending on the size of the network.

Step 13 Return to your originating procedure (NTP).

DLP-G493 Provision Protected Optical Channel Network Connections

Purpose	This task creates a protected OCHNC circuit when a PSM card is provisioned at the endpoint nodes of a DWDM network. OCH trails, which carry OCHCC circuits, are associated to the OCHNCs.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
	An OCHNC add port on the source node and an OCHNC drop port on destination node of the same wavelength
	Cisco Transport Planner Traffic Matrix Report
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** tab, then click **Create**.

Step 3 In the Circuit Creation dialog box, choose **OCHNC** from the Circuit Type list.

Step 4 Click **Next**.

Step 5 In the Circuit area of the Circuit Attributes page, provision the OCHNC circuit attributes:

- Name—Assign a name to the OCHNC. The name can be alphanumeric and up to 48 characters (including spaces). Circuit names should be 44 characters or less if you want the ability to create monitor circuits. If you leave the field blank, CTC assigns a default name to the circuit.
- Type—(Display only) OCHNC.
- Size—(Display only) Equipped non specific is the default.
- OCHNC Wavelength—Choose a band (either **C Band** or **L Band**) and wavelength number type (**Odd** or **Even**) in the lower drop-down list. Then, choose the wavelength that you want to provision in the upper drop-down list. See Table 16-6 on page 16-20 and Table 16-7 on page 16-22 for C-band and L-band wavelengths.
- Bidirectional—Check this box to create a bidirectional OCHNC; uncheck it to create a unidirectional OCHNC. This field is not available if you check the Protection option.
- OCHNC DCN—Check this box to create an OCHNC DCN. The OCHNC DCN establishes preliminary connectivity between nodes that lack LAN or optical service channel (OSC) connections. After the OCHNC is created, you create a GCC termination to provide permanent communications channel between the nodes. See the "DLP-G76 Provision DCC/GCC Terminations" task on page 16-82.
- Protection—Check to create a protected OCHNC (only endpoint nodes equipped with PSM cards will be selectable as circuit endpoints).
- State—Provisions the OCHNC circuit state. The state can be **IS,AINS** (ANSI)/**Unlocked, automatic in-service** (ETSI) or **OOS,DSBLD** (ANSI)/**Locked,Disabled** (ETSI).

Step 6 Click **Next**.

Step 7 In the Circuit Source area, choose the source node from the Node drop-down list. Only endpoint nodes equipped with PSM cards are available for selection in the Node drop-down list. The slot, port, and the source In and Out OTS lines are automatically chosen by CTC.

Step 8 Click **Next**.

Step 9 In the Circuit Destination area, choose the destination node from the Node drop-down list. Only endpoint nodes equipped with PSM cards are available for selection in the Node drop-down list. The slot, port, and the source In and Out OTS lines are automatically chosen by CTC.

Step 10 Click **Next**. CTC completes the circuit creation by routing two distinct paths (a working path and a protected path) from the source node to the destination node. The working path is the one exiting the In/Out working source OTS lines and entering the In/Out working destination OTS lines. The protected path is the one exiting the In/Out protected source OTS lines and entering the In/Out protected destination OTS lines.

Step 11 Complete the "DLP-G438 Set OCH Routing Preferences" task on page 16-31. Skip this step and continue with Step 12 if no constraints are needed. If the trunk ports are already connected by an existing OCH Trail (MXP case) or by a direct PPC link, the OCH Circuit Routing Preferences page appears in read-only mode; all buttons are disabled. Continue with Step 12.

Step 12 Click **Finish**. The Circuit Creation wizard closes and the new OCHNC appears in the Circuits table with a DISCOVERED status in the Status column. (The circuit might take a few minutes to appear, depending on the size of the network.)

Step 13 Return to your originating procedure (NTP).

DLP-G106 Delete Optical Channel Network Connections

Purpose	This task deletes DWDM OCHNC circuits.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note If you are deleting more than half of all the active OCHNCs, it is recommended that you delete them two at a time to allow for proper power compensation. You do not need to delete the active OCHNCs two at a time if you are deleting all the them.

Step 1 To preserve existing settings you must back up the database of every node on the path of the circuit. Complete the "NTP-G103 Back Up the Database" task on page 24-2 to back up the databases for all nodes on the circuit path. Record the circuit information if you plan to recreate the circuit.

Step 2 Consult your NOC or other appropriate personnel to verify that the OCHNC can be safely deleted.

Step 3 Investigate all network alarms and resolve any problems that might be affected by the OCHNC deletion.

Step 4 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 5 In the Circuits table, under the Type column, choose one or more OCHNCs that you want to delete. (To choose more than one OCHNC, press the **Shift** or **Control** keys as you click the circuits.)

Step 6 Click **Delete**.

Step 7 In the Delete Circuits confirmation dialog box, check **Notify when completed**, as needed.

If checked, the CTC Alerts confirmation dialog box will alert you when the OCHNC is deleted. During this time, you cannot perform other CTC functions. If you are deleting many OCHNCs, waiting for confirmation might take a few minutes. Circuits are deleted whether or not this check box is checked.

Note The CTC Alerts dialog box will not automatically open to show a deletion error unless you checked All alerts or Error alerts only in the CTC Alerts dialog box. For more information, see the DLP-G53 Configure the CTC Alerts Dialog Box for Automatic Popup. If the CTC Alerts dialog box is not set to open automatically with a notification, the red triangle inside the CTC Alerts toolbar icon indicates that a notification exists.

Step 8 Complete either of the following:

- If you checked Notify when completed, the CTC Alerts dialog box appears. If you want to save the information, continue with Step 9. If you do not want to save the information, continue with Step 10.

- If you did not check Notify when completed, the Circuits page appears. Continue with Step 11.

Step 9 If you want to save the information in the CTC Alerts dialog box, complete the following steps.

a. Click **Save**.

b. Click **Browse** and navigate to the directory where you want to save the file.

c. Type the file name using a.txt file extension, and click **OK**.

Step 10 Click **Close** to close the CTC Alerts dialog box.

Step 11 Complete the "NTP-G103 Back Up the Database" task on page 24-2 for every node on the path of the circuit if you require a backup of your changes.

Step 12 Return to your originating procedure (NTP).

DLP-G426 Edit an OCHNC Circuit Name

Purpose	This task changes the name of an OCHNC circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G105 Provision Optical Channel Network Connections, page 16-41
	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 2 To rename the OCHCC circuit, do either of the following.

- Network view—Select the OCHCC circuit in the Circuits tab and click **Edit**.
- NFV view or GMPLS view—Double-click the circuit in the Circuits tab.

Step 3 In the Edit Circuit dialog box, click the **General** tab.

Step 4 In the Name field, enter the new OCHNC circuit name.

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

DLP-G420 Change an OCHNC Administrative State

Purpose	This task changes the administrative state of an OCHNC circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G105 Provision Optical Channel Network Connections, page 16-41 DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Go to the network view, NFV view, or GMPLS view, and click the **Circuits** tab.

Step 2 To change the administrative state of the OCHCC circuit, do either of the following.

- Network view—Select the OCHCC circuit in the Circuits tab and click **Edit**.
- NFV view or GMPLS view—Double-click the circuit in the Circuits tab.

Step 3 In the Edit Circuit dialog box, click the **State** tab.

Step 4 Choose an administrative state from the drop-down list:

- **IS,AINS** (ANSI) or **Unlocked,AutomaticInService** (ETSI)
- **OOS** (ANSI) or **Locked** (ETSI)

Step 5 Click **Apply**.

Step 6 If you are changing the OCHNC state to OOS,DSBLD (ANSI) or Locked,Disabled (ETSI), click **OK** in the confirmation dialog box. (No confirmation dialog box appears when you place OCH trails in service.)
For information about the OCH circuit state transitions, see the Administrative and Service States document.

Step 7 Return to your originating procedure (NTP).

DLP-G710 Reroute Wavelength of GMPLS Circuits

Purpose	This task reroutes an existing GMPLS circuit through an alternate path based on the specified path constraints.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note GMPLS OCHCC circuits cannot be rerouted. Only the OCH Trail associated with the OCHCC circuit can be rerouted.

Step 1 From the View menu, choose **Go to Network View** and click the **FV** icon in the toolbar. The NFV view opens.

Step 2 From the Change Perspective drop-down list in the toolbar, choose **GMPLS**. The GMPLS view opens.

Step 3 Click the **Wavelength re-routing** button.

Step 4 In the confirmation dialog box, click **Yes** to enter the wavelength re-routing view. The Wavelength re-routing pane is displayed.

Step 5 In the **Circuits** tab, select the GMPLS circuit to be rerouted.

Step 6 From the **Constraint Config** drop-down list, select the required constraint type. For more information about the various constraint types, see the Table 12-18.

Step 7 In the map, select the node or link to which the constraint is to be applied.

Step 8 Repeat Step 5 and Step 6 to apply more constraints, as needed.

Note While applying constraint to include a node or link on the alternate path, the selection of the nodes or links must be done sequentially, starting form the source to the destination of the circuit.

Step 9 Click **Apply**. The circuit is rerouted if a feasible path is found that complies with the specified constraints. After a successful reroute, a confirmation message is displayed. Otherwise, a failure notification is displayed.

Step 10 Repeat the reroute process in case the reroute fails in Step 9. Click **Clear** in the Wavelength re-routing pane to clear the previous selections. Repeat the Step 6 through Step 9.

Step 11 Click the **Wavelength re-routing** button on the toolbar to close the Wavelength re-routing pane. In the confirmation dialog box, click **Yes**.

Step 12 Return to your originating procedure (NTP).

NTP-G200 Create, Delete, and Manage STS or VC Circuits for the ADM-10G Card

Purpose	This procedure creates and deletes STS and VC circuits for the ADM-10G card.
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at a node on the network where you want to manage the STS or VC circuits. If you are already logged in, continue with Step 2.

Step 2 If you want to assign a name to the STS or VC source and destination ports before you create the circuit, complete the "DLP-G104 Assign a Name to a Port" task on page 16-16. If not, continue with the next step.

Step 3 If you are creating STS or VC circuits on ADM-10G cards across two nodes, you must complete the "DLP-G395 Create an Optical Channel Trail" task on page 16-34. If not, continue with the next step.

Step 4 Complete the "DLP-G463 Create an Automatically Routed STS or VC Circuit" task on page 16-50, as needed.

Step 5 Complete the "DLP-G464 Create a Manually Routed STS or VC Circuit" task on page 16-53, as needed.

Step 6 Complete the "DLP-G467 Edit an STS or VC Circuit Name" task on page 16-58, as needed.

Step 7 Complete the "DLP-G466 Delete an STS or VC Circuit" task on page 16-57, as needed.

Stop. You have completed this procedure.

DLP-G463 Create an Automatically Routed STS or VC Circuit

Purpose	This procedure creates an automatically routed STS or VC circuit for the ADM-10G card. CTC chooses the circuit route based on the parameters you specify and on the software version.
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure requires the use of automatic routing. Automatic routing is not available if both the Automatic Circuit Routing NE default and the Network Circuit Automatic Routing Overridable NE default are set to FALSE. For a full description of these defaults see the *Network Element Defaults*.

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** tab, then click **Create**.

Step 3 In the Circuit Creation dialog box, complete the following fields:

- Circuit Type—Choose **STS** or **VC** from the Circuit Type list.
- Number of Circuits—Enter the number of STS or VC circuits that you want to create. The default is 1. If you are creating multiple circuits with the same slot and sequential port numbers, you can use Auto-ranged to create the circuits automatically.
- Auto-ranged—This check box is automatically selected if you enter more than 1 in the Number of Circuits field. Auto-ranging creates identical (same source and destination) sequential circuits automatically. Uncheck the box if you do not want CTC to create sequential circuits automatically.

Step 4 Click **Next**.

Step 5 Define the circuit attributes:

- Name—Assign a name to the circuit. The name can be alphanumeric and up to 48 characters, (including spaces). Circuit names should be 43 characters or less if you want the ability to create monitor circuits. If you leave the field blank, CTC assigns a default name to the circuit.
- Size—Choose the circuit size.
  - Available SONET circuits are **STS-1, STS-3c, STS-6c, STS-9c, STS-12c, STS-18c, STS-24c, STS-36c, STS-48c**, and **STS-192c**.
  - Available SDH circuits are**VC4, VC4-2c, VC4-3c, VC4-4c, VC4-6c, VC4-8c, VC4-12c, VC4-16c**, and **VC4-64c**.

Note For creating a circuit using a Gigabit Ethernet port, choose the circuit size as **STS-24c** for a SONET circuit or **VC4-8c** for a SDH circuit.

Note An equivalent SDH circuit size for STS-1 SONET circuit does not exist.

- Bidirectional—Leave checked for this circuit (default).
- Create cross-connects only (TL1-like)—Check this box if you want to create one or more cross-connects to complete a signal path for TL1-generated circuits.
- Diagnostic—Leave unchecked.
- State—Choose the administrative state to apply to all of the cross-connects in a circuit:
  - IS (ANSI)/Unlocked (ETSI)—Puts the circuit cross-connects in the IS-NR (ANSI) or unlocked-enabled (ETSI) service state.
  - OOS,DSBLD (ANSI)/Locked,Disabled (ETSI)—Puts the circuit cross-connects in the OOS-MA,DSBLD (ANSI) or locked-enabled,disabled (ETSI) service state. Traffic is not passed on the circuit.
  - IS,AINS (ANSI)/Unlocked,AutomaticInService (ETSI)—Puts the circuit cross-connects in the OOS-AU,AINS (ANSI) or unlocked-disabled,automaticInService (ETSI) service state and suppresses alarms and conditions. When the connections receive a valid signal, the service state automatically changes to IS-NR (ANSI) or unlocked-enabled (ETSI).
  - OOS,MT (ANSI)/Locked,maintenance (ETSI)—Puts the circuit cross-connects in the OOS-MA,MT (ANSI) or locked-enabled,maintenance (ETSI) service state. The maintenance state does not interrupt traffic flow; it suppresses alarms and conditions and allows loopbacks to be performed on the circuit. Use OOS,MT (ANSI) or locked,maintenance (ETSI) for circuit testing or to suppress circuit alarms temporarily.
- Apply to drop ports—Check this check box if you want to apply the administrative state chosen in the State field to the circuit source and destination ports. CTC applies the administrative state to the ports only if the circuit bandwidth is the same as the port bandwidth or, if the port bandwidth is larger than the circuit, the circuit must be the first circuit to use the port. If not, a Warning dialog box displays the ports where the administrative state could not be applied. If the check box is unchecked, CTC does not apply the administrative state to the source and destination ports.

Note If ports managed into the IS (ANSI) or Unlocked (ETSI) administrative state are not receiving signals, loss of signal alarms are generated and the port service state transitions to OOS-AU,FLT (ANSI) or Unlocked-disabled,failed (ETSI).

- Protected Drops—Check this box if you want the circuit routed on protected drops only, that is, to ONS 15454 cards that are in 1:1, 1:N, 1+1, or optimized 1+1 protection. If you check this box, CTC displays only protected cards and ports as source and destination choices.

Step 6 If the circuit will be routed on a path protection configuration, complete the "DLP-G465 Provision Path Protection Selectors" task on page 16-56. Otherwise, continue with Step 7.

Step 7 Click **Next**.

Step 8 In the Circuit Source area, choose the source node from the Node drop-down list, then choose the source shelf (multishelf nodes only) from the Shelf drop-down list, the source slot from the Slot drop-down list, and, if needed, the source port from the Port drop-down list. For most cards, the port will be automatically chosen.

Step 9 If you need to create a secondary source, for example, a path protection bridge/selector circuit entry point in a multivendor path protection configuration, click **Use Secondary Source** and repeat Step 8 to define the secondary source. If you do not need to create a secondary source, continue with Step 10.

Step 10 Click **Next**.

Step 11 In the Circuit Destination area, choose the destination node from the Node drop-down list (only the source node will be available because the source and destination nodes are the same), then choose the destination shelf (multishelf nodes only) from the Shelf drop-down list, the destination slot from the Slot drop-down list, and, if needed, the destination port from Port drop-down list.

Step 12 Click **Next**.

Step 13 In the Circuit Routing Preferences area, choose **Route Automatically**. Two options are available; choose either, both, or none based on your preferences.

- Using Required Nodes/Spans—Check this check box if you want to specify nodes and spans to include or exclude in the CTC-generated circuit route.

  Including nodes and spans for a circuit ensures that those nodes and spans are in the working path of the circuit (but not the protect path). Excluding nodes and spans ensures that the nodes and spans are not in the working or protect path of the circuit.

- Review Route Before Creation—Check this check box if you want to review and edit the circuit route before the circuit is created.

Step 14 To set the circuit path protection, complete one of the following:

- To route the circuit on a protected path, leave Fully Protected Path checked and continue with Step 15. CTC creates a fully protected circuit route based on the path diversity option you choose. Fully protected paths might or might not have path protection path segments (with primary and alternate paths), and the path diversity options apply only to path protection path segments, if any exist.
- To create an unprotected circuit, uncheck **Fully Protected Path** and continue with Step 16.

Step 15 If you selected Fully Protected Path in Step 14 and the circuit will be routed on a path protection configuration, choose one of the following:

- Nodal Diversity Required—Ensures that the primary and alternate paths within path protection portions of the complete circuit path are nodally diverse.
- Nodal Diversity Desired—Specifies that node diversity is preferred, but if node diversity is not possible, CTC creates fiber-diverse paths for the path protection portion of the complete circuit path.
- Link Diversity Only—Specifies that only fiber-diverse primary and alternate paths for path protection portions of the complete circuit path are needed. The paths might be node-diverse, but CTC does not check for node diversity.

Step 16 If you checked Using Required Nodes/Spans in Step 13, complete the following substeps. Otherwise, continue with Step 17.

a. In the Circuit Constraints for Automatic Routing area, click a node or span on the circuit map.

b. Click **Include** to include the node or span in the circuit. Click **Exclude** to exclude the node or span from the circuit. The order in which you choose included nodes and spans is the order in which the circuit is routed. Click spans twice to change the circuit direction.

c. Repeat Step b for each node or span you wish to include or exclude.

d. Review the circuit route. To change the circuit routing order, choose a node in the Required Nodes/Lines or Excluded Nodes Links lists and click the **Up** or **Down** buttons to change the circuit routing order. Click **Remove** to remove a node or span.

Step 17 Click **Next**.

Step 18 If you selected Review Route Before Creation in Step 13, complete the following substeps. If not, continue with Step 19.

a. Click **Next**.

b. Review the circuit route. To add or delete a circuit span, choose a node on the circuit route. Blue arrows show the circuit route. Green arrows indicate spans that you can add. Click a span arrowhead, then click **Include** to include the span or **Remove** to remove the span.

c. If the provisioned circuit does not reflect the routing and configuration you want, click **Back** to verify and change circuit information. If the circuit needs to be routed to a different path, see the "DLP-G464 Create a Manually Routed STS or VC Circuit" procedure on page 16-53.

Step 19 Click **Finish**. One of the following results occurs if you entered more than one circuit in the Number of Circuits field on the Circuit Creation dialog box.

- If you chose Auto-ranged, CTC automatically creates the number of circuits entered in the Number of Circuits field. If auto-ranging cannot complete all the circuits, for example, because sequential ports are unavailable at the source or destination, a dialog box appears. Set the new source or destination for the remaining circuits, then click **Finish** to continue auto-ranging. After completing the circuits, the Circuits window appears.
- If you did not choose Auto-ranged, the Circuit Creation dialog box appears so you can create the remaining circuits. Repeat Steps 3 through 18 for each additional circuit. After completing the circuits, the Circuits window appears.

Step 20 In the Circuits window, verify that the new circuits appear in the circuits list.

Stop. You have completed this procedure.

DLP-G464 Create a Manually Routed STS or VC Circuit

Purpose	This procedure creates an STS or VC circuit and allows you to provision the circuit route for the ADM-10G card.
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** tab, then click **Create**.

Step 3 In the Circuit Creation dialog box, complete the following fields:

- Circuit Type—Choose **STS** or **VC** from the Circuit Type list.
- Number of Circuits—Enter the number of STS or VC circuits that you want to create. The default is 1.
- Auto-ranged—(Automatically routed circuits only) If you entered more than 1 in the Number of Circuits field on the Circuit Creation dialog box, uncheck this box. (The box is unavailable if only one circuit is entered in the Number of Circuits field.)

Step 4 Click **Next**.

Step 5 Define the circuit attributes:

- Name—Assign a name to the circuit. The name can be alphanumeric and up to 48 characters (including spaces). Circuit names should be 43 characters or less if you want the ability to create monitor circuits. If you leave the field blank, CTC assigns a default name to the circuit.
- Size—Choose the circuit size.
  - Available SONET are **STS-1, STS-3c, STS-6c, STS-9c, STS-12c, STS-18c, STS-24c, STS-36c, STS-48c**, and **STS-192c**.
  - Available SDH circuits are **VC4, VC4-2c, VC4-3c, VC4-4c, VC4-6c, VC4-8c, VC4-12c, VC4-16c**, and **VC4-64c**.

Note For creating a circuit using a Gigabit Ethernet port, choose the circuit size as **STS-24c** for a SONET circuit or **VC4-8c** for a SDH circuit.

- Bidirectional—Leave checked for this circuit (default).
- Create cross-connects only (TL1-like)—Check this box if you want to create one or more cross-connects to complete a signal path for TL1-generated circuits.
- State—Choose the administrative state to apply to all of the cross-connects in a circuit:
  - IS (ANSI)/Unlocked (ETSI)—Puts the circuit cross-connects in the IS-NR (ANSI) or unlocked-enabled (ETSI) service state.
  - OOS,DSBLD (ANSI)/Locked,Disabled (ETSI)—Puts the circuit cross-connects in the OOS-MA,DSBLD (ANSI) or locked-enabled,disabled (ETSI) service state. Traffic is not passed on the circuit.
  - IS,AINS (ANSI)/Unlocked,AutomaticInService (ETSI)—Puts the circuit cross-connects in the OOS-AU,AINS (ANSI) or unlocked-disabled,automaticInService (ETSI) service state and suppresses alarms and conditions. When the connections receive a valid signal, the service state automatically changes to IS-NR (ANSI) or unlocked-enabled (ETSI).
  - OOS,MT (ANSI)/Locked,maintenance (ETSI)—Puts the circuit cross-connects in the OOS-MA,MT (ANSI) or locked-enabled,maintenance (ETSI) service state. The maintenance state does not interrupt traffic flow; it suppresses alarms and conditions and allows loopbacks to be performed on the circuit. Use OOS,MT (ANSI) or locked,maintenance (ETSI) for circuit testing or to suppress circuit alarms temporarily.
- Apply to drop ports—Check this check box if you want to apply the administrative state chosen in the State field to the circuit source and destination ports. CTC applies the administrative state to the ports only if the circuit bandwidth is the same as the port bandwidth or, if the port bandwidth is

larger than the circuit, the circuit must be the first circuit to use the port. If not, a Warning dialog box displays the ports where the administrative state could not be applied. If the check box is unchecked, CTC does not apply the administrative state to the source and destination ports.

Note If ports managed into the IS (ANSI) or Unlocked (ETSI) administrative state are not receiving signals, loss of signal alarms are generated and the port service state transitions to OOS-AU,FLT (ANSI) or Unlocked-disabled,failed (ETSI).

- Protected Drops—Check this box if you want the circuit routed on protected drops only, that is, to ONS 15454 cards that are in 1:1, 1:N, 1+1, or optimized 1+1 protection. If you check this box, CTC shows only protected cards and ports as source and destination choices.

Step 6 If the circuit will be routed on a path protection configuration, complete the "DLP-G465 Provision Path Protection Selectors" task on page 16-56. Otherwise, continue with Step 7.

Step 7 Click **Next**.

Step 8 In the Circuit Source area, choose the source node from the Node drop-down list, then choose the source shelf (multishelf nodes only) from the Shelf drop-down list, the source slot from the Slot drop-down list, and, if needed, the source port from the Port drop-down list. For most cards, the port will be automatically chosen.

Step 9 If you need to create a secondary source, for example, a path protection bridge/selector circuit entry point in a multivendor path protection configuration, click **Use Secondary Source** and repeat Step 8 to define the secondary source. If you do not need to create a secondary source, continue with Step 10.

Step 10 Click **Next**.

Step 11 In the Circuit Destination area, choose the destination node from the Node drop-down list (only the source node will be available because the source and destination nodes are the same), then choose the destination shelf (multishelf nodes only) from the Shelf drop-down list, the destination slot from the Slot drop-down list, and, if needed, the destination port from Port drop-down list.

Step 12 Click **Next**.

Step 13 In the Circuit Routing Preferences area, uncheck **Route Automatically**.

Step 14 To set the circuit path protection, complete one of the following:

- To route the circuit on a protected path, leave Fully Protected Path checked and continue with Step 15. Fully protected paths might or might not have path protection path segments (with primary and alternate paths), and the path diversity options apply only to path protection path segments, if any exist.
- To create an unprotected circuit, uncheck **Fully Protected Path** and continue with Step 17.

Step 15 If you selected Fully Protected Path in Step 14 and the circuit will be routed on a path protection configuration, choose a Node-Diverse Path option:

- Nodal Diversity Required—Ensures that the primary and alternate paths within the path protection portions of the complete circuit path are nodally diverse.
- Nodal Diversity Desired—Specifies that node diversity is preferred, but if node diversity is not possible, CTC creates fiber-diverse paths for the path protection portion of the complete circuit path.
- Link Diversity Only—Specifies that only fiber-diverse primary and alternate paths for path protection portions of the complete circuit path are needed. The paths might be node-diverse, but CTC does not check for node diversity.

Step 16 Click **Next**.

Step 17 In the Route Review/Edit area, node icons appear for you to route the circuit manually. Click the source node icon if it is not already selected.

Step 18 Starting with a span on the source node, click the arrow of the span you want the circuit to travel. The arrow turns yellow. In the Selected Span area, the From and To fields provide span information. The source STS or VC appears.

Step 19 If you want to change the source STS or VC, adjust the Source STS or VC field; otherwise, continue with Step 20.

Step 20 Click Add Span. The span is added to the Included Spans list and the span arrow turns blue.

Step 21 If the Fully Protect Path check box is checked in the Circuit Routing Preferences panel, you must add two spans for all path protection or unprotected portions of the circuit route from the source to the destination.

Step 22 Repeat Steps 18 through 21 until the circuit is provisioned from the source to the destination node through all intermediary nodes.

Step 23 Click **Finish**. CTC compares your manually provisioned circuit route with the specified path diversity option you chose in Step 15. If the path does not meet the specified path diversity requirement, CTC displays an error message and allows you to change the circuit path.

Step 24 If you entered more than 1 in the Number of Circuits field on the Circuit Creation dialog box, the Circuit Creation dialog box appears so you can create the remaining circuits. Repeat Steps 3 through 23 for each additional circuit.

Step 25 When all the circuits are created, the main Circuits window appears. Verify that the circuits you created are correct.

Stop. You have completed this procedure.

DLP-G465 Provision Path Protection Selectors

Purpose	This task provisions path protection selectors during circuit creation or during a topology upgrade conversion.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
	The Circuit Attributes page of the Circuit Creation wizard must be open.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Provisioning path signal degrade (SD-P) or path signal fail (SF-P) thresholds in the Circuit Attributes page of the Circuit Creation wizard sets the values only for path protection-protected spans. The circuit source and destination use the node default values of 10E-4 for SD-P and 10E-6 for SF-P for unprotected circuits and for the source and drop of path protection circuits.

Step 1 In the path protection area of the Circuit Attributes page of the Circuit Creation wizard, set the path protection selectors:

- Provision working go and return on primary path—Check this box to route the working path on one fiber pair and the protect path on a separate fiber pair. This feature only applies to bidirectional path protection circuits.
- Revertive—Check this box if you want traffic to revert to the working path when the conditions that diverted it to the protect path are repaired. If you do not choose Revertive, traffic remains on the protect path after the switch.
- Reversion time—If Revertive is checked, click the Reversion time field and choose a reversion time from the drop-down list. The range is 0.5 to 12.0 minutes. The default is 5.0 minutes. This is the amount of time that will elapse before the traffic reverts to the working path. Traffic can revert when conditions causing the switch are cleared.
- SF threshold—Set the path protection path-level signal failure bit error rate (BER) thresholds.
- SD threshold—Set the path protection path-level signal degrade BER thresholds.
- Switch on PDI-P—Check this box if you want traffic to switch when an STS or VC payload defect indicator is received.

Step 2 Return to your originating procedure (NTP).

DLP-G466 Delete an STS or VC Circuit

Purpose	This task deletes STS or VC circuits.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "NTP-G103 Back Up the Database" task on page 24-2 to preserve existing settings and, if you will recreate the circuits, record the circuit information.

Step 2 Verify that traffic is no longer carried on the circuit and that the circuit can be safely deleted.

Step 3 Investigate all network alarms and resolve any problems that might be affected by the circuit deletion.

Step 4 From the View menu, choose **Go to Network View**.

Step 5 Click the **Circuits** tab.

Step 6 Choose one or more STS or VC circuits from the Type column that you want to delete, then click **Delete**.

Step 7 In the Delete Circuits confirmation dialog box, complete the following:

- Change drop port admin state—Check this box if you want to change the administrative state for the circuit source and destination ports. After checking the box, choose one of the following administrative states:
  - **IS** (ANSI) or **Unlocked** (ETSI)—Puts the ports in service.
  - **IS,AINS** (ANSI) or **UnlockedAutomaticInService** (ETSI)—Puts the ports in automatic in service.
  - **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI)—Removes the ports from service and disables them.

- **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI)—Removes the ports from service for maintenance.

- Notify when completed—If checked, the CTC Alerts confirmation dialog box indicates when the circuit is deleted. During this time, you cannot perform other CTC functions. If you are deleting many circuits, waiting for confirmation might take a few minutes. Circuits are deleted whether or not this check box is checked.

Note The CTC Alerts dialog box will not automatically open to show a deletion error unless you checked All alerts or Error alerts only in the CTC Alerts dialog box. For more information, see the DLP-G53 Configure the CTC Alerts Dialog Box for Automatic Popup. If the CTC Alerts dialog box is not set to open automatically with a notification, the red triangle inside the CTC Alerts toolbar icon indicates that a notification exists.

Step 8 Complete one of the following:

- If you checked Notify when completed, the CTC Alerts dialog box appears. If you want to save the information, continue with Step 8. If you do not want to save the information, continue with Step 9.
- If you did not check Notify when completed, the Circuits page appears. Continue with Step 10.

Step 9 If you want to save the information in the CTC Alerts dialog box, complete the following steps. If you do not want to save it, continue with Step 10.

a. Click **Save**.

b. Click **Browse** and navigate to the directory where you want to save the file.

c. Type the file name using a TXT file extension, and click **OK**.

Step 10 Click **Close** to close the CTC Alerts dialog box.

Step 11 Complete the "NTP-G103 Back Up the Database" task on page 24-2 if you require a backup of your changes.

Step 12 Return to your originating procedure (NTP).

DLP-G467 Edit an STS or VC Circuit Name

Purpose	This task changes the name of an STS or VC circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** tab.

Step 3 Click the STS or VC circuit whose name you want to edit, then click **Edit**. The Edit Circuit dialog box appears with the General tab displayed.

Step 4 In the Name field, enter the new STS or VC circuit name.

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

NTP-G150 Upgrade Optical Channel Network Connections to Optical Channel Client Connections

Purpose	This procedure upgrades OCHNCs created in earlier software releases to OCHCCs. It also upgrades an OCHNC circuit to an OCH trail circuit (without the OCHCC circuit) in case the PPCs or internal patchcords connect to an ADM_10G or GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE (only in L2-over-DWDM mode) cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G105 Provision Optical Channel Network Connections, page 16-41
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note During this procedure, the OCHNC is replaced with two circuit types, the OCHCC, which establishes a connection between the client card client ports, and the OCH trail, which establishes a connection between the client card trunk ports. The OCH trail is given the same name as the OCHNC. The OCHCC is given a system-generated name in the format: *circuit-type_NE-name::unique sequence number*. To edit the OCHCC circuit name, complete the "DLP-G424 Edit an OCHCC Circuit Name" task on page 16-28. To edit the OCH trail circuit name, complete the "DLP-G424 Edit an OCHCC Circuit Name" task on page 16-28.

Note Multiple OCHCCs might use the same OCH trail. The OCH Wlen (wavelength) parameter on the Circuits page can be used to determine the OCHCC and OCH trail associations.

Step 1 As needed, identify the OCHCC to be provisioned using the "DLP-G350 Use the Cisco Transport Planner Traffic Matrix Report" task on page 15-31.

Step 2 Complete the DLP-G46 Log into CTC at a node on the network where you want to upgrade the OCHNCs. If you are already logged in, continue with Step 3.

Step 3 From the View menu, choose **Go to Network View**.

Step 4 Click the **Circuits** tab and find the OCH you want to upgrade.

Step 5 Record the following information:

- OCHNC Wlen (OCHNC wavelength)
- Source node/shelf (if applicable)/slot/port/side (include both Side A and Side B nodes, if present)
- Destination node/shelf (if applicable)/slot/port/side (include both Side A and Side B nodes, if present)

Step 6 Use the information recorded in Step 5 to complete one of the following

- DLP-G344 Verify Provisionable and Internal Patchcords, page 16-61—Complete this task if provisionable patchcords (PPCs) and internal patchcords exist on the network but you are not sure whether one was created for the OCHNC that you want to upgrade.
- NTP-G184 Create a Provisionable Patchcord, page 16-72—Complete this procedure if you know that PPCs were not created between the OCHNC node and the client node. If you recently upgraded from a previous release, you must create PPCs between the source client and OCHNC node and between the destination client and OCHNC node.

Step 7 In network view, click the OCHNC that you want to upgrade.

Step 8 From the Tools menu, choose **Circuits** > **Upgrade OCHNC**. If the Upgrade OCHNC Initialization "Completed" status appears (Figure 16-4), continue with Step 9. If the "Failed" status appears (Figure 16-5), complete the following substeps:

a. Click each failure reason to view the failure details. A common cause of initialization failures is the absence or incorrect completion of PPCs or internal patchcords between the client nodes and the optical channel (OCH) nodes.

b. Repeat Steps 3 through 8, verifying that the OCHNC ports and provisionable patchcord (PPC) path match on both sides. If the upgrade "Failed" status appears again, click **Save** to save the results to a local or network computer. (The file can be opened with any text editor.) Then, contact your next level of support.

Figure 16-4 Upgrade OCHNC Initialization—Completed

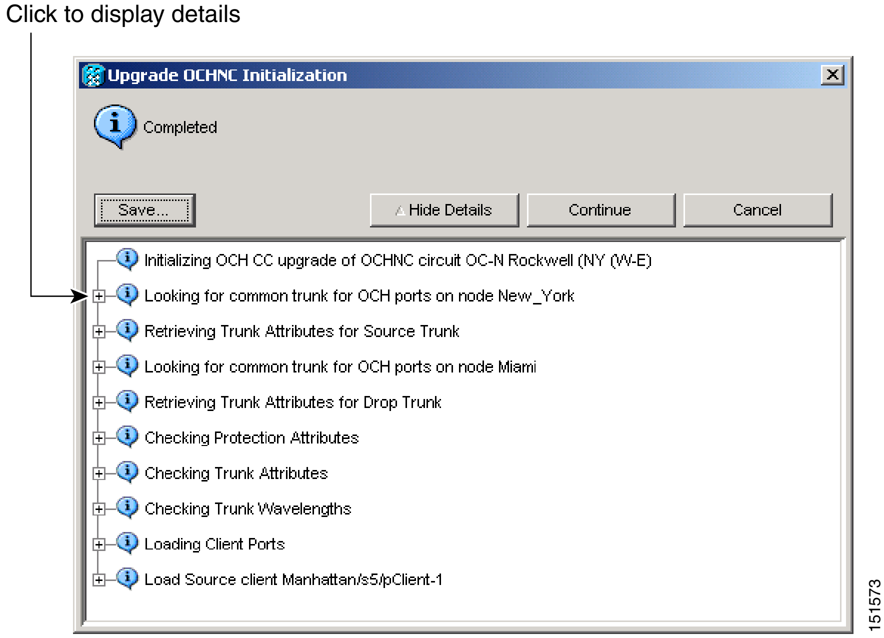
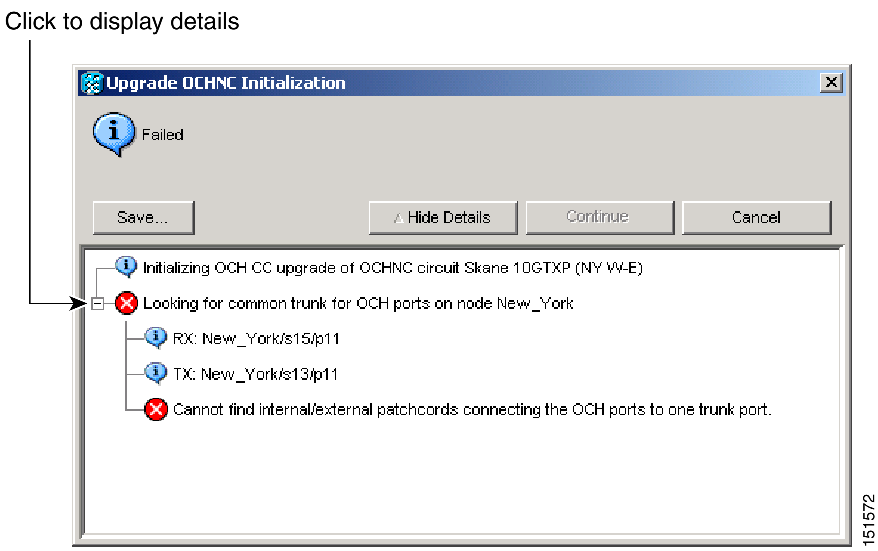


Figure 16-5 Upgrade OCHNC Initialization—Failed



Step 9 Click each result to review the details. If you want to save the results, click Save and save the results to a file on a local or network computer. Click **Continue**.

Step 10 Review the information in the Upgrade OCHNC dialog box, then click **OK**.

Step 11 Click **Yes** in the confirmation dialog box, then click **OK** on the Completed Upgrade OCHNC wizard page.

Tip To see all of the information in the Source and Destination table cells, increase the column widths by clicking and dragging the column heading borders to the right or left.

Step 12 View the OCHCC and its OCH trail in the Circuits page. For information and procedures for viewing and editing OCHCC and OCH trails, see the "NTP-G58 Locate and View Optical Channel Circuits" procedure on page 16-65.

Stop. You have completed this procedure.

DLP-G344 Verify Provisionable and Internal Patchcords

Purpose	This task verifies the PPCs that are required between client TXP, MXP, ADM-10G, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, AR_XP or ITU-T line cards and OCH DWDM nodes for OCHCCs. This task is not required for OCHNCs.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

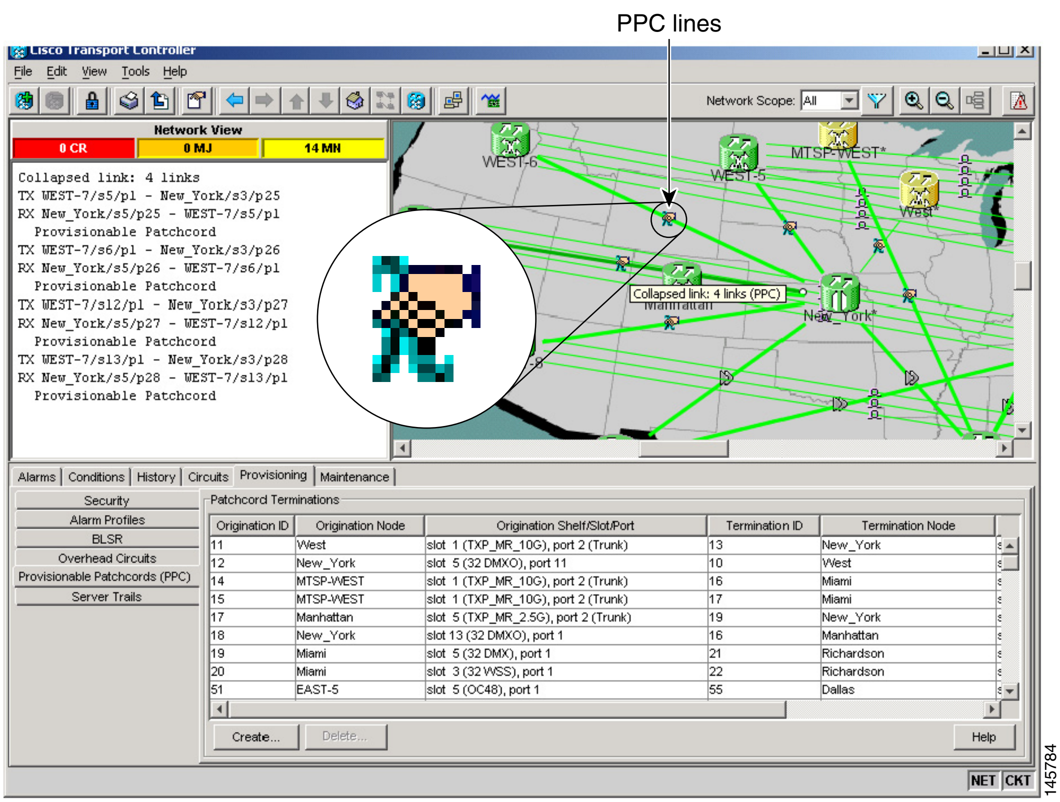
Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning > Provisionable Patchcords (PPC)** tabs.

Step 3 Use one of the following methods to verify that PPCs exist from the client TXP, MXP, ADM-10G, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, AR_XP or ITU-T line card node, slot, and port to the DWDM OCH node, slot, port, and wavelength:

- Review the Patchcord Terminations table. PPCs should exist from the client TXP, MXP, ADM-10G, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, AR_XP or ITU-T line card node to the OCH node, slot, and port recorded in the referring procedure.
- Review the network graphic (see Figure 16-6). PPCs are represented by a small hand holding a lambda symbol. Clicking the PPC line on the graphic displays the PPC source and destination nodes, slots, and ports in the CTC information area. This information should match the node, slot, and port recorded in the referring procedure.

Figure 16-6 Viewing the Provisionable Patchcords Table



Origination ID	Origination Node	Origination Shelf/Slot/Port	Termination ID	Termination Node
11	West	slot 1 (TXP_MR_10G), port 2 (Trunk)	13	New_York
12	New_York	slot 5 (32 DMXO), port 11	10	West
14	MTSP-WEST	slot 1 (TXP_MR_10G), port 2 (Trunk)	16	Miami
15	MTSP-WEST	slot 1 (TXP_MR_10G), port 2 (Trunk)	17	Miami
17	Manhattan	slot 5 (TXP_MR_2.5G), port 2 (Trunk)	19	New_York
18	New_York	slot 13 (32 DMXO), port 1	16	Manhattan
19	Miami	slot 5 (32 DMX), port 1	21	Richardson
20	Miami	slot 3 (32 WSS), port 1	22	Richardson
51	EAST-5	slot 5 (OC48), port 1	55	Dallas

Step 4 Display the OCHCC source node in node view.

Step 5 Click the **Provisioning > WDM-ANS > Internal Patchcords** tab.

Step 6 Verify that internal patchcords exist from the source TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, or AR_XP OCH trunk port to the OCH filter port. If so, continue with Step 7. If not, complete the "NTP-G242 Create an Internal Patchcord Manually" task on page 14-114.

Step 7 Display the OCHCC destination node in node view.

Step 8 Click the **Provisioning > WDM-ANS > Internal Patchcords** tab.

Step 9 Verify that internal patchcords exist from the destination TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, OTU2_XP, AR_MXP, or AR_XP trunk port to the OCH filter port. If so, you are completed with this task. If not, complete the "NTP-G242 Create an Internal Patchcord Manually" task on page 14-114.

Step 10 Return to your originating procedure (NTP).

NTP-G183 Diagnose and Fix OCHNC and OCH Trail Circuits

Purpose	This procedure checks nodes that are traversed by an OCHNC or OCH trail circuit to verify that all conditions required for bringing the circuit in service are in place. If not, the procedure identifies the invalid condition and provides links to the location in CTC where it can be fixed.
Tools/Equipment	None
Prerequisite Procedures	DLP-G105 Provision Optical Channel Network Connections, page 16-41, or DLP-G395 Create an Optical Channel Trail, page 16-34
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note This procedure cannot be used for OCHCC circuits.

Step 1 Complete the DLP-G46 Log into CTC at a node on the network where you want to diagnose and fix the OCHNC or OCH trail circuit. If you are already logged in, continue with Step 2.

> **Note** Do not check Disable Circuit Management in the Login dialog box. No circuits appear if this option is checked.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Circuits** tab.

Step 4 Click the OCHNC or OCH trail that you want to diagnose.

Step 5 Click **Edit**.

Step 6 In the Edit Circuit dialog box, click the **Diagnostic and Fix** tab.

Step 7 Click **Start**. The diagnostic checks all OCHNC or OCH trail node connections and displays the results in an expandable tree view under the OCH diagnostic heading.

Step 8 Double-click **OCH diagnostic** to display the diagnostic messages.

- No problems are found—A "*node*: No issues found" message appears, where *node* is the node name or IP address of an ONS 15454 containing the OCHNC or OCH trail source, destination, or pass-through connection. If this message appears for all nodes, continue with Step 9.
- Problems are found—double-click on the nodes with problems and the error messages appear with a hyperlink labeled Fix or Check. If error messages appear, complete the fixes using the tasks and procedures listed in Table 16-9.

Note Only one error per node is displayed. If multiple errors exist, you must fix the first error, then rerun the diagnostic to display the next error(s).

Table 16-9 Diagnostic and Fix Errors

Error Message	Description/Fix
Invalid connection state for "*circuit name*": *administrative state*	The circuit state is not valid. Click **Fix** to display the State tab of the Edit Circuit dialog box where you can change the circuit state using the "DLP-G419 Change an OCH Trail Administrative State" task on page 16-39 or the "DLP-G420 Change an OCHNC Administrative State" task on page 16-48.
Invalid admin state: *administrative state*	The state of a port traversed by the circuit is not valid, for example, the port is in service. Click **Fix** to display the card view Provisioning tab, where you can change the port administrative state using the appropriate task for changing the optical line settings in Chapter 20, "Change DWDM Card Settings."
ANS couldn't regulate the port	ANS could not be regulated for the port. Click **Fix** to display the node view Provisioning > WDM-ANS > Port Status tab where you can launch ANS using the "NTP-G37 Run Automatic Node Setup" task on page 14-128.
APC couldn't regulate the port	APC could not be regulated for the port. Click **Fix** to display the network view Maintenance > APC tab. Double-click the domain to expand the view. Right-click the node/side and choose the end you want to view. APC information is displayed on the right side. Read any message that might explain the failure, or restart APC by completing the DLP-G158 Enable Automatic Power Control.
APC regulation is running	Indicates that APC regulation is running and must be allowed to finish. Click **Check** to display the node view Maintenance > DWDM > APC tab where you can monitor the APC regulation.
APC is not enabled for this side.	APC is not enabled on an ONS 15454 side. Click **Fix** to display the network view Maintenance > APC tab where you can enable APC using the DLP-G158 Enable Automatic Power Control.

Step 9 If you want to save the diagnostic results to a text file, complete the following steps. If not, continue with Step 10.

a. Click **Save.**

b. In the Save Diagnostic and Fix to File dialog box, enter the local directory and file name, or click **Browse** to navigate to a directory where you want to save the file.

c. Click **OK**.

Step 10 Repeat Steps 7 through 9 until "No issues found" appears for all nodes traversed by the OCHNC or OCH trail circuit.

Stop. You have completed this procedure.

NTP-G58 Locate and View Optical Channel Circuits

Purpose	This procedure allows you to locate and view OCHNC, OCHCC and OCH trail circuits. You can also export circuit data into a text file.
Tools/Equipment	None
Prerequisite Procedures	DLP-G105 Provision Optical Channel Network Connections, page 16-41 DLP-G346 Provision Optical Channel Client Connections, page 16-18
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Complete the DLP-G46 Log into CTC at a node on the network where you want to view the circuits. If you are already logged in, continue with Step 2.

Note Do not check Disable Circuit Management in the Login dialog box. No circuits appear if this option is checked.

Step 2 As needed, complete the "DLP-G100 Search for Optical Channel Circuits" task on page 16-65.

Step 3 As needed, complete the "DLP-G101 View Optical Channel Circuit Information" task on page 16-66.

Step 4 As needed, complete the "DLP-G102 Filter the Display of Optical Channel Circuits" task on page 16-69.

Step 5 As needed, complete the "DLP-G103 View Optical Channel Circuits on a Span" task on page 16-71.

Step 6 As needed, complete the DLP-G114 Export CTC Data.

Stop. You have completed this procedure.

DLP-G100 Search for Optical Channel Circuits

Purpose	This task searches for OCHNC, OCHCC, OCH trail, and ONS 15454 circuits at the network, node, or card level.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Navigate to the appropriate CTC view:

- To search the entire network, from the View menu choose **Go to Network View**.
- To search for circuits that originate, terminate, or pass through a specific node, from the View menu choose **Go to Other Node**, then choose the node you want to search and click **OK**.

- To search for circuits that originate, terminate, or pass through a specific card, double-click the card on the shelf graphic in node view (single-shelf mode) or shelf view (multishelf mode) to open the card in card view.

Step 2 Click the **Circuits** tab.

Step 3 If you are in node or card view, choose the scope for the search, **Node** or **Network (All)**, in the Scope drop-down list located at the bottom right side of the screen. Choose **Node** to see all of the circuits on that node, or choose **Network (All)** to see all circuits in the network.

Step 4 Click **Search** if you need to search through the list of circuits.

Step 5 In the Circuit Name Search dialog box, complete the following:

- Find What—Enter the text of the circuit name you want to find. This field is not case-sensitive.
- Match whole word only—Check this check box to instruct CTC to select circuits only if the entire word matches the text in the Find What field.
- Match case—Check this check box to instruct CTC to select circuits only when the capitalization matches the capitalization entered in the Find What field.
- Direction—Choose the direction for the search. Searches are conducted up or down from the currently selected circuit.

Step 6 Click **Find Next**. If a match is found the circuit will be highlighted in the Circuits page. To continue the search, click **Find Next** again to find the next circuit.

Step 7 Repeat Steps 5 and 6 until you are finished, then click **Cancel**.

Step 8 Return to your originating procedure (NTP).

DLP-G101 View Optical Channel Circuit Information

Purpose	This task provides information about OCHNC, OCHCC, OCH trail, and ONS 15454 circuits.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Navigate to the appropriate CTC view:

- To view circuits for an entire network, from the View menu choose **Go to Network View**.
- To view circuits that originate, terminate, or pass through a specific node, from the View menu choose **Go to Other Node**, then choose the node you want to search and click **OK**.
- To view circuits that originate, terminate, or pass through a specific card, in node view (single-shelf mode) or shelf view (multishelf mode), double-click the card containing the circuits you want to view.

Note In node or card view, you can change the scope of the circuits that appear by choosing Card (in card view), Node, or Network from the Scope drop-down list in the bottom right corner of the Circuits page.

Step 2 Click the **Circuits** tab. The Circuits tab shows the following information:

Note The following order is the default column sequence, the order might be different on your screen, depending on your individual CTC setup.

- Circuit Name—Name of the circuit. The circuit name can be manually assigned or automatically generated.
- Type—OCHNC, OCHCC, or OCH-Trail.

Note The following circuit types are not applicable to DWDM nodes: STS, VT, VTT (VT tunnel), VAP (VT aggregation point), STS-v (STS VCAT circuit), VT-v (VT VCAT circuit), HOP (high-order circuit), LOP (low-order circuit), VCT (VC low-order tunnel), and VCA (low-order VCAT circuit).

- Size—Circuit size. OCHNC, OCHCC, and OCH-Trail sizes are Equipped not specific, Multi-rate, 2.5 Gbps No FEC, 2.5 Gbps FEC, 10 Gbps No FEC, and 10 Gbps FEC.

Note The following circuit types under the circuit size column are not applicable to DWDM nodes: STS, VT, VCAT, VC12, VC11, VC3, and VC4.

- OCHNC Wlen—The wavelength provisioned for the OCHNC, OCHCC, or OCH trail. See Table 16-6 on page 16-20 for a list of channels and wavelengths.
- Dir—The circuit direction, either two-way or one-way.
- Protection—The type of circuit protection. See Table 16-10 on page 16-68 for a list of protection types.
- Status—The circuit status. See Table 16-11 on page 16-68 for a list of circuit statuses.
- Source—The circuit source in the format: *node/slot/port "port name"*. The port name will appear in quotes only if a name was assigned to it. (To assign names to ports, see the "DLP-G104 Assign a Name to a Port" task on page 16-16.)
- Destination—The circuit destination in the format: *node/slot/port "port name"*. The port name will appear in quotes only if a name was assigned to it. (To assign names to ports, see the "DLP-G104 Assign a Name to a Port" task on page 16-16.)
- # of VLANS—The number of VLANs used by an Ethernet circuit. VLANs are not applicable to DWDM nodes.
- # of Spans—The number of internode links that constitute the circuit. Right-clicking the column title shows a shortcut menu from which you can choose Span Details to show or hide circuit span detail.

- State—The circuit service state, which is an aggregate of the service states of its cross-connects. For ANSI shelves, the service state is IS, OOS, or OOS-PARTIAL. For ETSI shelves, the service state is Unlocked, Locked, or Locked-partial. For more information about ANSI and ETSI service states, see the *Administrative and Service States* document.
  - IS/Unlocked—All cross-connects are in service and operational.
  - OOS/Locked—For ANSI, all cross-connects are OOS-MA,MT and/or OOS-MA,DSBLD. For ETSI, all cross-connects are Locked-enabled,maintenance and/or Locked-enabled,disabled.
  - OOS-PARTIAL/Locked-partial—At least one cross-connect is IS-NR (ANSI) or Unlocked-enabled (ETSI) and others are out-of-service.

Note Right-clicking a column title (Circuit name, Type, etc.) opens a shortcut menu that allows you to show or hide circuit details.

- Acpt Threshold—The optical validation acceptance threshold value set for the GMPLS circuit. For more information on the threshold values, see the "12.10.1.2 Acceptance Thresholds" section on page 12-110.
- Opt Val—The optical validation result for the GMPLS circuit. For more information on the optical validation values, see the "12.10.1.3 Validation Modes" section on page 12-110.

Table 16-10 Circuit Protection Types

Protection Type	Description
Y-cable	(OCHNC and OCH-Trail circuit types only) The circuit is protected by a transponder or muxponder card Y-cable protection group.
Splitter	The circuit is protected by the protect transponder splitter protection.
Unprot	A circuit with a source and destination on different nodes is not protected.
N/A	A circuit with connections on the same node is not protected.
Unknown	A circuit has a source and destination on different nodes and communication is down between the nodes. This protection type appears if not all circuit components are known.

Table 16-11 Cisco ONS 15454 Circuit Status

Status	Definition/Activity
CREATING	CTC is creating a circuit.
DISCOVERED	CTC created a circuit. All components are in place and a complete path exists from the circuit source to the circuit destination.
DELETING	CTC is deleting a circuit.

Table 16-11 Cisco ONS 15454 Circuit Status (continued)

Status	Definition/Activity
PARTIAL	A CTC-created circuit is missing a cross-connect or network span, a complete path from source to destination(s) does not exist, or an alarm interface panel (AIP) change occurred on one of the circuit nodes and the circuit is in need of repair. (AIPs store the node MAC address.) In CTC, circuits are represented using cross-connects and network spans. If a network span is missing from a circuit, the circuit status is PARTIAL. However, a PARTIAL status does not necessarily mean that a circuit traffic failure has occurred, because traffic might flow on a protect path. Network spans are in one of two states: up or down. On CTC circuit and network maps, up spans are shown as green lines, and down spans are shown as gray lines. If a failure occurs on a network span during a CTC session, the span remains on the network map but its color changes to gray to indicate the span is down. If you restart your CTC session while the failure is active, the new CTC session cannot discover the span and its span line will not appear on the network map. Subsequently, circuits routed on a network span that goes down will appear as DISCOVERED during the current CTC session, but they will appear as PARTIAL to users who log in after the span failure. This status does not appear for OCHNC circuit types.
DISCOVERED_TL1	A TL1-created circuit or a TL1-like CTC-created circuit is complete. A complete path from source to destination(s) exists. This status does not appear for OCHNC circuit types.
PARTIAL_TL1	A TL1-created circuit or a TL1-like CTC-created circuit is missing a cross-connect, and a complete path from source to destination(s) does not exist. This status does not appear for OCHNC circuit types.

Step 3 Return to your originating procedure (NTP).

DLP-G102 Filter the Display of Optical Channel Circuits

Purpose	This task filters the display of OCHNCs, OCHCCs, OCH trails and SONET or SDH circuits in the Circuits page. You can filter the circuits in network, node, or card view based on circuit or OCHNC name, size, type, direction, and other attributes.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 Navigate to the appropriate CTC view:

- To filter network circuits, from the View menu choose **Go to Network View**.
- To filter circuits that originate, terminate, or pass through a specific node, from the View menu choose **Go to Other Node**, then choose the node you want to search and click **OK**.
- To filter circuits that originate, terminate, or pass through a specific card, double-click the card on the shelf graphic in node view (single-shelf mode) or shelf view (multishelf mode) to open the card in card view.

Step 2 Click the **Circuits** tab.

Step 3 Set the attributes for filtering the circuit display:

a. Click the **Filter** button.

b. In the General tab of the Circuit Filter dialog box, set the following filter attributes, as necessary:

- Name—Enter a complete or partial circuit name to filter circuits based on the circuit name.
- Direction—Choose one: **Any** (direction not used to filter circuits), **1-way** (display only one-way circuits), or **2-way** (display only two-way circuits).
- OCHNC Wlen—(DWDM OCHNCs only) Choose an OCHNC wavelength to filter the circuits. For example, choosing 1530.33 will display channels provisioned on the 1530.33-nm wavelength.
- Status—Choose one: **Any** (status not used to filter circuits) or **Discovered** (display only discovered circuits). Other statuses do not apply to OCHNCs.
- State—Choose one: **OOS** (ANSI) or **Locked** (ETSI) to display only out-of-service circuits, **IS** (ANSI) or **Unlocked** (ETSI) to display only in-service circuits (OCHNCs have IS/Unlocked states only), or **OOS-PARTIAL** (ANSI) or **Locked-partial** (ETSI) to display only circuits with cross-connects in mixed service states.
- Protection—Enter the circuit protection type to filter circuits based on their protection.
- Shelf—(multishelf nodes only) Enter the shelf name to filter circuits based on that shelf.
- Slot—Enter a slot number to filter circuits based on the source or destination slot.
- Port—Enter a port number to filter circuits based on the source or destination port.
- Type—Choose one: **Any** (type not used to filter circuits), **OCHNC** (displays only OCHNCs), **OCHCC** (displays only OCHCCs), or **OCH-Trail** (displays only OCH trail circuits).

Note The following circuit types are not applicable to DWDM nodes: STS, VT, VT Tunnel, STS-V, VT-V, and VT Aggregation Point, VC_HO_PATH_CIRCUIT, VC_LO_PATH_CIRCUIT, VC_LO_PATH_TUNNEL, VC_LO_PATH_AGGREGATION, VC_HO_PATH_VCAT_CIRCUIT, and VC_LO_PATH_VCAT_CIRCUIT.

- Size—Click the appropriate check boxes to filter circuits based on size. The following sizes are available, depending on the circuit type: **Multi-rate**, **Equipment non specific**, **2.5 Gbps FEC**, **2.5 Gbps No FEC**, **10 Gbps FEC**, and **10 Gbps No FEC**.

Note VT1.5, STS-1, STS3c, STS-6c, STS-9c, STS-12c, STS-24c, STS-48c, and STS-192c are not applicable to ANSI DWDM nodes. VC12, VC3, VC4, VC4-2c, VC4-3c, VC4-4c, VC4-6c, VC4-8c, VC4-9c, VC4-16c, and VC4-64 are not applicable to ETSI DWDM nodes.

The check boxes shown depend on the Type field selection. If you chose Any, all sizes are available. If you chose OCHNC as the circuit type, only Multi-rate, Equipment non specific, 2.5 Gbps FEC, 2.5 Gbps No FEC, 10 Gbps FEC, and 10 Gbps No FEC appear. If you choose OCHCC, only OCHCC is available. If you choose OCH Trail, only Equipment non specific is available.

Step 4 To set the filter for the ring, node, link, and source and drop types, click the **Advanced** tab and complete the following substeps. If you do not want to make advanced filter selections, continue with Step 5.

a. If you made selections on the General tab, click **Yes** in the confirmation box to apply the settings.

b. In the Advanced tab of the Circuit Filter dialog box, set the following filter attributes as necessary:

- Ring—Choose the ring from the drop-down list.
- Node—Click the check boxes by each node in the network to filter circuits based on node.
- Link—Choose a link in the network.
- Source/Drop—Choose one of the following to filter circuits based on whether they have single or multiple sources and drops: **One Source and One Drop Only** or **Multiple Sources or Multiple Drops**.

Step 5 Click **OK**. Circuits matching the attributes in the Filter Circuits dialog box appear in the Circuits page.

Step 6 To turn filtering off, click the Filter icon in the lower right corner of the Circuits page. Click the icon again to turn filtering on, and click the **Filter** button to change the filter attributes.

Step 7 Return to your originating procedure (NTP).

DLP-G103 View Optical Channel Circuits on a Span

Purpose	This task allows you to view OCHNCs, OCHCCs, and OCH trails on an ONS 15454 span.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Retrieve or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), from the View menu choose **Go to Network View**. If you are already in network view, continue with Step 2.

Step 2 Right-click the green line between the nodes containing the circuits that you want to view and choose **Circuits** to view OCHNCs, OCHCCs, or unprotected circuits on the span.

Step 3 In the Circuits on Span dialog box, view information about the circuits that traverse the span. The information that appears depends on the circuit type. For OCHNCs, the following information appears:

- Type—The type of circuit: OCHNC, OCHCC, or OCH-Trail.
- Size—The circuit size.
- OCHNC Wavelength—The wavelength provisioned for the OCHNC.
- DIR—2-way or 1-way.

- Circuit—The OCHNC circuit name.
- OCHNC Dir—The direction provisioned for the OCHNC, either Side B to Side A or Side A to Side B.

Step 4 Return to your originating procedure (NTP).

NTP-G184 Create a Provisionable Patchcord

Purpose	This procedure creates a provisionable patchcord (PPC), also called a virtual link. Four types of PPCs can be created: • Client/Trunk to Client/Trunk (L2) • Client/Trunk to Client/Trunk • Side to Side (OTS) • OCH-Trunk to OCH-Filter PPCs create a virtual connection between the OCH and the client nodes. (PPCs are not required for OCHNCs.)
Tools/Equipment	OC-N, TXP, MXP, OADM, ROADM, multiplexer (MUX), and demultiplexer (DMX) cards
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note If a Side-to-Side PPC is created between nodes, it will no longer function if the node Security Mode mode is enabled (see "DLP-G264 Enable Node Security Mode" task on page 14-24). If the Secure mode is enabled, the DCN extension feature is unable to use the LAN interface to extend the internal network (due to the network isolation in this configuration mode). The result is that the topology discovery on the Side-to-Side PPC no longer operates.

Note This task requires data communications channel (DCC) or generic communications channel (GCC) connectivity between the OCH node and the subtended TXP, MXP, or ITU-T line card client shelves.

Note An optical port requires two patchcords when the remote end is Y-cable protected, or is an add/drop multiplexer, or multiplexer/demultiplexer port.

Note This procedure automatically turns on any OPT-RAMP-C or OPT-RAMP-CE cards installed.

Step 1 Complete the following tasks, as needed, to verify the cabling between the TXP/MXP/line cards in the client node and the OCH cards in the DWDM node:

- DLP-G349 Use the Cisco Transport Planner Internal Connections Report, page 14-80
- DLP-G350 Use the Cisco Transport Planner Traffic Matrix Report, page 15-31

Step 2 In the node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Comm Channels > PPC** tabs. Alternatively, in network view, click the **Provisioning > Provisionable Patchcord (PPC)** tabs.

PPCs can be created in either node or network view. However, if you create the PPC in node view, the PPC origination ports will be restricted to the cards installed on the node. Therefore, choose node view only if you know that the PPC origination port resides on a card installed in the node.

Note You can create OTS-to-OTS PPC only in the network view.

Step 3 Click **Create**. The PPC Attributes page of the PPC Creation wizard appears.

Step 4 Choose one of the following PPC link types. Table 16-2 provides a list of ports that serve as PPC endpoints for each option. However, if Cisco 7600 node is used as the client node, then choose only the OCH-Trunk to OCH-Filter link type.

- Client/Trunk to Client/Trunk (L2)—Creates a PPC between two NNI client or trunk ports on GE_XP, 10GE_XP, GE_XPE, 10GE_XPE cards provisioned in L2-over-DWDM mode.
- Client/Trunk to Client/Trunk—Creates a PPC between two optical channel trunk ports on TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, OTU2_XP, or ITU-T line cards.
- Side to Side (OTS)—Creates a PPC between two OTS (optical transport section) ports that belong to a Side. This option establishes DCN connectivity between nodes that do not have OSCM or OSC-CSM cards installed or TNC OSC provisioned and therefore do not have OSC connectivity. CTC selects the OTS ports after you choose the origination and termination sides.
- OCH-Trunk to OCH-Filter—Creates a PPC between an optical channel trunk port on a TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, OTU2_XP, or ITU-T line card, or Cisco 7600 series node and an optical channel filter port on a MUX, DMX, or WSS card; or ADD/DROP port of a 15216-FLD-4, or 15216-MD-40-EVEN, 15216-EF-40-EVEN, 15216-MD-48-EVEN , 15216-MD-40-ODD, 15216-EF-40-ODD, or 15216-MD-48-ODD passive module.

Table 16-12 Provisionable Patchcord Ports

Card	Client/Trunk (L2) Port	Client/Trunk Port	OTS Port	OCH Filter Port
GE_XP 10GE_XP GE_XPE 10GE_XPE	Client or trunk port in NNI mode	Any trunk port	—	—
TXP MXP ADM-10G OTU2_XP ITU-T	—	Any trunk port	—	—

Table 16-12 Provisionable Patchcord Ports (continued)

Card	Client/Trunk (L2) Port	Client/Trunk Port	OTS Port	OCH Filter Port
OPT-BST OPT-BST-E OPT-BST-L	—	—	LINE RX LINE TX	—
OPT-AMP-17-C OPT-AMP-C OPT-AMP-L	—	—	COM RX[1] COM TX[1] LINE RX[2] LINE TX[2]	—
OPT-PRE	—	—	COM RX[3] COM TX[3]	—
OPT-RAMP-C OPT-RAMP-CE 15454-M-RAMAN-CTP 15454-M-RAMAN-COP	—	—	LINE RX LINE TX	—
40-SMR1-C 40-SMR2-C	—	—	LINE RX LINE TX	—
32MUX 32MUX-O 40-MUX-C	—	—	—	Any CHAN RX port
32DMX 32DMX-L 32DMX-O 40-DMX-C 40-DMX-CE	—	—	—	Any CHAN TX port
32WSS 32WSS-L 40-WSS-C 40-WSS-CE	—	—	—	Any ADD port
40-WXC-C	—	—	COM RX COM TX	—
80-WXC-C	—	—	EAD(i), i=1 to 8 COM AD COM RX DROP TX EXP TX	—

Table 16-12 Provisionable Patchcord Ports (continued)

Card	Client/Trunk (L2) Port	Client/Trunk Port	OTS Port	OCH Filter Port
MMU	—	—	EXP A RX EXP A TX	—
40-SMR2-C	—	—	—	ADD-RX DROP-RX EXP-TX EXPi-RX
40-SMR1-C	—	—	—	ADD-RX DROP-RX EXP-TX EXP-RX LINE-RX LINE-TX
TDC-CC TDC-FC	—	—	—	DC-RX DC-TX
XT-40G XM-40G XM-40G-CE XT-40G-CE	—	Any trunk port	—	—
15216-MD-40-ODD 15216-MD-40-EVEN	—	—	—	Any CHAN RX/TX port
15216-EF-40-ODD 15216-EF-40-EVEN	—	—	—	Any CHAN RX/TX port
15216-MD-48-ODD 15216-MD-48-EVEN	—	—	—	Any CHAN RX/TX port
15216-FLD-4	—	—	—	Any CHAN RX/TX port

1. When Card Mode is OPT-PRET.
2. When Card Mode is OPT-LINE.
3. Line nodes with two OPT-PRE cards and no BST cards installed.

Step 5 If you chose Client/Trunk to Client/Trunk or OCH-Trunk to OCH-Filter in Step 4, complete the following fields. If you chose Client/Trunk to Client/Trunk (L2) or Side to Side (OTS) (in Step 4, continue with Step 6.

- OCHNC Wavelength—(OCH Trunk to OCH Filter only) From the drop-down lists, choose the wavelength band (C or L), wavelength number type (Odd or Even), and then the wavelength.

Note Same wavelengths must be set at both the ends of a virtual link (Cisco 7600 node and the DWDM node). This wavelength must be set on the Cisco 7600 series router port on which the PPC or virtual link is configured.

- Protected—Check this box if you want only protected cards and ports to appear as options in the OCHNC origination and termination pages.

Step 6 Click **Next**.

Step 7 In the PPC Origination page, complete the fields shown in Table 16-13. The table columns indicate whether the field is provisionable based on the option chosen in Step 4.

Table 16-13 PPC Origination Fields

Field	Description	Client/Trunk to Client/Trunk(L2)	Client/Trunk to Client/Trunk	OCH-Trunk to OCH-Filter	Side to Side (OTS)
Node	Choose the node where the PPC will originate.	Yes	Yes	Yes	Yes
	(IPoDWDM using Cisco 7600) Choose the DWDM node as the PPC termination node.	No	No	Yes	No
Side	Choose the side where the PPC will originate.	No	No	No	Yes
Shelf	(Multishelf only) Choose the shelf where the PPC will originate.	Yes	Yes	Yes	Yes
Slot	Choose the slot where the PPC will originate.	Yes	Yes	Yes	Yes
Port	Choose the port where the PPC will originate.	Yes	Yes	Yes	No
Tx Port	(Display only) The OTS TX port where the PPC will originate.	No	No	No	Yes
Rx Port	Choose the RX port where the PPC will originate.	No	No	No	Yes
Protection	(Display only) Displays the protection option chosen in Step 5, if applicable.	No	Yes	Yes	No

Table 16-13 PPC Origination Fields (continued)

Field	Description	Client/Trunk to Client/Trunk(L2)	Client/Trunk to Client/Trunk	OCH-Trunk to OCH-Filter	Side to Side (OTS)
ID	Displays the ID automatically assigned to the PPC.	Yes	Yes	No	No
Tx ID	Displays the transmit ID automatically assigned to the PPC.	No	No	Yes	Yes
Rx ID	Displays the receive ID automatically assigned to the PPC.	No	No	Yes	Yes

Step 8 Click **Next**. If you chose Client/Trunk to Client/Trunk or OCH Trunk to OCH Filter with the Protected option in Step 4, continue with Step 9. If not, continue with Step 11.

Step 9 In the PPC Protect Termination page, provision the ID fields. If you chose OCH Trunk to OCH Trunk in Step 4, one ID field is available. If you chose OCH Trunk to OCH Filter in Step 4, two ID fields are available, Rx ID and Tx ID.

Step 10 Click **Next**.

Step 11 In the PPC Termination page, complete the fields shown in Table 16-14. The OCH Trunk to OCH Trunk, OCH Trunk to OCH Filter, and Side to Side (OTS) columns indicate whether the field is provisionable.

Table 16-14 PPC Termination Fields

Field	Description	Client/Trunk to Client/Trunk (L2)	Client/Trunk to Client/Trunk	OCH Trunk to OCH Filter	Side to Side (OTS)
Node	Choose the node where the PPC will terminate.	Yes	Yes	Yes	Yes
	(IPoDWDM using Cisco 7600) Choose the DWDM node as the PPC termination node.	No	No	Yes	No
Side	Choose the side where the PPC will terminate.	No	No	No	Yes
Shelf	(Multishelf only) Choose the shelf where the PPC will terminate.	Yes	Yes	Yes	Yes
Slot	Choose the slot where the PPC will terminate.	Yes	Yes	Yes	Yes
Port	Choose the port where the PPC will terminate.	Yes	Yes	No	No
Tx Port	Choose the TX port where the PPC will terminate.	No	No	Yes	Yes
Rx Port	Choose the RX port where the PPC will terminate.	No	No	Yes	Yes

Table 16-14 PPC Termination Fields (continued)

Field	Description	Client/Trunk to Client/Trunk (L2)	Client/Trunk to Client/Trunk	OCH Trunk to OCH Filter	Side to Side (OTS)
Protection	(Display only) Displays the protection option chosen in Step 5, if applicable.	No	Yes	No	No
ID	Displays the ID automatically assigned to the PPC.	Yes	Yes	No	No
Rx ID	Displays the receive ID automatically assigned to the PPC.	No	No	Yes	Yes
Tx ID	Displays the transmit ID automatically assigned to the PPC.	No	No	Yes	Yes

Step 12 Click **Next**. If you chose Client/Trunk to Client/Trunk or OCH Trunk to OCH Filter with the Protected option in Step 4, continue with Step 13. If not, continue with Step 14.

Step 13 In the PPC Protect Termination page, provision the ID fields. If you chose Client/Trunk to Client/Trunk in Step 4, one ID field is available. If you chose OCH Trunk to OCH Filter in Step 4, two ID fields are available, Rx ID and Tx ID.

Step 14 In the PPCs ID page, review the PPC information. If the PPC information is correct, click **Finish**. If you need to make corrections, click **Back** and return to the wizard page where you want to change the information.

Stop. You have completed this procedure.

NTP-G181 Manage GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card SVLAN Databases

Purpose	This procedure creates a service provider VLAN (SVLAN) database for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards provisioned in L2-over-DWDM mode. The procedure stores newly created SVLANs in the card (each card has its own SVLAN DB). It also loads and merges SVLAN databases into the VLAN DB tab where they can be edited.
Tools/Equipment	OC-N, TXP, MXP, OADM, ROADM, multiplexer (MUX), and demultiplexer (DMX) cards
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at the node on the network where you will manage the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE SVLAN databases.

Step 2 As needed, complete the following tasks:

- DLP-G421 Create and Store an SVLAN Database, page 16-79
- DLP-G382 Add and Remove SVLANS to/from GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE NNI Ports, page 11-397
- DLP-G422 Load or Merge an SVLAN Database, page 16-80

Stop. You have completed this procedure.

DLP-G421 Create and Store an SVLAN Database

Purpose	This task creates an SVLAN for a network of GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards provisioned in L2-over-DWDM mode. It then stores the SVLAN database on the card and not on the node.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning > SVLAN > SVLAN DB** tabs.

Step 3 In the box next to the Add row(s) button, enter the number of SVLANs you want to create.

Step 4 Click **Add row(s)**.

Step 5 For each SVLAN row, enter the following:

- SVLAN ID—Enter the SVLAN ID. The range is 1 to 4093 with the following restrictions:
  - 0 indicates an untagged frame.
  - The database can contain a maximum of 4092 unprotected SVLANS. However, it can contain a maximum of 1024 protected SVLANs.
- SVLAN Name—Enter the SVLAN name. It can be up to 32 alphanumeric characters.
- Protection—If this is a protected SVLAN, check the Protection check box. A maximum of 1024 SVLANs can be protected.
- MAC Learning—Enables or disables MAC learning for the port. MAC learning is used by Layer 2 switches to learn the MAC addresses of network nodes so they know where to send traffic. Layer 2 switches including the GE_XP and 10GE_XP cards in L2-over-DWDM mode maintain a MAC learning table that associates the MAC addresses and VLANs with a given port.

Note MAC address table aging is 300 seconds. It cannot be changed. To set this option, the card mode must be L2-over-DWDM.

- IGMP—Enables or disables the Internet Group Management Protocol (IGMP). By default, IGMP is disabled.
- IGMP Fast Leave—Enables or disables the IGMP fast leave. By default, IGMP fast leave is disabled.
- IGMP Suppression—Enables or disables the IGMP report suppression. By default, IGMP Suppression is disabled.

Step 6 Click **Store**.

Step 7 In the Store SVLAN DB dialog box, choose one of the following:

- To Node(s)—Stores the SVLAN database in one or more network nodes. Choose the network nodes where you want to store the SVLAN database.
- Shelf—Appears only when the node is provisioned as a multishelf. Choose the shelf where you want to store the SVLAN database.
- Slot—Choose the slot containing the card where the SVLAN database is stored. To choose more than one slot, press the **Shift** key, or click **Select All**.
- To File—Stores the SVLAN database in a file. Enter a file name, then click **Browse** to navigate to a local or network drive where you want to store the file.

Step 8 Click **OK**.

Step 9 Return to your originating procedure (NTP).

DLP-G422 Load or Merge an SVLAN Database

Purpose	This task loads or merges an SVLAN database stored on the card or local file into the VLAN DB tab on the CTC network view.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning > SVLAN > SVLAN DB** tabs.

Step 3 Click one of the following:

- **Load**—Loads an SVLAN database from the card or local file and replaces any SVLANs that are in the network view VLAN DB table.
- **Merge**—Loads a SVLAN database from the card or local file, but does not replace any SVLANs that are in the network view VLAN DB table. The loaded database is merged with any SVLANs that might be in the table.

Step 4 In the Load SVLAN DB dialog box, choose one of the following:

- From Node—Loads the SVLAN database from the card. Choose the card where you want to load the SVLAN database.

- Shelf—Appears only when the node is provisioned as a multishelf. Choose the shelf where you want to load the SVLAN database.
- Slot—Choose the slot containing the card where you want to load the SVLAN database from.
- From File—Loads the SVLAN database from a file. Enter the file path in the blank field, or click **Browse** to navigate to a local or network directory containing the database file.

Step 5 Click **OK**.

Step 6 Return to your originating procedure (NTP).

NTP-G60 Create and Delete Overhead Circuits

Purpose	This procedure creates overhead circuits on an ONS 15454 network. Overhead circuits include ITU-T GCCs, the AIC-I card orderwire, and the AIC-I card UDC.
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The DCCs, GCCs, and OSCs should not be provisioned between SONET (ANSI) and SDH (ETSI) nodes using CTC or TL1 because they cannot operate between SONET and SDH nodes. These communication channels should be provisioned on similar nodes, such as SONET-to-SONET or SDH-to-SDH.

Step 1 Complete the DLP-G46 Log into CTC at the node where you will create the overhead circuit. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "DLP-G76 Provision DCC/GCC Terminations" task on page 16-82.

Step 3 As needed, complete the "DLP-G97 Provision a Proxy Tunnel" task on page 16-84.

Step 4 As needed, complete the "DLP-G98 Provision a Firewall Tunnel" task on page 16-85.

Step 5 As needed, complete the "DLP-G109 Provision Orderwire" task on page 16-86.

Step 6 As needed, complete the "DLP-G110 Create a User Data Channel Circuit" task on page 16-88.

Step 7 As needed, complete the "DLP-G112 Delete Overhead Circuits" task on page 16-89.

Stop. You have completed this procedure.

DLP-G76 Provision DCC/GCC Terminations

Purpose	This task creates the DWDM DCC/GCC terminations required for network setup when using the TXP, MXP, and XP cards. Perform this task before you create OCHCC or OCHNC circuits for these cards. In this task, you can also set up the node so that it has direct IP access to a far-end non-ONS node over the DCC/GCC network.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note For the OTU2_XP card, you can provision the GCC on any ITU-T G.709-enabled port in Transponder card configuration and on any port in Standard Regen or Enhanced FEC card configuration. The OTU2_XP card supports a maximum of three GCC terminations (on port 3, port 4, and either port 1 or 2) at a time.

Note The DCCs, GCCs, and OSCs should not be provisioned between SONET (ANSI) and SDH (ETSI) nodes using CTC or TL1 because they cannot operate between SONET and SDH nodes. These communication channels should be provisioned on similar nodes, such as SONET-to-SONET or SDH-to-SDH.

Step 1 If you are provisioning DCC termination on the TXP and MXP card, set the termination mode of the card as appropriate. See the "G.38 Termination Modes" section on page G-33 for details.

Step 2 If you are provisioning DCC termination, ensure that the OTN is disabled on OTN interfaces (usually trunk ports). If OTN is enabled, provision GCC instead of DCC termination. For more information about managing OTN setting on the card, see the "11.23 Procedures for Transponder and Muxponder Cards" section on page 11-142.

Step 3 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Comm Channels > GCC** tabs.

Step 4 Select the DCC or GCC tabs as necessary. Available tabs are:

- GCC (both ANSI and ETSI)

  Note For AR_MXP and AR_XPE cards, GCC goes down after changing the trunk state to IS,AINS (ANSI) or Unlocked,automaticInService (ETSI). The GCC comes up when the trunk state changes to IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) after the specified soak time.

- DCC
  - SDCC and LDCC (for ANSI)
  - RS-DCC and MS-DCC (for ETSI)

Step 5 Click the **Create** button. The Create Terminations dialog box appears.

Step 6 Select the ports where you want to create the DCC/GCC termination. To select more than one port, press the **Shift** key or the **Ctrl** key.

Step 7 Under Port Admin State area, select one of the following:

- **Leave unchanged**—Does not change the DCC/GCC termination port administrative state.
- **Set to IS** or **Set to Unlocked** —Puts the DCC/GCC termination port in service.
- **Set OOS,DSLBD to IS,AINS** (for ANSI) or **Set Locked,disabled to Unlocked,automaticInService** (for ETSI)—Changes a port that is currently out of service or locked to automatic in service.
- **Set OOS,DSLBD to OOS,MT** (for ANSI) or **Set Locked,disabled to Locked,maintenance** (for ETSI)—Changes a port that is currently out of service or locked to out of service for maintenance.

Step 8 For GCC termination, the GCC Rate is set as 192 kbps by default. For AR_MXP and AR_XP cards provisioned on 15454 ONS M6 and 15454 ONS M2 shelves, the GCC rate can be set to 400 kbps and 1200 kbps for OTU1 and OTU2 ports respectively.

Note Ensure that the same GCC rate is configured at both ends of a GCC channel.

Step 9 Verify that the Disable OSPF on Link is unchecked. If this check box is checked, node discovery through the link termination will not happen.

Step 10 If the DCC/GCC termination includes a non-ONS node, check the **Far End is Foreign** check box. This automatically sets the far-end node IP address to 0.0.0.0, which means that any address can be specified by the far end. To change the default to a specific IP address, see the DLP-G184 Change a GCC Termination.

Step 11 In the Layer 3 area, perform one of the following options:

- Check the **IP** box only if the DCC/GCC is between the ONS 15454 and another ONS node and only ONS nodes reside on the network. The DCC/GCC will use Point-to-Point Protocol (PPP).
- Check both the **IP** box and the **OSI** box if the DCC/GCC is between the ONS 15454 and another ONS node, and third-party NEs that use the OSI protocol stack are on the same network. The DCC/GCC will use PPP.

Step 12 If you checked OSI, complete the following substeps. If you checked IP only, continue with Step 13.

a. Click **Next**.

b. Provision the following fields:

- Router—Choose the OSI router.
- ESH—Sets the End System Hello (ESH) propagation frequency. End system (ES) NEs transmit ESHs to inform other ESs and intermediate systems (ISs) about the Network Service Access Points (NSAPs) that the ES NEs serve. The default is 10 seconds. The range is 10 to 1000 seconds.
- ISH—Sets the Intermediate System Hello (ISH) protocol data unit (PDU) propagation frequency. IS NEs send ISHs to other ESs and ISs to inform them about the IS NEs that the IS NEs serve. The default is 10 seconds. The range is 10 to 1000 seconds.
- IIH—Sets the Intermediate System to Intermediate System Hello (IIH) PDU propagation frequency. The IS-IS Hello PDUs establish and maintain adjacencies between ISs. The default is 3 seconds. The range is 1 to 600 seconds.

- IS-IS Cost—Sets the cost for sending packets on the LAN subnet. The IS-IS protocol uses the cost to calculate the shortest routing path. The default metric cost for LAN subnets is 60. The cost normally should not be changed.

Step 13 Click **Finish**. The following alarms appear until all the network DCC/GCC terminations are created and the ports are in service:

- GCC-EOC for GCC termination
- EOC for SDCC termination
- EOC-L for LDCC termination

Step 14 Return to your originating procedure (NTP).

DLP-G97 Provision a Proxy Tunnel

Purpose	This task sets up a proxy tunnel to communicate with a non-ONS far-end node. Proxy tunnels are only necessary when the proxy server is enabled and a foreign GCC termination exists, or if static routes exist so that the GCC network is used to access remote networks or devices. You can provision a maximum of 12 proxy server tunnels.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G76 Provision DCC/GCC Terminations, page 16-82
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note If the proxy server is disabled, you cannot set up a proxy tunnel.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Network > Proxy** tabs.

Step 2 Click **Create**.

Step 3 In the Create Tunnel dialog box, complete the following fields:

- Source Address—Type the IP address of the source node (32-bit length) or source subnet (any other length).
- Length—Choose the length of the source subnet mask.
- Destination Address—Type the IP address of the destination node (32-bit length) or destination subnet (any other length).
- Length—Choose the length of the destination subnet mask.

Step 4 Click **OK**.

Step 5 Continue with your originating procedure (NTP).

DLP-G98 Provision a Firewall Tunnel

Purpose	This task provisions destinations that will not be blocked by the firewall. Firewall tunnels are only necessary when the proxy server is enabled and a foreign GCC termination exists, or if static routes cause the GCC network to access remote networks or devices. You can provision a maximum of 12 firewall tunnels.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC DLP-G76 Provision DCC/GCC Terminations, page 16-82
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note If the proxy server is configured as proxy-only or is disabled, you cannot set up a firewall tunnel.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Network > Firewall** tabs.

Step 2 Click **Create**.

Step 3 In the Create Tunnel dialog box, complete the following fields:

- Source Address—Type the IP address of the source node (32-bit length) or source subnet (any other length).
- Length—Choose the length of the source subnet mask.
- Destination Address—Type the IP address of the destination node (32-bit length) or destination subnet (any other length).
- Length—Choose the length of the destination subnet mask.

Step 4 Click **OK**.

Step 5 Continue with your originating procedure (NTP).

DLP-G108 Change the Service State for a Port

Purpose	This task puts a port in service or removes a port from service. After creating an IP-encapsulated tunnel, put the ports that are hosting the IP-encapsulated tunnel in service.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note For more information about service states, see the *Administrative and Service States* document.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode) on the shelf graphic, double-click the card with the ports you want to put in or out of service. The card view appears.

Step 2 Click the **Provisioning > Line** tabs.

Step 3 In the Admin State column for the target port, choose one of the following from the drop-down list:

- **IS** (ANSI) or **Unlocked** (ETSI)—Puts the port in the IS-NR (ANSI) or Unlocked-enabled (ETSI) service state.
- **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI)—Puts the port in the OOS-MA,DSBLD (ANSI) or Locked-enabled,disabled (ETSI) service state.

  For ANSI nodes, traffic is not passed on the port until the service state is changed to IS-NR; OOS-MA,MT; or Out-of-Service and Autonomous, Automatic In-Service (OOS-AU,AINS). For ETSI nodes, traffic is not passed on the port until the service state is changed to Unlocked-enabled; Locked-enabled,maintenance; or Unlocked-disabled,automaticInService.
- **OOS,MT** (ANSI) or **Locked,maintenance** (ETSI)—Puts the port in the OOS-MA,MT/Locked-enabled,maintenance service state. This state does not interrupt traffic flow, but alarm reporting is suppressed and loopbacks are allowed. Raised fault conditions, whether or not their alarms are reported, can be retrieved from the CTC Conditions tab or by using the TL1 RTRV-COND command. Use the OOS-MA,MT/Locked-enabled,maintenance administrative state for testing or to suppress alarms temporarily. Change to the IS-NR/Unlocked-enabled or OOS-AU,AINS/Unlocked-disabled,automaticInService administrative states when testing is complete.
- **IS,AINS (ANSI)** or **Unlocked,automaticInService (ETSI)**—Puts the port in the OOS-AU,AINS/Unlocked-enabled,automaticInService service state. In this state, alarm reporting is suppressed, but traffic is carried and loopbacks are allowed. After the soak period passes, the port changes to IS-NR/Unlocked-enabled. Raised fault conditions, whether their alarms are reported or not, can be retrieved from the CTC Conditions tab or by using the TL1 RTRV-COND command.

Step 4 If you set the Admin State field to IS-AINS or Unlocked,automaticInService, set the soak period time in the AINS Soak field. This is the amount of time that the port will stay in the OOS-AU,AINS or Unlocked-enabled,automaticInService state after a signal is continuously received. When the soak period elapses, the port changes to the IS-NR or Unlocked-enabled state.

Step 5 Click **Apply**. The new port service state appears in the Service State column.

Step 6 As needed, repeat this task for each port.

Step 7 Return to your originating procedure (NTP).

DLP-G109 Provision Orderwire

Purpose	This task provisions orderwire on the AIC-I card.
Tools/Equipment	An AIC-I card must be installed in Slot 9. An OSCM, OSC-CSM, MXP_2.5_10E, MXP_2.5_10G, MXPP_MR_2.5G, or MXP_MR_2.5G card must be installed.

Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning > Overhead Circuits** tabs.

Step 3 Click **Create**.

Step 4 In the Overhead Circuit Creation dialog box, complete the following fields in the Circuit Attributes area:

- Name—Assign a name to the circuit. The name can be alphanumeric and up to 48 characters (including spaces).
- Circuit Type—Choose either **Local Orderwire** or **Express Orderwire** depending on the orderwire path that you want to create. If regenerators are not used between ONS 15454 nodes, you can use either local or express orderwire channels. If regenerators exist, use the express orderwire channel. You can provision up to four ONS 15454 OC-N/STM-N ports for each orderwire path.
- PCM—Choose the Pulse Code Modulation voice coding and companding standard, either **Mu_Law** (North America, Japan) or **A_Law** (Europe). The provisioning procedures are the same for both types of orderwire.

Caution When provisioning orderwire for ONS 15454 nodes residing in a ring, do not provision a complete orderwire loop. For example, a four-node ring typically has Side B and Side A ports provisioned at all four nodes. However, to prevent orderwire loops, provision two orderwire ports (Side B and Side A) at all but one of the ring nodes.

Step 5 Click **Next**.

Step 6 In the Circuit Source area, complete the following information:

- Node—Choose the source node.
- Shelf—(Multishelf mode only) Choose the source shelf.
- Slot—Choose the source slot.
- Port—If applicable, choose the source port.

Step 7 Click **Next**.

Step 8 In the Circuit Destination area, complete the following information:

- Node—Choose the destination node.
- Shelf—(Multishelf mode only) Choose the destination shelf.
- Slot—Choose the destination slot.
- Port—If applicable, choose the destination port.

Step 9 Click **Finish**.

Step 10 Return to your originating procedure (NTP).

DLP-G110 Create a User Data Channel Circuit

Purpose	This task creates a UDC circuit on the ONS 15454. A UDC circuit allows you to create a dedicated data channel between nodes.
Tools/Equipment	An OSCM, OSC-CSM, MXPP_MR_2.5G, or MXP_MR_2.5G card must be installed.
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning > Overhead Circuits** tabs.

Step 3 Click **Create**.

Step 4 In the Overhead Circuit Creation dialog box, complete the following fields in the Circuit Attributes area:

- Name—Assign a name to the circuit. The name can be alphanumeric and up to 48 characters (including spaces).
- Type—Choose either **User Data-F1** or **User Data D-4-D-12** from the drop-down list. (User Data D-4-D-12 is not available if the ONS 15454 is provisioned for DWDM.)

Step 5 Click **Next**.

Step 6 In the Circuit Source area, complete the following information:

- Node—Choose the source node.
- Shelf—(Multishelf mode only) Choose the source shelf.
- Slot—Choose the source slot.
- Port—If applicable, choose the source port.

Step 7 Click **Next**.

Step 8 In the Circuit Destination area, complete the following information:

- Node—Choose the destination node.
- Shelf—(Multishelf mode only) Choose the destination shelf.
- Slot—Choose the destination slot.
- Port—If applicable, choose the destination port.

Step 9 Click **Finish**.

Step 10 Return to your originating procedure (NTP).

DLP-G112 Delete Overhead Circuits

Purpose	This task deletes overhead circuits. Overhead circuits include IP-encapsulated tunnels, AIC-I card orderwire, and UDCs.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Deleting overhead circuits is service affecting if the circuits are in service (IS). To put circuits out of service (OOS), see the "DLP-G108 Change the Service State for a Port" task on page 16-85.

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Provisioning > Overhead Circuits** tabs.

Step 3 Click the overhead circuit that you want to delete: local or express orderwire, user data, IP-encapsulated tunnel, or DCC tunnel.

Step 4 Click **Delete**.

Step 5 In the confirmation dialog box, click **Yes** to continue.

Step 6 Return to your originating procedure (NTP).

NTP-G62 Create a J0 Section Trace

Purpose	This procedure creates a repeated, fixed-length string of characters used to monitor interruptions or changes to traffic between nodes.
Tools/Equipment	One TXP or MXP card must be installed.
Prerequisite Procedures	NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 DLP-G223 Change the 4x2.5G Muxponder Line Settings, page 11-265 (if necessary) DLP-G224 Change the 4x2.5G Muxponder Section Trace Settings, page 11-267
Required/As Needed	As needed (optional if path trace is set)
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at a node on the network where you will create the section trace. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the TXP or MXP card.

Step 3 Click the **Provisioning > Line > Section Trace** tabs.

Step 4 From the Port drop-down list, choose the port for the section trace.

Step 5 From the Received Trace Mode drop-down list, enable the section trace expected string by choosing **Manual**.

Step 6 In the Transmit Section Trace String Size area, click **1 byte** or **16 byte**. The 1 byte option allows you to enter one character and the 16 byte option allows a 15 character string.

Step 7 In the New Transmit String field, enter the string that you want to transmit. Enter a string that makes the destination port easy to identify, such as the node IP address, node name, or another string. If the New Transmit String field is left blank, the J0 transmits a string of null characters.

Step 8 If you set the Section Trace Mode field to Manual, enter the string that the destination port should receive from the source port in the New Expected String field.

Step 9 If the card's Termination mode is set to Line, click the **Disable AIS and RDI if TIM-P is detected** check box if you want to suppress the alarm indication signal (AIS) and remote defect indication (RDI) when the STS Section Trace Identifier Mismatch Path (TIM-P) alarm appears. If the card's Termination mode is set to Section, the **Disable AIS and RDI if TIM-P is detected** check box will be grayed out and you will not be able to select it. Continue on to Step 10. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for descriptions of alarms and conditions.

Step 10 Click **Apply**.

Step 11 After you set up the section trace, the received string appears in the Received field. The following options are available:

- Click **Hex Mode** to display section trace in hexadecimal format. The button name changes to ASCII Mode. Click **ASCII Mode** to return the section trace to ASCII format.
- Click the **Reset** button to reread values from the port.
- Click **Default** to return to the section trace default settings (Section Trace Mode is set to Off and the New Transmit and New Expected Strings are null).

Caution Clicking Default will generate alarms if the port on the other end is provisioned with a different string.

The expect and receive strings are updated every few seconds.

Stop. You have completed this procedure.

NTP-G203 Create End-to-End SVLAN Circuits

Purpose	This procedure manually creates an end-to-end SVLAN circuit for the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards provisioned in L2-over-DWDM mode.
Tools/Equipment	None

Prerequisite Procedures	DLP-G46 Log into CTC
	DLP-G379 Change the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Card Mode, page 11-149
	DLP-G421 Create and Store an SVLAN Database, page 16-79
	NTP-G178 Create, Delete, and Manage Optical Channel Trails, page 16-33
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** > **SVLAN** tabs.

Step 3 Click **Create**.

Step 4 Define the circuit attributes:

- Name—Assign a name to the source SVLAN circuit. The name can be alphanumeric and up to 48 characters (including spaces). If you leave the field blank, CTC assigns a default name to the source cross-connect.
- Type—(Display only) SVLAN.
- SVLAN ID—Displays the SVLAN identifier. Enter a SVLAN ID between 1 and 4093.

Note Do not duplicate SVLAN IDs.

- Protection—Before enabling SVLAN protection be sure to define the master node in the OCH Ring that contains the circuit. Protection must be enabled in order to have a SVLAN protected circuit provisioned.
  Check/uncheck to enable/disable SVLAN protection. A maximum of 1024 SVLANs can be protected.

Step 5 Click **Next**.

Step 6 Provision the circuit source (UNI or NNI client interfaces):

a. From the **Node** drop-down list, choose the circuit source node.

b. From the **Slot** drop-down list, choose the slot where the card exists.

c. From the **Port** drop-down list, choose the port where the circuit must originate (UNI or NNI client ports).

Step 7 Click **QinQ Settings**. Provision the IEEE 802.1QinQ VLAN tags on the GE_XP, 10GE_XP, GE_XPE, or 10GE_XPE cards. See the "DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings" task on page 11-400.

Step 8 Click **Next**.

Step 9 Provision the circuit destination (UNI or NNI client interfaces):

a. From the **Node** drop-down list, choose the circuit destination node.

b. From the **Slot** drop-down list, choose the slot where the card exists.

c. From the **Port** drop-down list, choose the port where the circuit must terminate (UNI or NNI client ports).

Step 10 Click **QinQ Settings**. Provision the IEEE 802.1QinQ VLAN tags on the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards. See DLP-G384 Provision the GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE QinQ Settings, page 11-400.

Step 11 Click **Next**.

Step 12 The SVLAN Circuit Routing Preview pane provides the following information:

- SVLAN Circuit Path—Nodes and spans. Click a node to select it. Blue arrows show the new SVLAN route. Move your cursor over the arrow to view span information including source, destination, and span loss information.
- Selected Node—Node that is currently chosen in the graphic. All actions that are invoked will apply to this node.
- Included Nodes—Nodes that are included in the circuit path.
- Excluded Nodes—Nodes that are excluded from the circuit path.
- Include—Includes the node displayed in the Selected Node field in the circuit path. Click **Apply** to update the circuit with the new constraints. This option is not applicable for protected SVLAN circuits.
- Exclude—Excludes the node displayed in the Selected Node field from the circuit path. Click **Apply** to update the circuit with the new constraints. This option is not applicable for protected SVLAN circuits.

Step 13 Click **Finish** to complete the circuit creation.

Step 14 To edit the SVLAN circuit, see instructions described in the "DLP-G472 Edit the End-to-End SVLAN Circuit" section on page 16-92.

Stop. You have completed this procedure.

DLP-G472 Edit the End-to-End SVLAN Circuit

Purpose	This task edits an end-to-end SVLAN circuit.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** > **SVLAN** tabs.

Step 3 Select the SVLAN circuit that you want to edit and click **Edit**.

The Edit Circuit pane appears.

- Use the General tab to view circuit information (circuit type, size, protection type, and routing preference), and to modify the circuit name.
- Use the End Points tab to view and define new circuit drops for the SVLAN circuit.

Step 4 Return to your originating procedure (NTP).

NTP-G229 Provision DCN Extension for a Network Using GCC/DCC

Purpose	This procedure provisions a DCN extension for a network using GCC/DCC as the communication channel
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at a node on the network (for example, Node A) where you want to provision the DCN extension. If you are already logged in, continue with Step 2.

Step 2 Complete the "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41, to create an OCHNC DCN circuit for the wavelength of the transponder (TXP) to be used for the GCC channel.

Step 3 Complete the "DLP-G76 Provision DCC/GCC Terminations" task on page 16-82, to create a GCC service channel on the transponder in Node A.

Step 4 Complete the DLP-G46 Log into CTC at another node on the network (for example, Node B) where you want to provision the DCN extension.

Step 5 Complete the "DLP-G105 Provision Optical Channel Network Connections" task on page 16-41, to create an OCHNC DCN circuit for the wavelength of the transponder to be used for the GCC channel.

Step 6 Complete the "DLP-G76 Provision DCC/GCC Terminations" task on page 16-82, to create a GCC service channel on the transponder in Node B.

Step 7 Turn up the circuit by forcing an ALS manual restart on the line-facing amplifier:

- **a.** Double-click the line-facing amplifier card
- **b.** Click the **Maintenance > ALS** tabs.
- **c.** From the ALS Mode drop-down list, choose Manual Restart.
- **d.** Click **Apply**. Click **Yes** in the confirmation dialog box.

Step 8 When the circuit is up, CTC discovers the GCC topology and shows the two nodes (Node A and B) connected by the GCC link.

Step 9 Complete the "NTP-G184 Create a Provisionable Patchcord" task on page 16-72, to create an OTS-to-OTS PPC between the two nodes.

Step 10 Complete the "DLP-G472 Merge two OCHNC DCN Circuits" task on page 16-94, to merge the two OCHNC DCN circuits into a single OCHNC circuit.

Stop. You have completed this procedure.

DLP-G472 Merge two OCHNC DCN Circuits

Purpose	This task merges two OCHNC DCN circuits into a single OCHNC circuit
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 From the View menu, choose **Go to Network View**.

Step 2 Click the **Circuits** tab.

Step 3 Select one of the OCHNC DCN circuits that you want to merge and click **Edit**. The Edit Circuit pane appears.

Step 4 Click **Merge** tab.

Step 5 Select the other OCHNC DCN circuit that you want to merge and click **Merge**.

Step 6 Return to your originating procedure (NTP).

NTP-G245 Create an Automatically Routed VCAT Circuit

Purpose	This procedure creates an automatically routed VCAT circuit.
Tools/Equipment	ADM-10G card.
Prerequisite Procedures	ADM-10G card must be installed at the nodes used in the VCAT circuit. Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Note This procedure requires the use of automatic routing. Automatic routing is not available if both the Automatic Circuit Routing NE default and the Network Circuit Automatic Routing Overridable NE default are set to FALSE. To view the NE default values, go to Shelf View and click the Provisioning->NE Defaults tab. For a full description of these defaults, see the *Network Element Defaults* section.

Step 1 Complete the DLP-G46 Log into CTC at the node where you would create the VCAT circuit. If you are already logged in, continue with Step 2.

Step 2 You must provision Ethernet or POS ports first before creating a VCAT circuit. Complete the following as necessary:

- To provision Ethernet ports for ADM-10G circuits, complete the "DLP-G551 Provision ADM-10G Ethernet Ports" task on page 16-101.

- To provision a VCAT circuit that traverses through a third-party network, complete the "DLP-G553 Create a Server Trail" procedure on page 16-102.

Step 3 From the View menu, choose **Go to Network View**.

Step 4 Click the **Circuits** tab, then click **Create**.

Step 5 In the Circuit Creation dialog box, choose **STS-V** or **VC_HO_PATH_VCAT_CIRCUIT** from the Circuit Type drop-down list. Click **Next**.

Step 6 Define the circuit attributes as follows:

- Name—Type the circuit name. The name can be alphanumeric and up to 48 characters (including spaces). Circuit names should be 43 characters or less if you want the ability to create monitor circuits. If you leave the field blank, CTC assigns a default name to the circuit. Monitor circuits are secondary circuits that monitor traffic on primary bidirectional circuits.
- Type—Displays the circuit type you chose in Step 5.
- Bidirectional—Checked by default and creates a bidirectional circuit.
- Create cross-connects only (TL1-like)—Check this check box if you want to create one or more cross-connects to complete a signal path for TL1-generated circuits.
- Apply to drop ports—Check this check box to apply the IS administrative state to the circuit source and destination ports. The IS state is applied to the ports only if the circuit bandwidth is the same as the port bandwidth, or if the port bandwidth is larger than the circuit, the circuit must be the first circuit to use the port. If not, a Warning dialog box shows the ports where the administrative state could not be applied. If the check box is unchecked, CTC does not change the service state of the source and destination ports.

  Note If the ports in the IS-state do not receive signals, then the loss of signal alarms are generated. This transitions the ports from the IS state to OOS-AU,FLT state.

- Symmetric—Checked by default. A bi-directional symmetrical VCAT circuit consists of only one VCAT member group. All member circuits are bi-directional circuits.
- Open VCAT—Check this check box to create open-ended VCAT circuits.
- Member size—Choose the member size. Choose the size of each member circuit in the VCG. STS1/STS3c for ANSI and VC4 for ETSI. For information about the member size that ADM-10G card supports, see Chapter 11, "Provision Transponder and Muxponder Cards".
- Num. of members—Choose the number of members. The number of members defines how much bandwidth is required at the trunk. Thus depending on bandwidth requirements of the ethernet traffic on the GE ports, choose appropriate number of members. For information about the number of members that ADM-10G card supports, see Chapter 11, "Provision Transponder and Muxponder Cards".

Note In ADM-10G cards, the Gigabit Ethernet port does not support flow control. When less than seven VC-4s are configured for the port, with the client traffic expected to be below the line rate, a burst in traffic beyond the supposed bandwidth leads to packet loss. It is, therefore, recommended to use an external flow control mechanism with less than seven VC-4s configured. Connecting a GE-XP or GE-XPE card between the client traffic and the ADM-10G Gigabit Ethernet interface enables such flow control.

- Mode—Select "None". The ADM-10G card supports only pure VCAT and does not support SW-LCAS or HW-LCAS.

> **Note** A failure on one member causes the entire VCAT circuit to fail. For ADM-10G card, you can add or delete members after creating a VCAT circuit with no protection. But while adding or deleting the members, the entire VCAT circuit does not carry traffic.

Step 7 Click **Next**.

Step 8 Complete the "DLP-G555 Provision a VCAT Circuit Source and Destination" task on page 16-105 for the VCAT circuit you are creating. If you are creating an open-ended VCAT circuit, complete the "DLP-G556 Provision an Open VCAT Circuit Source and Destination" task on page 16-105.

Step 9 In the VCAT Circuit Routing Preferences area, choose **Route Automatically**. The following options are available (choose either, both, or none based on your preferences).

- Using Required Nodes/Spans—Check this check box to specify nodes and spans to include or exclude in the CTC-generated circuit route.

  Including nodes and spans for a circuit ensures that those nodes and spans are in the working path of the circuit (but not the protect path). Excluding nodes and spans ensures that the nodes and spans are not in the working or protect path of the circuit.
- Review Route Before Creation—Check this check box to review and edit the circuit route before the circuit is created (you can see all the spans the circuit is traversing before the circuit creation is completed).

Step 10 If the VCAT circuit has a source or destination on a ADM-10G card, choose one of the following routing types.

- Common Routing—Routes the members on the same fiber.
- Split Routing—Allows the individual members to be routed on different fibers or each member to have different routing constraints. Split routing is required when creating circuits over a path protection configuration.

If the VCAT circuit does not have a source or destination on a ADM-10G card, common routing is automatically selected and you cannot change it.

Step 11 If you want to set preferences for individual members, complete the following in the Member Preferences area. Repeat for each member. To set identical preferences for all members, skip this step and continue with Step 12:

- Number—Choose a number (between 1 and 256) from the drop-down list to identify the member.
- Name—Type a unique name to identify the member. The name can be alphanumeric and up to 48 characters (including spaces). If you leave the field blank, CTC assigns a default name to the circuit.
- Protection—Choose the member protection type:
  - Fully Protected—Routes the circuit on a protected path.
  - Unprotected—Creates an unprotected circuit.
  - PCA—Routes the circuit on a BLSR protection channel.
  - DRI—(Split routing only) Routes the member on a dual-ring interconnect circuit.
- Node-Diverse Path—(Split routing only) Available for each member when Fully Protected is chosen.

Step 12 To set preferences for all members, complete the following in the Set Preferences for All Members area:

- Protection—Choose the member protection type:
  - Fully Protected—Routes the circuit on a protected path.

  - Unprotected—Creates an unprotected circuit.
  - PCA—Routes the member on a BLSR protection channel.
  - DRI—(Split routing only) Routes the member on a dual-ring interconnect circuit.
- Node-Diverse Path—(Split routing only) Available when Fully Protected is chosen.

Step 13 Click **Next**. If you chose Fully Protected or PCA, click **OK** to continue. If not, continue with the next step.

Step 14 If you selected Using Required Nodes/Spans in Step 9, complete the following substeps. If not, continue with Step 15:

a. In the Circuit Constraints area, choose the member that you want to route from the Route member number drop-down list.

b. Click a node or span on the circuit map.

c. Click **Include** to include the node or span in the circuit, or click **Exclude** to exclude the node or span from the circuit. The order in which you choose included nodes and spans is the order in which the circuit is routed. Click spans twice to change the circuit direction.

d. Repeat Steps b and c for each node or span you wish to include or exclude.

e. Review the circuit route. To change the circuit routing order, choose a node in the Required Nodes/Lines or Excluded Nodes Links lists, then click the **Up** or **Down** buttons to change the circuit routing order. Click **Remove** to remove a node or span.

f. Repeat Steps a through e for each member.

Step 15 If you selected Review Route Before Creation in Step 9, complete the following substeps. If not continue with Step 16:

a. In the Route Review/Edit area, choose the member that you want to route from the Route Member Number drop-down list.

b. Click a node or span on the circuit map.

c. Review the circuit route. To add or delete a circuit span, choose a node on the circuit route. Blue arrows indicate the circuit route. Green arrows indicate spans that you can add. Click a span arrowhead, then click **Include** to include the span or **Remove** to remove the span.

d. If the provisioned circuit does not reflect the routing and configuration you want, click **Back** to verify and change circuit information. If the circuit needs to be routed to a different path, see the "NTP-G246 Create a Manually Routed VCAT Circuit" procedure on page 16-98 to assign the circuit route yourself.

e. Repeat Steps a through d for each member.

Step 16 Click **Finish**. The Circuits window appears.

Note Depending on the complexity of the network and number of members, the VCAT circuit creation process can take several minutes.

Step 17 In the Circuits window, verify that the circuit you created appears in the circuits list.

Stop. You have completed this procedure.

NTP-G246 Create a Manually Routed VCAT Circuit

Purpose	This procedure creates a manually routed VCAT circuit.
Tools/Equipment	ADM-10G card.
Prerequisite Procedures	ADM-10G card must be installed at the nodes used in the VCAT circuit. Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at the node where you would create the circuit. If you are already logged in, continue with Step 2.

Step 2 If you want to assign a name to the tunnel source and destination ports before you create the circuit, complete the "DLP-G104 Assign a Name to a Port" task on page 16-16. If not, continue with Step 3.

Step 3 You must provision Ethernet or POS ports first before creating a VCAT circuit. Complete the following as necessary:

- To provision Ethernet ports for ADM-10G circuits, complete the "DLP-G551 Provision ADM-10G Ethernet Ports" task on page 16-101.
- To provision a VCAT circuit that traverses through a third-party network, complete the "DLP-G553 Create a Server Trail" procedure on page 16-102.

Step 4 From the View menu, choose **Go to Network View**.

Step 5 In the Circuit Creation dialog box, choose **STS-V** or **VC_HO_PATH_VCAT_CIRCUIT** from the Circuit Type drop-down list. Click **Next**.

Step 6 Define the circuit attributes as follows:

- Name—Type the circuit name. The name can be alphanumeric and up to 48 characters (including spaces). Circuit names should be 43 characters or less if you want the ability to create monitor circuits. If you leave the field blank, CTC assigns a default name to the circuit.
- Type—Displays the circuit type you chose in Step 5.
- Bidirectional—Checked by default and creates a bidirectional circuit.
- Create cross-connects only (TL1-like)—Check this check box if you want to create one or more cross-connects to complete a signal path for TL1-generated circuits.
- Apply to drop ports—Check this check box to apply the IS administrative state to the circuit source and destination ports. The IS state is applied to the ports only if the circuit bandwidth is the same as the port bandwidth, or if the port bandwidth is larger than the circuit, the circuit must be the first circuit to use the port. If not, a Warning dialog box shows the ports where the administrative state could not be applied. If the check box is unchecked, CTC does not change the service state of the source and destination ports.
- Symmetric—Checked is the default. A bi-directional symmetrical VCAT circuit consists of only one VCAT member group. All member circuits are bi-directional circuits.
- Open VCAT—Check this check box to create open-ended VCAT circuits.
- Member size—Choose the member size. Choose the size of each member circuit in the VCG. STS1/STS3c for ANSI and VC4 for ETSI. For information about the member size that ADM-10G card supports, see Chapter 11, "Provision Transponder and Muxponder Cards".

- Num. of members—Choose the number of members. The number of members defines how much bandwidth is required at the trunk. Thus depending on bandwidth requirements of the ethernet traffic on the GE ports, choose appropriate number of members. For information about the number of members that ADM-10G card supports, see Chapter 11, "Provision Transponder and Muxponder Cards"

Note In ADM-10G cards, the Gigabit Ethernet port does not support flow control. When less than seven VC-4s are configured for the port, with the client traffic expected to be below the line rate, a burst in traffic beyond the supposed bandwidth leads to packet loss. It is, therefore, recommended to use an external flow control mechanism with less than seven VC-4s configured. Connecting a GE-XP or GE-XPE card between the client traffic and the ADM-10G Gigabit Ethernet interface enables such flow control.

- Mode—ADM-10G card supports only pure VCAT and does not support SW-LCAS or HW-LCAS.

Note A failure on one member causes the entire VCAT circuit to fail. For ADM-10G card, you can add or delete members after creating a VCAT circuit with no protection. But while adding or deleting the members, the entire VCAT circuit does not carry traffic.

Step 7 Click **Next**.

Step 8 Complete the "DLP-G555 Provision a VCAT Circuit Source and Destination" task on page 16-105 for the VCAT circuit you are creating. If you are creating an open-ended VCAT circuit, complete the "DLP-G556 Provision an Open VCAT Circuit Source and Destination" task on page 16-105.

Step 9 In the Circuit Routing Preferences area, uncheck **Route Automatically**.

Step 10 If the VCAT circuit has a source or destination on a ADM-10G card, choose one of the following routing types.

- Common Routing—Routes the members on the same fiber.
- Split Routing—Allows the individual members to be routed on different fibers or each member to have different routing constraints. Split routing is required when creating circuits over a path protection configuration.

If the VCAT circuit does not have a source or destination on a ADM-10G card, common routing is automatically selected and you cannot change it.

Step 11 If you want to set preferences for individual members, complete the following in the Member Preferences area. Repeat for each member. To set identical preferences for all members, skip this step and continue with Step 12.

- Number—Choose a number (between 1 and 256) from the drop-down list to identify the member.
- Name—Type a unique name to identify the member. The name can be alphanumeric and up to 48 characters (including spaces). If you leave the field blank, CTC assigns a default name to the circuit.
- Protection—Choose the member protection type:
  - Fully Protected—Routes the circuit on a protected path.
  - Unprotected—Creates an unprotected circuit.
  - PCA—Routes the member on a BLSR protection channel.
  - DRI—(Split routing only) Routes the member on a dual-ring interconnect circuit.

- Node-Diverse Path—(Split routing only) Available for each member when Fully Protected is chosen.

Step 12 To set preferences for all members, complete the following in the Set Preferences for All Members area:

- Protection—Choose the member protection type:
  - Fully Protected—Routes the circuit on a protected path.
  - Unprotected—Creates an unprotected circuit.
  - PCA—Routes the member on a BLSR protection channel.
  - DRI—(Split routing only) Routes the member on a dual-ring interconnect circuit.
- Node-Diverse Path—(Split routing only) Available when Fully Protected is chosen.

Step 13 Click **Next**. If you chose Fully Protected or PCA, click **OK**. If not, continue with the next step.

Step 14 In the Route Review and Edit area, node icons appear so you can route the circuit manually.

Step 15 Complete the "DLP-G557 Provision a VCAT Circuit Route" task on page 16-106.

Step 16 Click **Finish**. If the path does not meet the specified path diversity requirement, CTC displays an error message and allows you to change the circuit path.

Note Depending on the complexity of the network and number of members, the VCAT circuit creation process can take several minutes.

Step 17 When all the circuits are created, the main Circuits window appears. Verify that the circuit you created appears in the window.

Stop. You have completed this procedure.

NTP-G247 Enable or disable Path Performance Monitoring on Intermediate Nodes

Purpose	This task enables or disables path performance monitoring on STS circuits of intermediate nodes carrying high volume traffic.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note For PM parameter definitions, see the 11.15.15 Performance Monitoring Parameter Definitions, page 11-94 section.

Step 1 In node view, double-click the ADM-10G card to display the card view.

Step 2 Click the **Provisioning > Line > SONET STS** tabs

Step 3 In the Provisioning->Line->SONET STS pane, check the Enable IPPM check box to enable path performance monitoring on the STS circuit. Uncheck (default option) the Enable IPPM to disable path performance monitoring on the STS circuit.

Step 4 Click **Apply**.

Step 5 Click the **Performance** tab to view PM parameters.

Step 6 Return to your originating procedure (NTP).

DLP-G551 Provision ADM-10G Ethernet Ports

Purpose	This task provisions ADM-10G Ethernet ports to carry traffic.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete DLP-G411 Provision an ADM-10G PPM and Port, page 11-150 to provision the PPM.

Step 2 In node view (single-shelf view) or shelf view (multishelf view), double-click the ADM-10G card to display the card view.

Step 3 Click the **Provisioning** > **Line > Ethernet** tabs.

Step 4 For each ADM-10G port, provision the following parameters:

- Port Name—Enter a logical name that defines the port.
- Admin State—Select the service state from the drop-down list. See the "DLP-G108 Change the Service State for a Port" task on page 16-85 for more information.
- MTU—The maximum size of the Ethernet frames accepted by the port. For jumbo size Ethernet frames, choose jumbo (the valid range is 64-9216) or select 1548 (default).
- Framing Type—Choose **GPF-F** POS framing (the default) or **HDLC** POS framing. The framing type needs to match the framing type of the POS device at the end of the circuit.
- CRC Encap—With GFP-F framing, you can configure a **32-bit** cyclic redundancy check (CRC) or **none** (no CRC) (the default). HDLC framing provides a set 16-bit or 32-bit CRC. The encap and CRC should be set to match the encap and CRC of the POS device on the end of the circuit.

Step 5 Click **Apply**.

Step 6 Refresh the statistics to get the current RMON counts:

a. Click the **Performance > Statistics** tabs.

b. Click **Refresh**.

Step 7 Return to your originating procedure (NTP).

DLP-G553 Create a Server Trail

Purpose	This procedure creates a server trail, which provides a connection between ONS nodes through a third-party network. You can create server trails between any two optical ports.
Tools/Equipment	None
Prerequisite Procedures	Chapter 14, "Turn Up a Node"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note You cannot create server trails on ports with DCC links.

Step 1 Complete the DLP-G46 Log into CTC at the node where you would create the circuit. If you are already logged in, continue with Step 2.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Click the **Provisioning > Server Trails** tabs.

Step 4 Click **Create**.

Step 5 In the Server Trail Creation dialog box, complete the following fields:

- Type—Choose **STS** or **VC**.
- Size—Depending on the type selected, choose the server trail size. For STSs, choose STS-1, STS-3c, STS-6c, STS-9c, STS-12c, or STS-24c; for VCs, choose VC-4, VC-4-2c, VC-4-3c, VC-4-4c, or VC4-8c
- Protection Type—Choose one of the following protection types: Preemptible, Unprotected, or Fully Protected. The server trail protection sets the protection type for any circuit that traverses it.
  - Preemptible— PCA circuits will use server trails with the Preemptible attribute.
  - Unprotected—In Unprotected Server Trail, CTC assumes that the circuits going out from that specific port will not be protected by provider network and will look for a secondary path from source to destination if you are creating a protected circuit.
  - Fully Protected—In Fully Protected Server Trail, CTC assumes that the circuits going out from that specific port will be protected by provider network and will not look for a secondary path from source to destination.
- Number of Trails—Enter the number of server trails. Number of trails determine the number of circuits that can be created on server trail. You can create a maximum of 3744 server trails on a node. You can create multiple server trails from the same port. This is determined by how many circuits of a particular server trail size can be supported on the port.
- SRLG—Enter a value for the Shared Resource Link Group (SRLG). SRLG is used by Cisco Transport Manager (CTM) to specify link diversity. The SRLG field has no restrictions. If you create multiple server trails from one port, you can assign the same SRLG value to all the links to indicate that they originate from the same port.

Step 6 Click **Next**.

Step 7 In the Source area, complete the following:

- From the Node drop-down list, choose the node where the server trail originates.

- From the Slot drop-down list, choose the slot containing the card where the server trail originates. (If a card's capacity is fully utilized, the card does not appear in the list.)
- Depending on the origination card, choose the source port and/or STS or VC from the Port and STS or VC lists. The Port list is only available if the card contains multiple ports. STSs and VCs do not appear if they are already in use by other circuits.

Step 8 Click **Next**.

Step 9 In the Destination area, complete the following:

- From the Node drop-down list, choose the destination node.
- From the Slot drop-down list, choose the slot containing the card where the server trail will terminate (destination card). (If a card's capacity is fully utilized, the card does not appear in the list.)
- Depending on the card selected, choose the destination port and/or STS or VC from the Port and STS or VC drop-down lists. The Port drop-down list is available only if the card has multiple ports. The STSs that appear depend on the card, circuit size, and protection scheme.

Step 10 Click **Finish**.

Note When Server Trails are created on an IPv4 or IPv6 node and the IP address of the node changes, complete the "DLP-G554 Repair Server Trails" task on page 16-103 to repair the Server Trails.

Stop. You have completed this procedure.

DLP-G554 Repair Server Trails

Purpose	This procedure repairs server trail terminations in cases where the IP address changes for a node connected by a Server Trail link.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The Server Trail Repair wizard can only fix the IP address changes and cannot fix Server Trail terminations when you migrate from IPv4 to IPv6 addresses.

Note The Server Trail Repair wizard cannot repair the server trails when IP address of nodes on both ends of the Server Trail are changed.

Note When server trails are created on an IPv4 or IPv6 node and the IP address of the node changes, make sure that the Server Trail Repair wizard is launched on the IP address of the node that changed. For example, if the IP address of server trails created on an IPv4 node changes, run the Server Trail Repair wizard on the IPv4 node and not on the IPv6 node.

Step 1 Complete the DLP-G46 Log into CTC at the node where you would repair server trails. If you are already logged in, continue with Step 2.

> **Note** The Server Trail Repair wizard works only when nodes at both ends of the server trail are added in the CTC. If CTC is launched after the IP address is changed or if the node on any of the sides is not discovered automatically, then the node has to be added manually into the CTC.

Step 2 From the View menu, choose **Go to Network View**.

Step 3 Choose the **Tools > Links > Repair Server Trails** option from the tool bar.
The **Server Trail Repair** wizard appears.

Step 4 Specify the changed IP address.
The **Server Trail Repair** window provides the following options:

- **Try to discover IP address changes**—The wizard searches and displays the list of changed IP addresses.

  > **Note** The wizard can discover multiple IP address changes. However, the wizard can repair only one IP address change at a time. To repair multiple IP address changes, run the **Server Trail Repair** wizard multiple times.

- **Apply the following IP change**—Allows you to specify the changed IP address.

  Select the node with the changed IP address and specify old IP address as Original IP Address. The wizard automatically displays the current IP address.

Step 5 Click **Next**.
If you selected the "Try to discover IP address changes" option in Step 4, then the wizard displays all the IP address changes that will be fixed. Click **Next**.

If you selected the "Apply the following IP change" option in Step 4, continue with Step 6.

Step 6 The Server Trail Terminations to Repair window appears. Click **Finish** to repair the server trails.

Stop. You have completed this procedure.

DLP-G555 Provision a VCAT Circuit Source and Destination

Purpose	This task provisions a virtual concatenated (VCAT) circuit source and destination.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note After you have selected the circuit properties in the Circuit Source dialog box according to the specific circuit creation procedure, you are ready to provision the circuit source.

Step 1 From the Node drop-down list (in the Source/Destination selection pane), choose the node where the circuit originates.

Step 2 From the Slot drop-down list, choose the slot containing the ADM-10G card where the circuit originates. (If a card's capacity (bandwidth) is fully utilized, it does not appear in the list.)

Step 3 Depending on the circuit origination card, choose the source port.

Step 4 Click **Next**.

Step 5 From the Node drop-down list, choose the destination node.

Step 6 From the Slot drop-down list, choose the slot containing the ADM10-G card where the circuit will terminate (destination card). (If a card's capacity (bandwidth) is fully utilized, the card does not appear in the list.)

Step 7 Choose the destination port.

Step 8 Click **Next**.

Step 9 Return to your originating procedure (NTP).

DLP-G556 Provision an Open VCAT Circuit Source and Destination

Purpose	This task provisions an open virtual concatenated (VCAT) circuit source and destination.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note After you have selected the circuit properties in the Circuit Source dialog box according to the specific circuit creation procedure, you are ready to provision the circuit source.

Step 1 From the Node drop-down list (in the Source/Destination selection pane), choose the node where the circuit originates.

Step 2 From the Slot drop-down list, choose the slot containing the ADM-10G card where the circuit originates. (If a card's capacity (bandwidth) is fully utilized, it does not appear in the list.)

Step 3 Depending on the circuit origination card, choose the source port.

Step 4 Click **Next**.

Step 5 Click the **Auto-ranged Destinations** check box to select the endpoints (CCAT/VCAT) automatically. Only the first endpoint needs to be selected; all the other endpoints are automatically created.

If you have not chosen auto-ranged destinations from the card selected in Step 2, then choose the source port and/or STS. If applicable, choose VC from the Port and STS drop down-lists. The Port drop-down list is available only if the card has multiple ports. STSs and VCs do not appear if they are already in use by other circuits.

Step 6 From the **Select Destinations For** drop-down list, choose the member number.

Step 7 From the Node drop-down list, choose the destination node.

Step 8 From the Slot drop-down list, choose the slot containing the card where the circuit will terminate (destination card). (If a card's capacity (bandwidth) is fully utilized, the card does not appear in the list.) Non-data cards may be used for open VCAT circuits. The cards that do not have ethernet ports are non-data cards.

Step 9 Click **Add Destinations**.

Step 10 Click **Next**.

Step 11 Verify that the open VCAT circuit source and destination appears.

Step 12 Return to your originating procedure (NTP).

DLP-G557 Provision a VCAT Circuit Route

Purpose	This task provisions the circuit route for manually routed VCAT circuits.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In the Circuit Creation wizard in the Route Review and Edit area, choose the member number from the Route Member Number drop-down list.

Step 2 Click the source node icon if it is not already selected.

Step 3 Starting with a span on the source node, click the arrow of the span you want the circuit to travel. The arrow turns yellow. In the Selected Span area, the From and To fields provide span information. The source STS or VC appears.

Step 4 Click **Add Span**. The span is added to the Included Spans list and the span arrow turns blue.

Step 5 Repeat Steps 3 and 4 until the circuit is provisioned from the source to the destination node through all intermediary nodes.

Step 6 Repeat Steps 1 through 5 for each member.

Step 7 Verify that a VCAT circuit route is provisioned.

Step 8 Return to your originating procedure (NTP).

CHAPTER 17

Monitor Performance

The information in this chapter is in a new location. See Monitor Performance for the performance monitoring (PM) parameters and concepts that are defined for dense wavelength division multiplexing (DWDM) cards in Cisco ONS 15454. PM parameters are used by service providers to gather, store, set thresholds, and report performance data for early detection of problems. This chapter also explains how to enable and view PM statistics.

CHAPTER 18

Manage the Node

The information in this chapter is in a new location. See Manage the Node for information related to modifying node provisioning for the Cisco ONS 15454 and performing common management tasks such as monitoring the dense wavelength division multiplexing (DWDM) automatic power control (APC) and span loss values.

CHAPTER 19

Alarm and TCA Monitoring and Management

The information in this chapter is in a new location. See Alarm and TCA Monitoring and Management for Cisco Transport Controller (CTC) alarm and threshold crossing alert (TCA) monitoring and management.

CHAPTER 20

Change DWDM Card Settings

This chapter explains how to change line, performance monitoring (PM), and threshold settings on Cisco ONS 15454 DWDM cards. To install cards, see the "NTP-G30 Install the DWDM Cards" procedure on page 14-64.

Note The procedures and tasks described in this chapter for the Cisco ONS 15454 platform is applicable to the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, unless noted otherwise.

Note Unless otherwise specified, the term "ONS 15454" refers to both ANSI and ETSI shelf assemblies and card parameters apply to cards installed in both ANSI and ETSI shelf assemblies.

Before You Begin

Before performing any of the following procedures, investigate all alarms and clear any trouble conditions. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* as necessary.

Caution Changing card settings can be service affecting. You should make all changes during a scheduled maintenance window.

This section lists the chapter procedures (NTPs). Turn to a procedure for applicable tasks (DLPs).

6. NTP-G93 Modify the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Line Settings and PM Thresholds, page 20-65—Complete as needed.
7. NTP-G174 Modify the 40-WXC-C or 80-WXC-C Line Settings and PM Thresholds, page 20-79—Complete as needed.
8. NTP-G241 Modify the 40-SMR1-C and 40-SMR2-C Line Settings and PM Thresholds, page 20-96—Complete as needed.
9. NTP-G149 Modify the MMU Line Settings and PM Thresholds, page 20-116—Complete as needed.
10. NTP-G101 Modify Alarm Interface Controller–International Settings, page 20-119—As needed, complete this procedure to change settings for external alarms, controls, and orderwire for the AIC-I card.
11. NTP-G102 Change Card Service State, page 20-122—Complete as needed.
12. NTP-G240 Modify TDC-CC and TDC-FC Line Settings and PM Thresholds, page 20-76
13. NTP-G280 Modify Threshold Settings for the TNC and TNCE Cards, page 20-123

NTP-G90 Modify OSCM and OSC-CSM Card Line Settings and PM Thresholds

Purpose	This procedure changes the optical service channel (OSC) and PM parameters and thresholds for the OSCM and OSC-CSM cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC procedure at the node where you want to change the OSCM or OSC-CSM card settings. If you are already logged in, proceed to Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Perform any of the following tasks as needed:

- DLP-G199 Change the OSCM and OSC-CSM OC-3/STM-1 Line Settings, page 20-3
- DLP-G200 Change the OSCM and OSC-CSM OC-3/STM-1 Line SONET/SDH Thresholds, page 20-5
- DLP-G201 Change Optical Line Parameters for OSCM and OSC-CSM Cards, page 20-7
- DLP-G202 Change the OSCM and OSC-CSM Optical Line Threshold Settings, page 20-8
- DLP-G203 Change the OSCM and OSC-CSM ALS Maintenance Settings, page 20-12

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G199 Change the OSCM and OSC-CSM OC-3/STM-1 Line Settings

Purpose	This task changes the OC-3/STM-1 line settings for the OSC signal transmitted by OSCM and OSC-CSM cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OSCM or OSC-CSM card where you want to change the OC-3/STM-1 line settings.

Step 2 Click the **Provisioning > OC3 Line > OC3 Line** (ANSI) or **Provisioning > STM-1 > STM-1 Line** (ETSI) tabs.

Step 3 Modify any of the settings described in Table 20-1.

Table 20-1 OSCM and OSC-CSM Card OC-3/STM-1 Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	1
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	(Display only) Displays the port administrative state. For more information about administrative states, see the *Administrative and Service States* document.	• IS (ANSI) or Unlocked (ETSI)—Puts the port in service. The port service state changes to IS-NR (ANSI) or Unlocked-enabled (ETSI). • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI)—Puts the port in automatic in-service. The port service state changes to OOS-AU,AINS (ANSI) or Unlocked-disabled,automaticInService (ETSI).

Table 20-1 OSCM and OSC-CSM Card OC-3/STM-1 Line Settings (continued)

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR (In-Service and Normal [ANSI]) or Unlocked-enabled (ETSI)—The port is fully operational and is performing as provisioned. • OOS-AU,AINS (Out-Of-Service and Autonomous, Automatic In-Service [ANSI]) or Unlocked-disabled,automaticInService (ETSI)—The port is out of service, but traffic is carried. Alarm reporting is suppressed. The ONS node monitors the ports for an error-free signal. After an error-free signal is detected, the port stays in the OOS-AU,AINS/Unlocked-disabled,automaticInService state for the duration of the soak period. After the soak period ends, the port service state changes to IS-NR/Unlocked-enabled. • OOS-MA,DSBLD (Out-of-Service and Management, Disabled [ANSI]) or Locked-enabled,disabled (ETSI)—The port is out of service and unable to carry traffic. • OOS-MA,MT (Out-of-Service and Management, Maintenance [ANSI]) or Locked-enabled,maintenance (ETSI)—The port is out of service for maintenance. Alarm reporting is suppressed, but traffic is carried and loopbacks are allowed.
SF BER	Sets the signal fail bit error rate.	From the drop-down list, choose one of the following: • 1E-3 • 1E-4 • 1E-5
SD BER	Sets the signal degrade bit error rate.	From the drop-down list, choose one of the following: • 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
Provides Synch	(Display only) If checked, the card is provisioned as a network element (NE) timing reference.	• Checked • Unchecked
SyncMsgIn	Enables synchronization status messages (SSM) on the S1 byte, which allow the node to choose the best timing source.	• Checked • Unchecked
Send Do Not Use	When checked, sends a Do Not Use for Synchronization (DUS) message on the S1 byte.	• Checked • Unchecked

Table 20-1 OSCM and OSC-CSM Card OC-3/STM-1 Line Settings (continued)

Parameter	Description	Options
PJSTSMon #	(Display only) Sets the STS that will be used for pointer justification.	This parameter is set to Off. It cannot be changed.
AINS Soak	(Display only) The automatic in-service soak period. It is always 00.00.	—
Type	Defines the port as SONET or SDH. The Enable Sync Msg field and the Send Do Not Use field must be disabled before the port can be set to SDH.	From the drop-down list, choose one of the following: • SONET • SDH

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G200 Change the OSCM and OSC-CSM OC-3/STM-1 Line SONET/SDH Thresholds

Purpose	This task changes the OC-3/STM-1 line SONET/SDH thresholds settings for the OSC signal transmitted by the OSCM and OSC-CSM cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf view), double-click the OSCM or OSC-CSM card where you want to change the SONET/SDH threshold settings.

Step 2 Click the **Provisioning > OC3 Line > SONET Thresholds** (ANSI) or **Provisioning > OC3 Line > SDH Thresholds** (ETSI) tabs.

Step 3 Thresholds can be set for Near End or Far End directions for either the 15-minute or 1-day intervals. You can set thresholds for either the Line or Section types. Path thresholds do not apply. Modify any of the settings described in Table 20-2 (ANSI) or Table 20-3 (ETSI).

Table 20-2 OSCM and OSC-CSM Cards OC3 Line SONET Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	1
CV	Coding violations	Numeric. Can be set for 15-minute or one-day intervals for Line or Section (Near and Far End). Select the bullet and click **Refresh**.

Table 20-2 OSCM and OSC-CSM Cards OC3 Line SONET Threshold Settings (continued)

Parameter	Description	Options
ES	Errored seconds	Numeric. Can be set for 15-minute or one-day intervals for Line or Section (Near and Far End). Select the bullet and click **Refresh**.
SES	Severely errored seconds	Numeric. Can be set for 15-minute or one-day intervals for Line or Section (Near and Far End). Select the bullet and click **Refresh**.
SEFS	Severely errored framing seconds (Section only)	Numeric. Can be set for Far End, for 15-minute or one-day intervals for Section only. Select the bullet and click **Refresh**.
FC	Failure count (Line only)	Numeric. Can be set for 15-minute or one-day intervals for Line (Near and Far End). Select the bullet and click **Refresh**
UAS	Unavailable seconds (Line only)	Numeric. Can be set for 15-minute or one-day intervals for Line (Near and Far End). Select the bullet and click **Refresh**.

Table 20-3 OSCM and OSC-CSM Cards OC3 Line SDH Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number.	1
EB	Errored block	Numeric. Can be set for 15-minute or one-day intervals for MS (Multiplex Section) or RS (Regeneration Section) (Near and Far End). Select the bullet and click **Refresh**.
ES	Errored seconds	Numeric. Can be set for 15-minute or one-day intervals for MS or RS (Near and Far End). Select the bullet and click **Refresh**.
SES	Severely errored seconds	Numeric. Can be set for 15-minute or one-day intervals for MS or RS (Near and Far End). Select the bullet and click **Refresh**.
BBE	Background block error	Numeric. Can be set for 15-minute or one-day intervals for MS or RS (Near and Far End). Select the bullet and click **Refresh**.
OFS	Out of frame seconds	Numeric. Can be set for 15-minute or one-day intervals for RS, Near End. Select the bullet and click **Refresh**.
UAS	Unavailable seconds	Numeric. Can be set for 15-minute or one-day intervals for MS or RS (Near and Far End). Select the bullet and click **Refresh**.

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G201 Change Optical Line Parameters for OSCM and OSC-CSM Cards

Purpose	This task changes the optical line parameters for OSCM and OSC-CSM cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OSCM or OSC-CSM card where you want to change the optical line parameters.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-4. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-4 OSCM and OSC-CSM Card Optical Line Parameter Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	OSCM • 2 (OSC-RX) • 3 (OSC-TX) OSC-CSM • 2 (COM-RX) • 3 (COM-TX) • 4 (LINE-RX) • 5 (LINE-TX) • 6 (OSC-RX) • 7 (OSC-TX)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance

Table 20-4 OSCM and OSC-CSM Card Optical Line Parameter Settings (continued)

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power	(Display only) Shows the current power level per port.	—
VOA Mode	(Display only) Shows the functional mode of the variable optical attenuator (VOA), when present.	• Constant Attenuation • Constant Power
VOA Power Ref	(Display only) Shows the optical power setpoint that must be reached when a VOA is present and VOA Mode is set to Constant Power. This parameter can only be modified by ANS.	—
VOA Power Calib	Modifies the optical power value of the VOA when VOA Mode is set to Constant Power.	Numeric. Double-click the parameter, enter a value, and press **Enter**.
VOA Attenuation Ref	(Display only) Shows the VOA attenuation value when VOA Mode is set to Constant Attenuation. This parameter can only be modified by ANS.	—
VOA Attenuation Calib	Modifies the attenuation value of the VOA when the VOA Mode is set to Constant Attenuation.	Numeric. Double-click the parameter, enter a value, and press **Enter**.
Active Channels	(Display only) Indicates how many channels the amplifier is carrying. Generally reflects the number of provisioned channels.	—
OSC Power	(Display only) Shows the OSC power level per port.	—

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G202 Change the OSCM and OSC-CSM Optical Line Threshold Settings

Purpose	This task changes the optical line threshold settings for OSCM and OSC-CSM cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OSCM or OSC-CSM card where you want to change the optical line threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

Step 3 Under Types, choose the type of threshold that you want to change, either **Warning** or **Alarm**.

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 4 Click **Refresh**.

Step 5 Modify any of the warning or alarm threshold settings. Table 20-5 shows the thresholds for warnings. Table 20-6 shows the thresholds for alarms.

Table 20-5 OSCM and OSC-CSM Cards Optical Line Warning Thresholds Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	OSCM • 2 (OSC-RX) • 3 (OSC-TX) OSC-CSM • 2 (COM-RX) • 3 (COM-TX) • 4 (LINE-RX) • 5 (LINE-TX) • 6 (OSC-RX) • 7 (OSC-TX)
opwrMin (dBm) (OSCM only)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm) (OSCM only)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMin OSC (dBm)	Sets the OSC low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax OSC (dBm)	Sets the OSC high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.

Table 20-6 OSCM and OSC-CSM Cards Optical Line Alarm Thresholds Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	OSCM • 2 (OSC-RX) • 3 (OSC-TX) OSC-CSM • 2 (COM-RX) • 3 (COM-TX) • 4 (LINE-RX) • 5 (LINE-TX) • 6 (OSC-RX) • 7 (OSC-TX)
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. If the VOA Mode is Constant Attenuation, you can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document. If VOA Mode is Constant Power, you cannot change the threshold manually because it is based on the Power setpoint (VOA Power Ref + VOA Power Calib). To change the threshold, you must change the VOA Power Calib value. This adjusts the Power setpoint. The threshold is automatically set to a value that is 5 dB lower than the Power setpoint. You can set the threshold manually at the COM-RX and LINE-RX ports.	Numeric (dB). Double-click the table cell, enter a value, then press **Enter**.
Pwr OSC Degrade Low (dBm)	Shows the power degrade low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) always active in Constant Power mode. In this case, the threshold is automatically linked to the Power setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint will result in changing the threshold (always 2 dB lower).	Numeric.

Table 20-6 OSCM and OSC-CSM Cards Optical Line Alarm Thresholds Settings (continued)

Parameter	Description	Options
Pwr OSC Degrade High (dBm)	Shows the power degrade high threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port that is associated to a VOA (OSC-VOA). In Constant Power mode, the port is always active and the threshold is automatically linked to the Power setpoint (VOA Power Ref + VOA Power Calib). To change the threshold, change the Power setpoint. The threshold will always be 2 dB higher than the Power setpoint.	Numeric.
Pwr OSC Failure (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. If the VOA Mode is Constant Attenuation, you can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document. If VOA Mode is Constant Power, you cannot change the threshold manually because it is based on the Power setpoint (VOA Power Ref + VOA Power Calib). To change the threshold, you must change the VOA Power Calib value. This adjusts the Power setpoint. The threshold is automatically set to a value that is 5 dB lower than the Power setpoint.	Numeric.
VOA Degrade High (dBm)	Does not apply to OSCM and OSC-CSM cards.	—
VOA Degrade Low (dBm)	Does not apply to OSCM and OSC-CSM cards.	—

Step 6 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 7 Return to your originating procedure (NTP).

DLP-G203 Change the OSCM and OSC-CSM ALS Maintenance Settings

Purpose	This task changes the automatic laser shutdown (ALS) maintenance settings for the OSC-CSM and OSCM cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The ALS function should only be disabled temporarily for installation or maintenance reasons. Activate ALS immediately after maintenance or installation.

Warning **Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm could pose an eye hazard.** Statement 1056

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OSC-CSM or OSCM card where you want to change the ALS maintenance settings.

Step 2 Click the **Maintenance > ALS** tabs.

Step 3 Modify any of the settings described in Table 20-7. The provisionable parameters are listed in the Options column in the table.

Table 20-7 OSC-CSM and OSCM ALS Maintenance Settings

Parameter	Description	Options
OSRI	Optical safety remote interlock. When set to On, the OSC TX output power is shut down.	From the drop-down list, choose one of the following: • On • Off
ALS Mode	Automatic laser shutdown mode. For OSCM cards, ALS provides the ability to shut down the OSC TX laser when the OSC RX detects a loss of signal (LOS). For OSC-CSM cards, ALS provides the same functions as the OSCM card and also enables an optical safety mechanism at the DWDM network layer. For more details, see G.2 Automatic Laser Shutdown, page G-6	From the drop-down list, choose one of the following: • Disable—Deactivates ALS. • Auto Restart—(Default) ALS is active. The power is automatically shut down when needed and automatically tries to restart using a probe pulse until the cause of the failure is repaired. • Manual Restart • Manual Restart for Test

Table 20-7 OSC-CSM and OSCM ALS Maintenance Settings (continued)

Parameter	Description	Options
Recovery Pulse Duration	(Display only) Displays the duration of the optical power pulse that begins when an amplifier restarts.	—
Recovery Pulse Interval	(Display only) Displays the interval between optical power pulses.	—
Currently Shutdown	(Display only) Displays whether or not the laser is currently shut down, either YES or NO.	—
Request Laser Restart	If checked, allows you to restart the laser.	Checked or unchecked

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

NTP-G91 Modify OPT-PRE and OPT-BST Card Line Settings and PM Thresholds

Purpose	This procedure changes the line and threshold settings for an OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier card.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at the node where you want to change the OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier card settings. If you are already logged in, proceed to Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Perform any of the following tasks as needed:

- DLP-G204 Change Optical Line Settings for OPT-PRE and OPT-BST Amplifiers, page 20-14
- DLP-G205 Change Optical Line Threshold Settings for OPT-PRE and OPT-BST Amplifiers, page 20-15
- DLP-G206 Change Optical Amplifier Line Settings for OPT-PRE and OPT-BST Amplifiers, page 20-19
- DLP-G207 Change Optical Amplifier Threshold Settings for OPT-PRE and OPT-BST Amplifiers, page 20-21
- DLP-G322 Change the OPT-BST ALS Maintenance Settings, page 20-25

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G204 Change Optical Line Settings for OPT-PRE and OPT-BST Amplifiers

Purpose	This task changes the optical line settings for an OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier where you want to change the optical line settings.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-8. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-8 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Amplifier Optical Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	OPT-BST, OPT-BST-E, and OPT-BST-L • 1 (COM-RX) • 2 (COM-TX) • 3 (OSC-RX) • 4 (OSC-TX) • 5 (LINE-RX) OPT-PRE • 1 (COM-RX) • 3 (DC-RX) • 4 (DC-TX)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click the Port Name table cell, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.

Table 20-8 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Amplifier Optical Line Settings (continued)

Parameter	Description	Options
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled (OPT-PRE only) • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power	(Display only) Shows the current power level per port.	—
Active Channels	(Display only) Indicates how many channels the port is carrying. Generally reflects the number of provisioned channels.	—
OSC Power	(Display only) Shows the OSC power level per port. Does not apply to OPT-PRE.	—

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G205 Change Optical Line Threshold Settings for OPT-PRE and OPT-BST Amplifiers

Purpose	This task changes the optical line threshold settings for an OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier where you want to change the optical line threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-9.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-9 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Card Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	OPT-BST, OPT-BST-E, and OPT-BST-L • 1 (COM-RX) • 2 (COM-TX) • 3 (OSC-RX) • 4 (OSC-TX) • 5 (LINE-RX) OPT-PRE • 1 (COM-RX) • 3 (DC-RX) 4 (DC-TX)
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter the name, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter the name, and press **Enter**.
opwrMin OSC (dBm)	Sets the OSC low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter the name, and press **Enter**.
opwrMax OSC (dBm)	Sets the OSC high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter the name, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-10.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-10 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Card Optical Line Alarm Thresholds Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX).	OPT-BST, OPT-BST-E, and OPT-BST-L • 1 (COM-RX) • 2 (COM-TX) • 3 (OSC-RX) • 4 (OSC-TX) • 5 (LINE-RX) OPT-PRE • 1 (COM-RX) • 3 (DC-RX) • 4 (DC-TX)
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document. For OPT-BST, OPT-BST-E, OPT-BST-L cards, this parameter applies to the COM-RX and LINE-RX ports.	Numeric. Double-click the table cell, enter a value and press **Enter**.
Power Degrade High (dBm)	Does not apply to OPT-BST, OPT-BST-E, OPT-BST-L, and OPT-PRE line parameters.	—
Power Degrade Low (dBm)	Does not apply to OPT-BST, OPT-BST-E, OPT-BST-L, and OPT-PRE line parameters.	—

Table 20-10 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Card Optical Line Alarm Thresholds Settings (continued)

Parameter	Description	Options
Pwr OSC Degrade Low (dBm)	Shows the power degrade low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) always active in Constant Power mode. In this case, the threshold is automatically linked to the Power setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint will result in changing the threshold (always 2 dB lower). Does not apply to OPT-PRE.	Numeric.
Pwr OSC Degrade High (dBm)	Shows the power degrade high threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port that is associated to a VOA (OSC-VOA). In Constant Power mode, the port is always active and the threshold is automatically linked to the Power setpoint (VOA Power Ref + VOA Power Calib). To change the threshold, change the Power setpoint. The threshold will always be 2 dB higher than the Power setpoint. Does not apply to OPT-PRE.	Numeric.
Pwr OSC Failure (dBm)	Shows the optical power low threshold for the OSC channel of the port. You can set the threshold manually at the LINE-RX port.	—
Gain Degrade Low (dB)	Does not apply to OPT-BST, OPT-BST-E, OPT-BST-L, and OPT-PRE line parameters.	—
Gain Degrade High (dB)	Does not apply to OPT-BST, OPT-BST-E, OPT-BST-L, and OPT-PRE line parameters.	—

Step 5 Return to your originating procedure (NTP).

DLP-G206 Change Optical Amplifier Line Settings for OPT-PRE and OPT-BST Amplifiers

Purpose	This task changes the optical amplifier line settings for an OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier where you want to change the optical amplifier line settings.

Step 2 Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-11. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-11 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Optical Amplifier Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	OPT-PRE • 2 (COM-TX) OPT-BST, OPT-BST-E, OPT-BST-L • 6 (LINE-TX)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port service state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Total Output Power	(Display only) Shows the current power level per port.	—

Table 20-11 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Optical Amplifier Line Settings (continued)

Parameter	Description	Options
Channel Power Ref.	(Display only) Shows the optical per-channel signal power setpoint that must be reached at the amplifier output when gain control is active.	—
Offset	Adjusts the Total Output Power unless network conditions prevent the adjustment, for example, the port is in IS state.	Numeric. Double-click the table cell, enter a value, then press **Enter**.
Active Channels	(Display only) Indicates how many channels the amplifier is carrying. Generally reflects the number of provisioned channels.	
OSC Power	Shows the OSC power level per port. Does not apply to OPT-PRE.	
Signal Output Power	(Display only) Shows the current output power leaving the amplifier, including the amplified spontaneous emissions (ASE) contribution.	—
Output Power Set-Point	(Display only) Shows the output power setpoint.	—
Working Mode	(Display only) Shows the working mode, either GAIN or POWER.	—
Gain	(Display only) The current gain of the amplifiers.	—
Gain Set Point	The value of the gain that the amplifier must achieve. APC can modify this value based on the number of optical channel network connection (OCHNC) circuits that are managed by the amplifier or to compensate for fiber aging insertion loss. For more information, see Chapter 13, "Network Reference."	Display only or numeric depending on mode setting. When the system is configured as metro core, this field is display only. When the system is configured as metro access, this field can be changed by the user.
Tilt Reference	(Display only) Shows the default value for the amplifier tilt. This field can only be modified by ANS.	—
Tilt Calibration	Allows you to manually change the amplifier tilt.	Numeric. Double-click the parameter, enter a value, and press **Enter**.
DCU Insertion Loss	(Display only; OPT-PRE cards only) Shows the dispersion compensation unit (DCU) insertion loss.	—

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G207 Change Optical Amplifier Threshold Settings for OPT-PRE and OPT-BST Amplifiers

Purpose	This task changes the optical amplifier threshold settings for an OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-PRE, OPT-BST, OPT-BST-E, or OPT-BST-L amplifier where you want to change the optical amplifier threshold settings.

Step 2 Click the **Provisioning > Opt Apli Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-12.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-12 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Card Amplifier Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	OPT-PRE • 2 (COM-TX) OPT-BST, OPT-BST-E, OPT-BST-L • 6 (LINE-TX)
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.

Table 20-12 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Card Amplifier Line Warning Threshold Settings

Parameter	Description	Options
opwrMin OSC (dBm)	Sets the OSC low power warning level. Does not apply to OPT-PRE.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax OSC (dBm)	Sets the OSC high power warning level. Does not apply to OPT-PRE.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Choose the alarm interval that you want to provision, either **15 minutes** or **1 Day**.

b. Under Types, choose **Alarm**.

c. Click **Refresh**.

d. Modify any of the alarm thresholds shown under the Options column in Table 20-13.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-13 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Card Amplifier Line Alarm Thresholds Setting

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	OPT-PRE • 2 (COM-TX) OPT-BST, OPT-BST-E, OPT-BST-L • 6 (LINE-TX)
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click the parameter, enter a value, and press **Enter**.

Table 20-13 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Card Amplifier Line Alarm Thresholds Setting (continued)

Parameter	Description	Options
Power Degrade High (dBm)	(Display only) Shows the current value of the optical power degrade high threshold. This threshold applies only when the amplifier is active and in constant power mode. Power Degrade High refers to the port's Signal Output Power value and is automatically calculated by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE when the amplifier is turned up. The Power Degrade High threshold is linked to the Output Power Setpoint on the Parameters tab. Changing the setpoint changes the Power Degrade High threshold. The threshold value is always 2 dB higher than the Output Power Setpoint value. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing. For more information, see Chapter 13, "Network Reference."	—
Power Degrade Low (dBm)	(Display only) Shows the current value of the optical power degrade high threshold configured in the card. This threshold applies only when the amplifier is active and in constant power mode. Power Degrade Low refers to the port's Signal Output Power value and is automatically calculated by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE when the amplifier is turned up. The Power Degrade Low threshold is automatically linked to the Output Power Setpoint on the Parameters tab. Changing the setpoint changes the Power Degrade Low threshold. The threshold value is always 2 dB lower than the Output Power Setpoint. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing.	—

Table 20-13 OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L Card Amplifier Line Alarm Thresholds Setting (continued)

Parameter	Description	Options
Gain Degrade High (dBm)	(Display only) Shows the current value of the gain degrade high threshold configured in the card. This threshold applies only when the amplifier is active and in constant gain mode. Gain Degrade High refers to the port's Gain value and is automatically calculated by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE when the amplifier is turned up. The Gain Degrade High threshold is linked to the Gain setpoint. Changing the setpoint changes the Gain Degrade High threshold. The threshold value is always 2 dB higher than the Gain Setpoint value. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing and to compensate for insertion loss due to fiber aging.	—
Gain Degrade Low (dBm)	(Display only) Shows the current value of the gain degrade low threshold configured in the card. This threshold applies only when the amplifier is active and in constant gain mode. Gain Degrade Low refers to the port's Gain value and is automatically calculated by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE when the amplifier is turned up. The Gain Degrade Low threshold is automatically linked to the Gain Setpoint that is provisioned. Changing the setpoint changes the Gain Degrade Low threshold. The threshold value is always 2 dB lower than the Gain Setpoint value. APC can also modify this value based on the number of OCHNC circuits that the amplifier is managing.	—

Step 5 Return to your originating procedure (NTP).

DLP-G322 Change the OPT-BST ALS Maintenance Settings

Purpose	This task changes the ALS maintenance settings for the OPT-BST, OPT-BST-E, and OPT-BST-L cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The ALS function should only be disabled temporarily for installation or maintenance reasons. Activate ALS immediately after maintenance or installation.

Warning **Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm could pose an eye hazard.** Statement 1056

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-BST, OPT-BST-E, or OPT-BST-L where you want to change the ALS maintenance settings.

Step 2 Click the **Maintenance > ALS Mode** tabs.

Step 3 Modify any of the settings described in Table 20-14. The provisionable parameters are listed in the Options column in the table.

Table 20-14 OPT-BST ALS Maintenance Settings

Parameter	Description	Options
OSRI	Optical safety remote interlock. When set to On, the OPT-BST TX output power is shut down.	From the drop-down list, choose one of the following: • On • Off
ALS Mode	Automatic laser shutdown. For OPT-BST cards, ALS provides the ability to shut down the OPT-BST TX laser when the OPT-BST RX detects an LOS. ALS also enables an optical safety mechanism at the DWDM network layer. For more information, see Appendix G, “Automatic Laser Shutdown.”	From the drop-down list, choose one of the following: • Disable—Deactivates ALS. If the OPT-BST faces a span without an OSC connection, choose this option. • Auto Restart—(Default) ALS is active. The power is automatically shut down when needed and automatically tries to restart using a probe pulse until the cause of the failure is repaired. • Manual Restart • Manual Restart for Test
Recovery Pulse Duration	(Display only) Displays the duration of the optical power pulse that begins when an amplifier restarts.	—
Recovery Pulse Interval	(Display only) Displays the interval between optical power pulses.	—
Currently Shutdown	(Display only) Displays whether or not the laser is currently shut down, either YES or NO.	—
Request Laser Restart	If checked, allows you to restart the laser.	Checked or unchecked

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

NTP-G160 Modify OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Line Settings and PM Thresholds

Purpose	This procedure changes the line and threshold settings for the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24amplifier cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at the node where you want to change the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, or OPT-EDFA-24 amplifier card settings. If you are already logged in, proceed to Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Set the card working mode:

Caution Do not change the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-EDFA-17, or OPT-EDFA-24 working mode if it is in service and circuits are provisioned.

a. Display the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-EDFA-17, or OPT-EDFA-24 card view.

b. Click the **Provisioning > Card** tabs.

c. In the Card Working Mode field, choose one of the following:
   - **OPT-PRE**—Sets the card working mode to optical preamplifier.
   - **OPT-LINE**—Sets the card working mode to optical booster amplifier.

d. Click **Apply**.

Step 4 Perform any of the following tasks as needed:

- DLP-G323 Change Optical Line Settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Amplifiers, page 20-28
- DLP-G324 Change Optical Line Threshold Settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Amplifiers, page 20-30

- DLP-G325 Change Optical Amplifier Line Settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 Amplifiers, page 20-34
- DLP-G326 Change Optical Amplifier Threshold Settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 Amplifiers, page 20-36
- DLP-G327 Change the ALS Maintenance Settings of OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Cards, page 20-44

Step 5 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G323 Change Optical Line Settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Amplifiers

Purpose	This task changes the optical line settings for the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 amplifier cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, or OPT-EDFA-24 amplifier where you want to change the optical line settings.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-15. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-15 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Amplifier Optical Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	• 1 (COM-RX) • 2 (COM-TX) • 3 (OSC-RX) • 4 (OSC-TX) • 5 (LINE-RX) • 6 (LINE-TX), OPT-RAMP-C and OPT-RAMP-CE only • 7 (DC-RX), OPT-AMP-L, OPT-AMP-C, OPT-RAMP-C, and OPT-RAMP-CE only. 7 (DFB-RX) for 15454-M-RAMAN-CTP only. • 8 (DC-TX), OPT-AMP-L and OPT-AMP-C only. 8 (DFB-TX) for 15454-M-RAMAN-CTP only. • 9 (RAMAN-RX), OPT-RAMP-C and OPT-RAMP-CE only. 9(ASE-RX) for 15454-M-RAMAN-CTP only.
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the “DLP-G104 Assign a Name to a Port” task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled (OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP only) • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power	(Display only) Shows the current power level per port.	—

Table 20-15 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Amplifier Optical Line Settings (continued)

Parameter	Description	Options
Active Channel	(Display only) Indicates how many channels the amplifier is carrying. Generally reflects the number of provisioned channels.	—
OSC Power	Shows the OSC power level per port. Does not apply to OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP.	—

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G324 Change Optical Line Threshold Settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Amplifiers

Purpose	This task changes the optical line threshold settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 amplifier cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, or OPT-EDFA-24 amplifier where you want to change the optical line threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-16.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-16 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX):	• 1 (COM-RX) • 2 (COM-TX) • 3 (OSC-RX) • 4 (OSC-TX) 4 (LINE-RX)—15454-M-RAMAN-CTP card only • 5 (LINE-RX) 5 (LINE-TX)—15454-M-RAMAN-CTP card only • 6 (LINE-TX), OPT-RAMP-C and OPT-RAMP-CE only • 7 (DC-RX), OPT-AMP-L, OPT-AMP-C, OPT-RAMP-C, and OPT-RAMP-CE only 7 (DFB-RX)—15454-M-RAMAN-CTP card only • 8 (DC-TX), OPT-AMP-L and OPT-AMP-C only 7 (DFB-RX)—15454-M-RAMAN-CTP card only • 9 (RAMAN-RX), OPT-RAMP-C and OPT-RAMP-CE only 9(ASE-RX)—15454-M-RAMAN-CTP card only
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter the name, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter the name, and press **Enter**.

Table 20-16 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Optical Line Warning Threshold Settings

Parameter	Description	Options
opwrMin OSC (dBm)	Sets the OSC low power warning level. Does not apply to OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter the name, and press **Enter**.
opwrMax OSC (dBm)	Sets the OSC high power warning level. Does not apply to OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter the name, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-17.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-17 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Card Optical Line Alarm Thresholds Setting

Parameter	Description	Options
Port	(Display only) Displays the port number.	• 1 (COM-RX) • 2 (COM-TX) • 3 (OSC-RX) • 4 (OSC-TX) 4 (LINE-RX)—15454-M-RAMAN-CTP card only • 5 (LINE-RX) 5 (LINE-TX)—15454-M-RAMAN-CTP card only • 6 (LINE-TX), OPT-RAMP-C and OPT-RAMP-CE only • 7 (DC-RX), OPT-AMP-L, OPT-AMP-C, OPT-RAMP-C, and OPT-RAMP-CE only 7 (DFB-RX)—15454-M-RAMAN-CTP card only • 8 (DC-TX), OPT-AMP-L and OPT-AMP-C only 8 (DFB-TX)—15454-M-RAMAN-CTP card only • 9 (RAMAN-RX), OPT-RAMP-C and OPT-RAMP-CE only 9(ASE-RX)—15454-M-RAMAN-CTP card only
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document. You can manually set the threshold at the COM-RX and LINE-RX ports.	Numeric.
Pwr OSC Failure (dBm)	Shows the optical power failure low threshold for the OSC channel of the port. You can manually set the threshold at the LINE-RX port.	Numeric.

Step 5 Return to your originating procedure (NTP).

DLP-G325 Change Optical Amplifier Line Settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 Amplifiers

Purpose	This task changes the optical amplifier line settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 amplifier cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, or OPT-EDFA-24 amplifier where you want to change the optical amplifier line settings.

Step 2 Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-18. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-18 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-EDFA-17, and OPT-EDFA-24 Optical Amplifier Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	6 (LINE-TX) 8 (DC-TX), OPT-RAMP-C and OPT-RAMP-CE only
Port Name	Assigns a name to the specified port.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance

Table 20-18 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-EDFA-17, and OPT-EDFA-24 Optical Amplifier Line Settings

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Total Output Power	(Display only) Shows the current power level per port.	—
Channel Power Ref.	(Display only) Shows the optical per-channel signal power setpoint that must be reached at the amplifier output when gain control is active.	—
Offset	Adjusts the Total Output Power unless network conditions prevent the adjustment, for example, the port is in IS state.	Numeric. Double-click to change.
Signal Output Power	(Display only) Shows the current output power leaving the amplifier, including the ASE contribution.	—
Output Power Set-Point	(Display only) Shows the output power setpoint. Does not apply to OPT-AMP-L, OPT-AMP-C, or OPT-AMP-17-C.	—
Working Mode	(Display only) Shows the working mode, either Output Power or Control Gain for the OPT-AMP-L or OPT-AMP-C; Control Power for the OPT-AMP-17-C; or Control Gain for the OPT-RAMP-C or OPT-RAMP-CE.	—
Gain	(Display only) The current gain of the amplifiers.	—
Gain Set Point	The value of the gain that the amplifier must achieve. APC can modify this value based on the number of OCHNC circuits that are managed by the amplifier or to compensate for fiber aging insertion loss. For more information, see Chapter 13, "Network Reference."	Display only or numeric depending on mode setting. When the system is configured as metro core, this field is display only.
Tilt (OPT-AMP-L and OPT-AMP-C)	(Display only) Shows the default value for the amplifier tilt. This field cannot be modified.	—
Tilt Reference (OPT-AMP-L, OPT-AMP-C, OPT-EDFA-17 and OPT-EDFA-24)	(Display only) Shows the default value for the amplifier tilt. This field can only be modified by ANS.	—

Table 20-18 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-EDFA-17, and OPT-EDFA-24 Optical Amplifier Line Settings

Parameter	Description	Options
Tilt Calibration (OPT-AMP-L, OPT-AMP-C, OPT-EDFA-17 and OPT-EDFA-24)	Allows you to manually change the amplifier tilt.	Numeric. Double-click the parameter, enter a value, and press **Enter**.
DCU Insertion Loss (OPT-AMP-L and OPT-AMP-C)	(Display only) When provisioned as an OPT-PRE only) Shows the DCU insertion loss.	—
Active Channels	(Display only) Indicates how many channels the amplifier is carrying. Generally reflects the number of provisioned channels.	—
VOA Attenuation Ref	(Display only) Indicates the value for the VOA attenuation setpoint. This field can only be modified by ANS.	—
VOA Attenuation Calib	Allows you to manually change the VOA setpoint.	Numeric. Double-click the parameter, enter a value, and press **Enter**.

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G326 Change Optical Amplifier Threshold Settings for OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 Amplifiers

Purpose	This task changes the optical channel threshold settings for the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 amplifier cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, or OPT-EDFA-24 amplifier where you want to change the optical amplifier threshold settings.

Step 2 Click the **Provisioning > Opt Ampli Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-19.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-19 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 Card Amplifier Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	6 (LINE-TX) 8 (DC-TX), OPT-RAMP-C and OPT-RAMP-CE only
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMin OSC (dBm)	Sets the OSC low power warning level. Does not apply to OPT-RAMP-C and OPT-RAMP-CE.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter the name, and press **Enter**.
opwrMax OSC (dBm)	Sets the OSC high power warning level. Does not apply to OPT-RAMP-C and OPT-RAMP-CE.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter the name, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-20.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-20 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 Card Amplifier Line Alarm Thresholds Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	6 (LINE-TX) 8 (DC-TX), OPT-RAMP-C and OPT-RAMP-CE only
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click to change.
Power Degrade High (dBm)	(Display only) Shows the current value of the optical power degrade high threshold. This threshold applies only when the amplifier is active and in constant power mode. Power Degrade High refers to the port's Signal Output Power value and is automatically calculated by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE when the amplifier is turned up. The Power Degrade High threshold is linked to the Output Power Setpoint on the Parameters tab. Changing the setpoint changes the Power Degrade High threshold. The threshold value is always 2 dB higher than the Output Power Setpoint value. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing. For more information, see Chapter 13, "Network Reference."	—

Table 20-20 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 Card Amplifier Line Alarm Thresholds Settings (continued)

Parameter	Description	Options
Power Degrade Low (dBm)	(Display only) Shows the current value of the optical power degrade high threshold configured in the card. This threshold applies only when the amplifier is active and in constant power mode. Power Degrade Low refers to the port’s Signal Output Power value and is automatically calculated by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE when the amplifier is turned up. The Power Degrade Low threshold is automatically linked to the Output Power Setpoint on the Parameters tab. Changing the setpoint changes the Power Degrade Low threshold. The threshold value is always 2 dB lower than the Output Power Setpoint. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing.	—

Table 20-20 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, and OPT-EDFA-24 Card Amplifier Line Alarm Thresholds Settings (continued)

Parameter	Description	Options
Gain Degrade High (dBm)	(Display only) Shows the current value of the gain degrade high threshold configured in the card. This threshold applies only when the amplifier is active and in constant gain mode. Gain Degrade High refers to the port's Gain value and is automatically calculated by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE when the amplifier is turned up. The Gain Degrade High threshold is linked to the Gain setpoint. Changing the setpoint changes the Gain Degrade High threshold. The threshold value is always 2 dB higher than the Gain Setpoint value. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing and to compensate for insertion loss due to fiber aging.	—
Gain Degrade Low (dBm)	(Display only) Shows the current value of the gain degrade low threshold configured in the card. This threshold applies only when the amplifier is active and in constant gain mode. Gain Degrade Low refers to the port's Gain value and is automatically calculated by the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE when the amplifier is turned up. The Gain Degrade Low threshold is automatically linked to the Gain Setpoint that is provisioned. Changing the setpoint changes the Gain Degrade Low threshold. The threshold value is always 2 dB lower than the Gain Setpoint value. APC can also modify this value based on the number of OCHNC circuits that the amplifier is managing.	—

Step 5 Return to your originating procedure (NTP).

DLP-G538 Change Optical Raman Line Settings for OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP Amplifiers

Purpose	This task changes the optical Raman line settings for OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP amplifier cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, or 15454-M-RAMAN-COP amplifier where you want to change the optical Raman line settings.

Step 2 Click the **Provisioning > Opt. Raman. Line > Parameters** tab.

Step 3 Modify any of the settings described in Table 20-21. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-21 OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP Optical Raman Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	3 (RAMAN-RX) for 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP cards only 6 (RAMAN-TX) for 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP cards only 10 RAMAN-TX
Port Name	Assigns a name to the specified port.	User-defined. Name can be up to 32 alphanumeric/ special characters. This field is blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance

Table 20-21 OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP Optical Raman Line Settings (continued)

Parameter	Description	Options
Power	(Display only) Indicates the current Raman power.	—
Active Channels	(Display only) Indicates how many channels the amplifier is carrying. Generally reflects the number of provisioned channels. This field can be modified by ANS or the Raman wizard.	—
Ratio	(Display only) Indicates the ratio of the Raman power setpoint distributed between the two Raman pumps.	—
Power Setpoint	(Display only) Indicates the Raman power setpoint as the sum of Pump1 and Pump 2 set points. This field is modified by ANS or the Raman wizard.	—

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G539 Change Optical Raman Line Threshold Settings for OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP Amplifiers

Purpose	This task changes the optical channel threshold settings for the OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP amplifier cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, or 15454-M-RAMAN-COP amplifier where you want to change the optical Raman threshold settings.

Step 2 Click the **Provisioning > Opt. Raman. Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-22.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-22 OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP Card Raman Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	3 (RAMAN-RX) for 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP cards only 6 (RAMAN-TX) for 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP cards only 10 RAMAN-TX
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-20.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-23 OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP Card Raman Line Alarm Thresholds Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	3 (RAMAN-RX) for 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP cards only 6 (RAMAN-TX) for 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP cards only 10 RAMAN-TX
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click to change.

Step 5 Return to your originating procedure (NTP).

DLP-G327 Change the ALS Maintenance Settings of OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 Cards

Purpose	This task changes the ALS maintenance settings for the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 amplifier cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note To perform this task, the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-EDFA-17, or OPT-EDFA-24 card must be in OPT-LINE mode.

Note The ALS function should only be disabled temporarily for installation or maintenance reasons. Activate ALS immediately after maintenance or installation.

Warning **Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm could pose an eye hazard.** Statement 1056

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the OPT-AMP-L, OPT-AMP-17C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, or OPT-EDFA-24 card where you want to change the ALS maintenance settings.

Step 2 Click the **Maintenance > ALS** tabs.

Step 3 Modify any of the settings described in Table 20-24. The provisionable parameters are listed in the Options column in the table.

Table 20-24 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 ALS Maintenance Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	10 (RAMAN-RX), OPT-RAMP-C and OPT-RAMP-CE only 8 (DC-TX), OPT-RAMP-C and OPT-RAMP-CE only 6 (RAMAN-TX), 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP only 8 (DFB-TX), 15454-M-RAMAN-CTP only
OSRI	Optical safety remote interlock. When set to **On**, the OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, or 15454-M-RAMAN-COP TX output power is shut down.	From the drop-down list, choose one of the following: • On • Off

Table 20-24 OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, 15454-M-RAMAN-COP, OPT-EDFA-17, and OPT-EDFA-24 ALS Maintenance Settings (continued)

Parameter	Description	Options
ALS Mode	Sets the Automatic laser shutdown mode. For OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, 15454-M-RAMAN-CTP, and 15454-M-RAMAN-COP cards, ALS provides the ability to shut down the TX laser when the card RX detects an LOS. ALS also enables an optical safety mechanism at the DWDM network layer. For more information, see Chapter 13, "Network Reference."	From the drop-down list, choose one of the following: • Disable—Deactivates ALS. If the OPT-AMP-L, OPT-AMP-17-C, or OPT-AMP-C, faces a span without an OSC connection, choose this option. • Auto Restart—(Default) Activates ALS. The power is automatically shut down when needed and automatically tries to restart using a probe pulse until the cause of the failure is repaired. • Manual Restart • Manual Restart for Test
Recovery Pulse Duration	(Display only) Displays the duration of the optical power pulse that begins when an amplifier restarts.	—
Recovery Pulse Interval	(Display only) Displays the interval between optical power pulses.	—
Currently Shutdown	(Display only) Displays the current status of the laser.	—
Request Laser Restart	If checked, allows you to restart the laser for maintenance.	Checked or unchecked
OSC Based Startup	If checked, allows the Raman pump to be turned on even though OSC is the only detected power and there is no Raman signal.	Checked or unchecked.

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

NTP-G202 Modify PSM Card Line Settings and PM Thresholds

Purpose	This procedure changes the line and threshold settings for the PSM card.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC at the node where you want to change the card settings. If you are already logged in, proceed to Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Perform any of the following tasks as needed:

- DLP-G514 Change the PSM Card Mode, page 20-47
- DLP-G476 Change Optical Line Settings for the PSM Card, page 20-48
- DLP-G477 Change Optical Line Threshold Settings for the PSM Card, page 20-49
- DLP-G478 Change the PSM ALS Maintenance Settings, page 20-52

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G514 Change the PSM Card Mode

Purpose	This task changes the PSM card mode.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note You cannot change the PSM card mode if any of the PSM ports is in use in the normal configuration, that is, at least one patchcord is provisioned on the PSM ports.

Step 1 In the node view (single-shelf mode) or shelf view (multishelf mode), double-click the PSM card where you want to change the card mode.

Step 2 Click the **Provisioning > Card** tab.

Step 3 From the Mode drop-down list, choose one of the following:

- Normal—Sets the PSM card in normal configuration. In this configuration, the PSM card supports channel protection, line protection, and multiplex section protection configurations.

- Standalone—Sets the PSM card in standalone configuration. In this configuration, the PSM card can be equipped in any slot and supports all node configurations. When you select this option, CTC will:
  - Not support creation of patchcords
  - Set all VOA set points to 0dB attenuation
  - Move the administrative state of all ports to IS (ANSI) or Unlocked (ETSI)

Note In the standalone configuration, you cannot change the administrative state of the PSM ports. However, you can enable optical safety in standalone configuration.

Step 4 Return to your originating procedure (NTP).

DLP-G476 Change Optical Line Settings for the PSM Card

Purpose	This task changes the optical line settings for the PSM card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the PSM card where you want to change the optical line settings.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-25 on page 20-48. The provisionable parameters are listed in the Options column.

Table 20-25 PSM Card Optical Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	• 1 (W-RX) • 2 (W-TX) • 3 (P-RX) • 4 (P-TX) • 5 (COM-RX) • 6 (COM-TX)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the “DLP-G104 Assign a Name to a Port” task on page 16-16.

Table 20-25 PSM Card Optical Line Settings (continued)

Parameter	Description	Options
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States*document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power	(Display only) Shows the current power level per port.	—
VOA Mode	(Display only) Shows the functional mode of the VOA, when present. **Note** For W-RX and P-RX ports, the VOA Mode is always set to Constant Attenuation.	• Constant Attenuation • Constant Power
VOA Attenuation Ref	(Display only) Shows the VOA attenuation value when VOA Mode is set to Constant Attenuation. This parameter can only be modified by ANS.	—
VOA Attenuation Calib	Modifies the attenuation value of the VOA when the VOA Mode is set to Constant Attenuation.	Numeric. Double-click the parameter, enter a value, and press **Enter**.
Active Channels	(Display only) Indicates how many channels the PSM card is carrying. Generally reflects the number of provisioned channels.	—

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G477 Change Optical Line Threshold Settings for the PSM Card

Purpose	This task changes the optical line threshold settings for the PSM card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution It is recommended that you use the optical line threshold values imported from the Cisco Transport Planner XML configuration file. If you want to modify the threshold values, consult your network operations center (NOC) or other appropriate personnel who can understand and set the correct threshold values.

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the PSM card where you want to change the optical line threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-26.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-26 PSM Card Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX)	• 1 (W-RX) • 2 (W-TX) • 3 (P-RX) • 4 (P-TX) • 5 (COM-RX) • 6 (COM-TX)
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter the value, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter the value, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-27.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-27 PSM Card Optical Line Alarm Thresholds Setting

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX)	• 1 (W-RX) • 2 (W-TX) • 3 (P-RX) • 4 (P-TX) • 5 (COM-RX) • 6 (COM-TX)
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click the table cell, enter a value, then press **Enter**.
VOA Degrade High (dB)	(Display only) Shows the VOA degrade high threshold. This VOA value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA that is always active in Constant Attenuation mode. The threshold is automatically linked to the VOA setpoint that is provisioned (VOA Attenuation Ref + VOA Attenuation Calib). Changing the setpoint will result in changing the threshold (always 2 dB higher).	Numeric.
VOA Degrade Low (dB)	(Display only) Shows the VOA degrade low threshold. This VOA value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA that is always active in Constant Attenuation mode. The threshold is automatically linked to the VOA setpoint that is provisioned (VOA Attenuation Ref + VOA Attenuation Calib). Changing the setpoint will result in changing the threshold (always 2 dB lower).	Numeric.

Step 5 Return to your originating procedure (NTP).

DLP-G478 Change the PSM ALS Maintenance Settings

Purpose	This task changes the ALS maintenance settings for the PSM card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The ALS function is applicable for a PSM card in line (or path) protection configuration only. It is not applicable for all other PSM protection configurations.

Note The ALS function should only be disabled temporarily for installation or maintenance reasons. Activate ALS immediately after maintenance or installation.

Warning **Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm could pose an eye hazard.** Statement 1056

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the PSM card where you want to change the ALS maintenance settings.

Step 2 Click the **Maintenance > ALS** tabs.

Step 3 Modify any of the settings described in Table 20-28. The provisionable parameters are listed in the Options column in the table.

Table 20-28 PSM ALS Maintenance Settings

Parameter	Description	Options
OSRI	Optical safety remote interlock. When set to On, only the PSM TX output power of the protect path is shut down.	From the drop-down list, choose one of the following: • On • Off
ALS Mode	Automatic laser shutdown. ALS provides the ability to shut down the PSM TX VOA when the PSM RX detects an LOS. ALS also enables an optical safety mechanism at the DWDM network layer. For more information, see Chapter G, "Automatic Laser Shutdown."	From the drop-down list, choose one of the following: • Disable—Deactivates ALS. • Auto Restart—(Default) ALS is active. The power is automatically shut down when needed and automatically tries to restart using a probe pulse until the cause of the failure is repaired. • Manual Restart • Manual Restart for Test
Recovery Pulse Duration	(Display only) Displays the duration of the optical power pulse that begins when the VOA restarts.	—
Recovery Pulse Interval	(Display only) Displays the interval between optical power pulses.	—
Currently Shutdown	(Display only) Displays whether or not the VOA is currently shut down.	• YES • NO • APR—This is a temporary option that is displayed when the Currently Shutdown status is changing from YES to NO.
Request Laser Restart	If checked, allows you to restart the VOA.	Checked or unchecked

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

NTP-G175 Modify 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x Line Card Settings and PM Thresholds

Purpose	This procedure changes the line and PM parameter threshold settings for the multiplexer and demultiplexer cards. The cards included in this category are the 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, and 4MD-xx.x cards.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Complete the DLP-G141 View Optical Power Statistics for 32MUX-O, 32WSS, 32WSS-L, 32DMX-O, 32DMX, 32DMX-L, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-MUX-C, 40-DMX-C, and 40-DMX-CE Cards to view the optical power statistics.

Step 1 Complete the DLP-G46 Log into CTC at the node where you want to change the card settings. If you are already logged in, continue with Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2 as needed.

Step 3 Perform any of the following tasks as needed:

- DLP-G414 Change Optical Line Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards, page 20-55
- DLP-G415 Change Optical Line Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards, page 20-57
- DLP-G416 Change Optical Channel Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards, page 20-59
- DLP-G417 Change Optical Channel Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards, page 20-62

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G414 Change Optical Line Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards

Purpose	This task changes the optical line settings for a 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the multiplexer or demultiplexer card where you want to change the optical line settings.

Step 2 Perform one of the following:

- For 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, and 40-DMX-CE cards, click the **Provisioning > Optical Line > Parameters** tabs.
- For 4MD-xx.x cards, click the **Provisioning > Optical Band > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-29. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-29 Multiplexer and Demultiplexer Card Optical Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	32DMX, 32DMX-O, 32DMX-L • 33 (COM-RX) 32MUX-O • 33 (COM-TX) 40-DMX-C, 40-DMX-CE • 41 (COM-RX) 40-MUX-C • 41 (COM-TX) 4MD-xx.x 9 (COM-RX) and 10 (COM-TX)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click the table cell, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.

Table 20-29 Multiplexer and Demultiplexer Card Optical Line Settings (continued)

Parameter	Description	Options
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power	(Display only) Shows the current power level per port.	—
AINS Soak	(Display only) The automatic in-service soak period. It is always 00.00.	—
VOA Mode	(Display only; 32DMX and 32DMX-L cards only) Shows the functional mode of the VOA, when present.	• Constant Attenuation • Constant Power
VOA Power Ref	(Display only; 32DMX and 32DMX-L cards only) Shows the optical power setpoint that must be reached when a VOA is present and VOA Mode is set to Constant Power. This parameter can only be modified by ANS.	—
VOA Power Calib	(32DMX and 32DMX-L cards only) Modifies the optical power value of the VOA when VOA Mode is set to Constant Power.	Numeric. Double-click the parameter, enter a value, and press **Enter**.
VOA ATTenuation Ref	(Display only; 32DMX and 32DMX-L cards only) Shows the VOA attenuation value when VOA Mode is set to Constant Attenuation. This parameter can only be modified by ANS.	—
VOA Attenuation Calib	(32DMX and 32DMX-L cards only) Modifies the attenuation value of the VOA when the VOA Mode is set to Constant Attenuation.	Numeric. Double-click the parameter, enter a value, and press **Enter**.
Active Channels	(Display only) Indicates how many channels the amplifier is carrying. Generally reflects the number of provisioned channels.	—

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G415 Change Optical Line Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards

Purpose	This task changes the optical line threshold settings for a 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 40-MUX-C, or 4MD-xx.x card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the multiplexer or demultiplexer card where you want to change the optical line threshold settings.

Step 2 Perform one of the following:

- For 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, or 40-MUX-C cards, click the **Provisioning > Optical Line > Optics Thresholds** tabs.
- For 4MD-xx.x cards, click the **Provisioning > Optical Band > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-30.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-30 Multiplexer and Demultiplexer Card Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and description.	• 33 (COM-RX) for 32DMX, 32DMX-O, 32DMX-L • 33 (COM-TX) for 32MUX-O • 41 (COM-RX) for 40-DMX-C/40-DMX-CE • 41 (COM-TX) for 40-MUX-C • 9 (COM-RX) and 10 (COM-TX) for 4MD-xx.x

Table 20-30 Multiplexer and Demultiplexer Card Optical Line Warning Threshold Settings (continued)

Parameter	Description	Options
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-31.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-31 Multiplexer and Demultiplexer Optical Line Alarm Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	32DMX, 32DMX-O, 32DMX-L • 33 (COM-RX) 32MUX-O • 33 (COM-TX) 40-DMX-C, 40-DMX-CE • 41 (COM-RX) 40-MUX-C • 41 (COM-TX) 4MD-xx.x • 9 (COM-RX) and 10 (COM-TX)
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click the parameter, enter a value, and press **Enter**.

Table 20-31 Multiplexer and Demultiplexer Optical Line Alarm Threshold Settings (continued)

Parameter	Description	Options
Power Degrade High (dBm)	Not applicable to 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 40-MUX-C, and 4MD-xx.x cards.	—
Power Degrade Low (dBm)	Not applicable to 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 40-MUX-C, and 4MD-xx.x cards.	—

Step 5 Return to your originating procedure (NTP).

DLP-G416 Change Optical Channel Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards

Purpose	This task changes the optical channel settings for a 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 40-MUX-C, or 4MD-xx.x card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the multiplexer or demultiplexer card where you want to change the optical channel settings.

Step 2 Click the **Provisioning > Optical Chn > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-32. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-32 Multiplexer and Demultiplexer Card Optical Channel Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	32MUX-O, 32DMX-O, 32DMX, 32DMX-L • 1 through 32 (CHAN-RX or CHAN-TX) 40-MUX-C, 40-DMX-C, 40-DMX-CE • 1 through 40 (CHAN-RX or CHAN-TX) 4MD-xx.x • 1 through 8 (CHAN-RX or CHAN-TX)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power	(Display only) Shows the current power level per port.	—
Actual Wavelength	(Display only) Shows the wavelength specified by the manufacturing data. This field cannot be set manually.	—
Expected Wavelength	Shows the preprovisioned wavelength.	Numeric. This field cannot be changed.
AINS Soak	(Display only) The automatic in-service soak period. It is always 00.00.	—
VOA Mode	Not applicable to the 32MUX-O, 32DMX-0, 4MD-xx.x cards. Shows the current functional mode of the VOA.	• Constant Power • Constant Attenuation

Table 20-32 Multiplexer and Demultiplexer Card Optical Channel Settings (continued)

Parameter	Description	Options
VOA Power Ref.	Not applicable to the 32MUX-O, 32DMX-0, 4MD-xx.x cards. Shows the power setpoint that must be reached on the path when a VOA is present and the VOA Mode is Constant Power. Demultiplexers show the reference value of the desired optical power going to the client. Multiplexers show the reference value of the desired per-channel optical power. This parameter can only be modified by ANS.	—
VOA Power Calib.	Not applicable to the 32MUX-O, 32DMX-0, 4MD-xx.x cards. The user can modify the optical output power to the VOA if necessary. The VOA power calibration offsets the VOA power reference. For demultplexers, you can modify the optical output power to the client if necessary. For multiplexers, you can modify the output power per channel. This feature is normally used when the Network Type is configured as Access in the Provisioning > WDM-ANS tab.	Numeric. Double-click the parameter, enter a value and press **Enter**.
VOA Attenuation Ref.	Not applicable to the 32MUX-O, 32DMX-0, 4MD-xx.x cards. Shows the attenuation value of the VOA when the VOA is set in attenuation mode. This parameter can only be modified by ANS and APC.	—
VOA Attenuation Calib.	Not applicable to the 32MUX-O, 32DMX-0, and 4MD-xx.x cards. Allows the user to modify the attenuation value of the VOA if necessary when the VOA mode is set for constant attenuation.	Numeric. Double-click the parameter, enter a value, and press **Enter**.

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G417 Change Optical Channel Threshold Settings for 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-MUX-C, 40-DMX-C, 40-DMX-CE, or 4MD-xx.x Cards

Purpose	This task changes the optical channel threshold settings for a 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 40-MUX-C, or 4MD-xx.x card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the multiplexer or demultiplexer card where you want to change the optical channel threshold settings.

Step 2 Click the **Provisioning > Optical Chn > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-33.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-33 Multiplexer and Demultiplexer Card Optical Channel Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	32MUX-O, 32DMX-O, 32DMX, 32DMX-L • 1 through 32 (CHAN-RX or CHAN-TX) 40-MUX-C, 40-DMX-C, 40-DMX-CE • 1 through 40 (CHAN-RX or CHAN-TX) 4MD-xx.x • 1 through 8 (CHAN-RX or CHAN-TX)
opwrMin (dBm)	Set the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Set the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-34.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-34 Multiplexer and Demultiplexer Card Optical Channel Alarm Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	32MUX-O, 32DMX-O, 32DMX, 32DMX-L • 1 through 32 (CHAN-RX or CHAN-TX) 40-MUX-C, 40-DMX-C, 40-DMX-CE • 1 through 40 (CHAN-RX or CHAN-TX) 4MD-xx.x • 1 through 8 (CHAN-RX or CHAN-TX)
Power Failure Low (dBm)	Shows the power failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 5 dB lower). The 32DMX and 40-DMX-C/40-DMX/CE are exceptions. 32DMX and 40-DMX-C/40-DMX-CE Power Failure Low thresholds apply to ports that are not associated to a VOA. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click the parameter, enter a value, and press **Enter**.

Table 20-34 Multiplexer and Demultiplexer Card Optical Channel Alarm Threshold Settings (continued)

Parameter	Description	Options
Power Degrade High (dBm)	(32MUX-O, 32DMX-0, and 4MD-xx.x cards only) Shows the power degrade high threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint will result in changing the threshold (always 3 dB higher).	—
Power Degrade Low (dBm)	(32MUX-O, 32DMX-0, and 4MD-xx.x cards only) Shows the power degrade low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint will result in changing the threshold (always 2 dB lower).	—

Step 5 Return to your originating procedure (NTP).

NTP-G93 Modify the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Line Settings and PM Thresholds

Purpose	This procedure changes the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE card thresholds and settings.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC procedure at the node where you want to change the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE card settings. If you are already logged in, continue with Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Perform any of the following tasks as needed:

- DLP-G212 Change 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Card Optical Channel Parameters, page 20-66
- DLP-G213 Change the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Card Optical Channel Thresholds, page 20-69

Note To use the alarm profile tab, including creating alarm profiles and suppressing alarms, see Alarm and TCA Monitoring and Management.

- DLP-G214 Change 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Card Optical Line Parameters, page 20-73
- DLP-G215 Change the 32WSS, 32-WSS-L, 40-WSS-C, or 40-WSS-CE Card Optical Line Thresholds, page 20-74

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G212 Change 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Card Optical Channel Parameters

Purpose	This task changes the optical channel parameter settings for the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE card where you want to change the optical channel parameter settings.

Step 2 Click the **Provisioning > Optical Chn: Optical Connector***n* **> Parameters** tabs, where *n* = one of the four available groups of eight optical channels.

Step 3 Modify any of the settings described in Table 20-35. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-35 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Optical Channel Parameter Settings

Parameter	Description	Options
Port	(Display only) Shows the port number. Each optical channel (wavelength) has two logical ports. However, only one is active at a time depending on the operating mode provisioned for the port on the card view Maintenance tab: either CHAN-RX or PASS-THROUGH. For the 32WSS or 32WSS-L, ports 1 through 32 (CHAN-RX) are assigned to optical channels configured as add channels. For the 40-WSS-C or 40-WSS-CE, CHAN-RX ports are 1 through 40. 32WSS or 32WSS-L ports 33 through 64 (PASS-THROUGH) are assigned to optical channels configured as pass-through channels. 40-WSS-C or 40-WSS-CE ports 41 through 80 are PASS-THROUGH channels.	—
Port Name	Allows a logical name to be assigned for each of the port.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled,automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance

Table 20-35 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Optical Channel Parameter Settings

Parameter	Description	Options
Power	(Display only) Power value read by the photodiode located after the VOA associated to the port, and calibrated to the COM_TX port. For more information, see the *Hardware Specifications* document.	Numeric value (dB)
Actual Wavelength	(Display only) Displays the actual wavelength utilized by the channel.	—
Expected Wavelength	(Display only) Displays the expected wavelength assigned for the channel.	—
AINS Soak	(Display only) The automatic in-service soak period. It is always 00.00.	—
VOA Mode	(Display only) Displays the active VOA working mode.	• Constant Power • Constant Attenuation
VOA Power Reference	(Display only) Shows the value of the optical power setpoint that must be reached on the path where a VOA is present, when VOA Mode is set to Constant Power. This value is the desired per-channel optical power. This parameter can only be modified by ANS.	Numeric value (dB)
VOA Power Calibration	Allows you to modify the VOA power value when VOA Mode is Constant Power.	Double-click the parameter, enter a value, and press **Enter**. • Numeric value (dB) • –37 dB to –2 dB
VOA Attenuation Reference	(Display only) Shows the attenuation value of the VOA when the VOA Mode is Constant Attenuation. This parameter can only be modified by ANS.	Numeric value (dB)
VOA Attenuation Calibration	Allows you to modify the VOA attenuation value when VOA Mode is Constant Attenuation.	Double-click the parameter, enter a value, and press **Enter**. • Numeric value (dB) • –30 dB to +30 dB

Table 20-35 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Optical Channel Parameter Settings

Parameter	Description	Options
Power ADD	(Display only) Displays a measurement of the optical power coming in on the ADD RX port, reported in the CHAN-RX port column. This is the power transmitted by the TX laser of the TXP or MXP card that is connected to the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE.	Numeric value (dB)
Path Value	(Display only) Displays the path value for the CHAN-RX port column parameter.	Standby

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G213 Change the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Card Optical Channel Thresholds

Purpose	This task changes the optical channel threshold settings for the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE card where you want to change the optical channel threshold settings.

Step 2 Click the **Provisioning > Optical Chn: Optical Connector***n* **> Optics Thresholds** tabs, where *n* = one of the four available groups of eight optical channels.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-36.

Table 20-36 32WSS, 32WSS-L, 40-WSS-C, and 40-WSS-CE Optical Channel Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Shows the port number, port type, and direction (RX or TX). Each optical channel (wavelength) has two logical ports. However, only one is active at a time depending on the operating mode provisioned for the port on the card view Maintenance tab: either CHAN-RX or PASS-THROUGH.	—
opwrMin (dBm)	Set the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Set the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-37.

Table 20-37 32WSS, 32WSS-L, 40-WSS-C, and 40-WSS-CE Optical Channel Alarm Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX). For each optical channel (wavelength), two logical ports are associated. Only one port can be active at a time, depending on the port's operating mode. The operating mode, provisioned on the card view Maintenance tab, is either CHAN RX or PASS-THROUGH. 32WSS and 32WSS-L ports 1 through 32 (CHAN-RX) are associated to optical channels configured as add/drop channels. 40-WSS-C or 40-WSS-CE ports 1 through 40 are the CHAN-RX channels. 32WSS or 32WSS-L ports 33 through 64 (PASS-THROUGH) are associated to optical channels configured as pass-through channels. For the 40-WSS-C or 40-WSS-CE, ports 41 through 80 are the PASS-THROUGH channels.	—
Power Failure Low (dBm)	(Display only) Shows the power failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 5 dB lower). The threshold is calculated automatically when you run ANS. For more information, see the *Hardware Specifications* document.	—

Table 20-37 32WSS, 32WSS-L, 40-WSS-C, and 40-WSS-CE Optical Channel Alarm Threshold Settings (continued)

Parameter	Description	Options
Power Degrade High (dBm)	(Display only) Shows the power degrade high threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 3 dB higher).	—
Power Degrade Low (dBm)	(Display only) Shows the power degrade low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 2 dB lower).	Numeric
Power ADD Failure Low (dBm)	Shows the power add failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to the actual measurement of the optical power on the ADD RX port. It is reported as CHAN RX, that is, the power transmitted by the Trunk-TX laser of the TXP/MXP card connected to the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE card.	Numeric. CTC does not allow it to be changed.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G214 Change 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE Card Optical Line Parameters

Purpose	This task changes the optical line parameter settings for the 32WSS, 32WSS-L, 40-WSS-C or 40-WSS-CE cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE card where you want to change the optical line parameter settings.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-38. The provisionable parameters are listed in the Options column. The SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-38 32WSS, 32WSS-L, 40-WSS-C, and 40-WSS-CE Optical Line Parameter Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	32WSS or 32WSS-L: • 65 (EXP-TX) • 66 (EXP-RX) • 67 (COM-TX) • 68 (COM-RX) • 69 (DROP-TX) 40-WSS-C or 40-WSS-CE: • 81 (EXP-TX) • 82 (EXP-RX) • 83 (COM-TX) • 84 (COM-RX) • 85 (DROP-TX)
Port Name	Allows you to assign a logical name for each of the ports shown.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.

Table 20-38 32WSS, 32WSS-L, 40-WSS-C, and 40-WSS-CE Optical Line Parameter Settings

Parameter	Description	Options
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power	(Display only) Power value read by the photodiode associated with the port.	Numeric value (dB)
AINS Soak	(Display only) The automatic in-service soak period. It is always 00.00.	—
Actual Channels	Number of active channels carried by the port (the difference between provisioned and failed)	—

Step 4 Return to your originating procedure (NTP).

DLP-G215 Change the 32WSS, 32-WSS-L, 40-WSS-C, or 40-WSS-CE Card Optical Line Thresholds

Purpose	This task changes the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE card optical line threshold settings.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 32WSS, 32WSS-L, 40-WSS-C, or 40-WSS-CE card where you want to change the optical line threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs for one of the groups of optical channels that are available.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-39.

Table 20-39 32WSS, 32WSS-L, 40-WSS-C, and 40-WSS-CE Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	32WSS or 32WSS-L: • 65 (EXP-TX) • 66 (EXP-RX) • 67 (COM-TX) • 68 (COM-RX) • 69 (DROP-TX) 40-WSS-C or 40-WSS-CE: • 81 (EXP-TX) • 82 (EXP-RX) • 83 (COM-TX) • 84 (COM-RX) • 85 (DROP-TX)
opwrMin (dBm)	Set the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm.
opwrMax (dBm)	Set the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-40.

Table 20-40 32WSS, 32WSS-L, 40-WSS-C, and 40-WSS-CE Optical Line Alarm Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	32WSS or 32WSS-L: • 65 (EXP-TX) • 66 (EXP-RX) • 67 (COM-TX) • 68 (COM-RX) • 69 (DROP-TX) 40-WSS-C or 40-WSS-CE: • 81 (EXP-TX) • 82 (EXP-RX) • 83 (COM-TX) • 84 (COM-RX) • 85 (DROP-TX)
Power Failure Low (dBm)	Shows the power failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click the parameter, enter a value, and press **Enter**.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

NTP-G240 Modify TDC-CC and TDC-FC Line Settings and PM Thresholds

Purpose	This procedure changes the TDC-CC or TDC-FC card line settings and PM thresholds.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to change the TDC-CC or TDC-FC card settings. If you are already logged in, continue with Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Perform any of the following tasks as needed:

- DLP-G545 Modify the Chromatic Dispersion Value for the TDC-CC and TDC-FC Cards, page 20-77.
- DLP-G528 Change Optical Line Threshold Settings for TDC-CC or TDC-FC Card, page 20-78.

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G545 Modify the Chromatic Dispersion Value for the TDC-CC and TDC-FC Cards

Purpose	This procedure modifies the chromatic dispersion (CD) value for the TDC-CC and TDC-FC cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In the node view (single-shelf mode) or shelf view (multishelf view), double-click the TDC-CC or TDC-FC card.

Step 2 Click **Provisioning > Card** tab **and then** select the CD value from the Compensating Value drop-down list.

Step 3 Click **Apply. A warning message appears stating that the change in compensation value could affect traffic.**

Step 4 Click **Yes**. The compensation value is set.

Step 5 Return to your originating procedure (NTP).

DLP-G528 Change Optical Line Threshold Settings for TDC-CC or TDC-FC Card

Purpose	This task changes the optical line threshold settings for the TDC-CC or TDC-FC card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. The warning thresholds must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the TDC-CC or TDC-FC card where you want to change the optical channel threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-41.

Table 20-41 TDC-CC and TDC-FC Cards Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (DC-RX or DC-TX).	• 1 (DC-RX) • 2 (DC-TX)
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter a value, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter a value, and press **Enter**.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-42.

Table 20-42 TDC-CC and TDC-FC Cards Optical Line Alarm Thresholds Setting

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (DC-RX or DC-TX).	• 1 (DC-RX) • 2 (DC-TX)
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click the table cell, enter a value, and press **Enter**.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

NTP-G174 Modify the 40-WXC-C or 80-WXC-C Line Settings and PM Thresholds

Purpose	This procedure changes the 40-WXC-C or 80-WXC-C card thresholds and settings.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to change the 40-WXC-C or 80-WXC-C card settings. If you are already logged in, continue with Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2. For 40-WXC-C cards, continue with Step 4. For 80-WXC-C cards, continue with Step 3.

Step 3 Verify the card mode for 80-WXC-C cards. Complete the following steps:

a. Display the 80-WXC-C card in card view.

b. Click the **Provisioning** > **Card** tabs.

c. Verify that the card mode is set to the mode designated by your site plan:

– BIDIRECTIONAL

– MULTIPLEXER

– DE-MULTIPLEXER

Step 4 If the card mode is set correctly, continue with Step 4. If not, complete the "DLP-G603 Change the 80-WXC-C Card Mode" task on page 20-80.

Step 5 Perform any of the following tasks as needed:

- DLP-G406 Change 40-WXC-C or 80-WXC-C Card Optical Channel Parameters, page 20-81
- DLP-G407 Change the 40-WXC-C or 80-WXC-C Optical Channel Thresholds, page 20-84

Note To use the alarm profile tab, including creating alarm profiles and suppressing alarms, see Alarm and TCA Monitoring and Management.

- DLP-G408 Change 40-WXC-C or 80-WXC-C Optical Line Parameters, page 20-87
- DLP-G409 Change the 40-WXC-C or 80-WXC-C Optical Line Thresholds, page 20-89
- DLP-G413 Change 40-WXC-C or 80-WXC-C Card WXC Line Parameters, page 20-91
- DLP-G771 Changing the WXC Line Thresholds for the 80-WXC-C Card, page 20-93

Step 6 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G603 Change the 80-WXC-C Card Mode

Purpose	This task changes the card mode of the 80-WXC-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 80-WXC-C card where you want to change the card mode.

Step 2 Click the **Provisioning** > **WXC Line** > **Parameters** tabs.

Step 3 Verify that any provisioned client or trunk ports have an **OOS-MA,DSBLD** (ANSI) or **Locked-enabled,disabled** (ETSI) service state in the Service State column. If so, continue with Step 4. If not, complete the following substeps.

a. For the first port that is in service, in the Admin State column, choose **OOS,DSBLD** (ANSI) or **Locked,disabled** (ETSI).

b. Repeat Step a. for each port that is in service.

c. Click **Apply**.

Step 4 Click the **Provisioning** > **Card** tabs. Choose one of the card modes shown in Table 20-43.

Table 20-43 80-WXC-C Card Modes

Mode	Description
Bidirectional	Provisions the 80-WXC-C card in the bidirectional mode. Traffic received from any of the nine input ports(EAD *i*, *i*=1 to 8, AD ports) are multiplexed and sent to the common output port (COM ports). The pre-amplifer output signal from the preamplifier is split in a 40%-to-60% ratio, 40% is sent on the drop path (DROP-TX port) and 60% is sent pass-through path (EXP-TX port).
Multiplexer	Provisions the 80-WXC-C card in the multiplexer mode. Traffic received from any of the nine input ports (EAD *i*, *i*=1 to 8, AD ports) are multiplexed and sent to the common output port (COM port).
Demultiplexer	Provisions the 80-WXC-C card in the demultiplexer mode. Traffic received from common input port (COM port) is demultiplexed and sent to the nine output ports (EAD *i*, *i*=1 to 8, AD ports).

Step 5 Click **Apply**, then click **Yes** in the confirmation dialog box.

Step 6 Return to your originating procedure (NTP)

DLP-G406 Change 40-WXC-C or 80-WXC-C Card Optical Channel Parameters

Purpose	This task changes the optical channel parameter settings for the 40-WXC-C or 80-WXC-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-WXC-C or 80-WXC-C card where you want to change the optical channel parameter settings.

Step 2 Click the **Provisioning > OCH > Parameters** tabs. For 40-WXC-C cards, continue with Step 4. For 80-WXC-C cards, continue with Step 3.

Step 3 Choose a wavelength from the Wavelength drop-down list and click **Retrieve** to retrieve the OCH parameters.

Step 4 Modify any of the settings described in Table 20-44. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-44 40-WXC-C and 80-WXC-C Optical Channel Parameter Settings

Parameter	Description	Options
Circuit Name	(Display only) Shows the circuit name. This is provisioned in the Circuits tab.	—
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	• IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance (40-WXC-C only)
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled,automaticInService (40-WXC-C only) • OOS-MA,DSBLD/Locked-enabled,disabled (40-WXC-C only) • OOS-MA,MT/Locked-enabled,maintenance (40-WXC-C only)
From	(Display only) The port where the circuit originated.	—
Power (40-WXC-C only)	(Display only) Power value read by the photodiode located after the VOA associated to the port, and calibrated to the COM_TX port. For more information, see the *Hardware Specifications* document.	Numeric value (dB)
Power From (80-WXC-C only)	Power on the port where the circuit originated.	—
To (80-WXC-C only)	(Display only) The port where the circuit terminated.	—
Power To (80-WXC-C only)	Power on the port where the circuit terminated.	—
Force Channel (80-WXC-C only)	Starts the channel by moving the VOA from Open to Closed loop. You can force a channel only when the **Force Channel Status** is in the Unlocked state.	• OFF • ON

Table 20-44 40-WXC-C and 80-WXC-C Optical Channel Parameter Settings (continued)

Parameter	Description	Options
Force Channel Status (80-WXC-C only)	(Display only) Displays the channel status.	• Unlocked—Can force channel startup • Locked—Cannot force channel startup as the device is under control of other functions like optical safety • Forced—Channel startup has already been forced
Actual Wavelength (40-WXC-C only)	(Display only) Displays the actual wavelength utilized by the channel.	—
VOA Mode	(Display only) Displays the active VOA working mode.	• Constant Power • Constant Attenuation
VOA Power Ref.	(Display only) Shows the value of the optical power setpoint that must be reached on the path where a VOA is present, when VOA Mode is set to Constant Power. This value is the desired per-channel optical power. This parameter can only be modified by ANS.	Numeric value (dB)
VOA Power Calib.	Allows you to modify the VOA power value when VOA Mode is Constant Power.	Double-click the parameter, enter a value, and press **Enter**. • Numeric value (dB) • –37 dB to –2 dB
VOA Attenuation Ref. (40-WXC-C only)	(Display only) Shows the attenuation value of the VOA when the VOA Mode is Constant Attenuation. This parameter can only be modified by ANS.	Numeric value (dB)
VOA Attenuation Calib. (40-WXC-C only)	Allows you to modify the VOA attenuation value when VOA Mode is Constant Attenuation.	Double-click the parameter, enter a value, and press **Enter**. • Numeric value (dB) • –30 dB to +30 dB

Step 5 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 6 Return to your originating procedure (NTP).

DLP-G407 Change the 40-WXC-C or 80-WXC-C Optical Channel Thresholds

Purpose	This task changes the optical channel threshold settings for the 40-WXC-C or 80-WXC-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-WXC-C or 80-WXC-C card where you want to change the optical channel threshold settings.

Step 2 Click the **Provisioning > OCH > OCH Thresholds** tabs, where *n* = one of the four available groups of eight optical channels.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**. For 40-WXC-C card, continue with Step 3c. For 80-WXC-C card, continue with Step 3d.

c. Click **Refresh**. Continue with Step 3g.

d. Choose a wavelength from the Wavelength drop-down list.

e. In the Port drop-down list, choose an OCH port where you want to change the optical channel threshold settings.

f. Click **Retrieve**.

g. Modify any of the warning thresholds shown under the Options column in Table 20-45.

Table 20-45 40-WXC-C and 80-WXC-C Optical Channel Warning Threshold Settings

Parameter	Description	Options
Circuit Name	(Display only) Shows the circuit name. This is provisioned in the Circuits tab.	—
Port Name	(Display only) Shows the port name.	—
Actual Wavelength	(Display only) Displays the actual wavelength utilized by the channel.	—
opwrMin (dBm)	Set the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Set the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.

h. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**. For 40-WXC-C card, continue with Step 4b. For 80-WXC-C card, continue with Step 4c.

b. Click **Refresh**. Continue with Step 4f.

c. Choose a wavelength from the Wavelength drop-down list.

d. In the Port drop-down list, choose an OCH port where you want to change the optical channel threshold settings:

For the 80-WXC-C card, the following ports are available to view:

- 1 (EAD)
- 2 (EAD)
- 3 (EAD)
- 4 (EAD)
- 5 (EAD)
- 6 (EAD)
- 7 (EAD)
- 8 (EAD)
- 9 (AD)
- 10 (COM)
- (DROP-TX) (in BIDI mode)

e. Click **Retrieve**.

f. Modify any of the alarm thresholds shown under the Options column in Table 20-46.

Table 20-46 40-WXC-C and 80-WXC-C Optical Channel Alarm Threshold Settings

Parameter	Description	Options
Circuit Name	(Display only) Shows the circuit name. This is provisioned in the Circuits tab.	—
Port Name	(Display only) Shows the port name.	—
Actual Wavelength	(Display only) Displays the actual wavelength utilized by the channel.	—

Table 20-46 40-WXC-C and 80-WXC-C Optical Channel Alarm Threshold Settings (continued)

Parameter	Description	Options
Power Failure Low (dBm)	(Display only) Shows the power failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 5 dB lower). The threshold is calculated automatically when you run ANS. For more information, see the *Hardware Specifications* document.	—
Power Degrade High (dBm)	(Display only) Shows the power degrade high threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 3 dB higher).	—
Power Degrade Low (dBm)	(Display only) Shows the power degrade low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 2 dB lower).	Numeric

g. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G408 Change 40-WXC-C or 80-WXC-C Optical Line Parameters

Purpose	This task changes the optical line parameter settings for 40-WXC-C or 80-WXC-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-WXC-C or 80-WXC-C card where you want to change the optical line parameter settings.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-47. The provisionable parameters are listed in the Options column. The SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-47 40-WXC-C or 80-WXC-C Optical Line Parameter Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	40-WXC-C card options: • 10 (DROP-TX) • 11 (EXP-TX) • 12 (COM-RX) • 13 (COM-TX) 80-WXC-C card options: • 11 (DROP-TX) • 12 (EXP-TX) • 13 (COM-RX)
Port Name	Allows you to assign a logical name for each of the ports shown.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance

Table 20-47 40-WXC-C or 80-WXC-C Optical Line Parameter Settings (continued)

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power (40-WXC-C only)	(Display only) Power value read by the photodiode associated with the port.	Numeric value (dB)
Active Channels (40-WXC-C only)	Number of active channels carried by the port (the difference between provisioned and failed)	—
VOA Mode (80-WXC-C in BIDI mode only)	(Display only) Displays the active VOA working mode.	• Constant Power • Constant Attenuation
VOA Attenuation Ref. (80-WXC-C in BIDI mode only)	(Display only) Shows the attenuation value of the VOA when the VOA Mode is Constant Attenuation. This parameter can only be modified by ANS.	Numeric value (dB)
VOA Attenuation Calib. (80-WXC-C in BIDI mode only)	Allows you to modify the VOA attenuation value when VOA Mode is Constant Attenuation.	Double-click the parameter, enter a value, and press **Enter**. • Numeric value (dB) • –30 dB to +30 dB

Step 4 Return to your originating procedure (NTP).

DLP-G409 Change the 40-WXC-C or 80-WXC-C Optical Line Thresholds

Purpose	This task changes the 40-WXC-C or 80-WXC-C card optical line threshold settings.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-WXC-C or 80-WXC-C card where you want to change the optical line threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs for one of the groups of optical channels that are available.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-48.

Table 20-48 40-WXC-C or 80-WXC-C Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	40-WXC-C card options: • 10 (DROP-TX) • 11 (EXP-TX) • 12 (COM-RX) • 13 (COM-TX) 80-WXC-C card options: • 11 (DROP-TX) • 12 (EXP-TX) • 13 (COM-RX
opwrMin (dBm)	Set the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm.
opwrMax (dBm)	Set the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-49.

Table 20-49 40-WXC-C or 80-WXC-C Optical Line Alarm Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	40-WXC-C card options: • 10 (DROP-TX) • 11 (EXP-TX) • 12 (COM-RX) • 13 (COM-TX) 80-WXC-C card options: • 11 (DROP-TX) • 12 (EXP-TX) • 13 (COM-RX)
Power Failure Low (dBm)	Shows the power failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click the parameter, enter a value, and press **Enter**.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G413 Change 40-WXC-C or 80-WXC-C Card WXC Line Parameters

Purpose	This task changes the WXC line parameter settings for 40-WXC-C or 80-WXC-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-WXC-C or 80-WXC-C card where you want to change the optical line parameter settings.

Step 2 Click the **Provisioning > WXC Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-50. The provisionable parameters are listed in the Options column. The SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-50 40-WXC-C or 80-WXC-C WXC Line Parameter Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	40-WXC-C card options: • 1 (EXP-RX) • 2 (EXP-RX) • 3 (EXP-RX) • 4 (EXP-RX) • 5 (EXP-RX) • 6 (EXP-RX) • 7 (EXP-RX) • 8 (EXP-RX) • 9 (ADD-RX) 80-WXC-C card options: • 1 (EAD) • 2 (EAD) • 3 (EAD) • 4 (EAD) • 5 (EAD) • 6 (EAD) • 7 (EAD) • 8 (EAD) • 9 (AD) • 10 (COM)
Port Name	Allows you to assign a logical name for each of the ports shown.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance

Table 20-50 40-WXC-C or 80-WXC-C WXC Line Parameter Settings (continued)

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Active Channels	(Display only) Indicates how many channels the port is carrying. Generally reflects the number of provisioned channels.	—
Power (80-WXC-C only)	(Display only) Shows the current power level per port.	—

Step 4 Return to your originating procedure (NTP).

DLP-G771 Changing the WXC Line Thresholds for the 80-WXC-C Card

Purpose	This task changes the WXC line thresholds for the 80-WXC-C card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are monitored by CTC as part of performance monitoring. They must be user-provisioned.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 80-WXC-C card where you want to change the WXC line thresholds.

Step 2 Click the **Provisioning > WXC Line > WXC Line Thresholds** tabs for one of the groups of optical channels that are available.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in the following table.

Table 20-51 80-WXC-C WXC Line Warning Thresholds

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	80-WXC-C card options: • 1 (EAD) • 2 (EAD) • 3 (EAD) • 4 (EAD) • 5 (EAD) • 6 (EAD) • 7 (EAD) • 8 (EAD) • 9 (AD) • 10 (COM)
opwrMin (dBm)	Set the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm.
opwrMax (dBm)	Set the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in this table.

Table 20-52 80-WXC-C WXC Line Alarm Thresholds

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX),	80-WXC-C card options: • 1 (EAD) • 2 (EAD) • 3 (EAD) • 4 (EAD) • 5 (EAD) • 6 (EAD) • 7 (EAD) • 8 (EAD) • 9 (AD) • 10 (COM)
Power Failure Low (dBm)	Shows the power failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. You can manually change the threshold. The value must be within the optical power range that is specified for the card.	Numeric. Double-click the parameter, enter a value, and press Enter.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G429 Multiplex a Single Wavelength on 40-WXC-C Card

Purpose	This task multiplexes a single wavelength onto the COM-TX port of a 40-WXC-C card. Perform this task for testing and troubleshooting a 40-WXC-C card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-WXC-C card where you want to multiplex a wavelength.

Step 2 Click the **Maintenance > OCHNC** tabs.

Step 3 Enter the following values:

Target Power (dBm)—Enter the target power. The default is –14.0 dBm.

- Input Port—Choose the EXP-RX or ADD-RX port where you want to multiplex the wavelength from.
- VOA Attenuation (dB)—Enter the VOA attenuation. The default values are:
  - 20 dB for four-way mesh and an EXP-RX input port
  - 16 dB for 8-way mesh and an EXP-RX input port
  - 22 dB for an ADD-RX input port
- Wavelength—Choose the wavelength that you want to multiplex. The supported wavelengths are the 40 channels of the C-band from 1530.33 nm to 1561.32 nm. A "Maintenance" wavelength is also provided that corresponds to a "Lambda zero" wavelength of 1529.55 nm.

Note You cannot multiplex a wavelength that is already allocated on the COM-TX port.

Step 4 Click **Apply**. This creates a cross-connection (add or pass-through) for the specified wavelength. This cross-connection remains active until you click **Clear**.

Step 5 If you want to multiplex additional channels, click **Clear** to delete the existing cross-connection, and repeat Steps 3 and 4. If not, continue with Step 6.

Step 6 To view the actual power on the COM-TX port, click **Refresh**. Wait 10-15 seconds for the actual power to appear.

Step 7 Return to your originating procedure (NTP).

NTP-G241 Modify the 40-SMR1-C and 40-SMR2-C Line Settings and PM Thresholds

Purpose	This procedure changes the 40-SMR1-C and 40-SMR2-C card thresholds and settings.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to change the 40-SMR1-C or 40-SMR2-C card settings. If you are already logged in, continue with Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Perform any of the following tasks as needed:

- DLP-G532 Change Optical Line Settings for 40-SMR1-C and 40-SMR2-C Cards, page 20-97

- DLP-G533 Change Optical Line Threshold Settings for 40-SMR1-C and 40-SMR2-C Cards, page 20-99
- DLP-G534 Change Optical Amplifier Line Settings for 40-SMR1-C and 40-SMR2-C Cards, page 20-103
- DLP-G535 Change Optical Amplifier Threshold Settings for 40-SMR1-C and 40-SMR2-C Cards, page 20-105
- DLP-G536 Change 40-SMR1-C and 40-SMR2-C Card Optical Channel Parameters, page 20-110
- DLP-G537 Change the 40-SMR1-C and 40-SMR2-C Optical Channel Thresholds, page 20-112

Note To use the alarm profile tab, including creating alarm profiles and suppressing alarms, see Alarm and TCA Monitoring and Management.

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G532 Change Optical Line Settings for 40-SMR1-C and 40-SMR2-C Cards

Purpose	This task changes the optical line settings for the 40-SMR1-C and 40-SMR2-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-SMR1-C or 40-SMR2-C card where you want to change the optical line settings.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-53. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-53 40-SMR1-C and 40-SMR2-C Optical Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX).	40-SMR1-C card options: • 1 (EXP-RX) • 3 (DC-RX) • 4 (DC-TX) • 5 (OSC-RX) • 6 (OSC-TX • 7 (ADD-RX) • 8 (DROP-TX) • 9 (LINE-RX) • 10 (LINE-TX) 40-SMR2-C card options: • 1 (DC-RX) • 2 (DC-TX) • 3 (OSC-RX) • 4 (OSC-TX • 5 (ADD-RX) • 6 (DROP-TX) • 7 (LINE-RX) • 10 (EXP-RX 1-2) • 11 (EXP-RX 1-3) • 12 (EXP-RX 1-4)
Port Name	Provides the ability to assign the specified port, a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance **Note** You cannot set the OOS,DSBLD/Locked,disabled administrative state for LINE and OSC ports, and hence the OOS-MA,DSBLD/Locked-enabled,disabled service state is not applicable for these ports.

Table 20-53 40-SMR1-C and 40-SMR2-C Optical Line Settings (continued)

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance **Note** You cannot set the OOS,DSBLD/Locked,disabled administrative state for LINE and OSC ports, and hence the OOS-MA,DSBLD/Locked-enabled,disabled service state is not applicable for these ports.
Power	(Display only) Shows the current power level per port.	—
VOA Mode	(Display only) Shows the functional mode of the variable optical attenuator (VOA), when present.	• Constant Attenuation • Constant Power
VOA Attenuation Ref	(Display only) Shows the VOA attenuation value when VOA Mode is set to Constant Attenuation. This parameter can only be modified by ANS.	—
VOA Attenuation Calib	Modifies the attenuation value of the VOA when the VOA Mode is set to Constant Attenuation.	Numeric. Double-click the parameter, enter a value, and press **Enter**.
Active Channels	(Display only) Indicates how many channels the amplifier is carrying. Generally reflects the number of provisioned channels.	—
OSC Power	(Display only) Shows the OSC power level per port.	—

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G533 Change Optical Line Threshold Settings for 40-SMR1-C and 40-SMR2-C Cards

Purpose	This task changes the optical line threshold settings for the 40-SMR1-C and 40-SMR2-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution CTC does not monitor warning thresholds. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-SMR1-C or 40-SMR2-C card where you want to change the optical line threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-54.

e. Click **Apply**. If the change affects service, a warning message appears. Click **Yes** to complete the change.

Table 20-54 40-SMR1-C and 40-SMR2-C Card Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (TX or RX):	40-SMR1-C card options: • 1 (EXP-RX) • 3 (DC-RX) • 4 (DC-TX) • 5 (OSC-RX) • 6 (OSC-TX • 7 (ADD-RX) • 8 (DROP-TX) • 9 (LINE-RX) • 10 (LINE-TX) 40-SMR2-C card options: • 1 (DC-RX) • 2 (DC-TX) • 3 (OSC-RX) • 4 (OSC-TX • 5 (ADD-RX) • 6 (DROP-TX) • 7 (LINE-RX) • 10 (EXP-RX 1-2) • 11 (EXP-RX 1-3) • 12 (EXP-RX 1-4)
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter the value, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter the value, and press **Enter**.
opwrMin OSC (dBm)	Sets the OSC low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the table cell, enter the value, and press **Enter**.
opwrMax OSC (dBm)	Sets the OSC high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the table cell, enter the value, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-55.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-55 40-SMR1-C and 40-SMR2-C Card Optical Line Alarm Thresholds Setting

Parameter	Description	Options
Port	(Display only) Displays the port number.	40-SMR1-C card options: • 1 (EXP-RX) • 3 (DC-RX) • 4 (DC-TX) • 5 (OSC-RX) • 6 (OSC-TX • 7 (ADD-RX) • 8 (DROP-TX) • 9 (LINE-RX) • 10 (LINE-TX) 40-SMR2-C card options: • 1 (DC-RX) • 2 (DC-TX) • 3 (OSC-RX) • 4 (OSC-TX • 5 (ADD-RX) • 6 (DROP-TX) • 7 (LINE-RX) • 10 (EXP-RX 1-2) • 11 (EXP-RX 1-3) • 12 (EXP-RX 1-4)
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric.
Power Degrade High (dBm)	Does not apply to 40-SMR1-C and 40-SMR2-C line parameters.	—

Table 20-55 40-SMR1-C and 40-SMR2-C Card Optical Line Alarm Thresholds Setting (continued)

Parameter	Description	Options
Power Degrade Low (dBm)	Does not apply to 40-SMR1-C and 40-SMR2-C line parameters.	—
Pwr OSC Degrade High (dBm)	Does not apply to 40-SMR1-C and 40-SMR2-C line parameters.	—
Pwr OSC Degrade Low (dBm)	Does not apply to 40-SMR1-C and 40-SMR2-C line parameters.	—
Pwr OSC Failure (dBm)	Shows the optical power failure threshold for the OSC. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. If there is a failure, an LOS-O alarm is raised. For more information, see the *Hardware Specifications* document.	Numeric.

Step 5 Return to your originating procedure (NTP).

DLP-G534 Change Optical Amplifier Line Settings for 40-SMR1-C and 40-SMR2-C Cards

Purpose	This task changes the optical amplifier line settings for 40-SMR1-C and 40-SMR2-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-SMR1-C or 40-SMR2-C card where you want to change the optical amplifier line settings.

Step 2 Click the **Provisioning > Opt. Ampli. Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-56. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-56 40-SMR1-C and 40-SMR2-C Card Line Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	40-SMR1-C card options: • 2 (EXP-TX) 40-SMR1-C card options: • 8 (LINE-TX) • 9 (EXP-TX 1-1)
Port Name	Provides the ability to assign the specified port, a name.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance **Note** You cannot set the OOS,DSBLD/Locked,disabled administrative state for LINE-TX and EXP-TX ports, and hence the OOS-MA,DSBLD/Locked-enabled,disabled service state is not applicable for these ports.
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance **Note** You cannot set the OOS,DSBLD/Locked,disabled administrative state for LINE-TX and EXP-TX ports, and hence the OOS-MA,DSBLD/Locked-enabled,disabled service state is not applicable for these ports.
Total Output Power	(Display only) Shows the current power level per port.	—
Offset	Adjusts the total output power unless network conditions prevent the adjustment, for example, if the port is in IS state.	Numeric. Double-click to change.
Active Channels	(Display only) Indicates how many channels the card is carrying. Generally reflects the number of provisioned channels.	—
OSC Power	(Display only) Shows the OSC power level per port.	—

Table 20-56 40-SMR1-C and 40-SMR2-C Card Line Settings (continued)

Parameter	Description	Options
Channel Power Ref.	(Display only) Shows the optical per channel signal power setpoint that must be reached at the amplifier output when gain control is active.	—
Signal Output Power	(Display only) Shows the current output power leaving the amplifier, including the ASE contribution.	—
Output Power Set-Point	(Display only) Shows the output power setpoint.	—
Working Mode	(Display only) Shows the working mode, either Output Power or Control Gain.	—
DCU Insertion Loss	(Display only) Shows the DCU insertion loss.	—
Gain	(Display only) The current gain of the amplifiers.	—
Gain Set Point	(Display only) The value of the gain that the amplifier must achieve. APC can modify this value based on the number of OCHNC circuits that the amplifier manages, or to compensate for fiber aging insertion loss. For more information, see Chapter 13, "Network Reference."	—
Tilt Reference	(Display only) Shows the default value for the amplifier tilt. Only ANS can modify this field.	—
Tilt Calibration	Allows you to manually change the amplifier tilt.	Numeric. Double-click the parameter, enter a value, and press **Enter**.

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

DLP-G535 Change Optical Amplifier Threshold Settings for 40-SMR1-C and 40-SMR2-C Cards

Purpose	This task changes the optical channel threshold settings for the 40-SMR1-C and 40-SMR2-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution CTC does not monitor warning thresholds. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-SMR1-C or 40-SMR2-C card where you want to change the optical amplifier threshold settings.

Step 2 Click the **Provisioning > Opt Ampli Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-57.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-57 40-SMR1-C and 40-SMR2-C Card Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	40-SMR1-C card options: • 2 (EXP-TX) 40-SMR1-C card options: • 8 (LINE-TX) • 9 (EXP-TX 1-1)
opwrMin (dBm)	Sets the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Sets the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMin OSC (dBm)	Sets the OSC low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm. Double-click the parameter, enter a value, and press **Enter**.
opwrMax OSC (dBm)	Sets the OSC high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm. Double-click the parameter, enter a value, and press **Enter**.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-58.

d. Click **Apply**. If the change affects service, a warning message appears. Click **Yes** to complete the change.

Table 20-58 40-SMR1-C and 40-SMR2-C Card Line Alarm Thresholds Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction.	40-SMR1-C card options: • 2 (EXP-TX) 40-SMR1-C card options: • 8 (LINE-TX) • 9 (EXP-TX 1-1)
Gain Degrade Low (dBm)	(Display only) Shows the current value of the gain degrade low threshold configured in the card. This threshold applies only when the amplifier is active and in constant gain mode. Gain Degrade Low refers to the Gain value of the port, which the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE automatically calculates when the amplifier is turned up. The Gain Degrade Low threshold is automatically linked to the Gain Setpoint that is provisioned. Changing the setpoint changes the Gain Degrade Low threshold. The threshold value is always 2 dB lower than the Gain Setpoint value. APC can also modify this value based on the number of OCHNC circuits that the amplifier is managing.	—
Gain Degrade High (dBm)	(Display only) Shows the current value of the gain degrade high threshold configured in the card. This threshold applies only when the amplifier is active and in constant gain mode. Gain Degrade High refers to the Gain value of the port, which the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE automatically calculates when the amplifier is turned up. The Gain Degrade High threshold is linked to the Gain setpoint. Changing the setpoint changes the Gain Degrade High threshold. The threshold value is always 2 dB higher than the Gain Setpoint value. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing and to compensate for insertion loss due to fiber aging.	—

Table 20-58 40-SMR1-C and 40-SMR2-C Card Line Alarm Thresholds Settings (continued)

Parameter	Description	Options
Power Failure Low (dBm)	Shows the optical power failure low threshold for the port. The threshold is calculated automatically when you run ANS. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click to change.

Table 20-58 40-SMR1-C and 40-SMR2-C Card Line Alarm Thresholds Settings (continued)

Parameter	Description	Options
Power Degrade High (dBm)	(Display only) Shows the current value of the optical power degrade high threshold. This threshold applies only when the amplifier is active and in constant power mode. Power Degrade High refers to the Signal Output Power value of the port, which the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE automatically calculates when the amplifier is turned up. The Power Degrade High threshold is linked to the Output Power Setpoint on the Parameters tab. Changing the setpoint changes the Power Degrade High threshold. The threshold value is always 2 dB higher than the output power setpoint value. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing. For more information, see Chapter 13, "Network Reference." **Note** In Control Power working mode, this parameter is applicable only on the EXP-TX port for the 40-SMR2-C card.	—
Power Degrade Low (dBm)	(Display only) Shows the current value of the optical power degrade low threshold configured in the card. This threshold applies only when the amplifier is active and in constant power mode. Power Degrade Low refers to the Signal Output Power value of the port, which the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE automatically calculates when the amplifier is turned up. The Power Degrade Low threshold is automatically linked to the Output Power Setpoint on the Parameters tab. Changing the setpoint changes the Power Degrade Low threshold. The threshold value is always 2 dB lower than the output power setpoint. APC can modify this value based on the number of OCHNC circuits that the amplifier is managing. **Note** In Control Power working mode, this parameter is applicable only on the EXP-TX port for the 40-SMR2-C card.	—

Step 5 Return to your originating procedure (NTP).

DLP-G536 Change 40-SMR1-C and 40-SMR2-C Card Optical Channel Parameters

Purpose	This task changes the optical channel parameter settings for the 40-SMR1-C and 40-SMR2-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-SMR1-C or 40-SMR2-C card where you want to change the optical channel parameter settings.

Step 2 Click the **Provisioning > OCH > Parameters** tab.

Step 3 From the Wavelength drop-down list, choose a wavelength and click **Retrieve** to retrieve the OCH parameters.

Step 4 Modify any of the settings described in Table 20-59. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-59 40-SMR1-C or 40-SMR2-C Card Optical Channel Parameter Settings

Parameter	Description	Options
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance **Note** You cannot set the OOS,MT/Locked,maintenance administrative state, and hence the OOS-MA,MT/Locked-enabled, maintenance service state is not applicable.
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled, disabled • OOS-MA,MT/Locked-enabled, maintenance **Note** You cannot set the OOS,MT/Locked,maintenance administrative state, and hence the OOS-MA,MT/Locked-enabled, maintenance service state is not applicable.
Power	(Display only) Power value read by the photodiode located after the VOA associated to the port, and calibrated to the port. For more information, see the *Hardware Specifications* document.	Numeric value (dB).
Circuit Name	(Display only) Shows the circuit name. This is provisioned in the Circuits tab.	—
From	(Display only) The port where the circuit originated.	—
To	(Display only) The port where the circuit terminated.	—
Power From	Power on the From port where the circuit originated.	—
Power To	Power on the To port where the circuit terminated.	—

Table 20-59 40-SMR1-C or 40-SMR2-C Card Optical Channel Parameter Settings (continued)

Parameter	Description	Options
Force Channel	Allows you to move the VOA from Open to Closed loop to start the channel. You can force a channel only when the Force Channel Status is in the Unlocked state.	From the drop-down list, choose one of the following: • OFF • ON
VOA Power Ref.	(Display only) Shows the value of the optical power setpoint that must be reached on the path where a VOA is present, when VOA Mode is set to Constant Power. This value is the desired per channel optical power. Only ANS can modify this field.	Numeric value (dB).
VOA Power Calib.	Allows you to modify the VOA power value when VOA Mode is Constant Power.	Double-click the parameter, enter a value, and press **Enter**. • Numeric value (dB) • –25 dB to +12 dB
Force Channel Status	(Display only) Displays the channel status. The different statuses are: • Unlocked—Can force channel startup • Locked—Cannot force channel startup as the device is under control of other functions like optical safety • Forced—Channel startup has already been forced	—

Step 5 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 6 Return to your originating procedure (NTP).

DLP-G537 Change the 40-SMR1-C and 40-SMR2-C Optical Channel Thresholds

Purpose	This task changes the optical channel threshold settings for the 40-SMR1-C and 40-SMR2-C cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution CTC does not monitor warning thresholds. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the 40-SMR1-C or 40-SMR2-C card where you want to change the optical channel threshold settings.

Step 2 Click the **Provisioning > OCH > OCH Thresholds** tab.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with c..

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Choose a wavelength from the Wavelength drop-down list.

d. In the Port drop-down list, choose an OCH port where you want to change the optical channel threshold settings:

For the 40-SMR1-C card, the following ports are available to view:

- 1 (EXP-RX)
- 2 (EXP-TX)
- 7 (ADD-RX)
- 8 (DROP-TX)
- 10 (LINE-TX)

For the 40-SMR2-C card, the following ports are available to view:

- 5 (ADD-RX)
- 6 (DROP-TX)
- 8 (LINE-TX)
- 9 (EXP-TX 1-1)
- 10 (EXP-RX 1-2)
- 11 (EXP-RX 1-3)
- 12 (EXP-RX 1-4)

e. Click **Retrieve**. Modify any of the warning thresholds shown under the Options column in Table 20-60.

Table 20-60 40-SMR1-C or 40-SMR2-C Card Optical Channel Warning Threshold Settings

Parameter	Description	Options
Circuit Name	(Display only) Shows the circuit name. This is provisioned in the Circuits tab.	—
Port Name	(Display only) Shows the port name.	—
Actual Wavelength	(Display only) Displays the actual wavelength that the channel utilizes.	—

Table 20-60 40-SMR1-C or 40-SMR2-C Card Optical Channel Warning Threshold Settings

Parameter	Description	Options
opwrMin (dBm)	Set the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.
opwrMax (dBm)	Set the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.

f. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Choose a wavelength from the Wavelength drop-down list.

c. In the Port drop-down list, choose an OCH port where you want to change the optical channel threshold settings.

d. Click **Retrieve**. Modify any of the alarm thresholds shown under the Options column in Table 20-61.

Table 20-61 40-SMR1-C or 40-SMR2-C Card Optical Channel Alarm Threshold Settings

Parameter	Description	Options
Circuit Name	(Display only) Shows the circuit name. This is provisioned in the Circuits tab.	—
Port Name	(Display only) Shows the port name.	—
Actual Wavelength	(Display only) Displays the actual wavelength utilized by the channel.	—
Power Failure Low (dBm)	Shows the power failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 5 dB lower). For more information, see the *Hardware Specifications* document.	—

Table 20-61 40-SMR1-C or 40-SMR2-C Card Optical Channel Alarm Threshold Settings (continued)

Parameter	Description	Options
Power Degrade High (dBm)	(Display only) Shows the power degrade high threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 3 dB higher). **Note** This threshold applies only to certain ports depending on the working mode you have set.	—
Power Degrade Low (dBm)	(Display only) Shows the power degrade low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. This threshold applies to a port associated to a VOA (OSC-VOA) that is always active in Constant Power mode. The threshold is automatically linked to the Power Setpoint (VOA Power Ref + VOA Power Calib) that is provisioned. Changing the setpoint results in changing the threshold (always 2 dB lower). **Note** This threshold applies only to certain ports depending on the working mode you have set.	Numeric

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

NTP-G149 Modify the MMU Line Settings and PM Thresholds

Purpose	This procedure changes the MMU card thresholds and settings.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to change the MMU card settings. If you are already logged in, continue with Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Perform any of the following tasks as needed:

Note To use the alarm profile tab, including creating alarm profiles and suppressing alarms, see Alarm and TCA Monitoring and Management.

- DLP-G342 Change MMU Optical Line Parameters, page 20-116
- DLP-G343 Change the MMU Optical Line Thresholds, page 20-118

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G342 Change MMU Optical Line Parameters

Purpose	This task changes the optical line parameter settings for the MMU card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the MMU card where you want to change the optical line parameter settings.

Step 2 Click the **Provisioning > Optical Line > Parameters** tabs.

Step 3 Modify any of the settings described in Table 20-62. The provisionable parameters are listed in the Options column in the table. In the Options column, the SONET (ANSI) option is followed by the SDH (ETSI) option.

Table 20-62 MMU Optical Line Parameter Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX): • 1 (EXP-RX) • 2 (EXP-TX) • 3 (COM-RX) • 4 (COM-TX) • 5 (EXP A-RX) • 6 (EXP A-TX)	—
Port Name	Allows you to assign a logical name for each of the ports shown.	User-defined. Name can be up to 32 alphanumeric/ special characters. Blank by default. Double-click, enter the name, and press **Enter**. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	Sets the port administrative state unless network conditions prevent the change. For more information about administrative states, see the *Administrative and Service States* document.	From the drop-down list, choose one of the following: • IS,AINS/Unlocked,automaticInService • OOS,DSBLD/Locked,disabled • OOS,MT/Locked,maintenance
Service State	(Display only) Identifies the autonomously generated state that gives the overall condition of the port. Service states appear in the format: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR/Unlocked-enabled • OOS-AU,AINS/Unlocked-disabled, automaticInService • OOS-MA,DSBLD/Locked-enabled,disabled • OOS-MA,MT/Locked-enabled,maintenance
Power	(Display only) Power value read by the photodiode associated with the port.	Numeric value (dB)
AINS Soak	(Display only) The automatic in-service soak period. It is always 00.00.	—
Actual Channels	Number of active channels carried by the port (the difference between provisioned and failed)	—

Step 4 Return to your originating procedure (NTP).

DLP-G343 Change the MMU Optical Line Thresholds

Purpose	This task changes the MMU card optical line threshold settings.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution Warning thresholds are not monitored by CTC. They must be user-provisioned and monitored through custom alarm profiles.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the MMU card where you want to change the optical line threshold settings.

Step 2 Click the **Provisioning > Optical Line > Optics Thresholds** tabs.

Step 3 If you want to change the warning thresholds, complete the following steps. If not, continue with Step 4.

a. Under Types, choose **Warning**.

b. Choose the warning interval that you want to provision, either **15 minutes** or **1 Day**.

c. Click **Refresh**.

d. Modify any of the warning thresholds shown under the Options column in Table 20-63.

e. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-63 MMU Optical Line Warning Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX):	• 1 (EXP-RX) • 2 (EXP-TX) • 3 (COM-RX) • 4 (COM-TX) • 5 (EXP A-RX) • 6 (EXP A-TX)
opwrMin (dBm)	Set the low power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is –50 dBm.
opwrMax (dBm)	Set the high power warning level.	Numeric. Can be set for 15-minute or one-day intervals. The default is 30 dBm.

Step 4 If you want to change the alarm thresholds, complete the following steps. If not, continue with Step 5.

a. Under Types, choose **Alarm**.

b. Click **Refresh**.

c. Modify any of the alarm thresholds shown under the Options column in Table 20-64.

d. Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Table 20-64 MMU Optical Line Alarm Threshold Settings

Parameter	Description	Options
Port	(Display only) Displays the port number, port type, and direction (RX or TX).	• 1 (EXP-RX) • 2 (EXP-TX) • 3 (COM-RX) • 4 (COM-TX) • 5 (EXP A-RX) • 6 (EXP A-TX)
Power Failure Low (dBm)	Shows the power failure low threshold. This power value applies to the corresponding port and is automatically calculated when ANS is run. You can manually change the threshold. The value must be within the optical power range that is specified for the card. For more information, see the *Hardware Specifications* document.	Numeric. Double-click the parameters, enter a value, and press **Enter**.

Step 5 Return to your originating procedure (NTP).

NTP-G101 Modify Alarm Interface Controller–International Settings

Purpose	This procedure provisions the AIC-I card to receive input from or send output to external devices wired to the backplane (called external alarms and controls or environmental alarms), or changes orderwire settings.
Tools/Equipment	None
Prerequisite Procedures	NTP-G72 Provision External Alarms and Controls on the Alarm Interface Controller-International Card DLP-G109 Provision Orderwire, page 16-86
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to change the AIC-I card settings. If you are already logged in, proceed to Step 2.

Step 2 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Step 3 Perform any of the following tasks as needed:

- DLP-G245 Change External Alarms Using the AIC-I Card, page 20-120
- DLP-G246 Change External Controls Using the AIC-I Card, page 20-121
- DLP-G247 Change AIC-I Card Orderwire Settings, page 20-121

Step 4 Complete the "NTP-G103 Back Up the Database" procedure on page 24-2.

Stop. You have completed this procedure.

DLP-G245 Change External Alarms Using the AIC-I Card

Purpose	This task changes external alarm settings on the AIC-I card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The procedure is the same if you are using the alarm expansion panel (AEP). In this case, the number of contacts that are shown on the screen is changed accordingly.

Step 1 Confirm that external-device relays are wired to the ENVIR ALARMS IN pins. See the "DLP-G20 Install Alarm Wires on the MIC-A/P (ETSI Only)" or the "DLP-G23 Install Alarm Wires on the Backplane (ANSI Only)" in the Cisco ONS 15454 Hardware Installation Guide for more information.

Step 2 Double-click the AIC-I card to display it in card view.

Step 3 Click the **Provisioning > External Alarms** tabs.

Step 4 Modify any of the following fields for each external device wired to the ONS 15454 backplane. For definitions of these fields, see NTP-G72 Provision External Alarms and Controls on the Alarm Interface Controller-International Card.

- Enabled
- Alarm Type
- Severity
- Virtual Wire
- Raised When
- Description

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

DLP-G246 Change External Controls Using the AIC-I Card

Purpose	This task changes external control settings on the AIC-I card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note The task is the same if you are using the AEP. In this case, the number of contacts that are shown on the screen is changed accordingly.

Step 1 Verify the external control relays to the ENVIR ALARMS OUT backplane pins. See the "DLP-G20 Install Alarm Wires on the MIC-A/P (ETSI Only)" or the "DLP-G23 Install Alarm Wires on the Backplane (ANSI Only)" in the Cisco ONS 15454 Hardware Installation Guide.

Step 2 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the AIC-I card to display it in card view.

Step 3 Click the **Provisioning > External Controls** tabs.

Step 4 Modify any of the following fields for each external control wired to the ONS 15454 backplane. For definitions of these fields, see the NTP-G72 Provision External Alarms and Controls on the Alarm Interface Controller-International Card.

- Enabled
- Trigger Type
- Control Type
- Description

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

DLP-G247 Change AIC-I Card Orderwire Settings

Purpose	This task changes orderwire settings on the AIC-I card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Caution When provisioning orderwire for ONS 15454s residing in a ring, do not provision a complete orderwire loop. For example, a four-node ring typically has Side B and Side A ports provisioned at all four nodes. However, to prevent orderwire loops, provision two orderwire ports (Side B and Side A) at all but one of the ring nodes.

Tip Before you begin, make a list of the ONS 15454 slots and ports that require orderwire communication.

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the AIC-I card to display it in card view.

Step 2 Click the **Provisioning > Local Orderwire** tabs or the **Provisioning > Express Orderwire** tabs, depending on the orderwire path that you want to change. Provisioning steps are the same for both types of orderwire.

Step 3 If needed, adjust the transmit (Tx) and receive (Rx) dBm values by moving the slider to the right or left for the headset type (four-wire or two-wire) that you will use. In general, you should not need to adjust the dBm values.

Step 4 If you want to turn on the audible alert (buzzer) for the orderwire, check the **Buzzer On** check box.

Step 5 Click **Apply**.

Step 6 Return to your originating procedure (NTP).

NTP-G102 Change Card Service State

Purpose	This procedure changes a card service state.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64 or NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to change the card service state.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Inventory** tab.

Step 3 Click the cell in the Admin State column for the card you want to change, and choose an administrative state from the drop-down list:

- **IS** (ANSI) or **Unlocked** (ETSI)
- **OOS,MT** (ANSI) or **Locked-enabled** (ETSI)

Step 4 Click **Apply**.

Step 5 If an error message appears indicating that the card state cannot be changed from its current state, click **OK**.

For information about the card state transitions, see the *Administrative and Service States* document.

Stop. You have completed this procedure.

NTP-G280 Modify Threshold Settings for the TNC and TNCE Cards

Purpose	This procedure changes the optical and line threshold settings for the TNC and TNCE cards on the Cisco ONS 15454 M2 and the Cisco ONS 15454 M6 shelves.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC "DLP-G605 Provision PPM and Port for the TNC and TNCE cards" in the Cisco ONS 15454 Hardware Installation Guide.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the DLP-G46 Log into CTC task at the node where you want to modify the threshold settings.

Step 2 Perform any of the following tasks as needed:

- "DLP-G609 Modify Optical Threshold Settings for the TNC and TNCE Cards" task on page 20-123
- "DLP-G610 Modify Line Threshold Settings for the TNC and TNCE cards" task on page 20-125

Stop. You have completed this procedure.

DLP-G609 Modify Optical Threshold Settings for the TNC and TNCE Cards

Purpose	This task changes the optical threshold settings for the TNC and TNCE cards on the ONS 15454 M2 and the ONS 15454 M6 shelves.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC "DLP-G605 Provision PPM and Port for the TNC and TNCE Cards" in the Cisco ONS 15454 Hardware Installation Guide.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the TNC and TNCE cards where you want to change the optical threshold settings.

Step 2 Click the **Provisioning > Optics Thresholds** tabs.

Step 3 Under Types, choose the type of threshold that you want to change, either **TCA** or **Alarm**.

Step 4 Click **Refresh**.

Step 5 Modify any of the threshold settings as needed by double-clicking the threshold value, deleting it, entering a new value, and hitting Enter. Table 20-65 shows the thresholds for warnings and alarms.

Note You can modify the optics thresholds either for 15 minutes or 1 day. To do so, choose the appropriate radio button and click Refresh. 15 minutes and 1 day interval are not applicable for alarm thresholds.

Table 20-65 TNC and TNCE cards Optical Warning and Alarms Thresholds Settings

Parameter	Description	Options
Port	(Display only) Displays the port number and port type.	• *port number* (OC3) • *port number* (FE) • *port number* (ONE-GE)
Laser Bias High (%)	Sets the maximum laser bias.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.
RX Power High (dBm)	Sets the maximum optical power received.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.
RX Power Low (dBm)	Sets the minimum optical power received.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.
TX Power High (dBm)	Sets the maximum optical power transmitted.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.
TX Power Low (dBm)	Sets the minimum optical power transmitted.	Numeric. Can be set for 15-minute or one-day intervals. Double-click the parameter, enter a value, and press **Enter**.

Step 6 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 7 Return to your originating procedure (NTP).

DLP-G610 Modify Line Threshold Settings for the TNC and TNCE cards

Purpose	This task changes the line threshold settings for the TNC and TNCE cards on the ONS 15454 M2 and the ONS 15454 M6 shelves.
Tools/Equipment	None
Prerequisite Procedures	DLP-G46 Log into CTC "DLP-G605 Provision PPM and Port for the TNC and TNCE cards" in the Cisco ONS 15454 Hardware Installation Guide.
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), double-click the TNC and TNCE cards where you want to change the line threshold settings.

Step 2 Click the **Provisioning > Line** tabs.

Step 3 Modify any of the threshold settings as described in the following tables. These settings are found in Ports, OC3 Line, and SONET Thresholds subtabs.

Table 20-66 TNC and TNCE cards Line Threshold Settings (Ports tab)

Parameter	Description	Options
Port	(Display only) Displays the port number and port type.	• *port number* (OC3) • *port number* (FE) • *port number* (ONE-GE)
Port Name	Provides the ability to assign the specified port a name.	User-defined. Name can be up to 32 alphanumeric/special characters. Blank by default. See the "DLP-G104 Assign a Name to a Port" task on page 16-16.
Admin State	(Display only) Displays the port administrative state. For more information about administrative states, see the *Administrative and Service States* document.	• IS (ANSI) or Unlocked (ETSI)—Puts the port in service. The port service state changes to IS-NR (ANSI) or Unlocked-enabled (ETSI). • IS,AINS (ANSI) or Unlocked,automaticInService (ETSI)—Puts the port in automatic in-service. The port service state changes to OOS-AU,AINS (ANSI) or Unlocked-disabled,automaticInService (ETSI).

Table 20-66 TNC and TNCE cards Line Threshold Settings (continued) (Ports tab)

Parameter	Description	Options
Service State	(Display only) Identifies the autonomously generated state that displays the overall condition of the port. Service states appear in these formats: Primary State-Primary State Qualifier, Secondary State. For more information about service states, see the *Administrative and Service States* document.	• IS-NR (In-Service and Normal [ANSI]) or Unlocked-enabled (ETSI)—The port is fully operational and is performing as provisioned. • OOS-AU,AINS (Out-Of-Service and Autonomous, Automatic In-Service [ANSI]) or Unlocked-disabled,automaticInService (ETSI)—The port is out of service, but traffic is carried. Alarm reporting is suppressed. The ONS node monitors the ports for an error-free signal. After an error-free signal is detected, the port stays in the OOS-AU,AINS/Unlocked-disabled,automaticInService state for the duration of the soak period. After the soak period ends, the port service state changes to IS-NR/Unlocked-enabled.
Reach	Indicates the distance from one node to another node	From the drop-down list, choose one of the following: • Auto Provision • LX • SX • CX • T • DX • HX • ZX • VX • CWDM • DWDM • LR 2 (SONET) • L2 (SDH) • ULH (SDH and SONET)

Table 20-67 TNC and TNCE cards Line Threshold Settings (OC3 Line tab)
Table 20-1

Parameter	Description	Options
SF BER	Sets the signal fail bit error rate.	From the drop-down list, choose one of the following: • 1E-3 • 1E-4 • 1E-5
SD BER	Sets the signal degrade bit error rate.	From the drop-down list, choose one of the following: • 1E-5 • 1E-6 • 1E-7 • 1E-8 • 1E-9
ProvidesSync	(Display only) If checked, the card is provisioned as a network element (NE) timing reference.	• Checked • Unchecked
SyncMsgIn	Enables synchronization status messages (SSM) on the S1 byte, which allow the node to choose the best timing source.	• Checked • Unchecked
SendDoNotUse	When checked, sends a “Do Not Use for Synchronization (DUS)” message on the S1 byte.	• Checked • Unchecked
PJSTSMon#	(Display only) Sets the STS that will be used for pointer justification.	This parameter is set to 0. It cannot be changed.
AINS Soak	(Display only) The automatic in-service soak period. It is always 00.00.	—
Type	Defines the port as SONET or SDH. The ProvidesSync Msg field and the Send Do Not Use field must be disabled before the port can be set to SDH.	From the drop-down list, choose one of the following: • SONET • SDH

Table 20-68 TNC and TNCE cards Line Threshold Settings (SONET)
Table 20-2

Parameter	Description	Options
CV	Coding violations	Numeric. Can be set for 15-minute or one-day intervals for Line or Section (Near and Far End).
ES	Errored seconds	Numeric. Can be set for 15-minute or one-day intervals for Line or Section (Near and Far End).

Table 20-2

Parameter	Description	Options
SES	Severely errored seconds	Numeric. Can be set for 15-minute or one-day intervals for Line or Section (Near and Far End).
SEFS	Severely errored framing seconds (Section only)	Numeric. Can be set for 15-minute or one-day intervals for Section (Near and Far End).
FC	Failure count (Line only)	Numeric. Can be set for 15-minute or one-day intervals for Line (Near and Far End).
UAS	Unavailable seconds (Line only)	Numeric. Can be set for 15-minute or one-day intervals for Line (Near and Far End).

Table 20-69 TNC and TNCE cards Line Threshold Settings (SDH)

Table 20-3

Parameter	Description	Options
RS-OFS	Out of frame seconds	Numeric. Can be set for 15-minute or one-day intervals for Section (Near and Far End).
EB	Errored block	Numeric. Can be set for 15-minute or one-day intervals for MS (Multiplex Section) or RS (Regeneration Section) (Near and Far End). Select the bullet and click **Refresh**.
ES	Errored seconds	Numeric. Can be set for 15-minute or one-day intervals for MS or RS (Near and Far End). Select the bullet and click **Refresh**.
SES	Severely errored seconds	Numeric. Can be set for 15-minute or one-day intervals for MS or RS (Near and Far End). Select the bullet and click **Refresh**.
BBE	Background block error	Numeric. Can be set for 15-minute or one-day intervals for MS or RS (Near and Far End). Select the bullet and click **Refresh**.
OFS	Out of frame seconds	Numeric. Can be set for 15-minute or one-day intervals for RS, Near End. Select the bullet and click **Refresh**.

Note Far end is not applicable for optics thresholds and Regenerator Section STM1 thresholds (or section thresholds in OC3).

Step 4 Click **Apply**. If the change affects traffic, a warning message appears. Click **Yes** to complete the change.

Step 5 Return to your originating procedure (NTP).

CHAPTER 22

Manage Network Connectivity

This chapter provides an overview of ONS 15454 data communications network (DCN) connectivity. Cisco Optical Networking System (ONS) network communication is based on IP, including communication between Cisco Transport Controller (CTC) computers and ONS 15454 nodes, and communication among networked ONS 15454 nodes. The chapter shows common Cisco ONS 15454 IP network configurations and includes detailed data communications network (DCN) case studies that are based on actual ONS 15454 installations. The chapter provides information about the ONS 15454 IP routing table, external firewalls, and open gateway network element (GNE) networks.

Although ONS 15454 DCN communication is based on IP, ONS 15454 nodes can be networked to equipment that is based on the Open System Interconnection (OSI) protocol suites. This chapter also describes the ONS 15454 OSI implementation and provides scenarios that show how the ONS 15454 can be networked within a mixed IP and OSI environment.

This chapter does not provide a comprehensive explanation of IP networking concepts and procedures, nor does it provide IP addressing examples to meet all networked scenarios. For ONS 15454 networking setup instructions, refer to the "Turn Up a Node" chapter.

Note Unless otherwise specified, in this chapter "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

Note To connect ONS 15454s to an IP network, you must work with a LAN administrator or other individual at your site who has IP networking training and experience.

22.1 IP Networking Overview

ONS 15454s can be connected in many different ways within an IP environment:

- They can be connected to LANs through direct connections or a router.
- IP subnetting can create ONS 15454 node groups that allow you to provision nodes in a network that are not connected with a data communications channel (DCC).
- Different IP functions and protocols can be used to achieve specific network goals. For example, Proxy Address Resolution Protocol (ARP) enables one LAN-connected ONS 15454 to serve as a gateway for ONS 15454s that are not connected to the LAN.
- Static routes can be created to enable connections among multiple CTC sessions with ONS 15454s that reside on the same subnet with multiple CTC sessions.
- ONS 15454s can be connected to Open Shortest Path First (OSPF) networks so ONS 15454 network information is automatically communicated across multiple LANs and WANs.
- The ONS 15454 proxy server can control the visibility and accessibility between CTC computers and ONS 15454 element nodes.

22.2 IP Addressing Scenarios

ONS 15454 IP addressing generally has nine common scenarios or configurations. Use the scenarios as building blocks for more complex network configurations. Table 22-1 provides a general list of items to check when setting up ONS 15454s in IP networks.

Table 22-1 General ONS 15454 IP Troubleshooting Checklist

Item	What to Check
Link integrity	Verify that link integrity exists between: • CTC computer and network hub/switch • ONS 15454s (backplane [ANSI] or MIC-C/T/P [ETSI] wire-wrap pins or RJ-45 port) and network hub/switch • Router ports and hub/switch ports
ONS 15454 hub/switch ports	If connectivity problems occur, set the hub or switch port that is connected to the ONS 15454 to 10 Mbps half-duplex.
Ping	Ping the node to test connections between computers and ONS 15454s.

Table 22-1 General ONS 15454 IP Troubleshooting Checklist (continued)

Item	What to Check
IP addresses/subnet masks	Verify that ONS 15454 IP addresses and subnet masks are set up correctly.
Optical connectivity	Verify that ONS 15454 optical trunk ports are in service and that a DCC is enabled on each trunk port.

22.2.1 Scenario 1: CTC and ONS 15454s on Same Subnet

Scenario 1 shows a basic ONS 15454 LAN configuration (Figure 22-1). The ONS 15454s and CTC computer reside on the same subnet. All ONS 15454s connect to LAN A, and all ONS 15454s have DCC connections.

Figure 22-1 Scenario 1: CTC and ONS 15454s on Same Subnet (ANSI and ETSI)

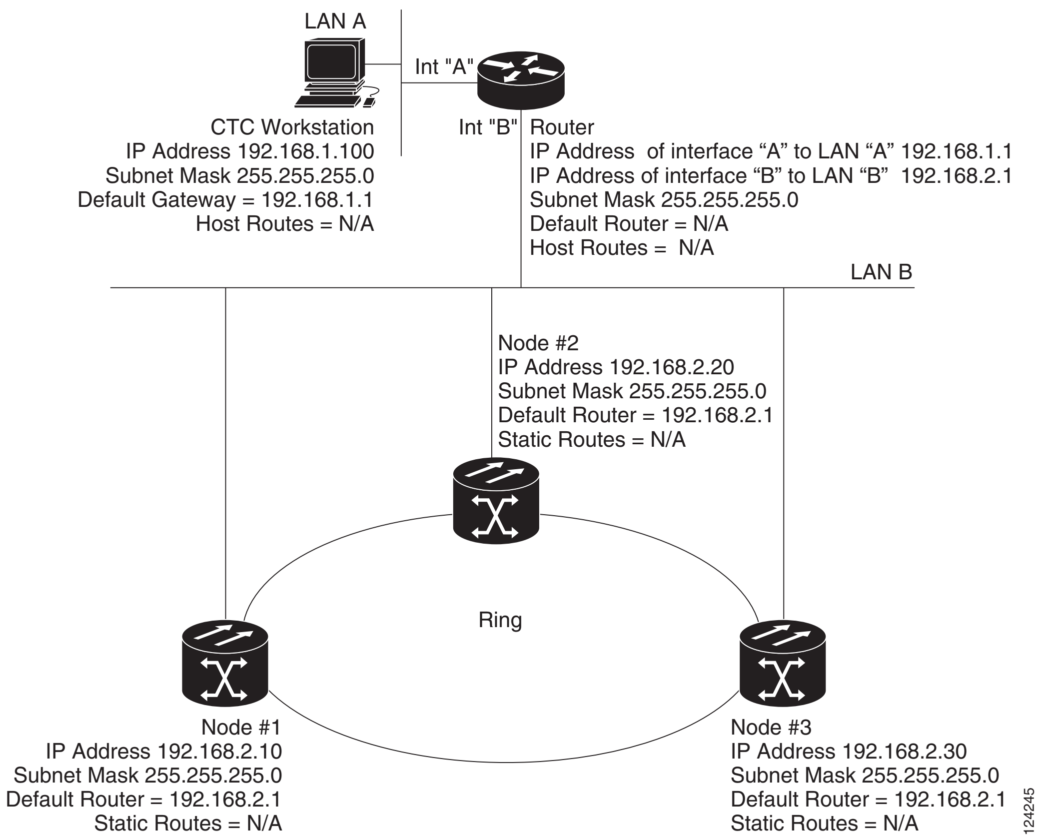
:TC Workstation

22.2.2 Scenario 2: CTC and ONS 15454s Connected to a Router

In Scenario 2, the CTC computer resides on a subnet (192.168.1.0) and attaches to LAN A (Figure 22-2). The ONS 15454s reside on a different subnet (192.168.2.0) and attach to LAN B. A router connects LAN A to LAN B. The IP address of router interface A is set to LAN A (192.168.1.1), and the IP address of router interface B is set to LAN B (192.168.2.1). The routers each have a subnet mask of 255.255.255.0.

On the CTC computer, the default gateway is set to router interface A. If the LAN uses Dynamic Host Configuration Protocol (DHCP), the default gateway and IP address are assigned automatically. In the Figure 22-2 example, a DHCP server is not available.

Figure 22-2 Scenario 2: CTC and ONS 15454s Connected to Router (ANSI and ETSI)



22.2.3 Scenario 3: Using Proxy ARP to Enable an ONS 15454 Gateway

ARP matches higher-level IP addresses to the physical addresses of the destination host. It uses a lookup table (called ARP cache) to perform the translation. When the address is not found in the ARP cache, a broadcast is sent out on the network with a special format called the ARP request. If one of the machines on the network recognizes its own IP address in the request, it sends an ARP reply back to the requesting host. The reply contains the physical hardware address of the receiving host. The requesting host stores this address in its ARP cache so that all subsequent datagrams (packets) to this destination IP address can be translated to a physical address.

Proxy ARP enables one LAN-connected ONS 15454 to respond to the ARP request for ONS 15454s not connected to the LAN. (ONS 15454 proxy ARP requires no user configuration.) For this to occur, the DCC-connected ONS 15454s must reside on the same subnet as the LAN-connected (gateway)

ONS 15454. When a LAN device sends an ARP request to an ONS 15454 that is not connected to the LAN, the gateway ONS 15454 (the one connected to the LAN) returns its MAC address to the LAN device. The LAN device then sends the datagram for the remote ONS 15454 to the MAC address of the proxy ONS 15454. The proxy ONS 15454 uses its routing table to forward the datagram to the non-LAN ONS 15454.

Scenario 3 is similar to Scenario 1, but only one ONS 15454 (Node 1) connects to the LAN (Figure 22-3). Two ONS 15454s (Node 2 and Node 3) connect to ONS 15454 Node 1 through the section DCC. Because all three ONS 15454s are on the same subnet, proxy ARP enables ONS 15454 Node 1 to serve as a gateway for ONS 15345 Node 2 and Node 3.

Note This scenario assumes all CTC connections are to Node 1. If you connect a laptop to either ONS 15454 Node 2 or Node 3, network partitioning occurs; neither the laptop or the CTC computer can see all nodes. If you want laptops to connect directly to end network elements (ENEs), you must create static routes (see the "22.2.5 Scenario 5: Using Static Routes to Connect to LANs" section on page 22-8) or enable the ONS 15454 proxy server (see "22.2.7 Scenario 7: Provisioning the ONS 15454 Proxy Server" section on page 22-12).

Be aware that:

- GNE and ENE 15454 proxy ARP is disabled.
- There is exactly one proxy ARP server on any given Ethernet segment; however, there might be more than one server in an ANSI or ETSI topology.
- The proxy ARP server does not perform the proxy ARP function for any node or host that is on the same Ethernet segment.
- It is important in Figure 22-3 that the CTC workstation be located within the same subnet and on the same Ethernet segment as the proxy ARP server.

Figure 22-3 Scenario 3: Using Proxy ARP (ANSI and ETSI)

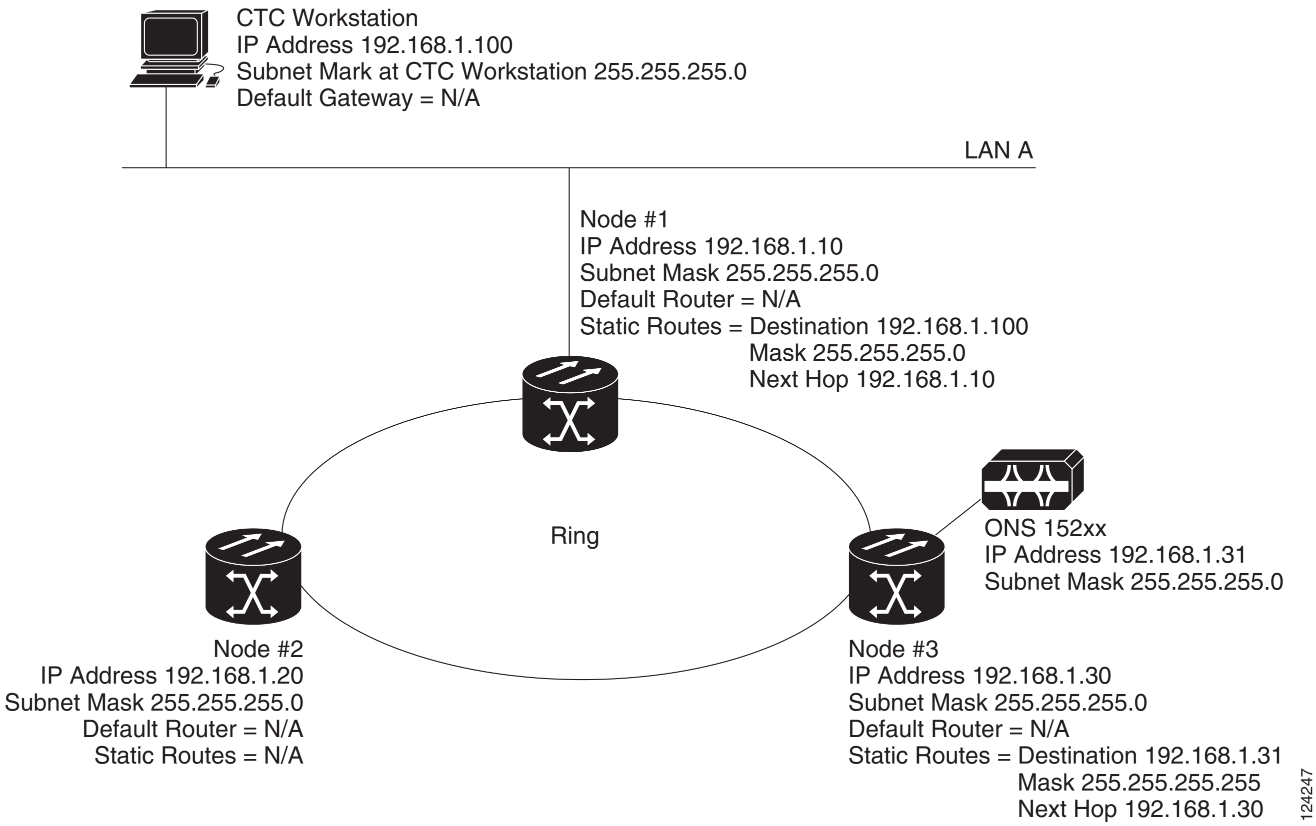
C Workstation
ddress 192.168.1.100

You can also use proxy ARP to communicate with hosts attached to the craft Ethernet ports of DCC-connected nodes (Figure 22-4). The node with an attached host must have a static route to the host. Static routes are propagated to all DCC peers using OSPF. The existing proxy ARP node is the gateway for additional hosts. Each node examines its routing table for routes to hosts that are not connected to the DCC network but are within the subnet. The existing proxy server replies to ARP requests for these additional hosts with the node MAC address. The existence of the host route in the routing table ensures that the IP packets addressed to the additional hosts are routed properly. Other than establishing a static route between a node and an additional host, no provisioning is necessary. The following restrictions apply:

- Only one node acts as the proxy ARP server for any given additional host.
- A node cannot be the proxy ARP server for a host connected to its Ethernet port.

In Figure 22-4, Node 1 announces to Node 2 and 3 that it can reach the CTC host. Similarly, Node 3 announces that it can reach the ONS 152xx. The ONS 152xx is shown as an example; any network element can be set up as an additional host.

Figure 22-4 Scenario 3: Using Proxy ARP with Static Routing (ANSI and ETSI)



22.2.4 Scenario 4: Default Gateway on CTC Computer

Scenario 4 is similar to Scenario 3, but Nodes 2 and 3 reside on different subnets, 192.168.2.0 and 192.168.3.0, respectively (Figure 22-5). Node 1 and the CTC computer are on subnet 192.168.1.0. Proxy ARP is not used because the network includes different subnets. For the CTC computer to communicate with Nodes 2 and 3, Node 1 is entered as the default gateway on the CTC computer.

Figure 22-5 Scenario 4: Default Gateway on a CTC Computer (ANSI and ETSI)

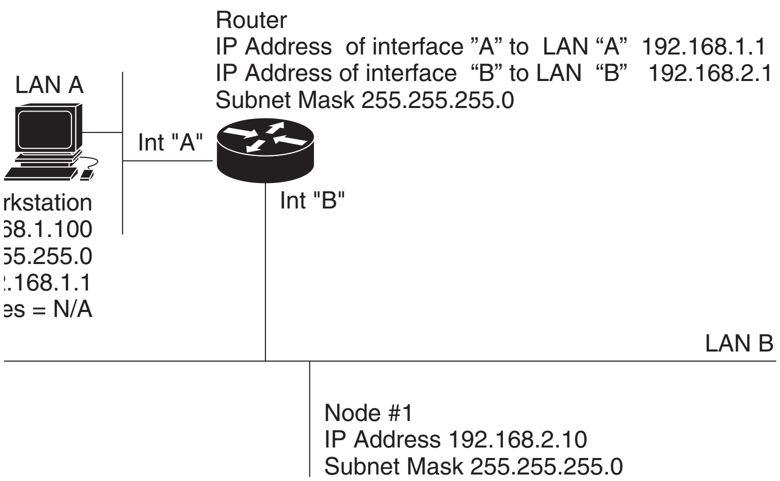
22.2.5 Scenario 5: Using Static Routes to Connect to LANs

Static routes are used for two purposes:

- To connect ONS 15454s to CTC sessions on one subnet connected by a router to ONS 15454s residing on another subnet. (These static routes are not needed if OSPF is enabled. Scenario 6 shows an OSPF example.)
- To enable multiple CTC sessions among ONS 15454s residing on the same subnet.

In Figure 22-6, one CTC residing on subnet 192.168.1.0 connects to a router through interface A (the router is not set up with OSPF). ONS 15454s residing on different subnets are connected through Node 1 to the router through interface B. Because Nodes 2 and 3 are on different subnets, proxy ARP does not enable Node 1 as a gateway. To connect to CTC computers on LAN A, a static route is created on Node 1.

Figure 22-6 Scenario 5: Static Route With One CTC Computer Used as a Destination (ANSI and ETSI)

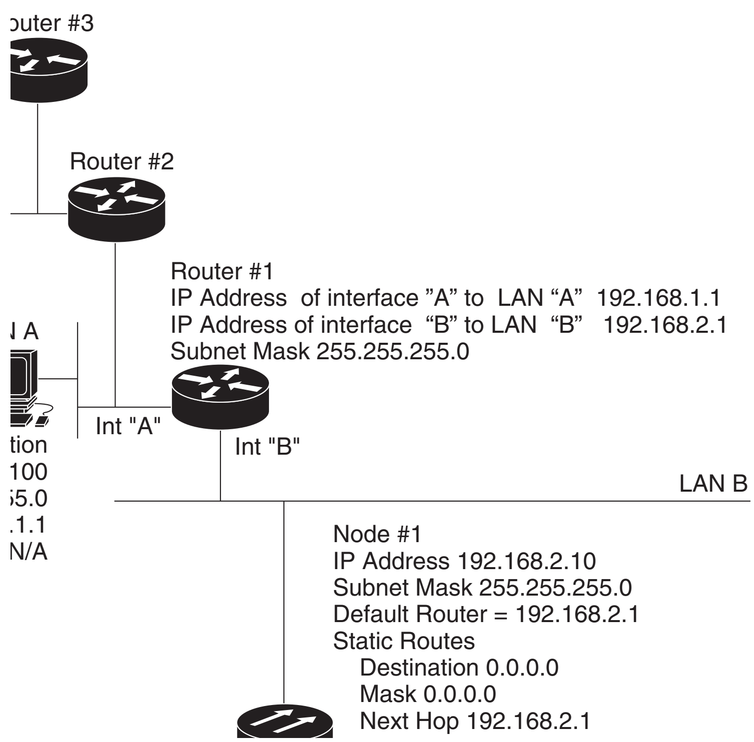


The destination and subnet mask entries control access to the ONS 15454s:

- If a single CTC computer is connected to a router, enter the complete CTC "host route" IP address as the destination with a subnet mask of 255.255.255.255.
- If CTC computers on a subnet are connected to a router, enter the destination subnet (in this example, 192.168.1.0) and a subnet mask of 255.255.255.0.
- If all CTC computers are connected to a router, enter a destination of 0.0.0.0 and a subnet mask of 0.0.0.0. Figure 22-7 shows an example.

The IP address of router interface B is entered as the next hop, and the cost (number of hops from source to destination) is 2.

Figure 22-7 Scenario 5: Static Route With Multiple LAN Destinations (ANSI and ETSI)



22.2.6 Scenario 6: Using OSPF

Open Shortest Path First (OSPF) is a link state Internet routing protocol. Link state protocols use a "hello protocol" to monitor their links with adjacent routers and to test the status of their links to their neighbors. Link state protocols advertise their directly connected networks and their active links. Each link state router captures the link state "advertisements" and puts them together to create a topology of the entire network or area. From this database, the router calculates a routing table by constructing a shortest path tree. Routes are recalculated when topology changes occur.

ONS 15454s use the OSPF protocol in internal ONS 15454 networks for node discovery, circuit routing, and node management. You can enable OSPF on the ONS 15454s so that the ONS 15454 topology is sent to OSPF routers on a LAN. Advertising the ONS 15454 network topology to LAN routers eliminates the need to manually enter static routes for ONS 15454 subnetworks. Figure 22-8 shows a network enabled for OSPF. Figure 22-9 shows the same network without OSPF. Static routes must be manually added to the router for CTC computers on LAN A to communicate with Nodes 2 and 3 because these nodes reside on different subnets.

OSPF divides networks into smaller regions, called areas. An area is a collection of networked end systems, routers, and transmission facilities organized by traffic patterns. Each OSPF area has a unique ID number, known as the area ID. Every OSPF network has one backbone area called “area 0.” All other OSPF areas must connect to area 0.

When you enable an ONS 15454 OSPF topology for advertising to an OSPF network, you must assign an OSPF area ID in decimal format to the ONS 15454 network. An area ID is a “dotted quad” value that appears similar to an IP address. Coordinate the area ID number assignment with your LAN administrator. All DCC-connected ONS 15454s should be assigned the same OSPF area ID.

Note It is recommended that the number of ONS 15454s in an OSPF area be limited, because this allows faster loading into a CTC an is less likely to incur any problems.

Figure 22-8 Scenario 6: OSPF Enabled (ANSI and ETSI)

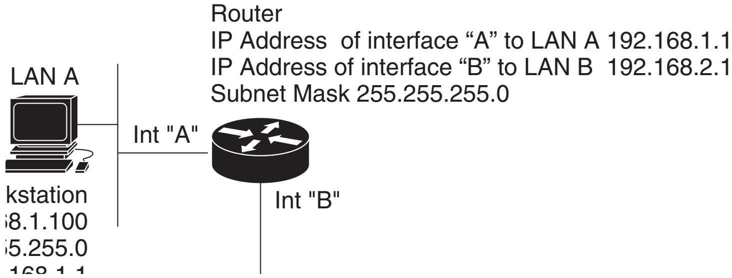
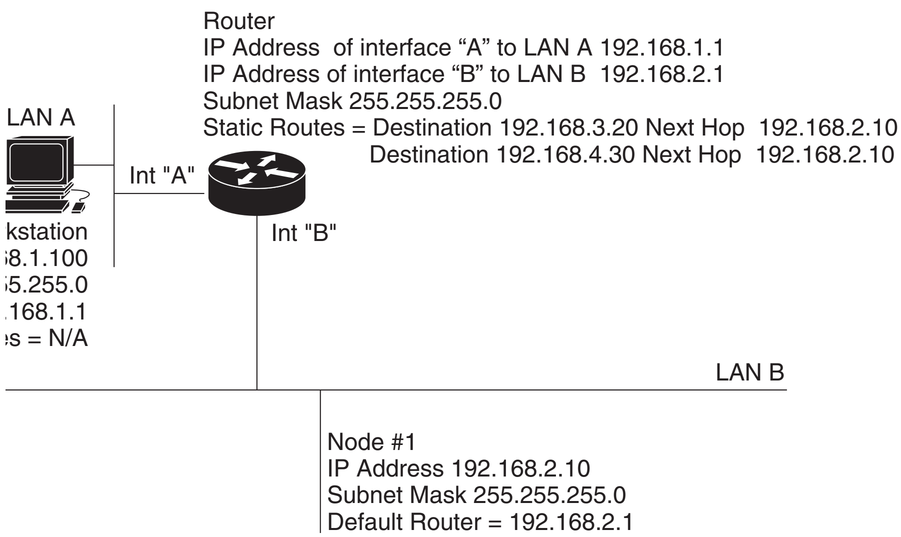


Figure 22-9 Scenario 6: OSPF Not Enabled (ANSI and ETSI)



22.2.7 Scenario 7: Provisioning the ONS 15454 Proxy Server

The ONS 15454 proxy server is a set of functions that allows you to network ONS 15454s in environments where visibility and accessibility between ONS 15454s and CTC computers must be restricted. For example, you can set up a network so that field technicians and network operations center (NOC) personnel can both access the same ONS 15454s while preventing the field technicians from accessing the NOC LAN. To do this, one ONS 15454 is provisioned as a GNE and the other ONS 15454s are provisioned as end ENEs. The GNE ONS 15454 tunnels connections between CTC computers and ENE ONS 15454s, providing management capability while preventing access for non-ONS 15454 management purposes.

The ONS 15454 gateway setting performs the following tasks:

- Isolates DCC IP traffic from Ethernet (craft port) traffic and accepts packets based on filtering rules. The filtering rules (see Table 22-3 on page 22-17 and Table 22-4 on page 22-17) depend on whether the packet arrives at the ONS 15454 DCC or TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE Ethernet interface.
- Processes Simple Network Time Protocol (SNTP) and Network Time Protocol (NTP) requests. ONS 15454 ENEs can derive time-of-day from an SNTP/NTP LAN server through the GNE ONS 15454.
- Processes Simple Network Management Protocol version 1 (SNMPv1) traps. The GNE ONS 15454 receives SNMPv1 traps from the ENE ONS 15454s and forwards or relays the traps to SNMPv1 trap destinations or ONS 15454 SNMP relay nodes.

The ONS 15454 proxy server is provisioned using the Enable proxy server on port check box on the Provisioning > Network > General tab. If checked, the ONS 15454 serves as a proxy for connections between CTC clients and ONS 15454s that are DCC-connected to the proxy ONS 15454. The CTC client establishes connections to DCC-connected nodes through the proxy node. The CTC client can connect to nodes that it cannot directly reach from the host on which it runs. If not selected, the node does not proxy for any CTC clients, although any established proxy connections continue until the CTC client exits. In addition, you can set the proxy server as an ENE or a GNE:

- External Network Element (ENE)—If set as an ENE, the ONS 15454 neither installs nor advertises default or static routes that go through its Ethernet port. However, an ENE does install and advertise routes that go through the DCC. CTC computers can communicate with the ONS 15454 using the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE craft port, but they cannot communicate directly with any other DCC-connected ONS 15454.

  In addition, firewall is enabled, which means that the node prevents IP traffic from being routed between the DCC and the LAN port. The ONS 15454 can communicate with machines connected to the LAN port or connected through the DCC. However, the DCC-connected machines cannot communicate with the LAN-connected machines, and the LAN-connected machines cannot communicate with the DCC-connected machines. A CTC client using the LAN to connect to the firewall-enabled node can use the proxy capability to manage the DCC-connected nodes that would otherwise be unreachable. A CTC client connected to a DCC-connected node can only manage other DCC-connected nodes and the firewall itself.
- Gateway Network Element (GNE)—If set as a GNE, the CTC computer is visible to other DCC-connected nodes and firewall is enabled.
- SOCKS Proxy-only—If Proxy-only is selected, firewall is not enabled. CTC can communicate with any other DCC-connected ONS 15454s.

Note If you launch CTC against a node through a Network Address Translation (NAT) or Port Address Translation (PAT) router and that node does not have proxy enabled, your CTC session starts and initially appears to be fine. However CTC never receives alarm updates and disconnects and reconnects every two minutes. If the proxy is accidentally disabled, it is still possible to enable the proxy during a reconnect cycle and recover your ability to manage the node, even through a NAT/PAT firewall.

Note ENEs that belong to different private subnetworks do not need to have unique IP addresses. Two ENEs that are connected to different GNEs can have the same IP address. However, ENEs that connect to the same GNE must always have unique IP addresses.

Figure 22-10 shows an ONS 15454 proxy server implementation. A GNE ONS 15454 is connected to a central office LAN and to ENE ONS 15454s. The central office LAN is connected to a NOC LAN, which has CTC computers. The NOC CTC computer and craft technicians must both be able to access the ONS 15454 ENEs. However, the craft technicians must be prevented from accessing or seeing the NOC or central office LANs.

In the example, the ONS 15454 GNE is assigned an IP address within the central office LAN and is physically connected to the LAN through its LAN port. ONS 15454 ENEs are assigned IP addresses that are outside the central office LAN and given private network IP addresses. If the ONS 15454 ENEs are collocated, the craft LAN ports could be connected to a hub. However, the hub should have no other network connections.

Figure 22-10 Scenario 7: ONS 15454 Proxy Server with GNE and ENEs on the Same Subnet (ANSI and ETSI)

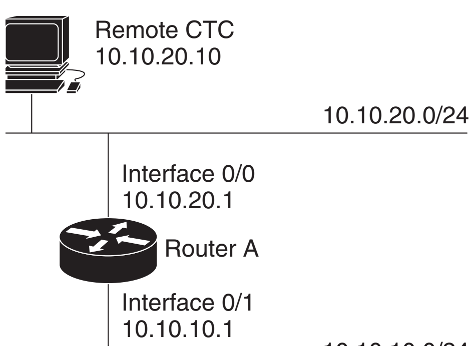


Table 22-2 shows recommended settings for ONS 15454 GNEs and ENEs in the configuration shown in Figure 22-10.

Table 22-2 ONS 15454 Gateway and End NE Settings

Setting	ONS 15454 Gateway NE	ONS 15454 End NE
OSPF	Off	Off

Table 22-2 ONS 15454 Gateway and End NE Settings (continued)

Setting	ONS 15454 Gateway NE	ONS 15454 End NE
SNTP server (if used)	SNTP server IP address	Set to ONS 15454 GNE IP address
SNMP (if used)	SNMPv1 trap destinations	Set SNMPv1 trap destinations to ONS 15454 GNE

Figure 22-11 shows the same proxy server implementation with ONS 15454 ENEs on different subnets. The ONS 15454 GNEs and ENEs are provisioned with the settings shown in Table 22-2.

Figure 22-11 Scenario 7: ONS 15454 Proxy Server with GNE and ENEs on Different Subnets (ANSI and ETSI)

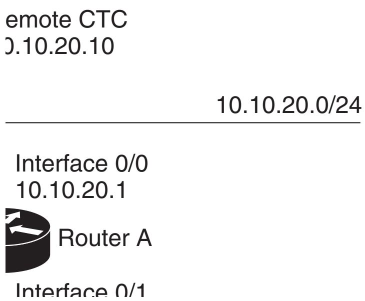


Figure 22-12 shows the same proxy server implementation with ONS 15454 ENEs in multiple rings.

Figure 22-12 Scenario 7: ONS 15454 Proxy Server With ENEs on Multiple Rings (ANSI and ETSI)

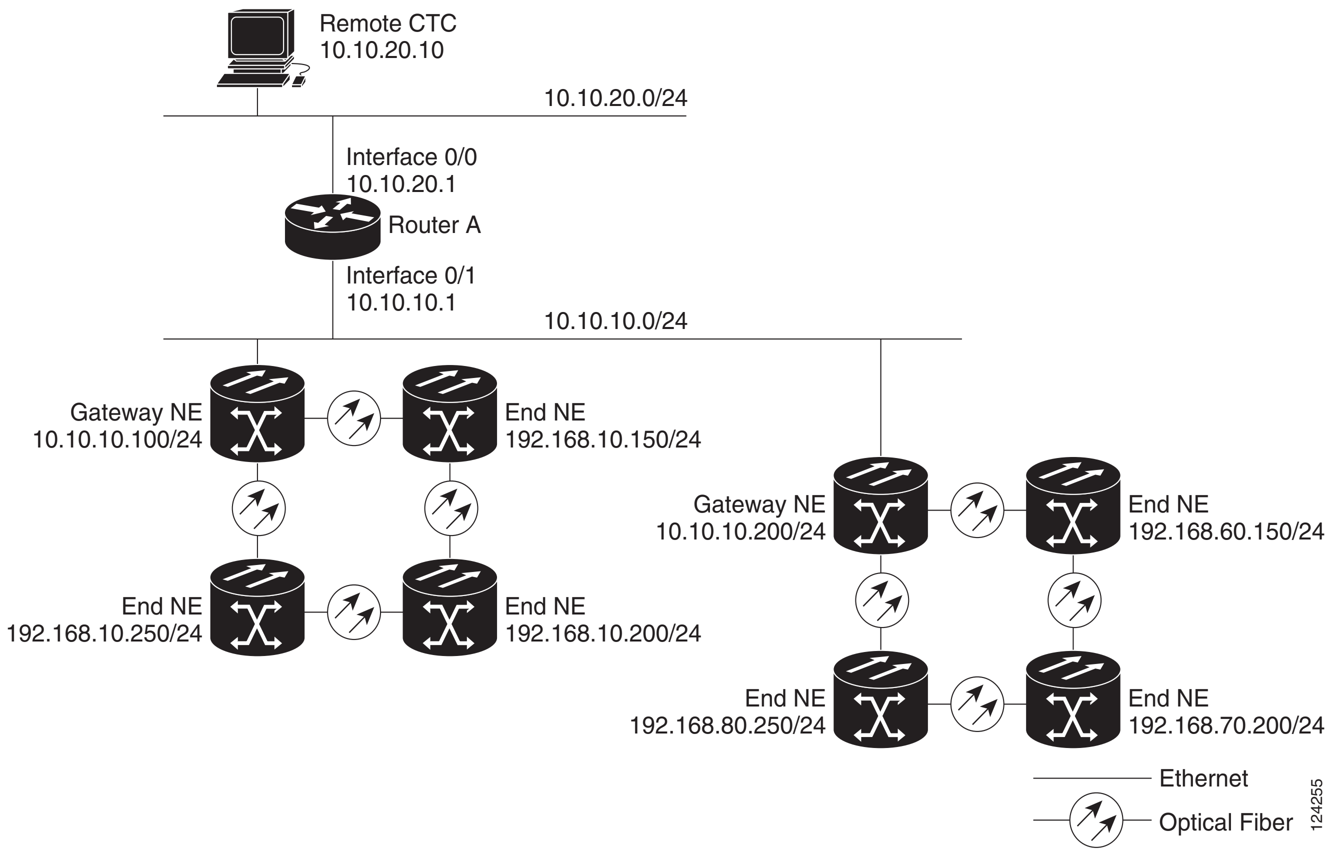


Table 22-3 shows the rules the ONS 15454 follows to filter packets for the firewall when nodes are configured as ENEs and GNEs. If the packet is addressed to the ONS 15454, additional rules (shown in Table 22-4) are applied. Rejected packets are silently discarded.

Table 22-3 Proxy Server Firewall Filtering Rules

Packets Arriving At:	Are Accepted if the Destination IP Address is:
TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE Ethernet interface	• The ONS 15454 itself • The ONS 15454's subnet broadcast address • Within the 224.0.0.0/8 network (reserved network used for standard multicast messages) • Subnet mask = 255.255.255.255
DCC interface	• The ONS 15454 itself • Any destination connected through another DCC interface • Within the 224.0.0.0/8 network

Table 22-4 Proxy Server Firewall Filtering Rules

Packets Arriving At:	Are Rejected If:
TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE Ethernet interface	• User Datagram Protocol (UDP) packets addressed to the SNMP trap relay port
DCC interface	• Transmission Control Protocol (TCP) packets addressed to the proxy server port (1080)

If you implement the proxy server, note that all DCC-connected ONS 15454s on the same Ethernet segment must have the same gateway setting. Mixed values produce unpredictable results, and might leave some nodes unreachable through the shared Ethernet segment.

If nodes become unreachable, correct the setting by performing one of the following:

- Disconnect the craft computer from the unreachable ONS 15454. Connect to the ONS 15454 through another network ONS 15454 that has a DCC connection to the unreachable ONS 15454.
- Disconnect all DCCs to the node by disabling them on neighboring nodes. Connect a CTC computer directly to the ONS 15454 and change its provisioning.

22.2.8 Scenario 8: Dual GNEs on a Subnet

The ONS 15454 provides GNE load balancing, which allows CTC to reach ENEs over multiple GNEs without the ENEs being advertised over OSPF. This feature allows a network to quickly recover from the loss of GNE, even if the GNE is on a different subnet. If a GNE fails, all connections through that GNE fail. CTC disconnects from the failed GNE and from all ENEs for which the GNE was a proxy, and then reconnects through the remaining GNEs. GNE load balancing reduces the dependency on the launch GNE and DCC bandwidth, both of which enhance CTC performance.

Note Dual GNEs do not need special provisioning

Figure 22-13 shows a network with dual GNEs on the same subnet.

Figure 22-13 Scenario 8: Dual GNEs on the Same Subnet (ANSI and ETSI)

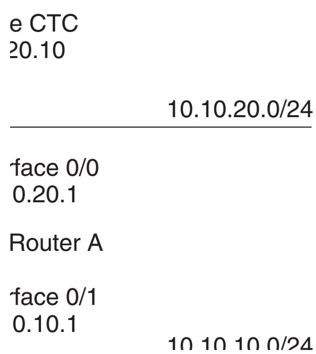
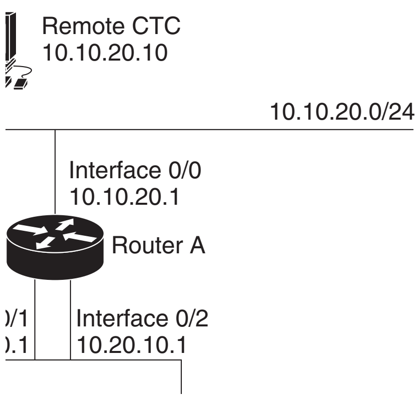


Figure 22-14 shows a network with dual GNEs on different subnets.

Figure 22-14 Scenario 8: Dual GNEs on Different Subnets (ANSI and ETSI)



22.2.9 Scenario 9: IP Addressing with Secure Mode Enabled

The TCC2, TCC2P, TCC3, TNC, TNCE, TSC, and TSCE cards default to repeater mode. In this mode, the front and back Ethernet (LAN) ports share a single MAC address and IP address. TCC2P, TCC3, TNC, TNCE, TSC, and TSCE cards allow you to place a node in secure mode, which prevents a front-access craft port user from accessing the LAN through the backplane port. Secure mode can be locked, which prevents the mode from being altered. To place a node in secure mode refer to the "DLP -G264 Enable Node Security Mode" task in the "Turn Up a Node" chapter. To lock secure node, refer to the "DLP-G265 Lock Node Security" task in the Manage the Node document.

22.2.9.1 Secure Mode Behavior

Changing a TCC2P, TCC3, TNC, TNCE, TSC, or TSCE node from repeater mode to secure mode allows you to provision two IP addresses for the ONS 15454 and causes the node to assign the ports different MAC addresses. In secure mode, one IP address is provisioned for the ONS 15454 backplane LAN port, and the other IP address is provisioned for the card Ethernet port. Both addresses reside on different subnets, providing an additional layer of separation between the craft access port and the ONS 15454 LAN. If secure mode is enabled, the IP addresses provisioned for the backplane LAN port and card Ethernet port must follow general IP addressing guidelines and must reside on different subnets from each other.

In secure mode, the IP address assigned to the backplane LAN port becomes a private address, which connects the node to an operations support system (OSS) through a central office LAN or private enterprise network. A Superuser can configure the node to hide or reveal the backplane's LAN IP address in CTC, the routing table, or TL1 autonomous message reports.

In repeater mode, a node can be a GNE or ENE. Placing the node into secure mode automatically turns on SOCKS proxy and defaults the node to GNE status. However, the node can be changed back to an ENE. In repeater mode, an ENE's SOCKS proxy can be disabled—effectively isolating the node beyond the LAN firewall—but it cannot be disabled in secure mode. To change a node's GNE or ENE status and disable the SOCKS proxy, refer to the "DLP-G56 Provision IP Settings" task in the "Turn Up a Node" chapter.

Caution Enabling secure mode causes the TCC2P, TCC3, TNC, TNCE, TSC, and TSCE cards to reboot; the card reboot affects traffic.

Caution The TCC2 card fails to boot when it is added as a standby card to a node containing an active TCC2P card configured in the secure mode.

Note If both front and backplane access ports are disabled in an ENE and the node is isolated from DCC communication (due to user provisioning or network faults), the front and backplane ports are automatically reenabled.

Figure 22-15 shows an example of secure mode ONS 15454 nodes with front-access Ethernet port addresses that reside on the same subnet.

Figure 22-15 Scenario 9: ONS 15454 GNE and ENEs on the Same Subnet with Secure Mode Enabled

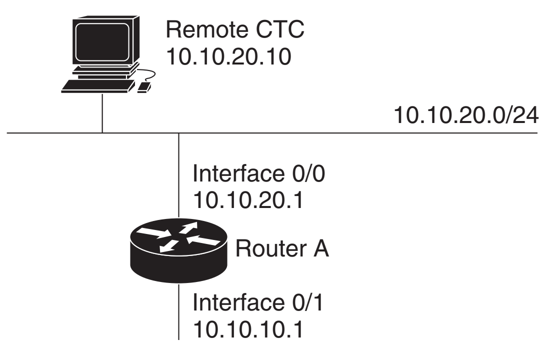
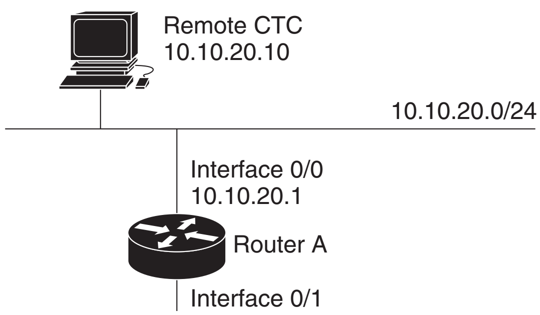


Figure 22-16 shows an example of ONS 15454 nodes connected to a router with secure mode enabled. In each example, the node's port address (node address) resides on a different subnet from the node backplane addresses.

Figure 22-16 Scenario 9: ONS 15454 GNE and ENEs on Different Subnets with Secure Mode Enabled



22.2.9.2 Secure Node Locked and Unlocked Behavior

Secure mode can be locked or unlocked on a node operating in secure mode. The default status is unlocked, and only a Superuser can issue a lock. When secure mode is locked, the node's configuration (including Ethernet port status) and lock status cannot be changed by any network user. To have a secure node's lock removed, contact Cisco Technical Support to arrange a Return Material Authorization (RMA) for the shelf assembly. See the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section on page lvii as needed. Enabling a lock makes a permanent change to the shelf's EEPROM.

A node's configuration lock is maintained if the active TCC2P, TCC3, TNC, TNCE, TSC, or TSCE card's database is reloaded. For example, if you attempt to load an unlocked node database onto a locked node's standby TCC2P, TCC3, TNC, TNCE, TSC, or TSCE card for transfer to the active TCC2P, TCC3, TNC, TNCE, TSC, or TSCE card (an action that is not recommended), the unlocked node's status (via the uploaded database) will not override the node's lock status. If you attempt to load a locked database onto the standby TCC2P, TCC3, TNC, TNCE, TSC, or TSCE card of an unlocked secure node, the active TCC2P, TCC3, TNC, TNCE, TSC, or TSCE card will upload the database. If the uploaded defaults indicate a locked status, this will cause the node to become locked. If a software load has been customized before a lock is enabled, all lockable provisioning features are permanently set to the customized NE defaults provided in the load and cannot be changed by any user.

22.3 DCN Case Studies

The ONS 15454 network is managed over the IP DCN and the optical service channels (OSCs), DCCs, and generic communications channels (GCCs). ONS 15454s perform many of the same functions as Layer 3 routers because they manage traffic between the DCN network management system (NMS) and the dense wavelength division multiplexing (DWDM) optical networks.

This section provides case studies that show different ways an ONS 15454 network can be implemented within the DCN. The case studies are based on actual field installations. They include the network problem, the network topology created to solve it, IP addressing examples, and strengths and weaknesses of the solution. Routing principles followed throughout the case studies include:

- If the ONS 15454 is connected to a DCN router, the default gateway points to the router.
- If the default gateway must advertise to the OSC/DCC/GCC network, a static route is added for the default gateway.
- If the network element (NE) is not connected to a DCN router, the default gateway is set to 0.0.0.0.

22.3.1 SOCKS Proxy Settings

SOCKS proxy (described in the "22.2.7 Scenario 7: Provisioning the ONS 15454 Proxy Server" section on page 22-12) enables the ONS 15454 to serve as a proxy for connections between CTC clients and ONS 15454 nodes connected by OSCs, GCCs, or DCCs. Although SOCKS proxy can make DCN implementations easier, it should not be used when any of the following conditions exist:

- Network management is based on SNMP and SNMP traps. The ONS 15454 can proxy SNMP traps, but if a redundant DCN connection is required, trap duplication on the network management platform will occur.
- Telnet and debug session are required. These are not possible over SOCKS proxy.
- Direct IP connectivity to every node is required.

If these conditions are not present and no requirement to have direct IP connectivity to every node exists (that is, management is performed using CTC and/or Cisco Transport Manager [CTM]), Cisco recommends that you use the SOCKS proxy only option for all nodes that connect to a DCN router.

22.3.2 OSPF

Activating OSPF (described in the "22.2.6 Scenario 6: Using OSPF" section on page 22-10) on the ONS 15454 LAN interface is another option that can be used to create resilient DCN connections. However, this option can only be enabled if every element in the network, from the NEs to the NOC, runs OSPF. This is not always possible, for example, the DCN connections might be on a public network out of the control of the organization using the ONS 15454 network. If you are considering enabling OSPF on the LAN, the following limitations must be considered:

- If OSPF is enabled on the LAN, the internal OSC/DCC/GCC OSPF area cannot be 0.0.0.0.
- The ONS 15454 can act as an OSPF area border gateway and support OSPF virtual links. However, virtual links cannot pass over the OSC/DCC/GCC network.

If all elements in the DCN network are not running OSPF, enabling OSPF on the LAN is very difficult without creating isolated areas and/or segmentation of OSPF area 0. However, if the DCN network is a full OSPF network, enabling OSPF on the LAN might be employed for resilient DCN networks.

22.3.3 Management of Non-LAN Connected Multishelf Node

When using dense wavelength division multiplexing (DWDM) multishelf management feature to subtend shelves from a node controller shelf, the Node Controller must be specially provisioned in case it does not have direct LAN reachability.

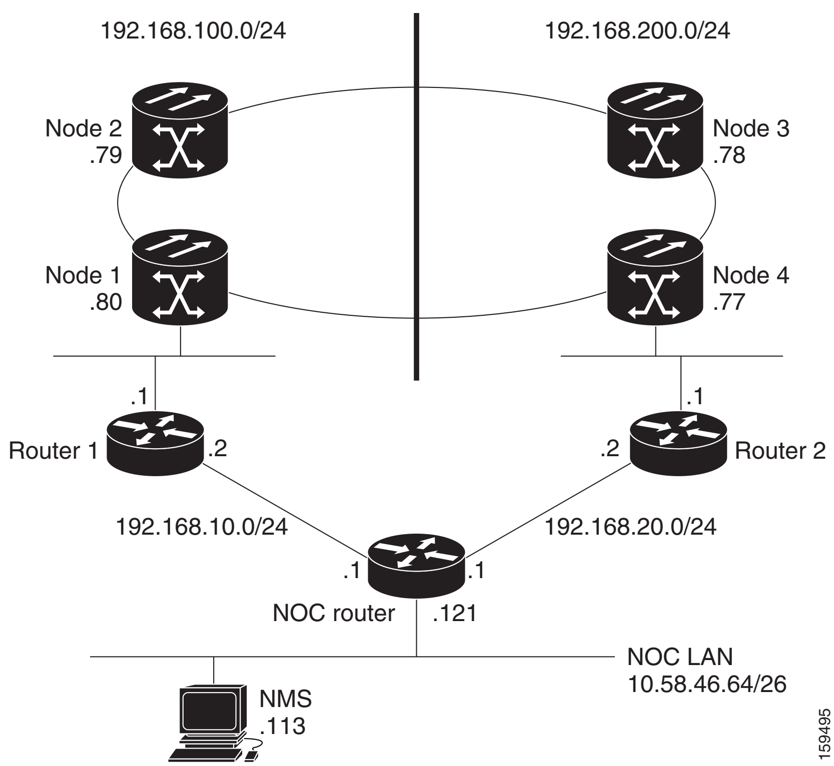
Non-LAN connected Multishelf nodes are not manageable from CTC unless SOCKS Proxy is enabled on the node. In a GNE/ENE firewall configuration, non-LAN connected network elements must be set up as end network elements (ENEs) if Firewall is required. If firewall is not required on the non-LAN connected Multishelf node, then the node must be set up as SOCKS Proxy

LAN-connected network elements (LNEs) can be set up as gateway network elements (GNEs) or as SOCKS proxies, depending upon network security requirements. If the GNE/ENE firewall feature is required, the LNE must be set up as a GNE. If the design does not require the firewall feature but does require all-IP networking, the LNE must be set up as a SOCKS proxy. For procedures to provision a node or shelf as a GNE, ENE or SOCKS proxy, refer to the "Turn Up a Node" chapter.

22.3.4 DCN Case Study 1: Ring Topology with Two Subnets and Two DCN Connections

DCN Case Study 1 (Figure 22-17) shows an ONS 15454 ring (DWDM or SONET/SDH). The ring is divided into two subnets and has two DCN connections for resiliency.

Figure 22-17 DCN Case Study 1: ONS 15454 Ring with Two Subnets and Two DCN Connections

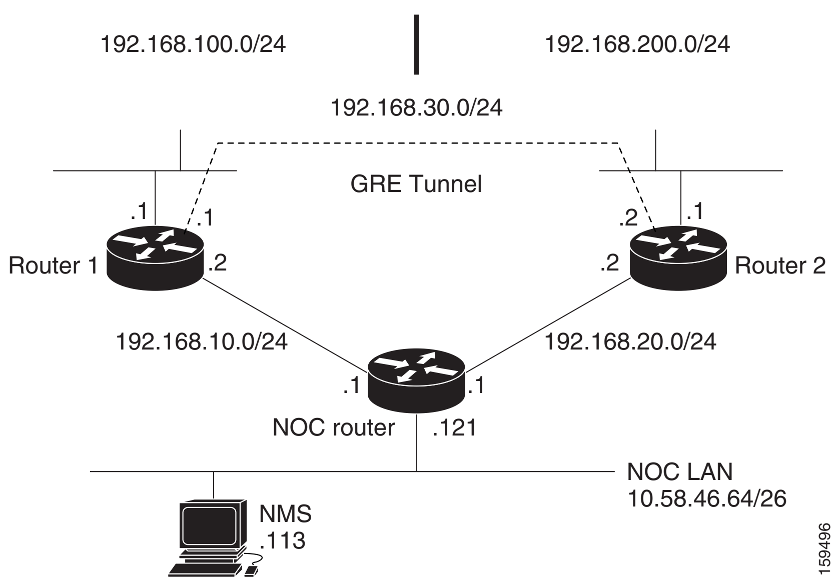


During normal operation, this configuration balances the management traffic load over the two available DCN connections. If one of the two DCN connections fails, the second DCN connection maintains accessibility so NE management can continue. However, if complete IP connectivity is required, for example, for SNMP when SOCKS proxy cannot be used, connection resilience is difficult to achieve because:

- The ONS 15454 does not support route overloading. Configuring different routers with different costs for the same network destination is not possible.
- The ONS 15454 always tries to route traffic on the LAN interface when its link is up, and the link on the NE connected to DCN router is always up.
- If the DCN connection fails, the route is longer available.

One solution is to create a generic routing encapsulation (GRE) tunnel to logically connect the remote Router 1 and remote Router 2 using the OSC/DCC/GCC network (Figure 22-18). With the GRE tunnel, both remote routers have an alternate path to reach the NOC network in case of DCN failure. However, the alternate path might become overloaded on the routing tables, resulting in higher costs.

Figure 22-18 DCN Case Study 1: ONS 15454 Ring with Two Subnets, Two DCN Connections, and GRE Tunnel



22.3.4.1 DCN Case Study 1 IP Configuration

The following sections show sample IP configuration at the routers and ONS 15454 nodes in DCN Case Study 1.

22.3.4.1.1 NOC Router Configuration

Interface configuration:

```
interface Ethernet0/0
 ip address 10.58.46.121 255.255.255.192
 no ip directed-broadcast
!
interface Ethernet1/0
```

```
 ip address 192.168.20.1 255.255.255.0
 no ip directed-broadcast
!
interface Ethernet2/0
 ip address 192.168.10.1 255.255.255.0
 no ip directed-broadcast
!
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 192.168.100.0 255.255.255.0 192.168.10.2
ip route 192.168.100.0 255.255.255.0 192.168.20.2 10
ip route 192.168.200.0 255.255.255.0 192.168.20.2
ip route 192.168.200.0 255.255.255.0 192.168.10.2 10
```

22.3.4.1.2 Router 1 IP Configuration

Interface configuration:

```
interface Ethernet0/0
ip address 192.168.10.2 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
ip address 192.168.100.1 255.255.255.0
no ip directed-broadcast
!
```

GRE tunnel interface configuration:

```
interface Tunnel0
ip address 192.168.30.1 255.255.255.0
tunnel source Ethernet1/0
tunnel destination 192.168.200.1
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.10.1
ip route 10.0.0.0 255.0.0.0 192.168.10.1
ip route 10.0.0.0 255.0.0.0 Tunnel0 10
ip route 192.168.200.0 255.255.255.0 Tunnel0 10
ip route 192.168.200.1 255.255.255.255 192.168.100.80
```

Note the host route to the peer Router 2 (192.168.200.1) points to the ONS 15454 network (through 192.168.100.80). This is required to set up the GRE tunnel. In this configuration, only the external route to 10.0.0.0 (that includes the NOC network) is overloaded with the alternate path. However, overloading might occur on this last-resort route.

22.3.4.1.3 Router 2 IP Configuration

Interface configuration:

```
interface Ethernet0/0
ip address 192.168.20.2 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
ip address 192.168.200.1 255.255.255.0
no ip directed-broadcast
```

GRE tunnel interface configuration:

```
interface Tunnel0
ip address 192.168.30.2 255.255.255.0
tunnel source Ethernet1/0
tunnel destination 192.168.100.1
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.20.1
ip route 10.0.0.0 255.0.0.0 192.168.20.1
ip route 10.0.0.0 255.0.0.0 Tunnel0 10
ip route 192.168.100.0 255.255.255.0 Tunnel0 10
ip route 192.168.100.1 255.255.255.255 192.168.200.77
```

The host routing path to the Router 1 (192.168.100.1) points to the ONS 15454 network (by 192.168.200.77). This is required to set up the GRE tunnel. In this configuration, only the external route to 10.0.0.0 (that includes the NOC network) is overloaded with the alternate path. However, overloading the last-resort route might occur. Table 22-5 shows network settings on the four ONS 15454 nodes. The static routes are created so the DCN-connected nodes advertise their capability to act as last-resort routers.

Table 22-5 DCN Case Study 1 Node IP Addresses

Node	IP Address/Mask	Default Gateway	Static Routes: Destination/Mask – Next Hop
Node 1	192.168.100.80/24	192.168.100.1	0.0.0.0/0 – 192.168.100.1
Node 2	192.168.100.79/24	0.0.0.0	—
Node 3	192.168.100.78/24	0.0.0.0	—
Node 4	192.168.100.77/24	192.168.100.1	0.0.0.0/0 – 192.168.200.1

22.3.4.2 DCN Case Study 1 Limitations

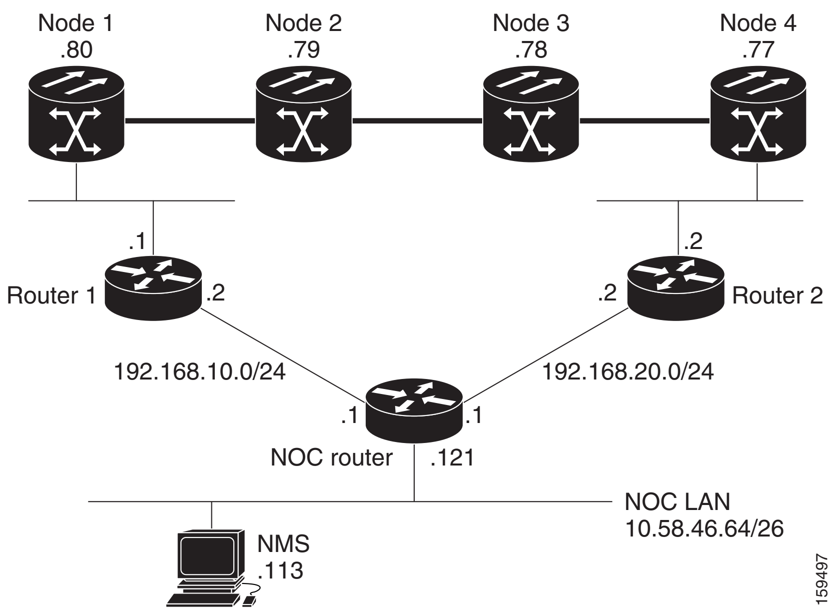
DCN Case Study 1 shows how a GRE tunnel can be created between two routers to create DCN connection resiliency. While the resiliency is a benefit, when a DCN failure forces traffic to the GRE tunnel, the path calculated by the ONS 15454 OSPF algorithm running in the OSC/DCC/GCC network is no longer the shortest one. Subsequently, the round-trip delay time (RTT) might increase significantly because the DCN protection in this configuration is transparent to the ONS 15454 network. The ONS 15454 continues to use the same routing table. In addition, if a DCN failure occurs, the routing path that uses the GRE tunnel adds additional latency because of the number and length of OSC/DCC/GCC spans that the tunnel has to travel over the ONS 15454 network.

This latency makes this DCN Case Study 1 solution difficult to scale to large networks. If this solution is used and the network grows significantly, a larger number of DCN-connected NEs are required. For example, the common rule in ONS 15454 DCN design is that all nodes should be within five section data communications channel (LDCC)/regeneration section DCC (RS-DCC/OSC or eight line DCC (LDCC) /multiplex section DCC (MS-DCC) spans from the network attached node. If Case Study 1 design is implemented, the maximum span numbers should be cut in half. However, if the DCN Case Study 1 design is used in networks that have full IP routing, have connectivity to every NE, and require only CTC/CTM management, the SOCKS proxy feature can be used to provide the same DCN connectivity resilience.

22.3.5 DCN Case Study 2: Linear Topology with DCN Connections on Both Ends

DCN Case Study 2, shown in Figure 22-19, shows a four-node linear topology with DCN connectivity at both ends.

Figure 22-19 DCN Case Study 2: ONS 15454 Linear Topology with DCN Connections at Both Ends



To maintain DCN resilience, static routes are used and a GRE tunnel is created between Router 1 and Router 2 over the DCC/OSC/GCC optical link. In this example, all ONS 15454s are part of the same subnet. Therefore, the Router 1 and Router 2 static route tables have more entries because alternate paths must be configured for every host.

22.3.5.1 DCN Case Study 2 IP Configurations

The following sections provide sample IP configurations at routers and ONS 15454 nodes in DCN Case Study 2.

22.3.5.1.1 NOC Router IP Configuration

Interface configuration:

```
interface Ethernet0/0
 ip address 10.58.46.121 255.255.255.192
 no ip directed-broadcast
!
interface Ethernet1/0
 ip address 192.168.20.1 255.255.255.0
 no ip directed-broadcast
!
interface Ethernet2/0
 ip address 192.168.10.1 255.255.255.0
 no ip directed-broadcast
!
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 192.168.100.0 255.255.255.0 192.168.10.2
ip route 192.168.100.0 255.255.255.0 192.168.20.2 100
ip route 192.168.100.77 255.255.255.255 192.168.20.2
ip route 192.168.100.77 255.255.255.255 192.168.10.2 10
ip route 192.168.100.78 255.255.255.255 192.168.20.2
ip route 192.168.100.78 255.255.255.255 192.168.10.2 10
ip route 192.168.100.79 255.255.255.255 192.168.10.2
ip route 192.168.100.79 255.255.255.255 192.168.20.2 10
ip route 192.168.100.80 255.255.255.255 192.168.10.2
ip route 192.168.100.80 255.255.255.255 192.168.20.2 10
```

22.3.5.1.2 Router 1 IP Configuration

Site 1 router interface:

```
interface Ethernet0/0
ip address 192.168.10.2 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
ip address 192.168.100.1 255.255.255.0
no ip directed-broadcast
```

GRE tunnel interface configuration:

```
interface Tunnel0
ip address 192.168.30.1 255.255.255.0
tunnel source Ethernet1/0
tunnel destination 192.168.100.2
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.10.1
ip route 10.0.0.0 255.0.0.0 192.168.10.1
ip route 10.0.0.0 255.0.0.0 Tunnel0 10
ip route 192.168.100.2 255.255.255.255 192.168.100.80
```

Note that the host routing path to the peer DCN router (Site 2, 192.168.100.2) points to the ONS 15454 network (by 192.168.100.80) that is required to set up the GRE tunnel. In this configuration, only the external route to 10.0.0.0 (that include the NOC network) is overloaded with the alternate path, but overloading of the last-resort route might also occur.

22.3.5.1.3 Router 2 IP Configuration

Interface configuration:

```
interface Ethernet0/0
ip address 192.168.20.2 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
ip address 192.168.100.2 255.255.255.0
no ip directed-broadcast
```

GRE tunnel interface configuration:

```
interface Tunnel0
ip address 192.168.30.2 255.255.255.0
tunnel source Ethernet1/0
```

```
tunnel destination 192.168.100.1
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.20.1
ip route 10.0.0.0 255.0.0.0 192.168.20.1
ip route 10.0.0.0 255.0.0.0 Tunnel0 10
ip route 192.168.100.1 255.255.255.255 192.168.100.77
```

Note that the host route to the Router 1 (192.168.100.1) points to the ONS 15454 network (by 192.168.200.77). This is required to set up the GRE tunnel. In this configuration, only the external route to 10.0.0.0 (that includes the NOC network) is overloaded with the alternate path. However, overloading the last-resort route might also occur.

Table 22-6 shows network settings on the four ONS 15454 nodes. The static routes are created so the DCN-connected nodes advertise their capability to act as last-resort routers.

Table 22-6 DCN Case Study 2 Node IP Addresses

Node	IP Address/Mask	Default Gateway	Static Routes: Destination/Mask – Next Hop
Node 1	192.168.100.80/24	192.168.100.1	0.0.0.0/0 – 192.168.100.1
Node 2	192.168.100.79/24	0.0.0.0	—
Node 3	192.168.100.78/24	0.0.0.0	—
Node 4	192.168.100.77/24	192.168.100.1	0.0.0.0/0 – 192.168.200.1

22.3.5.2 DCN Case Study 2 Limitations

The linear configuration in DCN Case Study 2 does not effectively protect the management network communication for every fiber failure because the DCN router is not notified of the failures. Therefore, it continues to send packets on the low-cost path. This problem does not occur in ring topologies where the fiber failure is internally protected from the optical ring network. However, the OSPF dynamic routing protocol can be used over the DCN network to provide a solution to this problem. An OSPF configuration is shown in DCN Case Study 3.

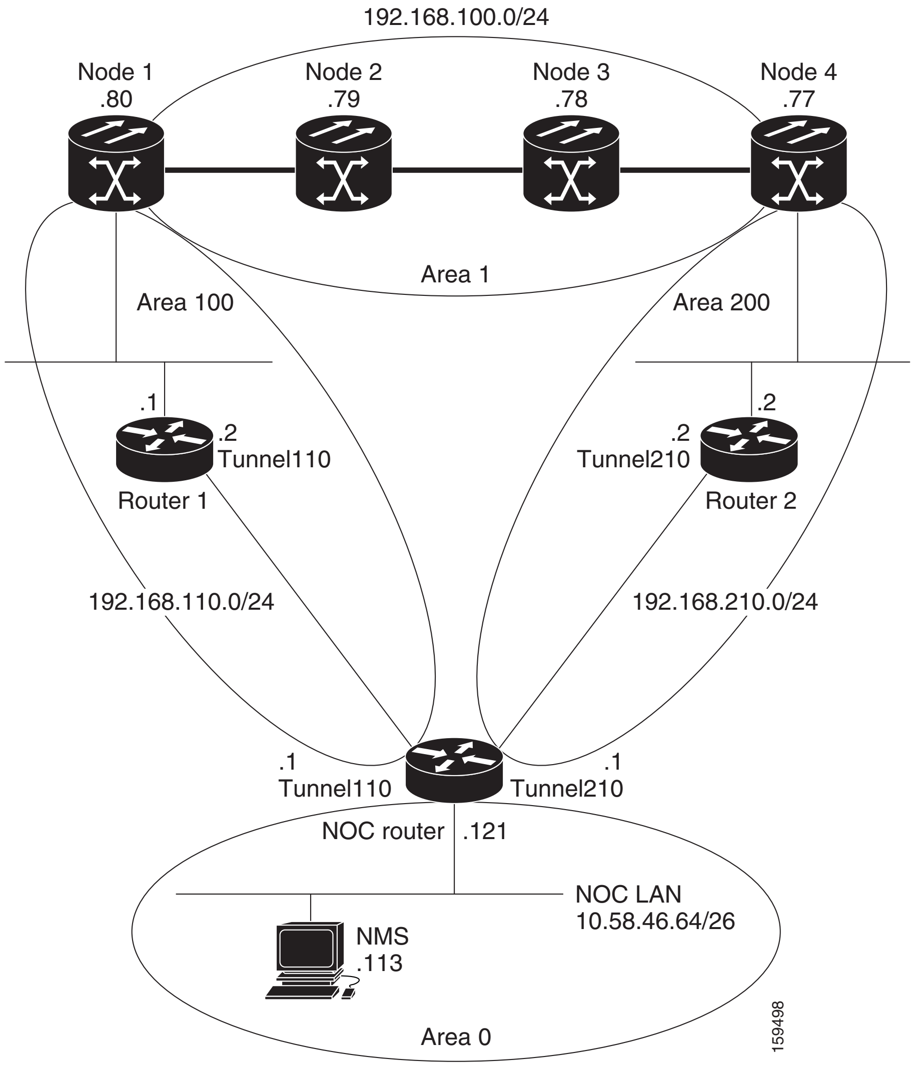
22.3.6 DCN Case Study 3: Linear Topology with DCN Connections on Both Ends Using OSPF Routing

DCN Case Study 3 is the same linear topology as DCN Case Study 2 except OSPF routing is used on the DCN network. This requires the OSPF active on LAN option, located on the node view (single-shelf mode) or multishelf view (multishelf mode) Provisioning > Network > OSPF tab, to be enabled at the end ONS 15454 nodes. In addition, OSPF must be running between Router 1, Router 2, and the NOC router.

Because the DCN connection usually passes over a public network where OSPF is not always an option, the connection between Router 1, Router 2, and the NOC router is configured as a GRE tunnel so OSPF can run on the tunnel itself.

Figure 22-20 shows the linear configuration with the separate OSPF areas, the tunnel connections, and the required OSPF virtual link. (The physical connections where the tunnels are passed are not shown in the figure because they are not directly part of the actual routing path.)

Figure 22-20 DCN Case Study 3: ONS 15454 Linear Topology with DCN Connections at Both Ends Using OSPF



22.3.6.1 DCN Case Study 3 IP Configurations

The following sections provide sample IP configurations at routers and ONS 15454 nodes for DCN Case Study 3.

22.3.6.1.1 NOC Router IP Configuration

Interface configuration:

```
interface Ethernet0/0
 ip address 10.58.46.121 255.255.255.192
 no ip directed-broadcast
!
interface Ethernet1/0
 ip address 192.168.20.1 255.255.255.0
 no ip directed-broadcast
```

```
!
interface Ethernet2/0
 ip address 192.168.10.1 255.255.255.0
 no ip directed-broadcast
!
interface Loopback0
 ip address 1.1.1.1 255.255.255.0
 no ip directed-broadcast
!
```

GRE tunnel interface configuration:

```
interface Tunnel110
 ip address 192.168.110.1 255.255.255.0
 tunnel source Ethernet2/0
 tunnel destination 192.168.10.2
!
interface Tunnel210
 ip address 192.168.210.1 255.255.255.0
 tunnel source Ethernet1/0
 tunnel destination 192.168.20.2
!
```

OSPF routing configuration:

```
router ospf 1
 network 1.1.1.0 0.0.0.255 area 0
 network 10.0.0.0 0.255.255.255 area 0
 network 192.168.110.0 0.0.0.255 area 100
 network 192.168.210.0 0.0.0.255 area 200
 area 100 virtual-link 192.168.100.80
 area 200 virtual-link 192.168.100.77
!
```

Note that the OSPF virtual link to the end ONS 15454s is created to connect the DCC/OSC/GCC OSPF area 1 to the backbone area 0. No static routes are defined on the NOC router.

22.3.6.1.2 Router 1 IP Configuration

Interface configuration:

```
interface Ethernet0/0
ip address 192.168.10.2 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
ip address 192.168.100.1 255.255.255.0
no ip directed-broadcast
```

GRE tunnel interface configuration:

```
interface Tunnel110
 ip address 192.168.110.2 255.255.255.0
 tunnel source Ethernet0/0
 tunnel destination 192.168.10.1
!
```

OSPF and static routing configuration:

```
router ospf 1
 log-adjacency-changes
 network 192.168.100.0 0.0.0.255 area 100
 network 192.168.110.0 0.0.0.255 area 100
!
```

```
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.10.1
```

22.3.6.1.3 Router 2 IP Configuration

Interface configuration:

```
interface Ethernet0/0
ip address 192.168.20.2 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
ip address 192.168.100.2 255.255.255.0
no ip directed-broadcast
```

GRE tunnel interface configuration:

```
interface Tunnel210
 ip address 192.168.210.2 255.255.255.0
 tunnel source Ethernet0/0
 tunnel destination 192.168.20.1
!
```

OSPF and static routing configuration:

```
router ospf 1
 network 192.168.100.0 0.0.0.255 area 200
 network 192.168.210.0 0.0.0.255 area 200
!
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.20.1
```

Table 22-7 shows network settings on the four ONS 15454 nodes. The static routes are created so the DCN-connected nodes can advertise their capability to act as last-resort routers.

Table 22-7 DCN Case Study 3 Node IP Addresses

Node	IP Address/Mask	Default Gateway	OSPF Configuration
Node 1	192.168.100.80/24	192.168.100.1	DCC/OSC/GCC area: 0.0.0.1 LAN area: 0.0.0.100 OSPF Area Range Table: • 192.168.100.79/32 - Area 0.0.0.1 • 192.168.100.78/32 - Area 0.0.0.1 • 192.168.100.77/32 - Area 0.0.0.1 Virtual Link Table: 1.1.1.1
Node 2	192.168.100.79/24	0.0.0.0	DCC/OSC/GCC area: 0.0.0.1 OSPF disabled on LAN

Table 22-7 DCN Case Study 3 Node IP Addresses (continued)

Node	IP Address/Mask	Default Gateway	OSPF Configuration
Node 3	192.168.100.78/24	0.0.0.0	DCC/OSC/GCC area: 0.0.0.1 OSPF disabled on LAN
Node 4	192.168.100.77/24	192.168.100.1	DCC/OSC/GCC area: 0.0.0.1 LAN area: 0.0.0.200 OSPF Area Range Table: • 192.168.100.80/32 - Area 0.0.0.1 • 192.168.100.79/32 - Area 0.0.0.1 • 192.168.100.78/32 - Area 0.0.0.1 Virtual Link Table: 1.1.1.1

The OSPF virtual link requires its neighbor to be indicated with its router ID, not the physical or tunnel interface connected to the network. Using a loopback interface on the NOC router makes the router ID selection independent from real interface IP address.

22.3.6.2 DCN Case Study 3 Limitations

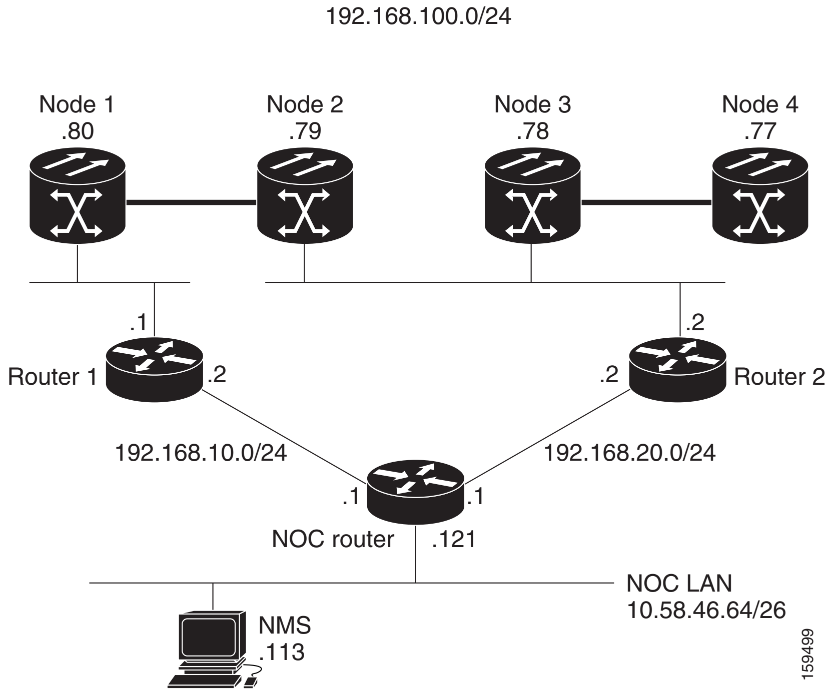
DCN Case Study 3 shows that OSPF can provide better DCN resilience and more efficient routing choices, which results in better performance. OSPF also provides better network scalability. Some limitations of using OSPF include:

- OSPF introduces additional complexity, for example, provisioning the OSPF virtual links and advertisement on the ONS 15454s and routers requires thought and planning.
- OSPF must be enabled on the DCN connection between the NOC and the site routers. This can also be done through GRE tunnels, as shown in this case study.
- Planning and thought must be given to the separation of the OSPF areas. Creation of virtual links to overcome the limitations described in the "22.3.2 OSPF" section on page 22-23 and to avoid isolated areas and segmentation in the backbone area requires planning as well.

22.3.7 DCN Case Study 4: Two Linear Cascaded Topologies With Two DCN Connections

DCN Case Study 4, shown in Figure 22-21, extends the simple linear topology shown in DCN Case Study 3. However in this example, two linear DCN connections go to the same site router and all the ONS 15454s are in the same subnet. A GRE tunnel logically connects the remote Router 1 and Router 2 over the OSC/DCC/GCC network, which is similar to the DCN Case Study 1 configuration (Figure 22-18). The GRE tunnel provides the remote routers with an alternate path to reach the NOC network in case a DCN failure occurs. However, the alternate paths might overload the router routing tables and carry a higher cost because all alternate paths are host-based due to the fact the ONS 15454s reside in the same subnet.

Figure 22-21 DCN Case Study 4: Two Linear Cascaded Topologies with Two DCN Connections



22.3.7.1 DCN Case Study 4 IP Configurations

The following sections provide sample IP configurations at the routers and ONS 15454 nodes for DCN Case Study 4.

22.3.7.1.1 NOC Router IP Configuration

Interface configuration:

```
interface Ethernet0/0
 ip address 10.58.46.121 255.255.255.192
 no ip directed-broadcast
!
interface Ethernet1/0
 ip address 192.168.20.1 255.255.255.0
 no ip directed-broadcast
!
interface Ethernet2/0
 ip address 192.168.10.1 255.255.255.0
 no ip directed-broadcast
!
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 192.168.100.0 255.255.255.0 192.168.10.2
ip route 192.168.100.0 255.255.255.0 192.168.20.2 100
ip route 192.168.100.77 255.255.255.255 192.168.20.2 10
ip route 192.168.100.77 255.255.255.255 192.168.10.2 20
ip route 192.168.100.78 255.255.255.255 192.168.20.2
ip route 192.168.100.78 255.255.255.255 192.168.10.2 10
ip route 192.168.100.79 255.255.255.255 192.168.20.2
```

```
ip route 192.168.100.79 255.255.255.255 192.168.10.2 10
ip route 192.168.100.80 255.255.255.255 192.168.10.2
ip route 192.168.100.80 255.255.255.255 192.168.20.2 10
ip route 192.168.200.0 255.255.255.0 192.168.20.2
ip route 192.168.200.0 255.255.255.0 192.168.10.2 100
```

22.3.7.1.2 Router 1 IP Configuration

Interface configuration:

```
interface Ethernet0/0
ip address 192.168.10.2 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
ip address 192.168.100.1 255.255.255.0
no ip directed-broadcast
```

GRE tunnel interface configuration:

```
interface Tunnel0
ip address 192.168.30.1 255.255.255.0
tunnel source Ethernet1/0
tunnel destination 192.168.100.2
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.10.1
ip route 10.0.0.0 255.0.0.0 192.168.10.1
ip route 10.0.0.0 255.0.0.0 Tunnel0 10
ip route 192.168.100.2 255.255.255.255 192.168.100.80
ip route 192.168.100.77 255.255.255.255 Tunnel0 20
ip route 192.168.100.78 255.255.255.255 Tunnel0 10
ip route 192.168.100.79 255.255.255.255 Tunnel0 10
```

Note that the host routing path to the peer DCN router (Router 2, 192.168.100.2) points to the ONS 15454 network (by 192.168.100.80). This is required to set up the GRE tunnel. In this configuration, only the external route to 10.0.0.0 (that includes the NOC network) is overloaded with the alternate path. However, overloading of the last-resort route could also occur.

22.3.7.1.3 Router 2 IP Configuration

Interface configuration:

```
interface Ethernet0/0
ip address 192.168.20.2 255.255.255.0
no ip directed-broadcast
!
interface Ethernet1/0
ip address 192.168.100.2 255.255.255.0
no ip directed-broadcast
```

GRE tunnel interface configuration:

```
interface Tunnel0
ip address 192.168.30.2 255.255.255.0
tunnel source Ethernet1/0
tunnel destination 192.168.100.1
```

Static routes with alternate paths at different costs:

```
ip classless
ip route 0.0.0.0 0.0.0.0 192.168.20.1
```

```
ip route 10.0.0.0 255.0.0.0 192.168.20.1
ip route 10.0.0.0 255.0.0.0 Tunnel0 10
ip route 192.168.100.1 255.255.255.255 192.168.100.79
ip route 192.168.100.80 255.255.255.255 Tunnel0 10
```

Note that the host routing path to the peer DCN router (Router, IP 192.168.100.1) points to the ONS 15454 network (by 192.168.200.79). This is required to set up the GRE tunnel. In this configuration, only the external route to 10.0.0.0 (that include the NOC network) is overloaded with the alternate path. However, overloading the last-resort route is also possible.

Table 22-8 shows network settings on the four ONS 15454 nodes. The static routes are created so the DCN-connected nodes can advertise their capability to act as last-resort routers.

Table 22-8 DCN Case Study 4 Node IP Addresses

Node	IP Address/Mask	Default Gateway	Static Routes: Destination/Mask – Next Hop
Node 1	192.168.100.80/24	192.168.100.1	0.0.0.0/0 – 192.168.100.1 192.168.100.1/32 – 192.168.100.80
Node 2	192.168.100.79/24	192.168.100.2	192.168.100.2/32 – 192.168.100.79
Node 3	192.168.100.78/24	192.168.100.2	0.0.0.0/0 – 192.168.100.2
Node 4	192.168.100.77/24	0.0.0.0	—

22.3.7.2 DCN Case Study 4 Limitations

Many limitations described in the "22.3.4.2 DCN Case Study 1 Limitations" section on page 22-27 also apply to this case study. However, the problems are less acute because of the DCN connection in the middle of the optical network. For DWDM networks, increased latency might became a problem if the linear topology has many spans with intermediate line amplifier or optical add/drop multiplexing (OADM) nodes, which is sometimes done to cover long-distance connections. In this case, when one DCN fails, management packets for nodes near the middle of the span travel 1.5 times the complete point-to-point connection. The normal routing figure is 0.5. The full connection length of a GRE tunnel is used as an alternate routing path.

22.4 DCN Extension

ONS 15454 DWDM networks require a communication channel to exchange data among the different nodes within the network. Until Software Release 7.0, the only usable channel was the optical service channel (OSC) provided by the OSCM and OSC-CSM cards. In a long DWDM metro network, usage of OSC channel adds limitations in terms of cost and performance because the OSC channel maximum loss is 37 dB.

The primary aim of the DCN extension feature is to remove the OSC constraint and leverage on already available external DCN or traffic matrix that allows nodes to be reached without using an OSC channel.

You can connect two nodes in a DWDM network without using an OSC channel in the following two methods:

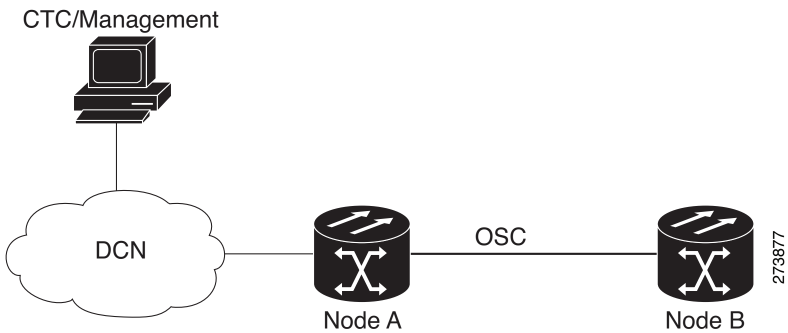
- Using external DCN
- Using GCC/DCC

The following sections describe the different communication methods and the factors to be considered while provisioning the connectivity.

22.4.1 Network Using OSC

Figure 22-22 shows a point-to-point network that uses OSC as the communication channel.

Figure 22-22 Network Using OSC

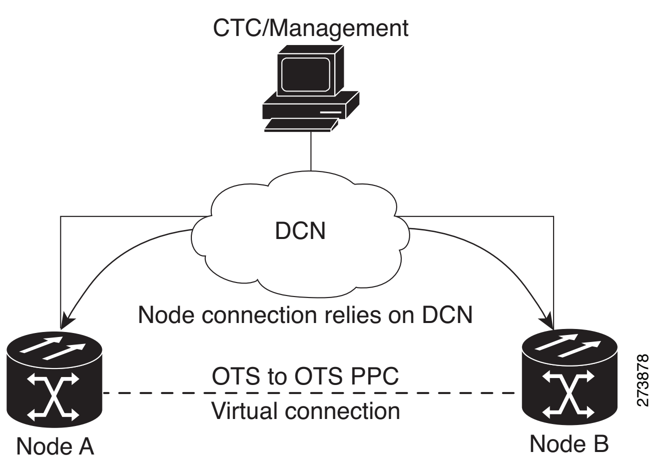


In a network using OSC channel, it is possible to supervise all the nodes from the network operations center (NOC) and all nodes can communicate with each other using the OSC channel. Network topology discovery is automatic when you use an OSC channel.

22.4.2 Network Using External DCN

Figure 22-23 shows a point-to-point network that uses external DCN as the communication channel.

Figure 22-23 Network Using External DCN

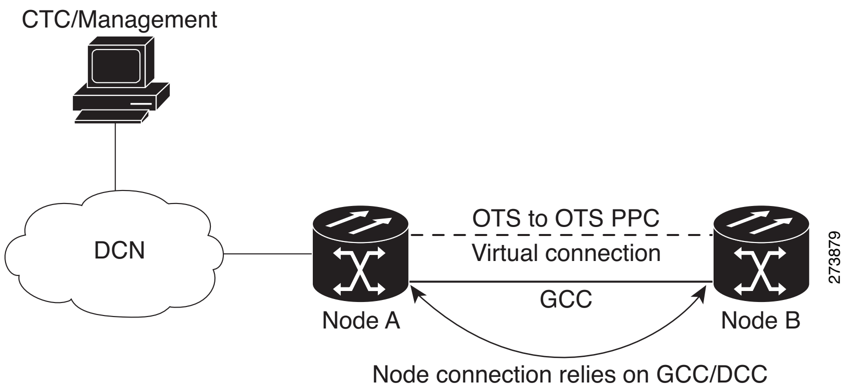


In a network using external DCN, it is possible to supervise all the nodes from the network operations center (NOC) and all nodes can communicate with each other using external DCN. The NOC is connected to each node through the external DCN. Since nodes do not have OSC connectivity, you must create an OTS-to-OTS PPC between the nodes. The OTS-to-OTS PPC creates a DCN connection between the nodes. Refer to the "Create Optical Channel Circuits and Provisionable Patchcords" chapter for instructions on how to provision an OTS-to-OTS PPC.

22.4.3 Network Using GCC/DCC

Figure 22-24 shows a point-to-point network that uses GCC/DCC as the communication channel.

Figure 22-24 Network Using GCC/DCC



In a network using GCC/DCC, one ONS 15454 node (for example, Node A) is provisioned as a gateway network element (GNE). The NOC is connected only to the GNE. It is possible to supervise all the nodes from the network operations center (NOC) and all nodes can communicate with each other using GCC/DCC.

However in such a network, because of the absence of the embedded OSC channel, discovery of the network topology is not automatic. You must manually provision the adjacency of nodes in order to configure the correct topology. Refer to the "Create Optical Channel Circuits and Provisionable Patchcords" chapter for instructions on how to provision DCN extension for a network using GCC/DCC.

22.5 Routing Table

ONS 15454 routing information is displayed on the Maintenance > Routing Table tab. The routing table provides the following information:

- Destination—Displays the IP address of the destination network or host.
- Mask—Displays the subnet mask used to reach the destination host or network.
- Gateway—Displays the IP address of the gateway used to reach the destination network or host.
- Usage—Shows the number of times the listed route has been used.
- Interface—Shows the ONS 15454 interface used to access the destination. Values are:
  - motfcc0—The ONS 15454 Ethernet interface, that is, the RJ-45 jack on the TCC2/TCC2P/TCC3 and, for ANSI shelves, the LAN 1 pins on the backplane or, for ETSI shelves, the LAN connection on the MIC-C/T/P.
  - pdcc0—An SDCC or RS-DCC interface, that is, an OC-N/STM-N trunk card identified as the SDCC or RS-DCC termination.
  - lo0—A loopback interface.

Table 22-9 shows sample routing entries for an ONS 15454.

Table 22-9 Sample Routing Table Entries

Entry	Destination	Mask	Gateway	Usage	Interface
1	0.0.0.0	0.0.0.0	172.20.214.1	265103	motfcc0
2	172.20.214.0	255.255.255.0	172.20.214.92	0	motfcc0
3	172.20.214.92	255.255.255.255	127.0.0.1	54	lo0
4	172.20.214.93	255.255.255.255	0.0.0.0	16853	pdcc0
5	172.20.214.94	255.255.255.255	172.20.214.93	16853	pdcc0

Entry 1 shows the following:

- Destination (0.0.0.0) is the default route entry. All undefined destination network or host entries on this routing table are mapped to the default route entry.
- Mask (0.0.0.0) is always 0 for the default route.
- Gateway (172.20.214.1) is the default gateway address. All outbound traffic that cannot be found in this routing table or is not on the node's local subnet is sent to this gateway.
- Interface (motfcc0) indicates that the ONS 15454 Ethernet interface is used to reach the gateway.

Entry 2 shows the following:

- Destination (172.20.214.0) is the destination network IP address.
- Mask (255.255.255.0) is a 24-bit mask, meaning all addresses within the 172.20.214.0 subnet can be a destination.
- Gateway (172.20.214.92) is the gateway address. All outbound traffic belonging to this network is sent to this gateway.
- Interface (motfcc0) indicates that the ONS 15454 Ethernet interface is used to reach the gateway.

Entry 3 shows the following:

- Destination (172.20.214.92) is the destination host IP address.
- Mask (255.255.255.255) is a 32 bit mask, meaning only the 172.20.214.92 address is a destination.
- Gateway (127.0.0.1) is a loopback address. The host directs network traffic to itself using this address.
- Interface (lo0) indicates that the local loopback interface is used to reach the gateway.

Entry 4 shows the following:

- Destination (172.20.214.93) is the destination host IP address.
- Mask (255.255.255.255) is a 32 bit mask, meaning only the 172.20.214.93 address is a destination.
- Gateway (0.0.0.0) means the destination host is directly attached to the node.
- Interface (pdcc0) indicates that a DCC interface is used to reach the destination host.

Entry 5 shows a DCC-connected node that is accessible through a node that is not directly connected:

- Destination (172.20.214.94) is the destination host IP address.
- Mask (255.255.255.255) is a 32-bit mask, meaning only the 172.20.214.94 address is a destination.
- Gateway (172.20.214.93) indicates that the destination host is accessed through a node with IP address 172.20.214.93.

- Interface (pdcc0) indicates that a DCC interface is used to reach the gateway.

22.6 External Firewalls

This section provides information on firewall ports required for various type of connections that are established with the NE (controller card). Also, there are examples of Access Control List (ACL) for external firewall configuration that makes a connection feasible with the controller card.

22.6.1 Firewall Ports

Table 22-10 lists the ports that must be enabled to establish a communication channel with the NE (controller card).

Table 22-10 Firewall Ports for Various Sessions

Session Type	Session Description	Mode	Port Number	Firewall ACL
CORBA	CORBA listener port on the NE	Standard	57790 (default); user configurable to the standard port 683 or any other port.[1]	Inbound
		Secure	57791 (default); user configurable to the standard port 684 or any other port.	
	Standard Internet Inter-ORB Protocol (IIOP) listener port on machine running CTC	Standard	Dynamic (default); user configurable to the standard port 683 or any other port.[2]	Outbound
		Secure	Dynamic (default); user configurable to the standard port 684 or any other port.	
SOCKS	CTC configured with SOCKS or GNE	—	1080	Inbound
HTTP	HTTP port on the NE	—	80	Inbound
HTTPS	HTTPS port on the NE	—	433[3]	Inbound
TL1	TL1 port on NE	Standard	3082, 3083, 2362	Inbound
		Secure	4083	
SNMP	SNMP listener port on NE	Standard	161	Inbound
		Secure		
	SNMP trap listener port on the machine receiving the traps	Standard	162 (default); user configurable to any port between 1024 to 65535	Outbound
		Secure		

1. To configure the port, see the “DLP-G61 Provision the IIOP Listener Port on the ONS 15454” task on page 14-34.
2. To configure the port, see the “DLP-G62 Provision the IIOP Listener Port on the CTC Computer” task on page 14-35.
3. If this port is blocked, NE could take long time to initialize.

22.6.2 ACL Examples

The following access control list (ACL) example shows a firewall configuration when the proxy server gateway setting is not enabled. In the example, the CTC workstation's address is 192.168.10.10. and the ONS 15454 address is 10.10.10.100. The firewall is attached to the GNE; hence, inbound is from the CTC to the GNE and outbound is from the GNE to CTC. The CTC Common Object Request Broker Architecture (CORBA) standard port is 683 and the TCC CORBA default port on TCC is 57790.

```
access-list 100 remark *** Inbound ACL, CTC -> NE ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 eq www
access-list 100 remark *** allows initial contact with ONS 15454 using http (port 80) ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 eq 57790
access-list 100 remark *** allows CTC communication with ONS 15454 GNE (port 57790) ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 established
access-list 100 remark *** allows ACKs back from CTC to ONS 15454 GNE ***

access-list 101 remark *** Outbound ACL, NE -> CTC ***
access-list 101 remark
access-list 101 permit tcp host 10.10.10.100 host 192.168.10.10 eq 683
access-list 101 remark *** allows alarms etc., from the 15454 (random port) to the CTC
workstation (port 683) ***
access-list 100 remark
access-list 101 permit tcp host 10.10.10.100 host 192.168.10.10 established
access-list 101 remark *** allows ACKs from the 15454 GNE to CTC ***
```

The following ACL example shows a firewall configuration when the proxy server gateway setting is enabled. As with the first example, the CTC workstation address is 192.168.10.10 and the ONS 15454 address is 10.10.10.100. The firewall is attached to the GNE; hence, inbound is from the CTC to the GNE and outbound is from the GNE to CTC. The CTC Common Object Request Broker Architecture (CORBA) standard port is 683 and the TCC CORBA default port on TCC is 57790.

```
access-list 100 remark *** Inbound ACL, CTC -> NE ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 eq www
access-list 100 remark *** allows initial contact with the 15454 using http (port 80) ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 eq 1080
access-list 100 remark *** allows CTC communication with the 15454 GNE (port 1080) ***
access-list 100 remark

access-list 101 remark *** Outbound ACL, NE -> CTC ***
access-list 101 remark
access-list 101 permit tcp host 10.10.10.100 host 192.168.10.10 established
access-list 101 remark *** allows ACKs from the 15454 GNE to CTC ***
```

22.7 Open GNE

The ONS 15454 can communicate with non-ONS nodes that do not support Point-to-Point Protocol (PPP) vendor extensions or OSPF type 10 opaque link-state advertisements (LSA), both of which are necessary for automatic node and link discovery. An open GNE configuration allows a GCC-based network to function as an IP network for non-ONS nodes.

To configure an open GNE network, you can provision GCC terminations to include a far-end, non-ONS node using either the default IP address of 0.0.0.0 or a specified IP address. You provision a far-end, non-ONS node by checking the Far End is Foreign check box during GCC creation. The default 0.0.0.0

IP address allows the far-end, non-ONS node to identify itself with any IP address; if you set an IP address other than 0.0.0.0, a link is established only if the far-end node identifies itself with that IP address, providing an extra level of security.

By default, the proxy server only allows connections to discovered ONS peers and the firewall blocks all IP traffic between the GCC network and LAN. You can, however, provision proxy tunnels to allow up to 12 additional destinations for SOCKS version 5 connections to non-ONS nodes. You can also provision firewall tunnels to allow up to 12 additional destinations for direct IP connectivity between the GCC network and LAN. Proxy and firewall tunnels include both a source and destination subnet. The connection must originate within the source subnet and terminate within the destination subnet before either the SOCKS connection or IP packet flow is allowed. A proxy connection is allowed if the CTC client is in a source subnet and the requested destination is in the destination subnet. Firewall tunnels allow IP traffic to route between the node Ethernet and pdcc interfaces. An inbound Ethernet packet is allowed through the firewall if its source address matches a tunnel source and its destination matches a tunnel destination. An inbound pdcc packet is allowed through the firewall if its source address matches a tunnel destination and its destination address matches a tunnel source. Tunnels only affect TCP and UDP packets.

The availability of proxy and/or firewall tunnels depends on the network access settings of the node:

- If the node is configured with the proxy server enabled in GNE or ENE mode, you must set up a proxy tunnel and/or a firewall tunnel.
- If the node is configured with the proxy server enabled in proxy-only mode, you can set up proxy tunnels. Firewall tunnels are not allowed.
- If the node is configured with the proxy server disabled, neither proxy tunnels nor firewall tunnels are allowed.

Figure 22-25 shows an example of a foreign node connected to the GCC network. Proxy and firewall tunnels are useful in this example because the GNE would otherwise block IP access between the PC and the foreign node.

Figure 22-25 Proxy and Firewall Tunnels for Foreign Terminations

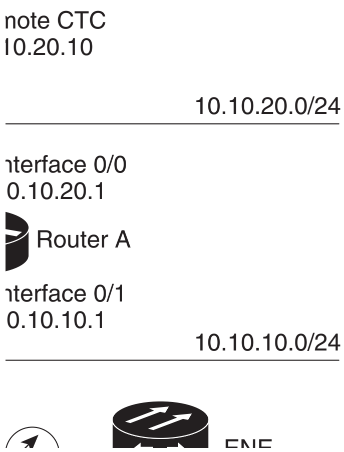
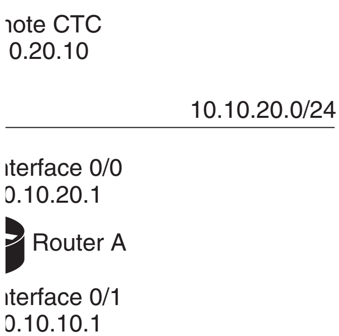


Figure 22-26 shows a remote node connected to an ENE Ethernet port. Proxy and firewall tunnels are useful in this example because the GNE would otherwise block IP access between the PC and foreign node. This configuration also requires a firewall tunnel on the ENE.

Figure 22-26 Foreign Node Connection to an ENE Ethernet Port



22.8 TCP/IP and OSI Networking

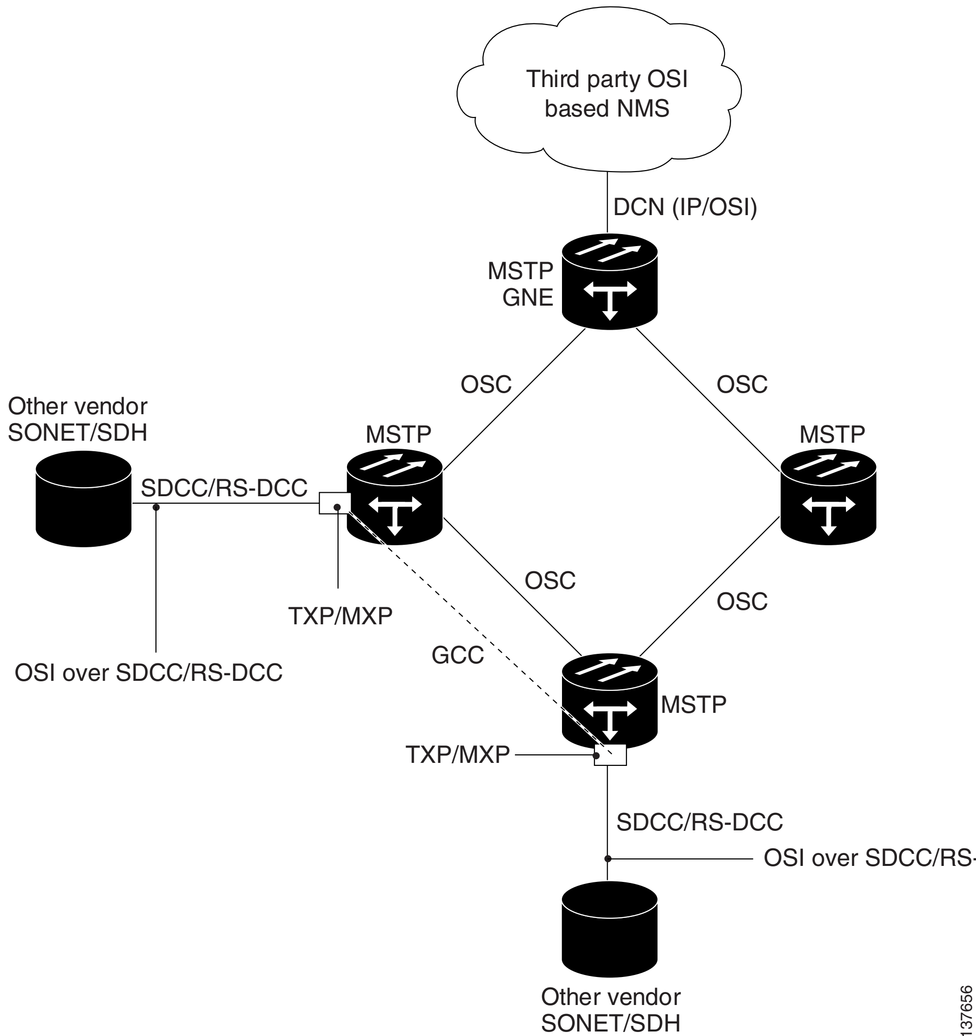
ONS 15454 DCN communication is based on the TCP/IP protocol suite. However, ONS 15454s can also be networked with equipment that uses the OSI protocol suite. While TCP/IP and OSI protocols are not directly compatible, they do have the same objectives and occupy similar layers of the OSI reference model. For detailed information about OSI protocols, processes, and scenarios, refer to the "Management Network Connectivity" chapter in the *ONS 15454 Reference Manual*. OSI/MultiService Transport Platform (MSTP) scenarios are provided in the following sections.

In OSI/MSTP Scenario 1 (Figure 22-27), an SDCC or RS-DCC carries an OC-N/STM-N signal from an OSI-based third-party NE to a transponder (TXP) or muxponder (MXP) card on an ONS NE. It is carried by GCC to a TXP/MXP card on another MSTP NE and then by SDCC or RS-DCC to a second third-party NE. This scenario requires TXPs/MXPs whose client interfaces can be provisioned in section or line termination mode. These include:

- TXP_MR_2.5 and TXPP_MR_2.5 (when equipped with OC-N/STM-N SFPs)
- TXP_MR_10G and TXP_MR_10E (when the client is configured as OC-192/STM-64)
- MXP_2.5_10G and MXP_2.5_10E

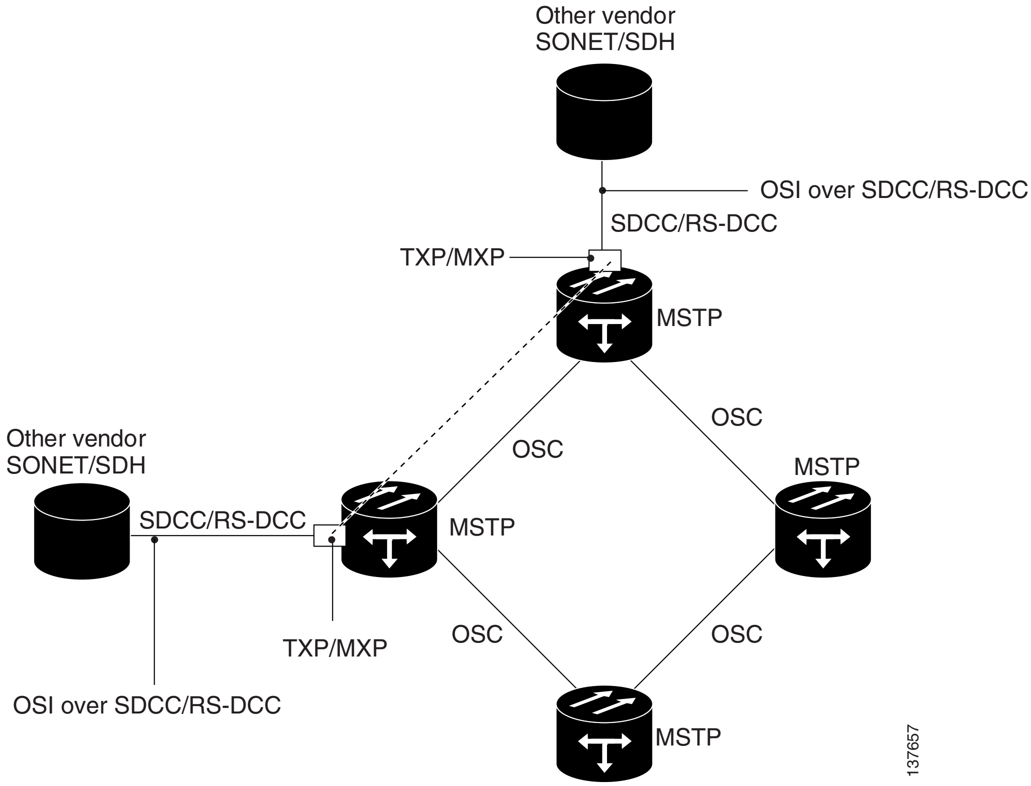
OSI has to be carried or tunneled to the other TXP/MXP card through an OSC termination, GCC termination, or both. The third-party NMS has OSI connectivity to its NEs with the MSTP ONS NE serving as the GNE for third-party vendor, OSI-based SONET equipment.

Figure 22-27 OSI/MSTP Scenario 1



OSI/MSTP Scenario 2 (Figure 22-28) is similar to Scenario 1, except the MSTP NEs do not have connectivity to an OSI NMS.

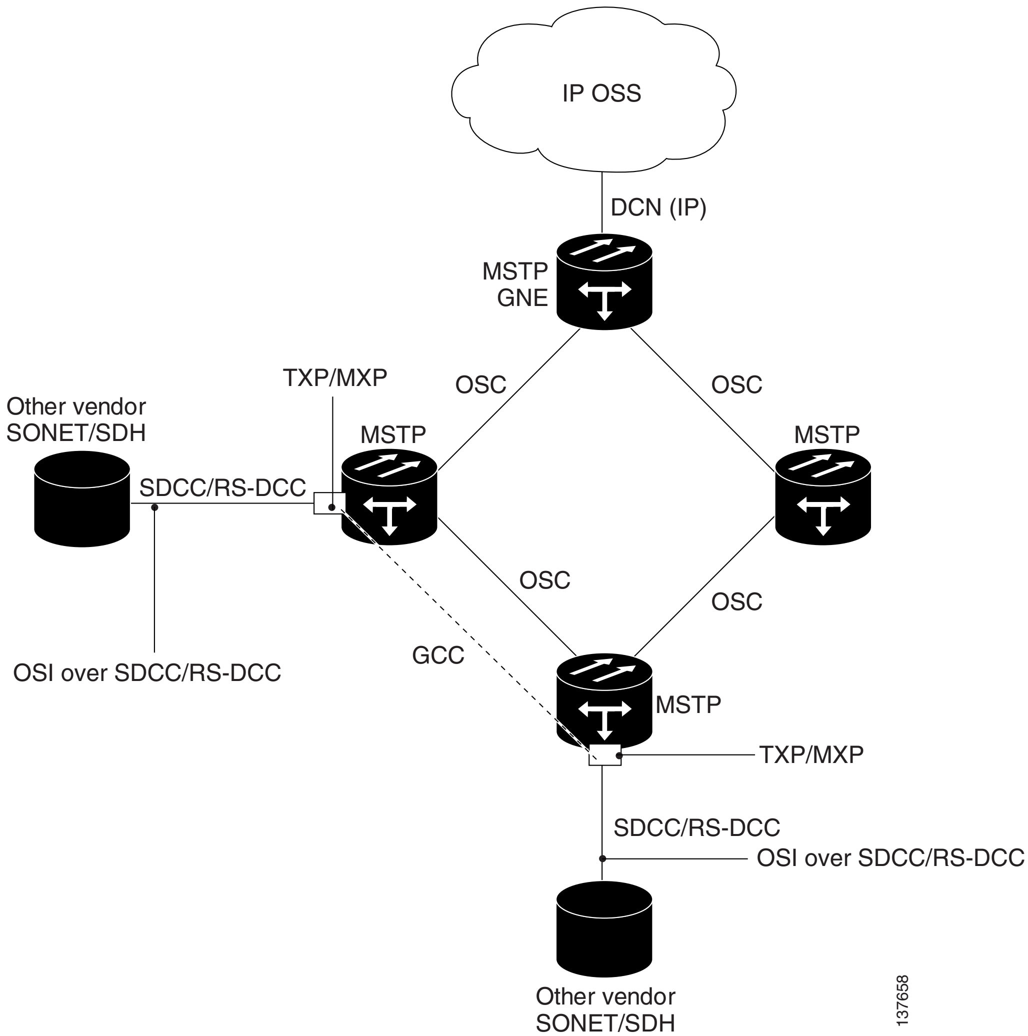
Figure 22-28 OSI/MSTP Scenario 2



OSI/MSTP Scenario 3 (Figure 22-29) shows the following:

- OSI is carried over an SDCC or RS-DCC termination.
- OSI has to be carried or tunneled to the other peer TXP/MXP through an OSC termination, GCC termination, or both.
- An OSS has IP connectivity to all the NEs.
- The MSTP NE is a GNE for the third-party OSI-based SONET NEs. The MSTP NEs perform all mediation functions.

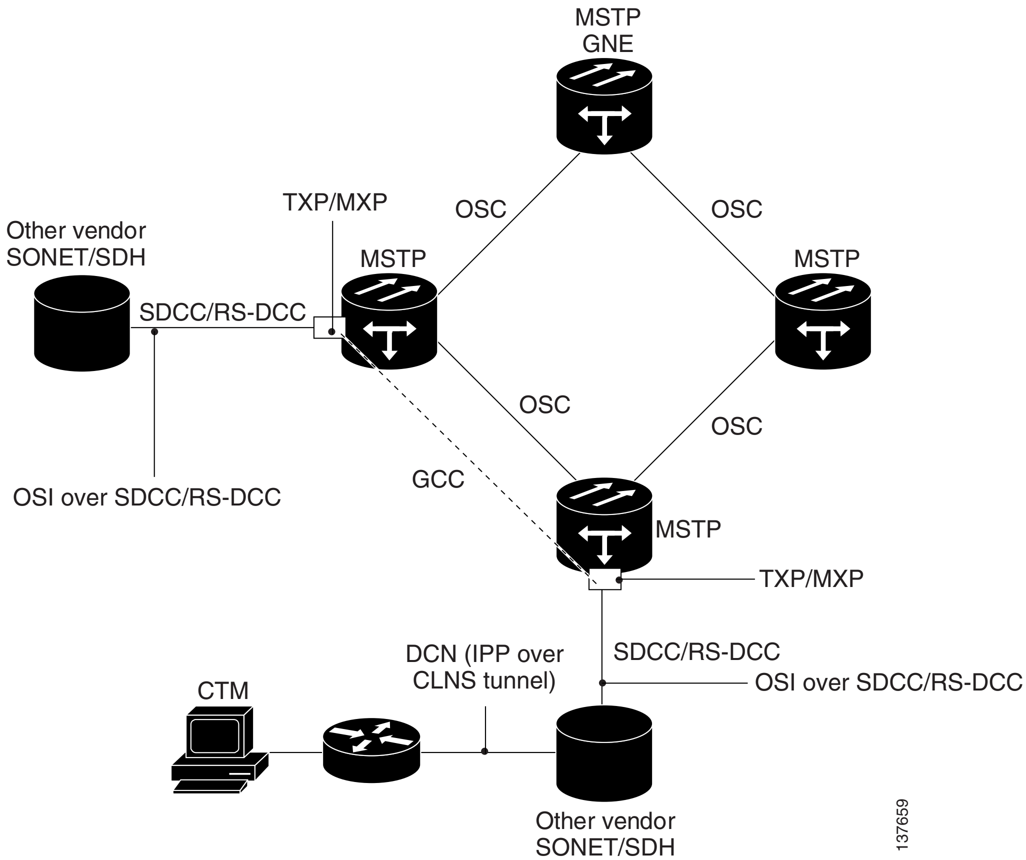
Figure 22-29 OSI/MSTP Scenario 3



OSI/MSTP Scenario 4 (Figure 22-30) shows the following:

- OSI is carried over an SDCC or RS-DCC termination.
- OSI has to be carried or tunneled to the other peer TXP/MXP through an OSC termination, GCC termination, or both
- An OSS has IP connectivity to all the NEs through third-party NE network.
- The MSTP NE is a GNE for the third-party OSI-based SONET NEs. The MSTP NEs perform all mediation functions.
- The third-party vendor NE is a GNE for the Cisco MSTP network.

Figure 22-30 OSI/IP Scenario 4



22.9 Link Management Protocol

This section describes Link Management Protocol[1] (LMP) management and configuration. To troubleshoot specific alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*. To configure LMP, refer to the "Turn Up a Network" chapter.

Note CTM support is not required for LMP.

LMP is used to establish traffic engineering (TE) links between Cisco ONS 15454 nodes or between Cisco ONS 15454 nodes and selected non-Cisco nodes that use vendor-specific hardware.

22.9.1 Overview

LMP manages TE links between nodes through the use of control channels. TE links are designed to define the most efficient paths possible for traffic to flow over a network and through the Internet. Traffic engineering encompasses traffic management, capacity management, traffic measurement and modeling,

1. The LMP protocol is specified by the IETF in an Internet-Draft, draft-ietf-ccamp-lmp-10.txt, which was published as a Proposed Standard, RFC 4204, (http://www.ietf.org/rfc/rfc4204.txt), on 2005-10-28.

network modeling, and performance analysis. Traffic engineering methods include call routing, connection routing, quality of service (QoS) resource management, routing table management, and capacity management.

LMP manages TE links between peer nodes, such as two optical cross-connect (OXC) nodes. Peer nodes have equivalent signaling and routing. LMP also manages TE links between a node such as an OXC and an adjacent optical line system (OLS) node. An example of an OLS node is an ONS 15454 DWDM node.

Networks with routers, switches, OXC nodes, DWDM OLS nodes, and add/drop multiplexers (ADM) use a common control plane such as Generalized Multiprotocol Label Switching (GMPLS) to provision resources and provide network survivability using protection and restoration techniques. LMP is part of the GMPLS protocol suite.

A single TE link can be formed from several individual links. Management of TE links can be accomplished with in-band messaging, as well as with out-of-band methods. The following material describes the LMP between a pair of nodes that manages TE links. LMP accomplishes the following:

- Maintains control channel connectivity
- Verifies the physical connectivity of the data links
- Correlates the link property information
- Suppresses downstream alarms
- Localizes link failures for protection/restoration purposes in multiple types of networks

DWDM networks often use Multiprotocol Label Switching (MPLS) and GMPLS as common-control planes to control how packets are routed through the network.

LMP manages the control channel that must exist between nodes for routing, signaling, and link management. For a control channel to exist, each node must have an IP interface that is reachable from the other node. Together, the IP interfaces form a control channel. The interface for the control messages does not have to be the same interface as the one for the data.

22.9.1.1 MPLS

MPLS provides a mechanism for engineering network traffic patterns that is independent of routing tables and routing protocols. MPLS assigns short labels to network packets that describe how to forward the packets through the network. The traditional Layer 3 forwarding mechanism requires each hop to analyze the packet header and determine the next hop based on routing table lookup. With MPLS, the analysis of the packet header is performed just once, when a packet enters the MPLS cloud. The packet is then assigned to a stream known as a Label Switch Path (LSP), which is identified with a label. The short, fixed-length label is an index into a forwarding table, which is more efficient than the traditional routing table lookup at each hop. Using MPLS, both the control protocol (used to manage the LSPs) and user data can be carried over the same bearer interfaces.

22.9.1.2 GMPLS

GMPLS is based on MPLS, with protocol extensions to support additional technologies, including time division multiplexing (TDM) slots (such as SONET and SDH), wavelength division multiplexing (WDM) wavelengths at Layer 1, and fiber. For MPLS, the control traffic (signaling and routing) can run over bearer interfaces. This is not the case with GMPLS, where a separate control channel is used. The GMPLS control channel is managed with LMP. With GMPLS, the control channels between two adjacent nodes do not need to use the same physical medium as the data links between those nodes.

22.9.2 Configuring LMP

Configuring LMP consists of the following four topics:

- Control channel management
- TE link management
- Link connectivity verification
- Fault management

22.9.2.1 Control Channel Management

Control channel management establishes and maintains control channels between adjacent nodes. Control channels use a Config message exchange and a fast keep-alive mechanism between the nodes. The latter is required if lower-level mechanisms are not available to detect control-channel failures. A maximum of four LMP control channels can be supported.

The nodes initially exchange configuration messages (Config, ConfigAck, and ConfigNack), which are used to exchange identifiers and negotiate parameters for the keep-alive protocol. The nodes then perform a continuous rapid exchange of Hello messages, which are used to monitor the health on the channel.

Note The identifiers are Local Node Id, Remote Node Id, Local Control Channel Id, and Remote Control Channel Id. The parameters are the HelloInterval and the HelloDeadInterval.

LMP out-of-fiber and LMP out-of-band control channels are supported and terminated on the shelf. An out-of-fiber control channel includes using the control plane network (Ethernet) for the control channel because Ethernet is separate from the fiber used for the data plane. An out-of-band control channel includes using overhead bytes, such as the SDCC and LDCC bytes, for the control channel because overhead bytes are separate from the payload. In-band means that the control messages are in the same channel as the data messages; therefore, out-of-band refers to overhead bytes in the same fiber, separate circuits dedicated to control messages in the same fiber (SONET/SDH circuits), or separate wavelengths in the same fiber (DWDM).

Note Overhead bytes are SDCC or LDCC for SONET networks, RS-DCC or MS-DCC for SDH networks, and GCC or OSC for DWDM networks.

Out-of-band implies in-fiber, but not in-band. In-fiber means that the control messages are in the same fiber as the data messages, and includes both in-band and out-of-band. Out-of-fiber means that the control messages take a path separate from the data plane. This includes separate fiber and Ethernet.

The control channel management for a peer node to OLS link is the same as that for a link between two peer nodes.

Note The software supports gracefully taking a control channel down for administration purposes (refer to Section 3.2.3 of the IETF LMP document). However, there is no provision for a graceful restart (refer to Section 8 of RFC 4204).

- Graceful means that the nodes participating in the control channel agree that the link should go down. To gracefully take down a control channel, the node sets the ControlChannelDown flag in its messages to the other node until either the HelloDeadInterval expires or the other node sends a message back with the ControlChannelDown flag set. In either case, the node then stops sending messages for this control channel. Before a control channel is taken down, there should be a backup control channel in place that can be used to manage the data links.

- Non-graceful means that one of the nodes just stops sending messages. The other side would declare a failure after the HelloDeadInterval, but would continue to send Hello messages to see if the control channel will come back up.

22.9.2.2 TE Link Management

LMP ensures that links are grouped into TE links and that the properties of those links are the same at both endpoints. This is called TE link management, or link property correlation.

Link property correlation is used to synchronize the TE link properties and verify the TE link configuration. The link property correlation function of LMP aggregates one or more data links into a TE link and synchronizes the properties of the TE link with the neighbor node. The procedure starts by sending a LinkSummary message to the neighbor. The LinkSummary message includes the local and remote Link Identifier, a list of all data links that make up the TE link, and various link properties. It is mandatory that a LinkSummaryAck or LinkSummaryNack message be sent in response to the receipt of a LinkSummary message, indicating agreement or disagreement with the link properties.

Note A maximum of 256 LMP TE links is supported.

22.9.2.3 Link Connectivity Verification

Link connectivity verification is not supported in this release, but might be supported in the future.

22.9.2.4 Fault Management

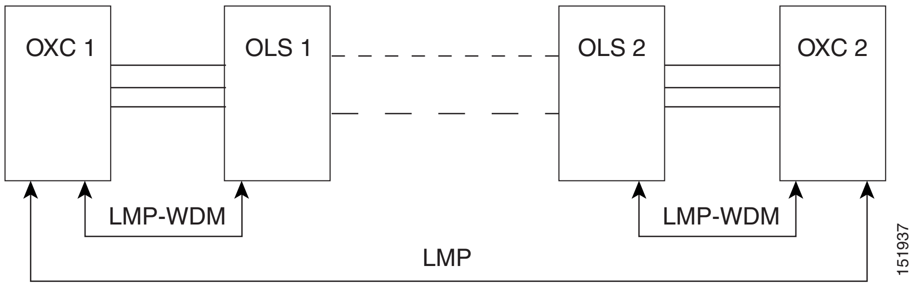
Fault management is particularly useful when the control channels are physically diverse from the data links. It is used for rapid notification regarding the status of one or more TE-link data channels. The use of fault management is negotiated as part of the TE link's LinkSummary exchange. Data links and TE link failures can be rapidly isolated and fault management supports both unidirectional and bidirectional LSPs. Transparent devices are useful because traditional methods for monitoring the health of allocated data links might no longer be appropriate. Instead, fault detection is delegated to the physical layer (for example, loss of light or optical monitoring of the data) instead of Layer 2 or Layer 3. Fault management uses the ChannelStatus, ChannelStatusAck, ChannelStatusRequest, and ChannelStatusResponse messages.

Note The LMP Channel Activation/Deactivation Indication procedures are not supported; they are described in the IETF LMP document, Sections 6.4 and 6.5.

22.9.3 LMP WDM

LMP manages traffic engineering links between peer nodes (nodes that are peers in signaling and/or routing). The purpose of the LMP WDM extensions[2] is to allow LMP to be used between an OXC node and an adjacent DWDM OLS node. Figure 22-31 illustrates the relationship between LMP and LMP-WDM. OXC 1 and OXC 2 are peer nodes whose control channel is managed with LMP. LMP-WDM manages the control channel between an OXC node and an OLS node.

Figure 22-31 LMP and LMP-WDM Relationship



When the two OLS nodes can communicate their configuration and the current state of their optical link to the two peer nodes (OXC 1 and OXC 2) through LMP-WDM, network usability is improved through the reduction of manual configuration and enhanced fault detection and recovery.

22.9.4 LMP Network Implementation

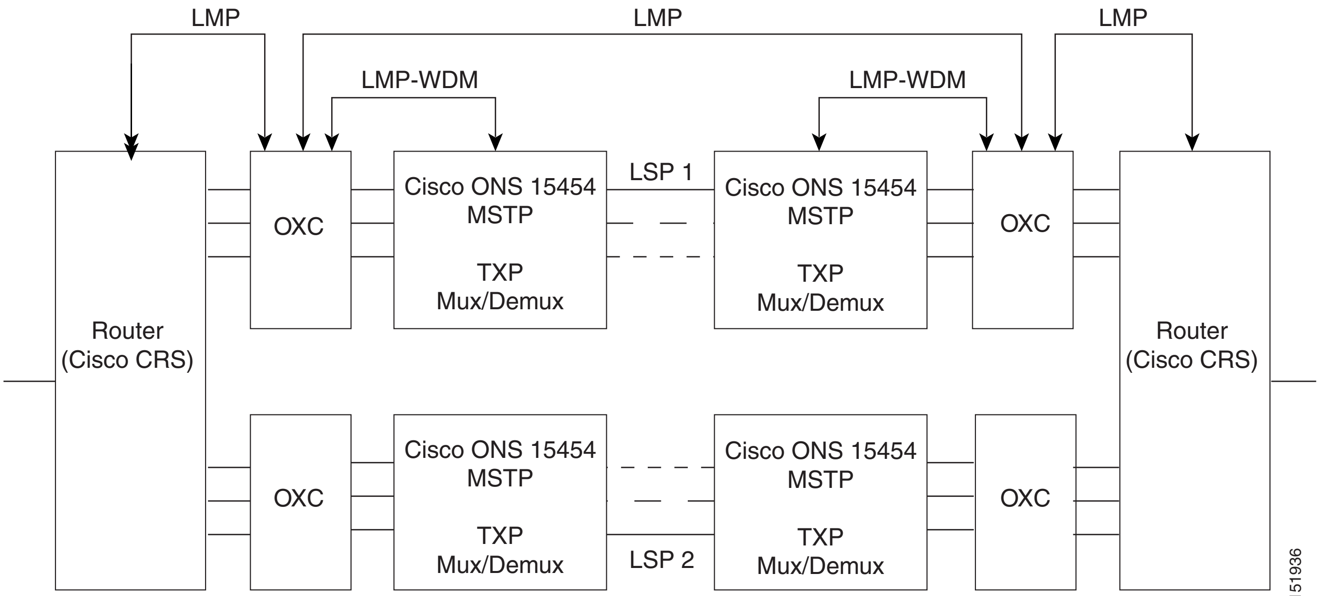
Figure 22-32 shows a network-level LMP implementation. It is an IP-plus-optical network, with end-to-end routing based on MPLS and GMPLS. The primary network components are:

- Routers
  - Cisco Carrier Router System (CSR)
  - Cisco Gigabit Switch Router (GSR)
  - Cisco ASR 9000 Series Routers
- An OXC node
- Ultra long-haul (ULH) DWDM equipment

LMP and other features allow the Cisco ONS 15454 DWDM node to fulfill the ULH DWDM role. Figure 22-32 illustrates the relationship between the network components.

2. LMP-WDM extensions that allow management of links between a peer node and an adjacent OLS node are described in the following IETF document: Internet-Draft, draft-ietf-ccamp-lmp-wdm-03.txt, published as a Proposed Standard, RFC 4209 (http://www.ietf.org/rfc/rfc4209.txt), 2005-11-1

Figure 22-32 LMP System Implementation



22.10 IPv6 Network Compatibility

IPv6 simplifies IP configuration and administration and has a larger address space than IPv4 to support the future growth of the Internet and Internet related technologies. It uses 128-bit addresses as against the 32-bit used in IPv4 addresses. Also, IPv6 gives more flexibility in designing newer addressing architectures.

Cisco ONS 15454 DWDM can function in an IPv6 network when an Internet router that supports Network Address Translation-Protocol Translation (NAT-PT) is positioned between the GNE, such as an ONS 15454 DWDM, and the client workstation. NAT-PT is a migration tool that helps users transition from IPv4 networks to IPv6 networks. NAT-PT is defined in RFC-2766. IPv4 and IPv6 nodes communicate with each other using NAT-PT by allowing both IPv6 and IPv4 stacks to interface between the IPv6 DCN and the IPv4 DCC networks.

Note IPv6 is supported on Cisco ONS 15454 DWDM Software R8.0 and later with an external NAT-PT router.

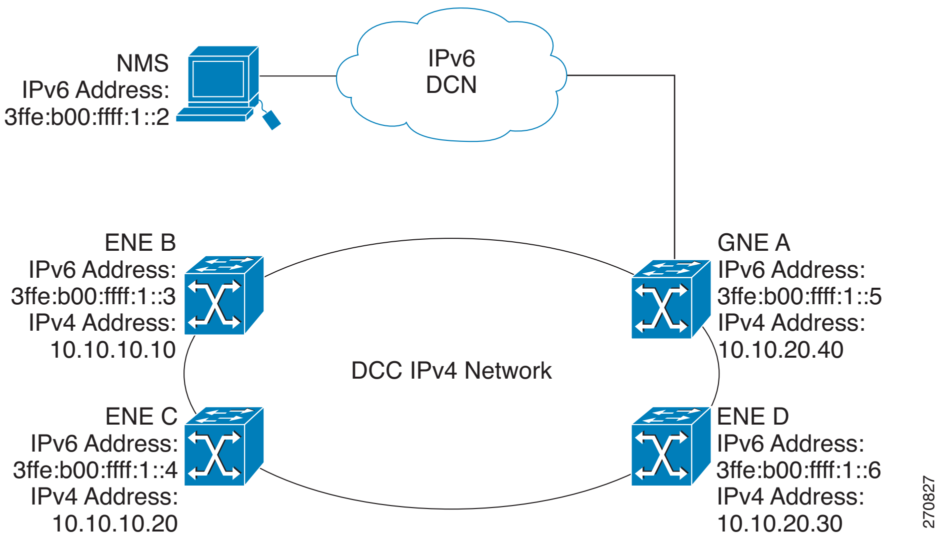
22.11 IPv6 Native Support

Cisco ONS 15454 DWDM Software R9.0 and later supports native IPv6. ONS 15454 DWDM can be managed over IPv6 DCN networks by enabling the IPv6 feature. After you enable IPv6 in addition to IPv4, you can use CTC, TL1, and SNMP over an IPv6 DCN to manage ONS 15454 DWDM. Each NE can be assigned an IPv6 address in addition to the IPv4 address. You can access the NE by entering the IPv4 address, an IPv6 address or the DNS name of the device. The IPv6 address is assigned only on the LAN interface of the NE. DCC/GCC interfaces use the IPv4 address.

By default, when IPv6 is enabled, the node processes both IPv4 and IPv6 packets on the LAN interface. If you want to process only IPv6 packets, you need to disable IPv4 on the node. Before you disable IPv4, ensure that IPv6 is enabled and the node is not in multishelf mode.

Figure 22-33 shows how an IPv6 DCN interacts with and IPv4 DCC.

Figure 22-33 IPv6-IPv4 Interaction



You can manage MSTP multishelf nodes over IPv6 DCN. RADIUS, FTP, SNTP, and other network applications support IPv6 DCN. To enable IPv6 addresses, you need to make the necessary configuration changes from the CTC or TL1 management interface. After you enable IPv6, you can start a CTC or TL1 session using the provisioned IPv6 address. The ports used for all IPv6 connections to the node are the same as the ports used for IPv4.

An NE can either be in IPv6 mode or IPv4 mode. In IPv4 mode, the LAN interface does not have an IPv6 address assigned to it. An NE, whether it is IPv4 or IPv6, has an IPv4 address and subnet mask. TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards do not reboot automatically when you provision an IPv6 address, but a change in IPv4 address initiates a TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card reset. Table 22-11 describes the differences between an IPv4 node and an IPv6 node.

Table 22-11 Differences Between an IPv6 Node and an IPv4 Node

IPv6 Node	IPv4 Node
Has both IPv6 address and IPv4 address assigned to its craft Ethernet interface.	Does not have an IPv6 address assigned to its craft Ethernet interface.
The default router has an IPv6 address for IPv6 connectivity, and an IPv4 address for IPv4 connectivity.	The default router has an IPv4 address.
Cannot enable OSPF on LAN. Cannot change IPv4 NE to IPv6 NE if OSPF is enabled on the LAN.	Can enable OSPF on the LAN.
Cannot enable RIP on the LAN. Cannot change IPv4 NE to IPv6 NE if RIP is enabled on the LAN.	Can enable static routes/RIP on the LAN.

Table 22-11 Differences Between an IPv6 Node and an IPv4 Node

IPv6 Node	IPv4 Node
Not supported on static routes, proxy tunnels, and firewall tunnels.	Supported on static routes, proxy tunnels, and firewall tunnels.
Routing decisions are based on the default IPv6 router provisioned.	

22.11.1 IPv6 Enabled Mode

The default IP address configured on the node is IPv4. You can use either CTC or the TL1 management interface to enable IPv6. For more information about enabling IPv6 from the CTC interface, see the "Turn Up a Node" chapter. For more information about enabling IPv6 using TL1 commands, see the *Cisco ONS SONET TL1 Command Guide* or the *Cisco ONS SDH TL1 Command Guide*.

22.11.2 IPv6 Disabled Mode

You can disable IPv6 either from the CTC or from the TL1 management interface. For more information about disabling IPv6 from the CTC interface, see the "Turn Up a Node" chapter. For more information about disabling IPv6 using TL1 commands, see the *Cisco ONS SONET TL1 Command Guide* or the *Cisco ONS SDH TL1 Command Guide*.

22.11.3 IPv6 in Non-secure Mode

In non-secure mode, IPv6 is supported on the front and the rear Ethernet interfaces. You can start a CTC or TL1 session using the IPv6 address provisioned on the on the front and rear ports of the NE.

22.11.4 IPv6 in Secure Mode

In secure mode, IPv6 is only supported on the rear Ethernet interface. The front port only supports IPv4 even if it is disabled on the rear Ethernet interface. For more information about provisioning IPv6 addresses in secure mode, see the "Turn Up a Node" chapter. For more information on secure mode behavior, see section 22.2.9 Scenario 9: IP Addressing with Secure Mode Enabled, page 22-19.

22.11.5 IPv6 Limitations

IPv6 has the following configuration restrictions:

- You can provision an NE as IPv6 enabled only if the node is a SOCKS-enabled or firewall-enabled GNE/ENE.
- IPSec is not supported.
- OSPF/RIP cannot be enabled on the LAN interface if the NE is provisioned as an IPv6 node.
- Static route/firewall/proxy tunnel provisioning is applicable only to IPv4 addresses even if the IPv6 is enabled.

- In secure mode, IPv6 is supported only on the rear Ethernet interface. IPv6 is not supported on the front port.
- ONS platforms use NAT-PT internally for providing IPv6 native support. NAT-PT uses the IPv4 address range 128.0.0.0 to 128.0.1.254 for packet translation. Do not use this address range when you enable IPv6 feature.

22.12 Integration with Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Routers

This section describes the integration of a Cisco ONS 15454 DWDM node with a Cisco CRS-1, a Cisco ASR 9000 series, or a Cisco 7600 series router. To provision end-to-end circuit connectivity between a DWDM node and a Cisco CRS-1, Cisco ASR 9000 series router, or a Cisco 7600 series router, see the Chapter 15, "Turn Up a Network."

This feature provides end-to-end circuit provisioning from one Cisco CRS-1, Cisco ASR 9000 series, or a Cisco 7600 series router to another Cisco CRS-1, Cisco ASR 9000 series, or a Cisco 7600 series router passing through an MSTP network (without using GMPLS). In other words, you can use CTC to create an OCH trail circuit that includes the Cisco CRS-1, Cisco ASR 9000 series, or a Cisco 7600 series nodes involved in the MSTP network. With this feature, circuit provisioning is extended to the physical layer interface module (PLIM) trunk ports of the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router.

Note Cisco ONS Software Release 9.4 supports Cisco CRS-1 routers using Cisco IOS XR Software Release 3.9, and Cisco ASR 9000 series routers using Cisco IOS XR Software Release 4.1.0, and Cisco 7600 routers using Cisco IOS Software Release 10.0. If you have an earlier version of the Cisco IOS XR software, you cannot configure LMP on the Cisco CRS-1 or Cisco ASR 9000 series router and the router is displayed as an unknown node in the CTC network view. Similarly, if you have an earlier version of the Cisco IOS software, you cannot configure virtual links on the Cisco 7600 series router and the router is displayed as an unknown node in the CTC network view.

Note Cisco 7600 series router does not support LMP provisioning. Therefore, virtual links or the provisionable patchcords are created to establish connectivity between Cisco 7600 series routers and DWDM nodes.

Note Interoperability among the Cisco CRS-1 routers, Cisco ASR 9000 series, and Cisco 7600 series routers is not supported.

For more information about the Cisco CRS-1 router, see the documentation set available at http://www.cisco.com/en/US/products/ps5763/tsd_products_support_series_home.html.

For more information about the Cisco ASR 9000 series router, see the documentation set available at

http://www.cisco.com/en/US/products/ps9853/tsd_products_support_series_home.html

For more information about the Cisco 7600 series router, see the documentation set available at

http://www.cisco.com/en/US/products/hw/routers/ps368/tsd_products_support_series_home.html

22.12.1 Card Compatibility

The following Cisco CRS-1 DWDM PLIMs support this feature:

- 4-10GE-ITU/C
- 1OC768-ITU/C
- 1OC768-DSPK

The following Cisco ASR 9000 series DWDM PLIMS support this feature:

- A9K-8T-L

The following Cisco 7600 series router cards support this feature:

- 76-ES+XT-2TG3CXL
- 76-ES+XT-4TG3CXL
- 76-ES+T-2TG
- 76-ES+T-4TG
- 76-ES+XC-20G3C
- 76-ES+XC-20G3CXL
- 76-ES+XC-40G3C
- 76-ES+XC-40G3CXL

The following ONS 15454 DWDM cards support this feature:

- 32MUX-O
- 32DMX-O
- 32WSS
- 32DMX
- 40-DMX-C
- 40-DMX-CE
- 40-MUX-C
- 40-WSS-C
- 40-WSS-CE

22.12.2 Node Management

Figure 22-34 depicts a typical network that includes DWDM nodes and Cisco CRS-1 routers.

Figure 22-34 Cisco ONS 15454 DWDM Node and Cisco CRS-1 Router Network

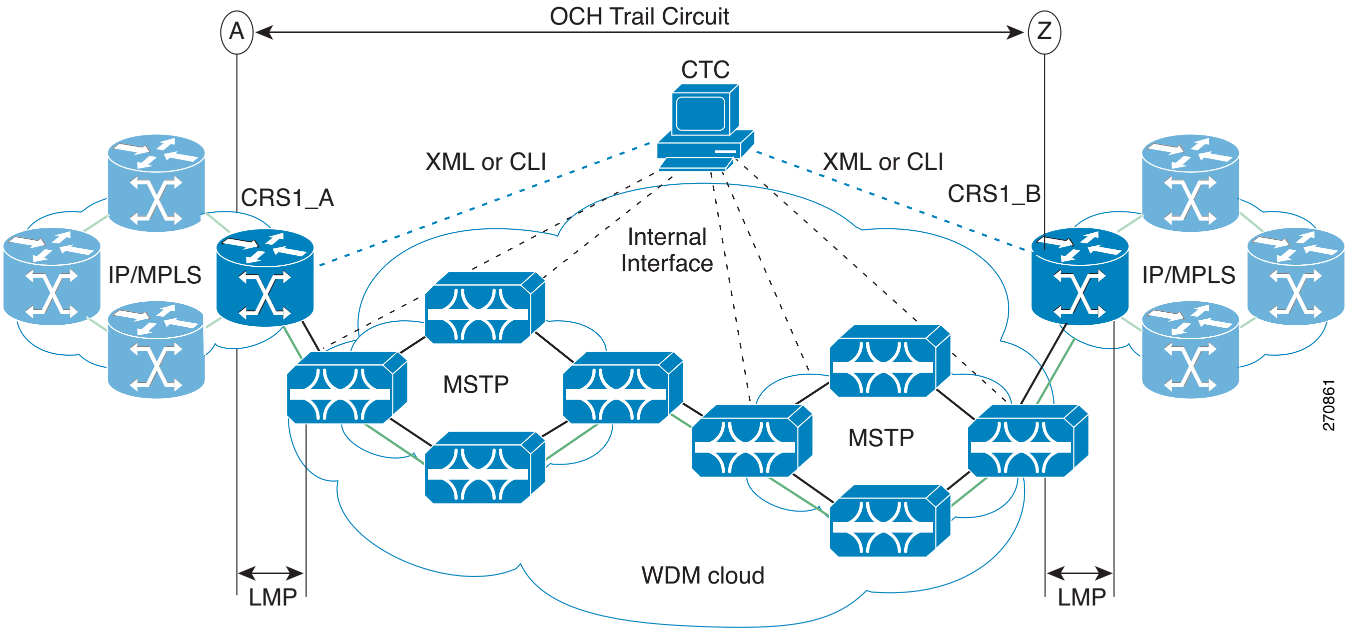
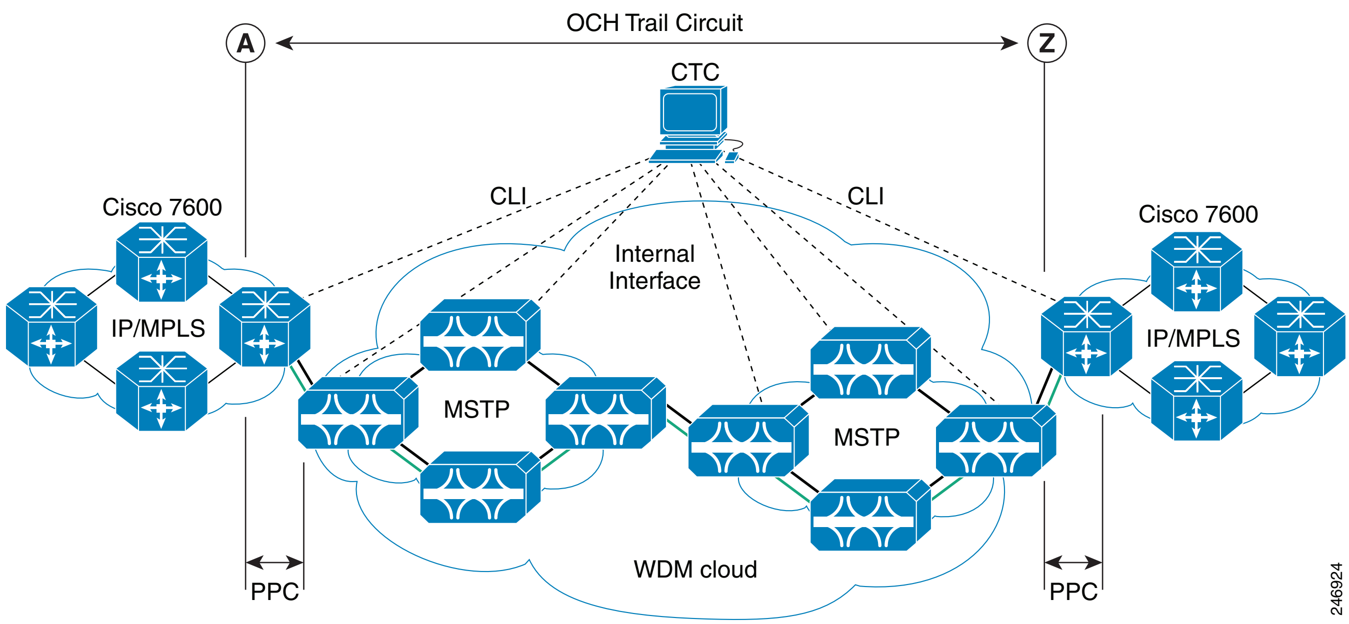


Figure 22-35 depicts a typical network that includes DWDM nodes and Cisco 7600 series routers.

Figure 22-35 Cisco ONS 15454 DWDM Node and Cisco 7600 Series Router Network



22.12.2.1 Physical Connections

The ONS 15454 DWDM node can be connected to CTC in multiple ways, as described in the section "ONS 15454 Connections".

The Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router must be connected to CTC through TCP/IP, using an Ethernet interface.

There must be two physical connections between the Cisco ONS 15454 DWDM node and the Cisco CRS-1, Cisco ASR 900 series, or Cisco 7600 series router for:

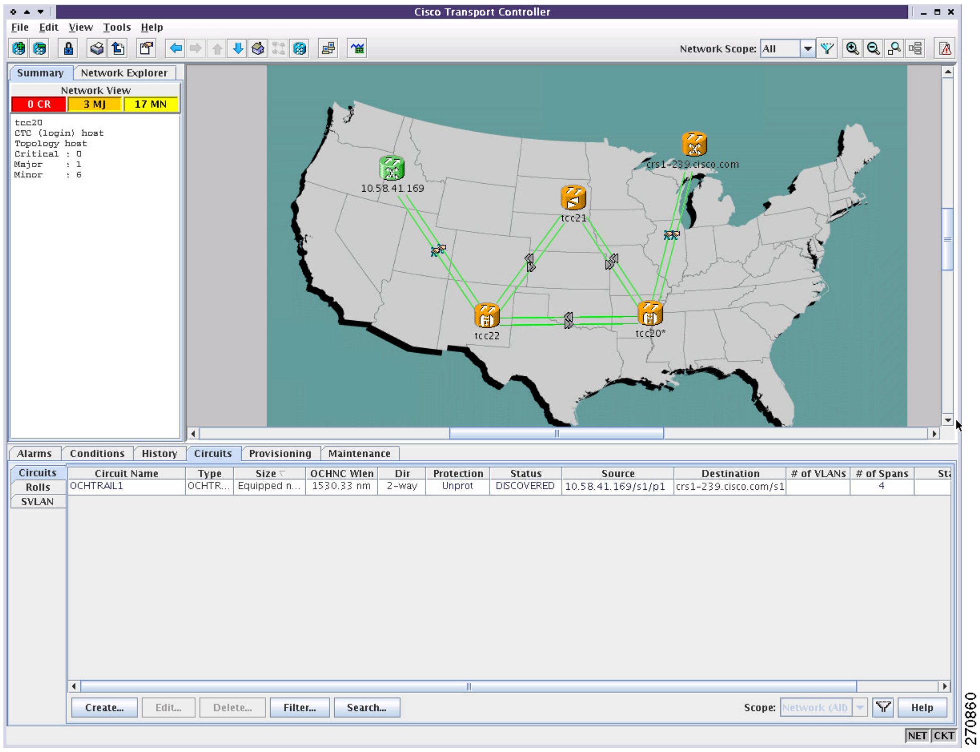
- (Cisco CRS-1 or Cisco ASR 900 series routers only) LMP Provisioning—This is implemented through the 10-Mbps Ethernet interface provided by the TCC2P card (on the Cisco ONS 15454 DWDM side) and the RP card (on the Cisco CRS-1 or Cisco ASR 9000 series router side).
- (Cisco 7600 series routers only) Virtual Link or Patch Cord Provisioning—This is implemented through the 10-Mbps Ethernet interface provided by the TCC2P card (on the Cisco ONS 15454 DWDM side) and the Supervisor card (on the Cisco 7600 series router side).
- 10-Gbps and 40-Gbps Traffic Provisioning—This is implemented through the fiber connection provided from the OCH ports of the multiplexer, demultiplexer, or WSS cards (on the Cisco ONS 15454 side) and from the trunk ports (on the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router side). You must use LC connectors on both the Cisco ONS 15454 DWDM side and the Cisco CRS-1 router side.

22.12.2.2 CTC Display

The CTC network view displays Cisco CRS-1 or Cisco ASR 9000 series routers that have LMP control channels to the DWDM node that you logged in to, and to the DWDM nodes with DCC connections to the login node (Figure 22-36). When a data link is established, the network view also displays the link between the Cisco CRS-1 or Cisco ASR 9000 series router and the DWDM node.

For a Cisco 7600 series router, you must manually add the node in CTC to make the router visible in the network view.

Figure 22-36 Cisco CRS-1 Router in CTC Network View



The color of the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router in the network view depends on the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router alarm status. The color of the link between the DWDM node and the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router depends on the link status. For more information on node and link colors, see the sections "CTC Node Colors" and "DCC Links".

22.12.3 Circuit Management

This section describes LMP provisioning, virtual link provisioning, and optical channel (OCH) trail circuit provisioning on the DWDM node and the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router.

22.12.3.1 LMP Provisioning

To provision end-to-end circuit connectivity from one Cisco CRS-1 or Cisco ASR 9000 series router to another Cisco CRS-1 or Cisco ASR 9000 series router passing through a DWDM network, you must configure LMP on the OCH ports of the first and last DWDM nodes (those adjacent to the Cisco CRS-1 or Cisco ASR 9000 series router) and on the PLIM trunk ports of the Cisco CRS-1 or Cisco ASR 9000 series router. Configuring LMP involves creating control channels, TE links, and data links. CTC primarily uses data links to discover circuit routes. For each 10-Gbps or 40-Gbps fiber between the Cisco CRS-1 or Cisco ASR 9000 series router and the DWDM node, you must create a TE link and a data link. You must have a dedicated TE link for each data link because the Cisco CRS-1 or

Cisco ASR 9000 series router does not support link bundling (aggregation of one or more data links into a single TE link). When the port association is correct (checked using the LinkSummary message), the operational state of the data link transitions to Up–Free.

During creation of data links between the OCH ports of the DWDM node and the PLIM trunk ports of the Cisco CRS-1 or Cisco ASR 9000 series router, CTC performs *lambda tuning*, that is, CTC automatically tunes the PLIM trunk port wavelength to match the supported wavelength on the OCH ports of the DWDM node. For more information on LMP, see the "22.9 Link Management Protocol" section on page 22-49.

You can configure LMP on the DWDM node and the Cisco CRS-1 or Cisco ASR 9000 series router through CTC. For details on configuring LMP, see the "Turn Up a Network" chapter.

Note LMP provisioning is not supported on Cisco 7600 series routers.

22.12.3.2 Virtual Link Provisioning

To provision end-to-end circuit connectivity from one Cisco 7600 series router to another Cisco 7600 series router passing through a DWDM network, you must configure virtual links or provisional patch cords (PPC) on the OCH ports of the first and last DWDM nodes (those adjacent to the Cisco 7600 series router) and on the trunk ports of the Cisco 7600 series router.

For more information on virtual link (virtual or provisionable patchcord) provisioning, see the "16.2 Virtual Patchcords" section on page 16-7.

You can configure virtual links on the DWDM node and the Cisco 7600 series router through CTC. For details on configuring provisionable patchcords, see the "Create Optical Channel Circuits and Provisionable Patchcords" chapter.

22.12.3.3 OCH Trail Circuit Provisioning

After you have provisioned LMP on the DWDM nodes and the Cisco CRS-1 or Cisco ASR 9000 series routers, or provisional patchcords on the DWDM nodes and the Cisco 7600 series routers, you can create an OCH trail circuit from one Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router to another Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router passing through an MSTP network. The endpoints (source and destination) of the OCH trail circuit must be Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series routers. CTC does not allow mixed nodes (Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router to DWDM node) for OCH trail circuits.

As part of OCH trail circuit creation, you must also define the following optical transport network (OTN) line parameters must be defined on both endpoints of the circuit:

- ITU-T G.709

Note ITU-T G.709 OPU-1E and OPU-2E standards are supported on Cisco 7600 series routers.

- Forward error correction (FEC)
- Signal fail bit error rate (SF BER)
- Signal degrade bit error rate (SD BER). The range of SD BER values supported for Cisco 7600 series router is from 5 to 9.

After you define the source and destination nodes for the OCH trail circuit, CTC evaluates the circuit for a valid route between the two endpoints. If a valid route exists, CTC creates the required connections on all the impacted nodes.

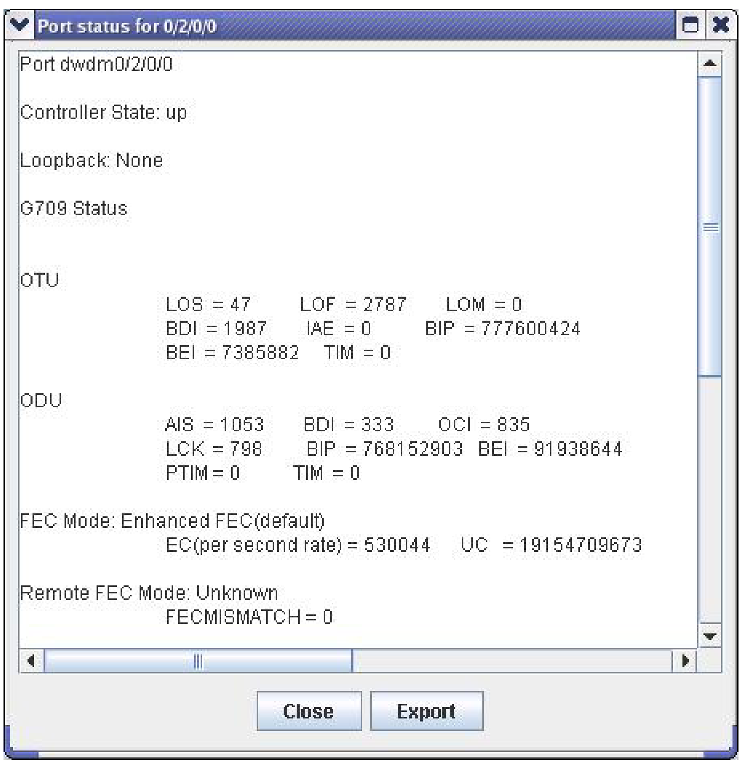
22.12.4 Cisco CRS-1, Cisco ASR 9000 Series, or Cisco 7600 Series Router Management from CTC

After you have provisioned LMP on the Cisco CRS-1 or Cisco ASR 9000 series router and the DWDM node, the Cisco CRS-1 or Cisco ASR 9000 series router gets displayed in the CTC network view. In case of Cisco 7600 series routers, you must be manually add the node using the **Add Node** option in the CTC network view and then provision virtual links (provisionable patchcords) on the Cisco 7600 series router and the DWDM node.

You can view active alarms, performance monitoring (PM) parameters, and the software version of the Cisco CRS-1 or Cisco ASR 9000 series router from CTC. To view PM parameters and active alarms for a specific PLIM port, right-click the Cisco CRS-1, or Cisco ASR 9000 series router in CTC network view and choose **Show Router Port Status >** *rack/slot/module/port* (Figure 22-37).

Performance monitoring (PM) parameters for Cisco 7600 series router cannot be viewed in CTC. To view active alarms for Cisco 7600 series, right-click the Cisco 7600 series router in CTC network view and choose **Show Router Port Status >** *rack/slot/module/port*.

Figure 22-37 Cisco CRS-1 Router PM Parameters



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To view all the active alarms for Cisco CRS-1 or Cisco ASR 9000 series router, right-click the Cisco CRS-1 or Cisco ASR 9000 series router in CTC network view and choose **Show Active Alarms**.

> **Note** The Loss of Signal (LOS) alarm is not reported as critical for the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 router, whereas, it is reported as critical for the ONS 15454 node. To avoid this inconsistency, you can use Cisco Craft Works Interface (CWI) to manually change the severity of the LOS alarm of the Cisco CRS-1, Cisco ASR 9000 series, or Cisco 7600 series router.

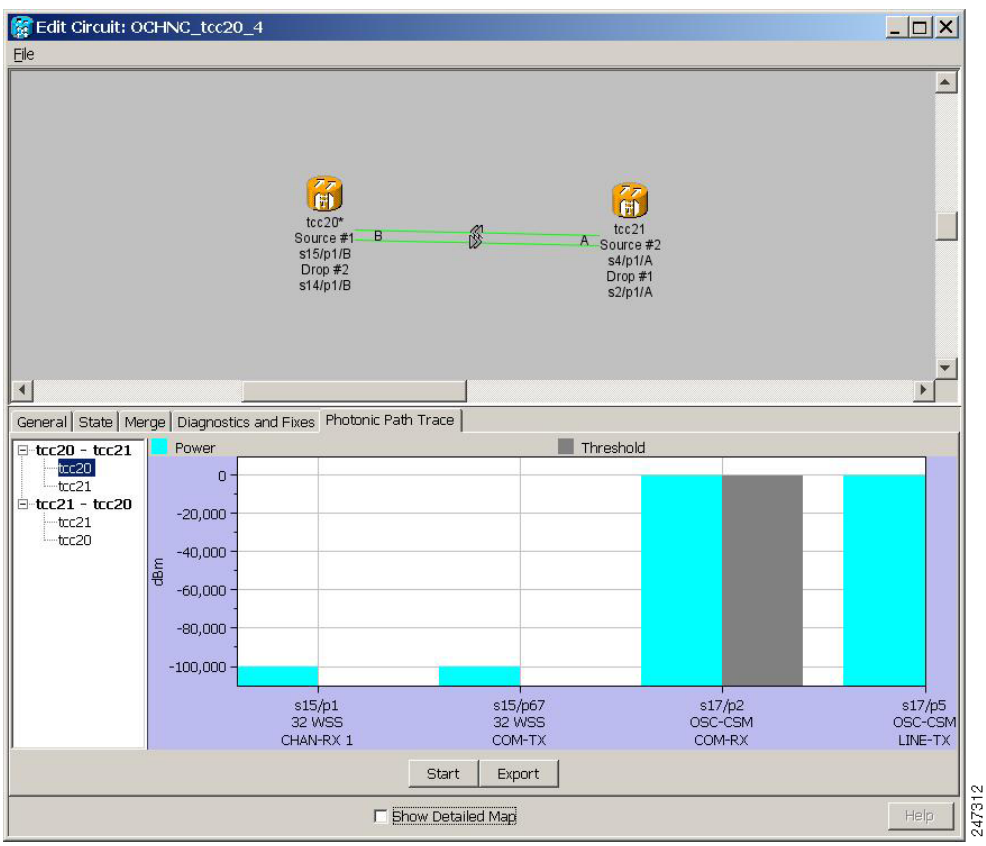
To view the software version, click the **Maintenance > Software** tabs in the CTC network view. The working software version for each node is listed in the Working Version column.

22.13 Photonic Path Trace

Photonic Path Trace (PPT) is a protocol that validates an optical path in an ONS 15454 MSTP network.

PPT performs evidence-based path validation and identifies nodes in case of provisioning failure. PPT uses the power levels on each port to validate the path. For every node in the optical path, PPT reports the power levels against the threshold values in the form of a histogram. The histogram is displayed in the Photonic Path Trace tab of the Edit Circuit window in CTC. For each node, a set of power values collected from all the traversed ports is displayed in the histogram (Figure 22-38).

Figure 22-38 Photonic Path Trace



> **Note** An OCHNC or OCH trail circuit must exist on the optical path on which PPT is started.

For information on how to start PPT on an optical path, see the "Turn Up a Network" chapter.

22.14 Shared Risk Link Group

SRLG is a unique 32 bit number that can be assigned to a link or DWDM node. This number can be used as an identifier of a link or a group of resources that may fail. A set of links constitute a SRLG if they share a resource (for example, a common fiber) whose failure causes the other links of the group to fail too. Therefore, the links in the group have a shared risk. A link can belong to multiple SRLGs. SRLG information is an unordered list of SRLGs that the link belongs to that is used by the router layer for making routing decisions. For example, if a router traverses through a diverse path, the path computation ensures that routing does not go through links sharing the same SRLG.

There are two types of SRLGs, unique and additional. Every link or DWDM node must be assigned a unique SRLG attribute. Additional SRLGs for DWDM nodes or links are optional and can be defined in CTC. The additional SRLGs for a link compute the additional risks associated with the link. A list of additional SRLGs for a link can be defined in the Additional Span SRLG information attribute in CTC. This list can contain up to 20 SRLGs.

When the SRLG value of a DWDM node or link is changed, the SRLG attributes are updated for all the relevant router ports. When a new router-based OCH trail is created, the SRLG information of the DWDM nodes and links that are part of the newly created circuit is automatically communicated to the source and destination router. SRLG information can also be synchronized when the SRLG values on the router ports differ from the SRLG values on the DWDM nodes. The SRLG information can be viewed as consolidated or detailed reports in CTC. For more information about provisioning SRLGs on DWDM nodes and links, refer to the "Turn Up a Network" chapter.

Note SRLG is not supported on Cisco 7600 nodes.

22.15 Proactive Protection Regen

When an optical signal degrades in a DWDM network, the downstream router is unaware of it. When the FEC limit is reached, there is traffic interruption with significant packet loss and an LOF alarm is raised. The LOF alarm triggers a Fast Reroute (FRR) mechanism in the router layer that switches traffic to a backup path.

The Proactive Protection Regen feature achieves a hitless switchover before the traffic is interrupted by triggering an FRR to backup paths before the LOF alarm is raised.

Proactive protection regen can be enabled on the OTU2_XP card ports when the card is used as a regenerator in Standard regen or Enhanced FEC mode. Proactive protection regen can also be configured during creation of OCH trail circuits between two Cisco CRS-1 routers.

As soon as the BER of the optical signal between the upstream router and the ONS node exceeds the trigger threshold value for the duration set as the trigger window, a PPR-FDI alarm is generated by the ONS node. The PPR-FDI alarm is sent to the downstream router which in turn triggers the switchover to the backup path. The downstream router then sends the PPR-BDI alarm to the upstream router to switch to the backup path.

For more information about configuring proactive protection regen on OTU2_XP cards and OCH trails in CTC, refer to the "Provision Transponder and Muxponder Cards" chapter.

Note Proactive protection regen is not supported on Cisco 7600 series nodes.

The Proactive Protection Regen can be enabled on the AR_MXP or AR_XP card when the card is in high-rate RGN_10G card mode. For more information about configuring proactive protection regen on AR_MXP and AR_XP cards in CTC, refer to the "Provision Transponder and Muxponder Cards" chapter.

CHAPTER 23

Upgrade, Add, and Remove Cards and Nodes

The information in this chapter is in a new location. See Upgrade, Add, and Remove Cards and Nodes for procedures to add and remove dense wavelength division multiplexing (DWDM) cards and nodes.

CHAPTER 24

Maintain the Node

This chapter provides procedures for maintaining the Cisco ONS 15454, including database backup and restoration, removing and replacing cards, viewing the ONS 15454 audit trail, and hardware maintenance procedures such as cleaning fibers, changing the fan tray filter, and other maintenance procedures.

Note The procedures and tasks described in this chapter for the Cisco ONS 15454 platform is applicable to the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, unless noted otherwise.

Note Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Before You Begin

Before performing any of the following procedures, investigate all alarms and clear any trouble conditions. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* as necessary for general troubleshooting information and alarm or error descriptions.

This section lists the chapter procedures (NTPs). Turn to a procedure to view its tasks (DLPs).

1. NTP-G103 Back Up the Database, page 24-2—Complete as needed.
2. NTP-G104 Restore the Database, page 24-3—Complete as needed.
3. NTP-G105 Restore the Node to Factory Configuration, page 24-4—Complete as needed to clear the database and upload a blank database and the latest software.
4. NTP-G133 View and Manage OSI Information, page 24-10—Complete as needed.
5. NTP-G106 Reset Cards Using CTC, page 24-13—Complete as needed to reset the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards and the dense wavelength division multiplexing (DWDM) cards.
6. NTP-G108 Viewing the Audit Trail Records, page 24-15—Complete as needed.
7. NTP-G109 Off-Load the Audit Trail Record, page 24-16—Complete as needed.
8. NTP-G110 Off-Load the Diagnostics File, page 24-17—Complete as needed.
9. NTP-G112 Change the Node Timing Reference, page 24-18—Complete as needed.
10. NTP-G113 View the ONS 15454 Timing Report, page 24-20—Complete as needed.

11. NTP-G135 Edit Network Element Defaults, page 24-23—Complete as needed to edit the factory-configured (default) network element (NE) settings for the Cisco ONS 15454.
12. NTP-G136 Import Network Element Defaults, page 24-24—Complete as needed to import the factory-configured (default) NE settings for the Cisco ONS 15454.
13. NTP-G137 Export Network Element Defaults, page 24-25—Complete as needed to export the factory-configured (default) NE settings for the Cisco ONS 15454.
14. NTP-G166 View the Facilities, page 24-26—Complete as needed to view all facilities for the Cisco ONS 15454.
15. NTP-G119 Power Down the Node, page 24-27—Complete as needed to power down the node.

NTP-G103 Back Up the Database

Purpose	This procedure stores a backup version of the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE (software) database on the workstation running Cisco Transport Controller (CTC) or on a network server.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required. Cisco recommends performing a database backup at approximately weekly intervals and prior to and after configuration changes.
Onsite/Remote	Onsite or remote
Security Level	Maintenance or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node you want to back up. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Maintenance > Database** tabs.

Step 3 Click **Backup**.

Step 4 Save the database on the workstation's hard drive or on network storage. Use an appropriate file name with the DB file extension; for example, database.db.

Step 5 Click **Save**.

Step 6 Click **OK** in the confirmation dialog box.

Stop. You have completed this procedure.

NTP-G104 Restore the Database

Purpose	This procedure restores the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card software database, either partially or completely.
Tools/Equipment	None
Prerequisite Procedures	NTP-G103 Back Up the Database, page 24-2
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note You must back up and restore the database for each node on a circuit path in order to maintain a complete circuit.

Note The following parameters are restored only when the **Complete Database (System and Provisioning)** checkbox is checked: node name, IP address, subnet mask and gateway, and IIOP port. If you change the node name and then restore a backed up database on this node, the circuits automatically map to the newly renamed node. It is recommended to keep a record of the old and new node names.

Caution If you are restoring the database on multiple nodes, wait approximately one minute after the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card reboot has completed on each node before proceeding to the next node.

Caution TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards can be used in single IP address (repeater) and dual IP address (secure) mode. The secure mode has advanced features that affect database restore. A database from a secure node cannot be loaded on an unsecure repeater node. A repeater mode database can be loaded onto a secure node but the database will follow the node characteristics (that is, it will become secure). A secure database cannot be loaded onto a TCC2; only TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards support secure mode. For more information about the dual IP secure mode, see the "NTP-G26 Set Up CTC Network Access" procedure on page 14-16. Also refer chapter, "Chapter 22, "Manage Network Connectivity."

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you are restoring the database. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Circuits** tab. Verify that no optical channel network connection (OCHNC) circuits have a PARTIAL_OOS state. If so, investigate and resolve the partial state before continuing.

Step 3 Complete the DLP-G157 Disable Automatic Power Control task

Step 4 In multishelf view (multishelf mode) or in node view (single-shelf mode), click the **Maintenance > Database** tabs.

Step 5 Click **Restore**.

Step 6 Locate the database file stored on the workstation hard drive or on network storage.

Note To clear all existing provisioning, locate and upload the database found on the latest ONS 15454 software CD.

Step 7 Click the database file to highlight it.

Step 8 Click **Open**. The DB Restore dialog box appears.

Caution Opening a restore file from another node or from an earlier backup might affect traffic on the login node.

Step 9 If you need a complete database restore, check the **Complete database (System and Provisioning)** checkbox. Continue with Step 11.

Note Complete database restore may be used only on a node that is removed from the network, and does not carry live provisioning traffic. This operation needs to be done by a live operator onsite, and must not use a remote connection.

Step 10 If you need to restore only the provisioning database (partial restore), do not check the **Complete database (System and Provisioning)** checkbox.

Step 11 Click **Ok**.

The Restore Database dialog box monitors the file transfer.

Step 12 Wait for the file to complete the transfer to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card.

Step 13 Click **OK** when the "Lost connection to node, changing to Network View" dialog box appears. Wait for the node to reconnect.

Step 14 Complete the DLP-G158 Enable Automatic Power Control task.

Stop. You have completed this procedure.

Note During the database restore process, GMPLS circuits provisioned after the database was backed up may go into the partial state. When this occurs, delete and recreate the GMPLS circuits to revert to the discovered state.

NTP-G105 Restore the Node to Factory Configuration

Purpose	This procedure reinitializes the Cisco ONS 15454, ONS 15454 M2,and ONS 15454 M6 using the CTC reinitialization tool. Reinitialization uploads a new software package to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards, clears the node database, and restores the factory default parameters.
Tools/Equipment	ONS 15454 System Software CD, Version 9.2 JRE 1.6 is recommended to log into the node after reinitialization is complete. The reinitialization tool can run on JRE 1.3.1_02, JRE 1.4.2, or JRE 1.6.

Prerequisite Procedures	NTP-G103 Back Up the Database, page 24-2 NTP-G17 Set Up Computer for CTC One of the following: • NTP-G18 Set Up CTC Computer for Local Craft Connection to the ONS 15454 • NTP-G19 Set Up a CTC Computer for a Corporate LAN Connection to the ONS 15454
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Superuser only

Caution Cisco strongly recommends that you keep different node databases in separate folders. This is because the reinitialization tool chooses the first product-specific software package in the specified directory if you use the Search Path field instead of the Package and Database fields. You might accidentally copy an incorrect database if multiple databases are kept in the specified directory.

Caution Restoring a node to the factory configuration deletes all cross-connects on the node.

Caution Cisco recommends that you save the node database to safe location if you will not be restoring the node using the database provided on the software CD.

Note The following parameters are not backed up and restored when you delete the database and restore the factory settings: node name, IP address, subnet mask and gateway, and IIOP port. If you change the node name and then restore a backed up database with a different node name, the circuits map to the new renamed node. Cisco recommends keeping a record of the old and new node names.

Note A node will remain locked in secure mode even if it is restored with the factory database. A node locked in secure mode can only be unlocked by Cisco Technical Support.

Step 1 If you need to install or replace one or more TCC2/TCC2P/TCC3 cards, see the "DLP-G33 Install the TCC2, TCC2P, or TCC3 Card" task on page 3-35. If you need to install one or more TNC/TNCE/TSC/TSCE cards, see the "DLP-G604 Install the TNC, TNCE, TSC, or TSCE Card" task on page 3-42.

Step 2 If you are using Microsoft Windows, complete the "DLP-G248 Use the Reinitialization Tool to Clear the Database and Upload Software (Windows)" task on page 24-6.

Step 3 If you are using UNIX, complete the "DLP-G249 Use the Reinitialization Tool to Clear the Database and Upload Software (UNIX)" task on page 24-8.

Stop. You have completed this procedure.

DLP-G248 Use the Reinitialization Tool to Clear the Database and Upload Software (Windows)

Purpose	This task reinitializes the Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 using the CTC reinitialization tool on a Windows computer. Reinitialization uploads a new software package to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards, clears the node database, and restores the factory default parameters.
Tools/Equipment	ONS 15454 System Software CD, Version 9.2 JRE 1.6 must be installed on the computer to log into the node at the completion of the reinitialization. The reinitialization tool can run on JRE 1.3.1_02, JRE 1.4.2, or JRE 1.6.
Prerequisite Procedures	NTP-G103 Back Up the Database, page 24-2 NTP-G17 Set Up Computer for CTC One of the following: • NTP-G18 Set Up CTC Computer for Local Craft Connection to the ONS 15454 • NTP-G19 Set Up a CTC Computer for a Corporate LAN Connection to the ONS 15454
Required/As Needed	As needed to clear the existing database from the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards and restore the node default settings.
Onsite/Remote	Onsite
Security Level	Superuser only

Caution Restoring a node to the factory configuration deletes all cross-connects on the node.

Note The ONS 14545 Software CD is if the Reinit.jar file, the CISCO 15454 package file, and the NE default file are not stored on your computer.

Note A node will remain locked in secure mode after the node's database is deleted, even if it is restored with the factory database. A node locked in secure mode can only be unlocked by Cisco Technical Support.

Step 1 Insert the ONS 15454 System Software CD, Version 9.2, into the computer CD-ROM drive. If the CTC Installation Wizard appears, click **Cancel**.

Step 2 From the Windows Start menu, choose **Run.** In the Run dialog box, click **Browse** and navigate to the CISCO15454 or CISCO15454SDH folder on the software CD.

Step 3 In the Browse dialog box Files of Type field, choose **All Files**.

Step 4 Choose the RE-INIT.jar file and click **Open**. The NE Re-Initialization window appears.

Step 5 Complete the following fields:

- GNE IP—If the node you are reinitializing is accessed through another node configured as a gateway network element (GNE), enter the GNE IP address. If you have a direct connection to the node, leave this field blank.
- Node IP—Enter the node name or IP address of the node that you are reinitializing.
- User ID—Enter the user ID needed to access the node.
- Password—Enter the password for the user ID.
- Upload Package—Check this box to send the software package file to the node. If unchecked, the software stored on the node is not modified.
- Force Upload—Check this box to send the software package file to the node even if the node is running the same software version. If unchecked, reinitialization will not send the software package if the node is already running the same version.
- Activate/Revert—Check this box to activate the uploaded software (if the software is a later than the installed version) or revert to the uploaded software (if the software is earlier than the installed version) as soon as the software file is uploaded. If unchecked, the software is not activated or reverted after the upload, allowing you to initiate the functions later from the node view Maintenance > Software tab.
- Re-init Database—Check this box to send a new database to the node. (This is equivalent to the CTC database restore operation.) If unchecked, the node database is not modified.
- Confirm—Check this box if you want a warning message displayed before any operation is performed. If unchecked, reinitialization does not display a warning message.
- Search Path—Enter the path to the CISCO15454 folder on the CD drive.

Step 6 Click **Go**.

Caution Before continuing with the next step, verify that the database to upload is correct. You cannot reverse the upload process after you click Yes.

Step 7 Review the information in the Confirm NE Re-Initialization dialog box, then click **Yes** to start the reinitialization.

The reinitialization begins. After the software is downloaded and activated, and the database is uploaded to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards, "Complete" appears in the status bar, and the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards reboot. Wait a few minutes for the reboot to complete.

Step 8 After the reboot is complete, log into the node using the "DLP-G46 Log into CTC" task.

Step 9 Complete the NTP-G24 Set Up Name, Date, Time, and Contact Information, page 14-13 and the NTP-G26 Set Up CTC Network Access, page 14-16.

Step 10 Return to your originating procedure (NTP).

DLP-G249 Use the Reinitialization Tool to Clear the Database and Upload Software (UNIX)

Purpose	This task reinitializes the Cisco ONS 15454, ONS 15454 M2, and ONS 15454 M6 using the CTC reinitialization tool on a UNIX computer. Reinitialization uploads a new software package to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards, clears the node database, and restores the factory default parameters.
Tools/Equipment	ONS 15454 SONET System Software CD, Version 9.2 JRE 1.6 must be installed on the computer to log into the node at the completion of the reinitialization. The reinitialization tool can run on JRE 1.3.1_02, JRE 1.4.2, or JRE 1.6.
Prerequisite Procedures	NTP-G103 Back Up the Database, page 24-2 NTP-G17 Set Up Computer for CTC One of the following: • NTP-G18 Set Up CTC Computer for Local Craft Connection to the ONS 15454 • NTP-G19 Set Up a CTC Computer for a Corporate LAN Connection to the ONS 15454
Required/As Needed	As needed to clear the existing database from the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards and restore the node default settings.
Onsite/Remote	Onsite
Security Level	Superuser only

Caution Restoring a node to the factory configuration deletes all cross-connects on the node.

Note A node will remain locked in secure mode after the node's database is deleted, even if it is restored with the factory database. A node locked in secure mode can only be unlocked by Cisco Technical Support.

Step 1 Insert the system software CD containing the reinitialization tool, software, and defaults database into the computer CD-ROM drive. If the CTC Installation Wizard appears, click **Cancel**.

Step 2 To find the recovery tool file, go to the CISCO15454 directory on the CD (usually /cdrom/cdrom0/CISCO15454 or /cdrom/cdrom0/CISCO15454SDH).

Step 3 If you are using a file explorer, double-click the **RE-INIT.jar** file. If you are working with a command line, run **java -jar RE-INIT.jar**. The NE Re-Initialization window appears.

Step 4 Complete the following fields:

- GNE IP—If the node you are reinitializing is accessed through another node configured as a GNE, enter the GNE IP address. If you have a direct connection to the node, leave this field blank.
- Node IP—Enter the node name or IP address of the node that you are reinitializing.
- User ID—Enter the user ID needed to access the node.
- Password—Enter the password for the user ID.

- Upload Package—Check this box to send the software package file to the node. If unchecked, the software stored on the node is not modified.
- Force Upload—Check this box to send the software package file to the node even if the node is running the same software version. If unchecked, reinitialization will not send the software package if the node is already running the same version.
- Activate/Revert—Check this box to activate the uploaded software (if the software is a later than the installed version) or revert to the uploaded software (if the software is earlier than the installed version) as soon as the software file is uploaded. If unchecked, the software is not activated or reverted after the upload, allowing you to initiate the functions later from the node view Maintenance > Software tab.
- Re-init Database—Check this box to send a new database to the node. (This is equivalent to the CTC database restore operation.) If unchecked, the node database is not modified.
- Confirm—Check this box if you want a warning message displayed before any operation is performed. If unchecked, reinitialization does not display a warning message.
- Search Path—Enter the path to the CISCO15454 or CISCO15454SDH folder on the CD drive.

Step 5 Click **Go**.

Caution Before continuing with the next step, verify that the database to upload is correct. You cannot reverse the upload process after you click **Yes**.

Step 6 Review the information in the Confirm NE Re-Initialization dialog box, then click **Yes** to start the reinitialization.

The reinitialization begins. After the software is downloaded and activated and the database is uploaded to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards, "Complete" appears in the status bar and the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards will reboot. Wait a few minutes for the reboot to complete.

Step 7 After the reboot is complete, log into the node using the "DLP-G46 Log into CTC" task.

Step 8 Complete the NTP-G24 Set Up Name, Date, Time, and Contact Information, page 14-13 and the NTP-G26 Set Up CTC Network Access, page 14-16.

Step 9 Return to your originating procedure (NTP).

NTP-G133 View and Manage OSI Information

Purpose	This procedure allows you to view and manage Open Systems Interconnection (OSI) including the End System to Intermediate System (ES-IS) and Intermediate System to Intermediate System (IS-IS) routing information tables, the Target Identifier Address Resolution Protocol (TARP) data cache, and the manual area table.
Tools/Equipment	None
Prerequisite Procedures	NTP-G103 Back Up the Database, page 24-2 NTP-G17 Set Up Computer for CTC NTP-G132 Provision OSI, page 14-36
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Note Additional information about the ONS 15454 implementation of OSI is provided in "Chapter 22, "Manage Network Connectivity.""

Step 1 Complete the "DLP-G46 Log into CTC" task. If you are already logged in, continue with Step 2.

Step 2 Perform any of the following tasks as needed:

- DLP-G298 View IS-IS Routing Information Base, page 24-10
- DLP-G299 View ES-IS Routing Information Base, page 24-11
- DLP-G300 Manage the TARP Data Cache, page 24-12

Stop. You have completed this procedure.

DLP-G298 View IS-IS Routing Information Base

Purpose	This task allows you to view the IS-IS protocol routing information base (RIB). IS-IS is an OSI routing protocol that floods the network with information about NEs on the network. Each NE uses the information to build a complete and consistent picture of a network topology. The IS-IS RIB shows the network view from the perspective of the IS node.
Tools/Equipment	None
Prerequisite procedures	"DLP-G46 Log into CTC"
Required/As needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Maintenance > OSI > IS-IS RIB** tabs.

Step 2 View the following RIB information for Router 1:

- Subnet Type—Indicates the OSI subnetwork point of attachment type used to access the destination address. Subnet types include SDCC, LDCC, GCC, OSC, and LAN.
- Location—Indicates the OSI subnetwork point of attachment. For data communications channel (DCC) subnets, the slot and port are displayed. LAN subnets are shown as LAN.
- Destination Address—The destination Network Service Access Point (NSAP) of the IS.
- MAC Address—For destination NEs that are accessed by LAN subnets, the NE's MAC address.

Step 3 If additional routers are enabled, you can view their RIBs by choosing the router number in the Router field and clicking **Refresh**.

Step 4 Return to your originating procedure (NTP).

DLP-G299 View ES-IS Routing Information Base

Purpose	This task allows you to view the ES-IS protocol RIB. ES-IS is an OSI protocol that defines how end systems (hosts) and intermediate systems (routers) learn about each other. For ESs, the ES-IS RIB shows the network view from the perspective of the ES node. For ISs, the ES-IS RIB shows the network view from the perspective of the IS node.
Tools/Equipment	None
Prerequisite procedures	"DLP-G46 Log into CTC"
Required/As needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Maintenance > OSI > ES-IS RIB** tabs.

Step 2 View the following RIB information for Router 1:

- Subnet Type—Indicates the OSI subnetwork point of attachment type used to access the destination address. Subnet types include SDCC, LDCC, GCC, OSC, and LAN.
- Location—Indicates the subnet interface. For DCC subnets, the slot and port are displayed. LAN subnets are shown as LAN.
- Destination Address—The destination IS NSAP.
- MAC Address—For destination NEs that are accessed by LAN subnets, the NE's MAC address.

Step 3 If additional routers are enabled, you can view their RIBs by choosing the router number in the Router field and clicking **Refresh**.

Step 4 Return to your originating procedure (NTP).

DLP-G300 Manage the TARP Data Cache

Purpose	This task allows you to view and manage the TARP data cache (TDC). The TDC facilitates TARP processing by storing a list of TID to NSAP mappings.
Tools/Equipment	None
Prerequisite procedures	"DLP-G46 Log into CTC" task
Required/As needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Maintenance > OSI > TDC** tabs.

Step 2 View the following TDC information:

- TID—The target identifier of the originating NE. For ONS 15454s, the TID is the name entered in the Node Name/TID field on the Provisioning > General tab.
- NSAP/NET—The NSAP or Network Element Title (NET) of the originating NE.
- Type—Indicates how the TDC entry was created:
  - Dynamic—The entry was created through the TARP propagation process.
  - Static—The entry was manually created and is a static entry.

Step 3 If you want to query the network for an NSAP that matches a TID, complete the following steps. Otherwise, continue with Step 4.

Note The TID to NSAP function is not available if the TDC is not enabled on the Provisioning > OSI > TARP subtab.

a. Click the **TID to NSAP** button.

b. In the TID to NSAP dialog box, enter the TID you want to map to an NSAP.

c. Click **OK**, then click **OK** in the information message box.

d. On the TDC tab, click **Refresh**.

If TARP finds the TID in its TDC, it returns the matching NSAP. If not, TARP sends protocol data units (PDUs) across the network. Replies will return to the TDC later, and a check TDC later message is displayed.

Step 4 If you want to delete all the dynamically generated TDC entries, click the **Flush Dynamic Entries** button. If not, continue with Step 5.

Step 5 Return to your originating procedure (NTP).

NTP-G106 Reset Cards Using CTC

Purpose	This procedure resets the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE and DWDM cards using CTC.
Tools/Equipment	None
Prerequisite Procedures	DLP-G33 Install the TCC2, TCC2P, or TCC3 Card, page 3-35 DLP-G604 Install the TNC, TNCE, TSC, or TSCE Card, page 3-42
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you are performing the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE reset. If you are already logged in, continue with Step 2.

Step 2 As needed, complete the "DLP-G250 Reset the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE Card" task on page 24-13.

Step 3 As needed, complete the "DLP-G251 Reset DWDM Cards Using CTC" task on page 24-14.

Stop. You have completed this procedure.

DLP-G250 Reset the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE Card

Purpose	This task resets the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card and switches the node to the redundant TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card.
Tools/Equipment	None
Prerequisite Procedures	DLP-G33 Install the TCC2, TCC2P, or TCC3 Card, page 3-35 DLP-G604 Install the TNC, TNCE, TSC, or TSCE Card, page 3-42 "DLP-G46 Log into CTC"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Warning **Do not reach into a vacant slot or chassis while you install or remove a module or a fan. Exposed circuitry could constitute an energy hazard.** Statement 206

Note Before you reset the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card, you should wait at least 60 seconds after the last provisioning change you made to avoid losing any changes to the database.

Note The ONS 15454 M2 chassis do not have a redundant controller card.

Note (On ONS 15454 shelf) When a software reset is performed on an active TCC2/TCC2P/TCC3, the AIC-I card goes through an initialization process and also resets. The AIC-I card reset is normal and happens each time an active TCC2/TCC2P/TCC3 card goes through a software-initiated reset.

Step 1 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Alarms** tab.

a. Verify that the alarm filter is not on. See the DLP-G128 Disable Alarm Filtering task as necessary.

b. Verify that no unexplained alarms appear on the network. If alarms appear, investigate and resolve them before continuing. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for procedures.

Step 2 In node view, right-click the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card to reveal a shortcut menu.

Step 3 For TCC2/TCC2P/TCC3 cards, click **Reset Card** to initiate a soft reset.

For TNC/TNCE/TSC/TSCE cards, click **Soft-Reset Card** to initiate a soft reset.

Note To initiate a hard reset on the TNC/TNCE/TSC/TSCE card, right-click the card and click **Hard-Reset Card** when the card is in OOS-MT state. See Equipment Inventory for more information.

Step 4 Click **Yes** when the confirmation dialog box appears.

Step 5 Click **Close** when the "Lost connection to node, changing to Network View" dialog box appears.

Step 6 Return to node view (single-shelf mode) or multishelf view (multishelf mode) and confirm that the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card LED is amber (standby).

Step 7 Return to your originating procedure (NTP).

DLP-G251 Reset DWDM Cards Using CTC

Purpose	This task resets the OSCM, OSC-CSM, 32MUX-O, 40-MUX-C, 32DMX-O, 32DMX, 40-DMX-C, 40-DMX-CE, 32WSS, 40-WSS-C, 40-WSS-CE, 40-SMR1-C, 40-SMR2-C, TDC-CC, TDC-FC, OPT-BST, OPT-PRE, OPT-AMP-17-C, 40-WXC-C, 80-WXC-C, AD-xC.xx.x, AD-xB.xx.x, transponder (TXP), muxponder (MXP), and ADM-10G cards using CTC.
Tools/Equipment	None
Prerequisite Procedures	NTP-G30 Install the DWDM Cards, page 14-64 NTP-G179 Install the TXP, MXP, AR_MXP, AR_XP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, ADM-10G, and OTU2_XP Cards, page 14-69 "DLP-G46 Log into CTC" task
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Warning **Do not reach into a vacant slot or chassis while you install or remove a module or a fan. Exposed circuitry could constitute an energy hazard.** Statement 206

Note ONS 15454 cards normally do not need to be reset. However, you might occasionally need to reset a card for testing or as an initial trouble-clearing step. For additional information, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

Note A software reset of the TXP and MXP card leads to removal of PM data from the PM counters. As a result, the PM counters do not display any PM data.

Step 1 If you will switch an active TXP or MXP card that is in a Y-cable protection group, complete the DLP-G179 Apply a Force Y-Cable or Splitter Protection Switch task. If not, continue with Step 2.

Step 2 Right-click the card that you want to reset to reveal a shortcut menu.

Step 3 Click **Reset Card**.

Step 4 Click **Yes** when the confirmation dialog box appears.

The card LED on the ONS 15454 shelf graphic will go through the following sequence: Fail (white LED), Ldg (white LED), and Act (green LED). The reset should complete within 1 to 2 minutes.

Step 5 If you performed a Y-cable protection group switch in Step 1, complete the DLP-G180 Clear a Manual or Force Y-Cable or Splitter Protection Switch task. If not, continue with Step 6.

Step 6 Return to your originating procedure (NTP).

NTP-G108 Viewing the Audit Trail Records

Purpose	This procedure explains how to view audit trail records. Audit trail records are useful for maintaining security, recovering lost transactions, and enforcing accountability. Accountability refers to tracing user activities; that is, associating a process or action with a specific user.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to view the audit trail log. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Maintenance > Audit** tabs.

Step 3 Click **Retrieve**.

A window containing the most recent audit trail records appears.

A definition of each column in the audit trail log is listed in Table 24-1.

Table 24-1 Audit Trail Column Definitions

Column	Definition
Date	Date when the action occurred in the format MM/dd/yy HH:mm:ss
Num	Incrementing count of actions
User	User ID that initiated the action
P/F	Pass/Fail (that is, whether or not the action was executed)
Operation	Action that was taken

Left-click the column headings to display the list in ascending-to-descending or descending-to-ascending order.

Right-click the column heading to display the following options:

- Reset Sorting—Resets the column to the default setting.
- Hide Column—Hides the column from view.
- Sort Column—Sorts the table by the column's values.
- Sort Column (incremental)—Sorts the table incrementally by multiple columns.
- Reset Columns Order/Visibility—Displays all hidden columns.
- Row Count—Provides a numerical count of log entries.

Shift-click the column heading for an incremental sort of the list.

Stop. You have completed this procedure.

NTP-G109 Off-Load the Audit Trail Record

Purpose	This procedure describes how to off-load up to 640 audit trail log entries in a local or network drive file to maintain a record of actions performed for the node. If the audit trail log is not off-loaded, the oldest entries are overwritten after the log reaches capacity.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to off-load the audit trail log. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click, click the **Maintenance > Audit** tabs.

Step 3 Click **Retrieve**.

Step 4 Click **Archive**.

Step 5 In the Archive Audit Trail dialog box, navigate to the directory (local or network) where you want to save the file.

Step 6 Enter a name in the File Name field.

You do not have to give the archive file a particular extension. It is readable in any application that supports text files, such as WordPad, Microsoft Word (imported), etc.

Step 7 Click **Save**. Click **OK**.

The 640 entries are saved in this file. The next entries continue with the next number in the sequence, rather than starting over.

Note Archiving does not delete entries from the CTC audit trail log. However, entries can be self-deleted by the system after the log maximum is reached. If you archived the entries, you cannot reimport the log file back into CTC and will have to view the log in a different application.

Stop. You have completed this procedure.

NTP-G110 Off-Load the Diagnostics File

Purpose	This procedure describes how to off-load a diagnostic file. The diagnostic file contains a set of debug commands that were run on a node and their results. This file is useful to the Cisco Technical Assistance Center (TAC) when troubleshooting problems with the node.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Maintenance or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to off-load the diagnostics file. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Maintenance > Diagnostic** tabs.

Step 3 Click **Node Diagnostic Logs**. The Node Diagnostics dialog box is displayed.

Step 4 Click **OK** to continue.

Step 5 In the Select a Filename for the Node Diagnostics Zip Archive dialog box, navigate to the directory (local or network) where you want to save the file.

Step 6 Enter a name in the File Name field.

You do not have to give the archive file a particular extension. It is a compressed file (.zip) that can be unzipped and read by Cisco Technical Support.

Step 7 Click **Save**.

The status window shows a progress bar indicating the percentage of the file being saved.

Step 8 Click **OK**.

Stop. You have completed this procedure.

NTP-G112 Change the Node Timing Reference

Purpose	This procedure enables automatic timing reference switching or returns the node timing to normal operation.
Tools/Equipment	None
Prerequisite Procedures	
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Maintenance or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to enable timing switching. If you are already logged in, continue with Step 2.

Step 2 Complete the "DLP-G259 Manual or Force Switch the Node Timing Reference" task on page 24-18 as needed.

Step 3 Complete the "DLP-G260 Clear a Manual or Force Switch on a Node Timing Reference" task on page 24-19 as needed.

Stop. You have completed this procedure.

DLP-G259 Manual or Force Switch the Node Timing Reference

Purpose	This task commands the node to switch to the timing reference you have selected.
Tools/Equipment	None
Prerequisite Procedures	"DLP-G46 Log into CTC"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Maintenance or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), click the **Maintenance > Timing > Source** tabs.

Step 2 From the Reference drop-down list for the desired Clock, choose the desired reference.

Step 3 From the Operation drop-down list for the desired Clock, choose one of the following options:

- **Manual**—This operation commands the node to switch to the reference you have selected if the synchronization status message (SSM) quality of the reference is not lower than the current timing reference.
- **Force**—This operation commands the node to switch to the reference you have selected, regardless of the SSM quality (if the reference is valid).

Note For information about the Clear option, see the "DLP-G260 Clear a Manual or Force Switch on a Node Timing Reference" task on page 24-19.

Step 4 Click **Apply** next to the timing source.

Step 5 Click **Yes** in the confirmation dialog box. If the selected timing reference is an acceptable valid reference, the node switches to the selected timing reference. If the selected timing reference is invalid, a warning dialog box appears. Click **OK**; the node will not switch to the new timing reference.

Step 6 Return to your originating procedure (NTP).

DLP-G260 Clear a Manual or Force Switch on a Node Timing Reference

Purpose	This task clears a Manual or Force switch on a node timing reference and reverts the timing reference to its provisioned reference.
Tools/Equipment	None
Prerequisite Procedures	"DLP-G46 Log into CTC"
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Maintenance or higher

Step 1 In node view (single-shelf mode) or shelf view (multishelf mode), click the **Maintenance > Timing > Source** tabs.

Step 2 Find the Clock reference that is currently set to Manual or Force in the Operation drop-down list.

Step 3 From the Operation drop-down list, choose **Clear**.

Step 4 Click **Apply**.

Step 5 Click **Yes** in the confirmation dialog box. If the normal timing reference is an acceptable valid reference, the node switches back to the normal timing reference as defined by the system configuration. If the normal timing reference is invalid or has failed, a warning dialog box appears. Click **OK**; the timing reference will not revert.

Step 6 Return to your originating procedure (NTP).

NTP-G113 View the ONS 15454 Timing Report

Purpose	This procedure displays the current status of the ONS 15454 timing references.
Tools/Equipment	None
Prerequisite Procedures	
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Maintenance or higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to view the node timing status. If you are already logged in, continue with Step 2.

Step 2 In node view (single-shelf mode) or shelf view (multishelf mode), click the **Maintenance > Timing > Report** tabs.

Step 3 In the Timing Report area, you can view node timing information. The date and time of the report appear at the top of the report. The time stamp is the same as the alarms time stamp and can be configured using the DLP-G118 Display Alarms and Conditions Using Time Zone task. Table 24-2 describes the report fields and entries.

Step 4 To update the report, click **Refresh**.

Table 24-2 ONS 15454 Timing Report

Item	Description	Option	Option Description
Clock	Indicates the timing clock. The report section that follows applies to the timing clock indicated.	NE	The node timing clock.
		BITS-1 Out	The BITS-1 Out timing clock.
		BITS-2 Out	The BITS-2 Out timing clock.

Table 24-2 ONS 15454 Timing Report (continued)

Item	Description	Option	Option Description
Status	Indicates the status of the timing clock.	INIT_STATE	The timing reference has not been provisioned. For an NE reference, this status appears just before the first provisioning messages when the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card is booting. Timing is provisioned to the internal clock of the node.
		HOLDOVER_STATE	The clock was locked onto a valid timing reference for more than 140 seconds when a failure occurred. Holdover state timing is a computation based on timing during the normal state combined with the node's internal clock. The node holds onto this frequency until the valid reference is restored. This status appears for NE references only.
		FREERUN_STATE	The node is running off its internal clock without any modification except the calibrated value to bring timing to 0 PPM. Freerun state can occur when a Force switch to the Internal clock is initiated, when all references fail without the 140 seconds of holdover data, or when only Internal timing references are defined. This status appears for NE references only.
		NO_SYNC_STATE	A synchronization timing reference is not defined. BITS-1 Out or BITS-2 Out default to this status until an OC-N/STM-N card is defined as its reference on the Provisioning > Timing tab. This status appears for external references only.
		NE_SYNCH_STATE	BITS-1 Out and BITS-2 Out use the same timing source as the NE. This is displayed when NE Reference is selected in the BITS-1 Out and BITS-2 Out Reference List on the Provisioning > Timing tab.
		NORMAL_STATE	The timing reference is locked onto one of its provisioned references. The reference cannot be Internal or NO SYNC STATE.
		FAST_START_STATE	The node has switched references, but the reference is too far away to reach NORMAL_STATE within an acceptable amount of time. FAST_START_STATE is a fast acquisition mode to allow the node to quickly acquire the reference. After it achieves this goal, the node progresses to NORMAL_STATE.
		FAST_START_FAILED_STATE	A timing reference is too far away to reach in normal state. The FAST_START_STATE could not acquire sufficient timing information within the allowable amount of time.
Status Changed At	Date and time of the last status change.	—	—

Table 24-2 ONS 15454 Timing Report (continued)

Item	Description	Option	Option Description
Switch Type	Type of switch.	AUTOMATIC	The timing switch was system-generated.
		Manual	The timing switch was a user-initiated Manual switch.
		Force	The timing switch was user-initiated Force switch.
Reference	Indicates the timing reference.	Three timing references are available on the Provisioning > Timing tab.	—
Selected	Indicates whether the reference is selected.	Selected references are indicated with an X.	—
Facility	Indicates the timing facility provisioned for the reference on the Provisioning > Timing tab.	BITS-1	The timing facility is a building integrated timing supply (BITS) clock attached to the node's BITS-1 pins.
		BITS-2	The timing facility is a BITS clock attached to the node's BITS-2 pins.
		OC-N/STM-N card with port number	If the node is set to line timing, this is the OC-N/STM-N card and port provisioned as the timing reference.
		Internal clock	The node is using its internal clock.
State	Indicates the timing reference state.	IS	The timing reference is in service.
		OOS	The timing reference is out of service.
Condition	Indicates the timing reference state.	OKAY	The reference is valid to use as a timing reference.
		OOB	Out of bounds; the reference is not valid and cannot be used as a timing reference, for example, a BITS clock is disconnected.
Condition Changed	Indicates the date and time of the last status change in MM/DD/YY HH:MM:SS format.	—	—
SSM	Indicates whether SSM is enabled for the timing reference.	Enabled	SSM is enabled.
		Disabled	SSM is not enabled.
SSM Quality	Indicates the SSM timing quality.	8 to 10 SSM quality messages might be displayed.	For a list of SSM message sets, see Chapter 26, "Timing Reference".
SSM Changed	Indicates the date and time of the last SSM status change in MM/DD/YY HH:MM:SS format.	—	—

Stop. You have completed this procedure.

NTP-G135 Edit Network Element Defaults

Purpose	This procedure edits the factory-configured NE defaults using the NE Defaults editor. The new defaults can be applied to the node where they are edited, or exported to a file to be imported for use on other nodes.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note For a list of NE defaults, see the "*Network Element Defaults* document.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to edit NE defaults.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Defaults** tabs. Wait for the Defaults selector frame to load the defaults. This could take several minutes.

Step 3 Under Defaults Selector, choose either a card (if editing card-level defaults) or NODE (if editing node-level defaults). Clicking on the node name (at the top of the Defaults Selector column) lists all available NE defaults (both node- and card-level) under Default Name.

Step 4 Locate a default that you want to change under Default Name.

Step 5 Click in the **Default Value** column for the default property that you are changing and either choose a value from the drop-down list (when available), or type in the desired new value.

Note If you click **Reset** before you click **Apply**, all values will return to their original settings.

Step 6 Click **Apply** (click in the **Default Name** column to activate the Apply button if it is unavailable). You can modify multiple default values before applying the changes.

A pencil icon will appear next to any default value that will be changed as a result of editing the defaults file.

Step 7 If you are modifying node-level defaults, a dialog box appears telling you that defaults were successfully applied to the node. Click **Yes**.

If you are modifying the IIOP Listener Port setting, a dialog box appears warning you that the node will reboot and asks if you want to continue. Click **Yes**.

Note Changes to most node defaults reprovision the node when you click Apply. Changes made to card settings using the Defaults Editor do not change the settings for cards that are already installed or slots that are preprovisioned for cards, but rather, change only cards that are installed or preprovisioned thereafter. To change settings for installed cards or preprovisioned slots, see Chapter 20, "Change DWDM Card Settings." To change settings for transponder or muxponder cards see Chapter 11, "Provision Transponder and Muxponder Cards."

Note Changing some NE defaults can cause CTC disconnection or a reboot of the node in order for the default to take effect. Before you change a default, view the Side Effects column of the Defaults editor (right-click a column header and select **Show Column > Side Effects**) and be prepared for the occurrence of any side effects listed for that default.

Stop. You have completed this procedure.

NTP-G136 Import Network Element Defaults

Purpose	This procedure imports the NE defaults using the NE Defaults editor. The defaults can either be imported from the CTC software CD (factory defaults) or from a customized file exported and saved from a node.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note For a list of NE defaults, refer to the "Network Element Defaults" document.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to import NE defaults.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Defaults** tabs.

Step 3 Click **Import**.

Step 4 If the correct file name and location of the desired file do not appear in the Import Defaults from File dialog box, click **Browse** and browse to the file that you are importing.

Step 5 When the correct file name and location appear in the dialog box, click **OK**. If you are importing the factory defaults, the correct file name is 15454-defaults.txt for ANSI shelves and 15454SDH-defaults.txt for ETSI shelves.

A pencil icon will appear next to any default value that will be changed as a result of importing the new defaults file.

Step 6 Click **Apply**.

Step 7 If the imported file fails to pass all edits, the problem field shows the first encountered problem default value that must be fixed. Change the problem default value and click **Apply**. Repeat until the imported file passes all edits successfully.

Step 8 If you are modifying node-level defaults, a dialog box appears telling you that defaults were successfully applied to the node. Click **Yes**.

Step 9 If you are modifying the IIOP Listener Port setting, a dialog box appears warning you that the node will reboot and asks if you want to continue. Click **Yes**.

Note Changes to most node defaults reprovision the node when you click Apply. Changes made to card settings using the Defaults Editor do not change the settings for cards that are already installed or slots that are preprovisioned for cards, but rather, change only cards that are installed or preprovisioned thereafter. To change settings for installed cards or preprovisioned slots, seeChapter 20, "Change DWDM Card Settings." To change settings for transponder or muxponder cards, see Chapter 11, "Provision Transponder and Muxponder Cards."

Note Changing some NE defaults can cause CTC disconnection or a reboot of the node in order for the default to take effect. Before you change a default, view the Side Effects column of the Defaults editor (right-click a column header and select **Show Column > Side Effects**) and be prepared for the occurrence of any side effects listed for that default.

Stop. You have completed this procedure.

NTP-G137 Export Network Element Defaults

Purpose	This procedure exports the NE defaults using the NE Defaults editor. The exported defaults can be imported to other nodes.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Superuser only

Note The defaults currently displayed are exported whether or not they have been applied to the current node.

Note The NE defaults can also be exported from the File > Export menu. These exported defaults are for reference only and cannot be imported.

Note For a list of NE defaults, refer to the Network Element Defaults document.

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to export NE defaults.

Step 2 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Defaults** editor tabs.

Step 3 Click **Export**.

Step 4 If the location where you want to export the file does not appear in the Export Defaults to File dialog box, click **Browse** and browse to the location.

Step 5 Change the file name to something that is easy to remember (the file name has no extension).

Step 6 Click **OK**.

Stop. You have completed this procedure.

NTP-G166 View the Facilities

Purpose	This procedure displays DWDM facility information for all facilities in a node (single-shelf mode), shelf view (multishelf mode), or multishelf node (multishelf mode).
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite or remote
Security Level	Maintenance and higher

Step 1 Complete the "DLP-G46 Log into CTC" task at the node where you want to view DWDM facilities.

Step 2 In node view (single-shelf mode), shelf view (multishelf mode), or multishelf view (multishelf mode), click the **Maintenance > DWDM> All Facilities** tabs.

- Marked—Displays a check mark if you have designated the facility for logical grouping. To mark a facility to group it with others, go to Step 3.
- Location—Displays the slot number, slot type, port number, and port type of the facility.
- Admin State—Displays the administrative state of the facility.
- Service State—Displays the service state of the facility.
- Power—Displays the power level of the facility.

Step 3 To mark certain facilities to group during column sorting, click the desired row and click **Mark**. A check mark appears in the Marked column. Click the Marked column header to group all of the checked facilities in ascending order. Click the Marked header again to sort in descending order.

Step 4 To sort the facilities by the Location, Admin State, Service State, or Power columns in ascending order, click on the desired column header. Click the column header again to sort in descending order.

Stop. You have completed this procedure.

NTP-G119 Power Down the Node

Purpose	This procedure stops all node activity.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Warning **Do not reach into a vacant slot or chassis while you install or remove a module or a fan. Exposed circuitry could constitute an energy hazard.** Statement 206

Caution The following procedure is designed to minimize traffic outages when powering down nodes, but traffic will be lost if you delete and recreate circuits that passed through a working node.

Note Always use the supplied ESD wristband when working with the Cisco ONS 15454. Plug the wristband into the ESD jack located on the fan-tray assembly or on the lower right outside edge of the shelf on the NEBS 3 shelf assembly. To access the ESD plug on the NEBS 3 shelf assembly, open the front door of the Cisco ONS 15454. The front door is grounded to prevent electrical shock. For detailed instructions on how to wear the ESD wristband, see the *Electrostatic Discharge and Grounding Guide for Cisco CPT and Cisco ONS Platforms*.

Note The CTC views referenced in this procedure depend on the mode. For more information about CTC views, see CTC Operation, Information, and Shortcuts.

Step 1 Identify the node that you want to power down. If no cards are installed, go to Step 20. If cards are installed, log into the node. See the "DLP-G46 Log into CTC" task for instructions.

Step 2 Choose **Go to Network View** from the View menu.

Step 3 Verify that the node is not connected to a network.

a. If the node is part of a Software R4.7 or later dense wavelength division multiplexing (DWDM) configuration, see the NTP-G130 Remove a DWDM Node and continue with Step 4.

b. If the node is not connected to a working network and the current configurations are no longer required, proceed to Step 4.

Note Before the power-down of a DWDM node, the fiber spans connected around it must be disconnected from the network. This is to prevent the accidental disconnection of wavelengths that pass through the shelf. A good indication that the shelf has been disconnected from the network is optical service channel (OSC) alarms, or no OSC channels provisioned.

Note Current configurations will be saved if Steps 4 to 20 are skipped.

Step 4 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Circuits** tab and verify that no circuits appear, then proceed to Step 5. If circuits appear, delete all the circuits that originate or terminate in the node. Complete the "DLP-G106 Delete Optical Channel Network Connections" section on page 16-46, the "DLP-G347 Delete Optical Channel Client Connections" section on page 16-26, or the "DLP-G112 Delete Overhead Circuits" section on page 16-89 as needed.

Note When deleting circuits from a node, make sure that the node is not connected to any network.

Step 5 In node view (single-shelf mode) or shelf view (multishelf mode), click the **Provisioning > Protection** tabs and delete all protection groups:

a. Click the protection group that needs to be deleted and click **Delete**.

b. Click **Yes**.

Repeat until no protection groups appear.

Step 6 In node view (single-shelf mode) or multishelf view (multishelf mode), click the **Provisioning > Comm Channels** tabs and delete all communications channel terminations:

a. Click the section data communications channel (SDCC), line data communications channel (LDCC), generic communications channel (GCC), link management protocol (LMP), provisionable (external) patchcords (PPC), or OSC termination that needs to be deleted and click **Delete**.

b. Click **Yes**.

Repeat until no SDCC, LDCC, GCC, or OSC terminations are present.

Step 7 Before deleting any installed DWDM cards, the optical sides and the optical patchcords must be deleted. In node view (single-shelf mode) or multishelf view (multishelf mode), click **Provisioning > WDM-ANS > Optical Side** tabs.

a. Select all the connections and click **Delete**.

b. Click **Yes**.

Repeat until no optical sides and the optical patchcords are present.

Step 8 In node view (single-shelf mode) or multishelf view (multishelf mode), click **Provisioning > WDM-ANS > Internal Patchcords** tabs.

a. Select all the connections and click **Delete**.

b. Click **Yes**.

Repeat until no internal patchcords are present.

Step 9 In node view (single-shelf mode) or multishelf view (multishelf mode), click **Provisioning > WDM-ANS > Provisioning** tabs and delete all the ANS parameters.

a. Select all the ANS parameters and click **Remove**. The Network Type parameter cannot be deleted.

b. Click **Yes**.

Step 10 In node view (single-shelf mode) or multishelf view (multishelf mode), click **Provisioning > WDM-ANS > Passive Cards** tabs, and delete all the passive cards.

a. Click the passive card you want to delete.

b. Click **Delete**, then click **Yes**.

Step 11 Repeat Step a and Step b for each installed passive card.

Step 12 For each installed channel-bearing card (AD-1C-xx.x, AD-2C-xx.x, and AD-4C-xx.x, where xx.x refers to the specific wavelengths), make sure all lines and bands are not in IS-NR (ANSI) or Unlocked-Enabled (ETSI) service state:

a. In card view, click the **Provisioning > Optical Line > Parameters** tabs.

b. In the Admin State column for each line, make sure that the default state IS, AINS (ANSI), or Unlocked,automaticInservice (ETSI) is selected.

c. Click the **Provisioning > Optical Chn > Parameters** tabs.

d. In the Admin State column for each line, make sure that the default state IS, AINS (ANSI), or Unlocked,automaticInservice (ETSI) is selected.

Step 13 For each installed DWDM band-bearing card (AD-1B-xx.x and AD-4B-xx.x, where xx.x refers to the specific wavelengths), make sure all lines and bands are not in the IS-NR (ANSI) or Unlocked-Enabled (ETSI) service state:

a. In card view, click the **Provisioning > Optical Line > Parameters** tabs.

b. In the Admin State column for each line, make sure that the default state IS, AINS (ANSI), or Unlocked,automaticInservice (ETSI) is selected.

c. Click the **Provisioning > Optical Band > Parameters** tabs.

d. In the Admin State column for each line, make sure that the default state IS, AINS (ANSI), or Unlocked,automaticInservice (ETSI) is selected.

Step 14 For each installed transponder (TXP), muxponder (MXP), multiplexer, demultiplexer, amplifier, OSC-CSM, OSCM, wavelength switch, or single module ROADM card (32MUX-O, 32DMX-0, 32DMX, 32WSS, 4MD-xx.x, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-DMX-C, 40-DMX-CE, 40-MUX-C, TDC-CC, TDC-FC, 40-SMR1-C, 40-SMR2-C, OPT-BST, OPT-PRE, TXP_MR_10G, TXP_MR_10E, TXP_MR_2.5G, TXPP_MR_2.5G, 40E-TXP-C, 40ME-TXP-C, MXP_2.5G_10G, MXP_2.5G_10E, MXP_MR_2.5G, MXPP_MR_2.5G, 40G-MXP-C, 40E-MXP-C, 40ME-MXP-C, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, or ADM-10G), make sure all lines are not in the IS-NR (ANSI) or Unlocked-enabled (ETSI) service state:

a. In card view, click the appropriate tab depending on the card:

- For MXP_2.5G, MXP_2.5G_10G, TXP_MR_10G, TXP_MR_10E, click the **Provisioning > Line > SONET** tabs if the card was provisioned for a SONET payload, or the **Provisioning > Line > SDH** tabs if the card was provisioned for an SDH payload.
- For TXP_MR_2.5G, TXPP_MR_2.5G, and MXPP_MR_2.5G cards, click the **Provisioning > Line > SONET** tabs.
- For MXP_2.5G_10E cards, click the **Provisioning > Line > Trunk** tabs.
- For MXP_MR_2.5G cards, click the **Provisioning > Line > Client** tabs.
- For ADM-10G, OTU2_XP, 40E-TXP-C, 40ME-TXP-C, 40G-MXP-C, 40E-MXP-C, 40ME-MXP-C cards, click the **Provisioning > Line > Ports** tabs.
- For 32MUX-O, 32DMX-0, 32DMX, 32WSS, 40MUX, 40DMUX-C, TDC-CC, TDC-FC, OPT-BST, OPT-PRE cards, click the **Provisioning > Optical Line > Parameters** tabs.
- For 32DMX, 32DMX-O, 40-DMX-C, 40-MUX-C, 40-DMX-CE, 4MD cards, click the **Provisioning > Optical Chn > Parameters** tabs.
- For 40-WSS-C/40-WSS-CE cards, click the **Provisioning > Optical Chn: Optical Connector *x* > Parameters** tabs.
- For 40-WXC-C cards, click the **Provisioning > WXC Line > Parameters** tabs.

- For 40-DMX-C, 40-MUX-C, and 40-DMX-CE cards, click the **Provisioning > Optical Line > Parameters** tabs.
- For 4MD-xx.x cards, click the **Provisioning > Optical Band > Parameters** tabs.
- For GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards, click the **Provisioning > Ether Ports > Ports** tabs.
- For OPT-BST and OPT-PRE cards, click the **Provisioning > Optical Ampli Line > Parameters** tabs.
- For the 40-SMR1-C and 40-SMR2-C cards, click the **Provisioning > Optical Line > Parameters** tabs and **Provisioning > Opt. Ampli. Line > Parameters** tabs.
- For OSC-CSM and OSCM cards, click the **Provisioning > Optical Line > Parameters** tabs.
- For ADM_10G cards, click the **Provisioning > Line > Ports** tabs.

b. In the Admin State column for each line, make sure that the default state IS, AINS (ANSI) or Unlocked,automaticInservice (ETSI) is selected.

c. Repeat Steps a and b for each installed DWDM card.

Note Ports are put in service when circuits are provisioned, and put out of service when circuits are deleted. When circuits are deleted the Admin State displays as IS, AINS (ANSI) or Unlocked,automaticInservice (ETSI) and the Service State displays OOS-AU,AINS (ANSI) or Unlocked-disabled,automaticInService (ETSI).

Step 15 Remove all fiber connections to the cards.

Step 16 In node view (single-shelf mode) or shelf view (multishelf mode), right-click an installed card and click **Delete**.

Step 17 Click **Yes**.

Step 18 After you have deleted the card, open the card ejectors and remove it from the node.

Step 19 Repeat Step 15 through Step 18 for each installed card.

Note You cannot delete a TCC2/TCC2P/TCC3 card in Cisco Transport Controller (CTC). Physically remove it after all the other cards have been deleted and removed.

Note (On 15454 M2 and 15454 M6) You cannot delete an active TNC/TNCE/TSC/TSCE card in Cisco Transport Controller (CTC). Physically remove it after all the other cards have been deleted and removed.

Step 20 Shut off the power from the power supply that feeds the node.

Step 21 Disconnect the node from its external fuse source.

Step 22 Store all of the cards that you removed and update inventory records according to local site practice.

Stop. You have completed this procedure.

CHAPTER 25

Security Reference

The information in this chapter is in a new location. See Security Reference for information related to Cisco ONS 15454 user IDs and security levels, user privileges and policies, audit trail, and RADIUS security.

CHAPTER 26

Timing Reference

The information in this chapter is in a new location. See Timing Reference for information about Cisco ONS 15454 users and node timing parameters, network timing, and Synchronization Status Messaging (SSM).

CHAPTER 27

SNMP

The information in this chapter is in a new location. See SNMP for information related to Simple Network Management Protocol (SNMP) implemented in the Cisco ONS 15454.

APPENDIX A

CTC Operation, Information, and Shortcuts

The information in this chapter is in a new location. See CTC Operation, Information, and Shortcuts views, menus options, tool options, shortcuts, table display options, and shelf inventory data presented in CTC.

APPENDIX B

Hardware Specifications

The information in this chapter is in a new location. See Hardware Specifications for information related to hardware and software specifications for the ONS 15454 ANSI and ETSI cards.

APPENDIX C

Administrative and Service States

The information in this chapter is in a new location. See Administrative and Service States for an understanding of administrative and service states for Cisco ONS 15454 dense wavelength division multiplexing (DWDM) cards, optical payload ports, out-of-band optical service channel (OSC) ports, optical channel network connections (OCHNCs), and transponder/muxponder cards and ports.

APPENDIX **D**

Configuring GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using PCLI

The information in this chapter is in a new location. See Configuring GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE Cards Using PCLI for information on how to provision GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards using Pseudo Command Line Interface (PCLI).

APPENDIX E

Pseudo Command Line Interface Reference

The information in this chapter is in a new location. See Pseudo Command Line Interface Reference for information related to Pseudo-IOS command line interface (PCLI) for GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards.

APPENDIX F

Fiber and Connector Losses in Raman Link Configuration

The information in this chapter is in a new location. See Fiber and Connector Losses in Raman Link Configuration for important guidelines to be followed when configuring a Raman link regardless of whether you are configuring the Raman link using the Raman installation wizard or the CiscoTransport Planner (CTP) XML file.

APPENDIX G

Card Features

This chapter describes features common to the Cisco ONS 15454 suite of cards.

Note Unless otherwise specified, "ONS 15454" refers to both ANSI and ETSI shelf assemblies.

Note The cards described in this chapter are supported on the Cisco ONS 15454, Cisco ONS 15454 M6, Cisco ONS 15454 M2 platforms, unless noted otherwise.

Note In this chapter, "RAMAN-CTP" refers to the 15454-M-RAMAN-CTP card. "RAMAN-COP" refers to the 15454-M-RAMAN-COP card.

Chapter topics include:

G.1 Safety Labels

This section explains the significance of the safety labels attached to some cards. The faceplates of the cards are clearly labeled with warnings about the laser radiation levels. You must understand all warning labels before working on these cards.

G.1.1 Class 1 Laser Product Cards

The TCC2, TCC2P, TCC3, TNC, TNCE, TSC, TSCE, OSCM, OSC-CSM, 32MUX-O, 32DMX-O, 4MD-xx.x, MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, ADM-10G, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, and OTU2_XP cards are Class 1 laser products.

The labels that appear on these cards are described in the following sections.

G.1.1.1 Class 1 Laser Product Label

The Class 1 Laser Product label is shown in Figure G-1.

Figure G-1 Class 1 Laser Product Label

145952

Class 1 lasers are products whose irradiance does not exceed the Maximum Permissible Exposure (MPE) value. Therefore, for Class 1 laser products the output power is below the level at which it is believed eye damage will occur. Exposure to the beam of a Class 1 laser will not result in eye injury and can therefore be considered safe. However, some Class 1 laser products might contain laser systems of a higher Class but there are adequate engineering control measures to ensure that access to the beam is not reasonably likely. Anyone who dismantles a Class 1 laser product that contains a higher Class laser system is potentially at risk of exposure to a hazardous laser beam

G.1.1.2 Hazard Level 1 Label

The Hazard Level 1 label is shown in Figure G-2. This label is displayed on the faceplate of the cards.

Figure G-2 Hazard Level Label

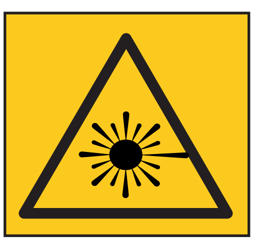
65542

The Hazard Level label warns users against exposure to laser radiation of Class 1 limits calculated in accordance with IEC60825-1 Ed.1.2.

G.1.1.3 Laser Source Connector Label

The Laser Source Connector label is shown in Figure G-3.

Figure G-3 Laser Source Connector Label



96635

This label indicates that a laser source is present at the optical connector where the label has been placed.

G.1.1.4 FDA Statement Labels

The FDA Statement labels are shown in Figure G-4 and Figure G-5. These labels show compliance to FDA standards and that the hazard level classification is in accordance with IEC60825-1 Am.2 or Ed.1.2.

Figure G-4 FDA Statement Label

COMPLIES WITH 21 CFR 1040.10
AND 1040.11 EXCEPT FOR
DEVIATIONS PURSUANT TO
LASER NOTICE NO.50,
DATED JULY 26, 2001

96634

Figure G-5 FDA Statement Label

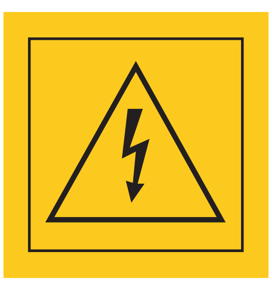
COMPLIES WITH 21 CFR 1040.10
AND 1040.11 EXCEPT FOR
DEVIATIONS PURSUANT TO
LASER NOTICE NO.50,
DATED JUNE 24, 2007

282324

G.1.1.5 Shock Hazard Label

The Shock Hazard label is shown in Figure G-6.

Figure G-6 Shock Hazard Label



65541

This label alerts personnel to electrical hazard within the card. The potential of shock hazard exists when removing adjacent cards during maintenance, and touching exposed electrical circuitry on the card itself.

G.1.2 Class 1M Laser Product Cards

The OPT-PRE, OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-AMP-17-C, OPT-AMP-C, OPT-RAMP-C, OPT-RAMP-CE, OPT-EDFA-17, OPT-EDFA-24, RAMAN-CTP, RAMAN-COP, TDC-CC, TDC-FC, PSM, AD-1C-xx.x, AD-2C-xx.x, AD-4c-xx.x, AD-1B-xx.x, AD-4B-xx.x, 32WSS, 32WSS-L, 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, 40-MUX-C, 40-WSS-C, 40-WSS-CE, 40-WXC-C, 80-WXC-C, 40-SMR1-C, 40-SMR2-C, MMU, TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, TXP_MR_2.5G, TXPP_MR_2.5G, MXP_MR_2.5G, MXPP_MR_2.5G, MXP_MR_10DME_C, MXP_MR_10DME_L, 40E-TXP-C, 40ME-TXP-C, 40G-MXP-C, 40E-MXP-C, 40ME-MXP-C, AR_MXP, and AR_XP are Class 1M laser products.

The labels that appear on these cards are described in the following subsections.

G.1.2.1 Class 1M Laser Product Statement

The Class 1M Laser Product statement is shown in Figure G-7.

Figure G-7 Class 1M Laser Product Statement

Class 1M lasers are products that produce either a highly divergent beam or a large diameter beam. Therefore, only a small part of the whole laser beam can enter the eye. However, these laser products can be harmful to the eye if the beam is viewed using magnifying optical instruments.

G.1.2.2 Hazard Level 1M Label

The Hazard Level 1M label is shown in Figure G-8. This label is displayed on the faceplate of the cards.

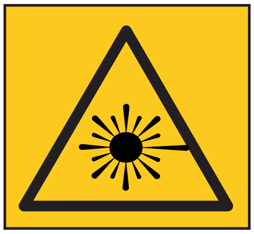
Figure G-8 Hazard Level Label

The Hazard Level label warns users against exposure to laser radiation of Class 1 limits calculated in accordance with IEC60825-1 Ed.1.2.

G.1.2.3 Laser Source Connector Label

The Laser Source Connector label is shown in Figure G-9.

Figure G-9 Laser Source Connector Label



96635

This label indicates that a laser source is present at the optical connector where the label has been placed.

G.1.2.4 FDA Statement Labels

The FDA Statement labels are shown in Figure G-10 and Figure G-11. These labels show compliance to FDA standards and that the hazard level classification is in accordance with IEC60825-1 Am.2 or Ed.1.2.

Figure G-10 FDA Statement Label

COMPLIES WITH 21 CFR 1040.10
AND 1040.11 EXCEPT FOR
DEVIATIONS PURSUANT TO
LASER NOTICE NO.50,
DATED JULY 26, 2001

96634

Figure G-11 FDA Statement Label

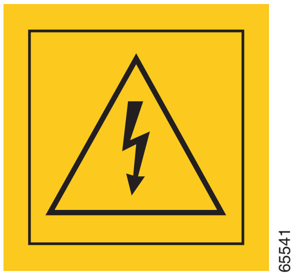
COMPLIES WITH 21 CFR 1040.10
AND 1040.11 EXCEPT FOR
DEVIATIONS PURSUANT TO
LASER NOTICE NO.50,
DATED JUNE 24, 2007

282324

G.1.2.5 Shock Hazard Label

The Shock Hazard label is shown in Figure G-12.

Figure G-12 Shock Hazard Label



This label alerts personnel to electrical hazard within the card. The potential of shock hazard exists when removing adjacent cards during maintenance, and touching exposed electrical circuitry on the card itself.

G.1.2.6 Burn Hazard Label

The burn hazard label is shown in Figure G-13.

Figure G-13 Burn Hazard Label

This label is displayed on the RAMAN-CTP and RAMAN-COP cards. The label alerts personnel against skin exposure to radiation that may cause burns. The potential of the burn hazard exists during handling of fibers.

G.2 Automatic Laser Shutdown

The Automatic Laser Shutdown (ALS) procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds and is user-configurable.

For information on ALS provisioning, refer the following procedures, as necessary:

- NTP-G162 Change the ALS Maintenance Settings, page 11-449
- DLP-G203 Change the OSCM and OSC-CSM ALS Maintenance Settings, page 20-12
- DLP-G322 Change the OPT-BST ALS Maintenance Settings, page 20-25

G.3 Card-Level Indicators

Multiple colored LEDs indicate the status of the card.

Table G-1 lists the three card-level LEDs on the following cards:

- TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE
- TXP_MR_10G and TXP_MR_10E
- TXP_MR_10E_C and TXP_MR_10E_L
- TXP_MR_2.5G and TXPP_MR_2.5G
- 40E-TXP-C and 40ME-TXP-C
- MXP_2.5G_10G and MXP_2.5G_10E
- MXP_2.5G_10E_C and MXP_2.5G_10E_L
- MXP_MR_2.5G and MXPP_MR_2.5G
- MXP_MR_10DME_C and MXP_MR_10DME_L
- 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C
- GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE
- ADM-10G
- OTU2_XP
- TXP_MR_10EX_C
- MXP_2.5G_10EX_C
- MXP_MR_10DMEX_C
- PSM
- TDC-CC and TDC-FC
- AR_MXP and AR_XP

Table G-1 Card-Level Indicators

Card-Level LED	Description
FAIL LED (Red)	Red indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	Green indicates that the card is operational (one or both ports active) and ready to carry traffic. Amber indicates that the card is operational and in standby (protect) mode.
SF LED (Amber)	Amber indicates a signal failure or condition such as loss of signal (LOS), loss of frame (LOF), or high bit error rates (BERs) on one or more of the card's ports. The amber SF LED is also illuminated if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the LED turns off.

Table G-2 lists the card-level LEDs on the AIC-I card.

Table G-2 Card-Level Indicators on the AIC-I Card

Card-Level LEDs	Description
Red FAIL LED	Indicates that the card's processor is not ready. The FAIL LED is on during reset and flashes during the boot process. Replace the card if the red FAIL LED persists.
Green ACT LED	Indicates the AIC-I card is provisioned for operation.
Green/Red PWR A LED	The PWR A LED is green when a supply voltage within a specified range has been sensed on supply input A. It is red when the input voltage on supply input A is out of range.
Green/Red PWR B LED	The PWR B LED is green when a supply voltage within a specified range has been sensed on supply input B. It is red when the input voltage on supply input B is out of range.
Yellow INPUT LED	The INPUT LED is yellow when there is an alarm condition on at least one of the alarm inputs.
Yellow OUTPUT LED	The OUTPUT LED is yellow when there is an alarm condition on at least one of the alarm outputs.
Green RING LED	The RING LED on the local orderwire (LOW) side is flashing green when a call is received on the LOW.
Green RING LED	The RING LED on the express orderwire (EOW) side is flashing green when a call is received on the EOW.

Table G-3 lists the card-level LEDs on the MS-ISC-100T card.

Table G-3 Card-Level Indicators on the MS-ISC-100T Card

Card-Level LEDs	Description
FAIL LED (Red)	The red FAIL LED indicates that the card processor is not ready or that a catastrophic software failure occurred on the card. As part of the boot sequence, the FAIL LED is turned on until the software deems the card operational.
ACT LED (Green)	The green ACT LED provides the operational status of the card. If the ACT LED is green, it indicates that the card is active and the software is operational.

Table G-4 lists the card-level LEDs on the following cards:

- 32MUX-O and 32DMX-O
- 4MD-xx.x
- OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L
- OPT-AMP-L, OPT-AMP-17-C, and OPT-AMP-C
- OPT-RAMP-C and OPT-RAMP-CE
- AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-1B-xx.x and AD-4B-xx.x
- 32WSS and 32WSS-L
- 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, and 40-MUX-C

- 40-WSS-C, 40-WSS-CE, 40-WXC-C, and 80-WXC-C
- 40-SMR1-C and 40-SMR2-C
- MMU
- OPT-EDFA-17 and OPT-EDFA-24

Table G-4 Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card's ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

Table G-5 lists the card-level LEDs on the following cards:

- OSCM
- OSC-CSM

Table G-5 Card-Level Indicators on the OSCM and OSC-CSM Cards

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OSCM or OSC-CSM is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as loss of signal (LOS), loss of frame alignment (LOF), line alarm indication signal (AIS-L), or high BER on one or more of the card's ports. The amber signal fail (SF) LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

G.4 Port-Level Indicators

For the following cards, the status of the card ports is indicated on the LCD screen of the ONS 15454 fan-tray assembly that displays the number and severity of alarms for a given port or slot.

- OPT-PRE, OPT-BST, OPT-BST-E, and OPT-BST-L
- OPT-AMP-L, OPT-AMP-17-C, and OPT-AMP-C
- OPT-RAMP-C and OPT-RAMP-CE
- RAMAN-CTP and RAMAN-COP

- OSCM and OSC-CSM
- 32MUX-O and 32DMX-O
- 4MD-xx.x
- AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-1B-xx.x, and AD-4B-xx.x
- 32WSS and 32WSS-L
- 32DMX, 32DMX-L, 40-DMX-C, 40-DMX-CE, and 40-MUX-C
- 40-WSS-C, 40-WSS-CE, 40-WXC-C, and 80-WXC-C
- 40-SMR1-C and 40-SMR2-C
- MMU
- OPT-EDFA-17 and OPT-EDFA-24

In some cards, multiple colored LEDs indicate the status of the port.

Port-Level LEDs for AR_MXP and AR_XP cards depend on the configured card mode.

Table G-6 lists the port-level LEDs on the following cards:

- TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L
- TXP_MR_2.5G and TXP_MR_10EX_C
- 40E-TXP-C and 40ME-TXP-C
- MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C

Table G-6 Port-Level Indicators

Port-Level LED	Description
Green Client LED[1]	The green Client LED indicates that the client port is in service and that it is receiving a recognized signal.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

1. The MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards have four client ports, and so have four client LEDs.

Table G-7 lists the port-level LEDs on the following cards:

- TXP_MR_10G
- MXP_2.5G_10G

Table G-7 Port-Level Indicators on the TXP_MR_10G and MXP_2.5G_10G cards

Port-Level LED	Description
Green Client LED (four LEDs for MXP_2.5G_10G[1])	The green Client LED indicates that the client port is in service and that it is receiving a recognized signal.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

Table G-7 Port-Level Indicators on the TXP_MR_10G and MXP_2.5G_10G (continued)cards

Port-Level LED	Description
Green Wavelength 1 LED	Each port supports two wavelengths on the DWDM side. Each wavelength LED matches one of the wavelengths. This LED indicates that the card is configured for Wavelength 1.
Green Wavelength 2 LED	Each port supports two wavelengths on the DWDM side. Each wavelength LED matches one of the wavelengths. This LED indicates that the card is configured for Wavelength 2.

1. The MXP_2.5G_10G card has four client ports, and so has four client LEDs.

Table G-8 lists the port-level LEDs on the TXPP_MR_2.5G card:

Table G-8 Port-Level Indicators on the TXPP_MR_2.5G card

Port-Level LED	Description
Green Client LED	The green Client LED indicates that the client port is in service and that it is receiving a recognized signal.
Green DWDM A LED	The green DWDM A LED indicates that the DWDM A port is in service and that it is receiving a recognized signal.
Green DWDM B LED	The green DWDM B LED indicates that the DWDM B port is in service and that it is receiving a recognized signal.

Table G-9 lists the port-level LEDs on the following cards:

- GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE
- MXP_MR_10DME_C, MXP_MR_10DME_L, and MXP_MR_10DMEX_C
- 40G-MXP-C, 40E-MXP-C, and 40ME-MXP-C

Table G-9 Port-Level Indicators

Port-Level LED	Description
Port LEDs (eight LEDs, four for each group, one for each SFP/XFP) Green/Red/Amber/Off	Green—The client port is either in service and receiving a recognized signal (that is, no signal fail), or Out of Service and Maintenance (OOS,MT or locked, maintenance) in which case the signal fail and alarms will be ignored. Red—The client port is in service but is receiving a signal fail (LOS). Amber—The port is provisioned and in a standby state. Off—The SFP is either not provisioned, out of service, not properly inserted, or the SFP hardware has failed.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

Table G-10 lists the port-level LEDs on the following cards:

- MXP_MR_2.5G
- MXPP_MR_2.5G

Table G-10 Port-Level Indicators on the MXP_MR_2.5G and MXPP_MR_2.5G cards

Port-Level LED	Description
Client LEDs (eight LEDs)	Green indicates that the port is carrying traffic (active) on the interface. Amber indicates that the port is carrying protect traffic (MXPP_MR_2.5G). Red indicates that the port has detected a loss of signal.
DWDM LED (MXP_MR_2.5G)	
Green (Active)	Green indicates that the card is carrying traffic (active) on the interface.
Red (LOS)	A red LED indicates that the interface has detected an LOS or LOC.
DWDMA and DWDMB LEDs (MXPP_MR_2.5G)	
Green (Active)	Green indicates that the card is carrying traffic (active) on the interface.
Amber (Protect Traffic)	When the LED is amber, it indicates that the interface is carrying protect traffic in a splitter protection card (MXPP_MR_2.5G).
Red (LOS)	A red LED indicates that the interface has detected an LOS or LOC.

Table G-11 lists the port-level LEDs on the following cards for both client and trunk ports:

- ADM-10G
- OTU2_XP

Note Client or trunk ports can each be in active or standby mode as defined in the related section for each specific protection type. For example, fiber-switched protection has active or standby trunk ports; 1+1 APS protection has active or standby client ports, and client 1+1 protection does not utilize active or standby ports.

Table G-11 Port-Level Indicators on the ADM-10G and OTU2_XP cards

Port-Level Status	Tri-color LED Description
The port-level LED is active and unprotected.	• If a port is in OOS/locked state for any reason, the LED is turned off. • If a port is in IS/unlocked state and the PPM is preprovisioned or is physically equipped with no alarms, the LED is green. • If a port is in IS state and the PPM is physically equipped but does have alarms, the LED is red.
The port-level LED is in standby.	• If a port is in OOS/locked state for any reason, the LED is turned off. • If a port is in the IS/unlocked state and the PPM is preprovisioned or is physically equipped with no alarms, the LED is amber. • If a port is in IS state and physically equipped but does have alarms, the LED is red.

Table G-12 lists the power-level LEDs on the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card.

Table G-12 Power-Level Indicators on the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards

Power-Level LEDs	Definition
Green/Amber/Red PWR A LED	The PWR A LED is green when the voltage on supply input A is between the low battery voltage (LWBATVG) and high battery voltage (HIBATVG) thresholds. The LED is amber when the voltage on supply input A is between the high battery voltage and extremely high battery voltage (EHIBATVG) thresholds or between the low battery voltage and extremely low battery voltage (ELWBATVG) thresholds. The LED is red when the voltage on supply input A is above extremely high battery voltage or below extremely low battery voltage thresholds.
Green/Amber/Red PWR B LED	The PWR B LED is green when the voltage on supply input B is between the low battery voltage and high battery voltage thresholds. The LED is amber when the voltage on supply input B is between the high battery voltage and extremely high battery voltage thresholds or between the low battery voltage and extremely low battery voltage thresholds. The LED is red when the voltage on supply input B is above extremely high battery voltage or below extremely low battery voltage thresholds.

Note For ONS 15454 ETSI shelf, the power-level LEDs are either green or red. The LED is green when the voltage on supply inputs is between the extremely low battery voltage and extremely high battery voltage thresholds. The LED is red when the voltage on supply inputs is above extremely high battery voltage or below extremely low battery voltage thresholds.

Table G-13 lists the network-level LEDs on the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card.

Table G-13 Network-Level Indicators on the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE cards

System-Level LEDs	Definition
Red CRIT LED	Indicates critical alarms in the network at the local terminal.
Red MAJ LED	Indicates major alarms in the network at the local terminal.
Yellow MIN LED	Indicates minor alarms in the network at the local terminal.
Red REM LED	Provides first-level alarm isolation. The remote (REM) LED turns red when an alarm is present in one or more of the remote terminals.
Green SYNC LED	Indicates that node timing is synchronized to an external reference.
Green ACO LED	After pressing the alarm cutoff (ACO) button, the ACO LED turns green. The ACO button opens the audible alarm closure on the backplane. ACO is stopped if a new alarm occurs. After the originating alarm is cleared, the ACO LED and audible alarm control are reset.

Table G-14 lists the ethernet port-level LEDs on the TNC/TNCE/TSC/TSCE card.

Table G-14 Ethernet Port-Level Indicators on the TNC/TNCE/TSC/TSCE cards

Port-Level LEDs	Definition
Green LINK LED	Indicates the connectivity status.
Amber ACT LED	Indicates data reception.

Table G-15 lists the SFP LED indicators.

Table G-15 TNC and TNCE SFP Indicators

Port Type	Link LED	Activity LED
OC3	• RED - No link • GREEN - Link	—
FE	• RED - No link • GREEN - Link	Blinks on packet flow
GE	• RED - No link • GREEN - Link	Blinks on packet flow

G.5 Client Interface

The client interface in TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C cards is implemented with a separately orderable XFP module. The module is a tri-rate transceiver, providing a single port that can be configured in the field to support an OC-192 SR-1 (Telcordia GR-253-CORE) or STM-64 I-64.1 (ITU-T G.691) optical interface, as well as 10GE LAN PHY (10GBASE-LR), 10GE WAN PHY (10GBASE-LW), 10G FC signals or IB_5G signals (TXP_MR_10EX_C only).

The client side XFP pluggable module supports LC connectors and is equipped with a 1310-nm laser.

The MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards provide four intermediate- or short-range OC-48/STM-16 ports per card on the client side. Both SR-1 or IR-1 optics can be supported and the ports use SFP connectors. The client interfaces use four wavelengths in the 1310-nm, ITU 100-MHz-spaced, channel grid.

The client interface in AR_MXP and AR_XP cards are implemented with a separately orderable XFP/SFP module. The module can be single-rate or multi-rate transceiver, providing a single port that can be configured in the field to support available payloads. For the list of supported payloads, see 11.20 AR_MXP and AR_XP Cards section.

G.6 DWDM Interface

The MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards serve as an OTN multiplexer, transparently mapping four OC-48 channels asynchronously to ODU1 into one 10-Gbps trunk. The tunable wavelengths for the DWDM trunk is as follows:

- MXP_2.5G_10E—Tunable for transmission over four wavelengths in the 1550-nm, ITU 100-GHz spaced channel grid.
- MXP_2.5G_10E_C and MXP_2.5G_10EX_C—Tunable for transmission over the entire C-band and the channels are spaced at 50-GHz on the ITU grid.
- MXP_2.5G_10E_L—Tunable for transmission over the entire L-band and the channels are spaced at 50-GHz on the ITU grid.
- AR_MXP and AR_XP—The wavelengths for the DWDM trunk is based on the pluggable.

Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the card in a loopback on the trunk port. Do not use direct fiber loopbacks as it can cause irreparable damage to the card.

Note On the MXP_2.5G_10EX_C card, you cannot disable ITU-T G.709 on the trunk side. If ITU-T G.709 is enabled, then FEC cannot be disabled.

G.7 DWDM Trunk Interface

On the trunk side, the TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, and TXP_MR_10EX_C cards provide a 10-Gbps STM-64/OC-192 interface. There are four tunable channels available in the 1550-nm band or eight tunable channels available in the 1580-nm band on the 50-GHz ITU grid for the DWDM interface. The card provides 3R (retime, reshape, and regenerate) transponder functionality for this 10-Gbps trunk interface. Therefore, the card is suited for use in long-range amplified systems. The DWDM interface is complaint with ITU-T G.707, ITU-T G.709, and Telcordia GR-253-CORE standards.

The DWDM trunk port operates at a rate that is dependent on the input signal and the presence or absence of the ITU-T G.709 Digital Wrapper/FEC. The possible trunk rates are:

- OC192 (9.95328 Gbps)
- OTU2 (10.70923 Gbps)
- 10GE (10.3125 Gbps) or 10GE into OTU2 (ITU G.sup43 11.0957 Gbps)
- 10G FC (10.51875 Gbps) or 10G FC into OTU2 (nonstandard 11.31764 Gbps)
- (TXP_MR_10EX_C only) Proprietary rate at the trunk when the client is provisioned as IB_5G.

The maximum system reach in filterless applications without the use of optical amplification or regenerators is nominally rated at 23 dB over C-SMF fiber. This rating is not a product specification, but is given for informational purposes. It is subject to change.

On the trunk side, the AR_MXP and AR_XP cards provide a 10-Gbps OTU2 or 2.5-Gbps OTU1 or 4-Gbps FC interfaces. The trunk wavelength can be tuned to any C-band wavelength, based on the pluggable inserted. The card provides 3R (retime, reshape, and regenerate) transponder functionality for this 10-Gbps trunk interface. Therefore, the card is suited for use in the long-range amplified systems.

The DWDM interface is complaint with ITU-T G.707, ITU-T G.709, and Telcordia GR-253-CORE standards. The DWDM trunk port operates at a rate that is dependent on the input signal and the presence or absence of the ITU-T G.709 Digital Wrapper/FEC.

The maximum system reach in filterless applications without the use of optical amplification or regenerators is nominally rated at 23 dB over C-SMF fiber. This rating is not a product specification, but is given for informational purposes. It is subject to change.

G.8 Enhanced FEC (E-FEC) Feature

A key feature of the TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, TXP_MR_10EX_C, and MXP_2.5G_10EX_C cards is the availability to configure the forward error correction in three modes: NO FEC, FEC, and E-FEC. The output bit rate is always 10.7092 Gbps as defined in ITU-T G.709, but the error coding performance can be provisioned as follows:

- NO FEC—No forward error correction
- FEC—Standard ITU-T G.975 Reed-Solomon algorithm
- E-FEC—Standard ITU-T G.975.1 I.7, two orthogonally concatenated BCH super FEC code. This FEC scheme contains three parameterizations of the same scheme of two orthogonally interleaved BCH. The constructed code is decoded iteratively to achieve the expected performance.

Note The E-FEC of the ONS 15454 and Cisco ASR 9000 are not compatible.

For the AR_MXP and AR_XP cards you can configure forward error correction on 10Gbps trunk XFP ports in four modes: NO FEC, FEC, I.4 E-FEC, and I.7 E-FEC. The 2.5Gbps SFP OTN ports have only two modes of operation—NO FEC and FEC. The output bit rate varies depending on the payload provisioned and FEC configured. Details of error coding performance that can be provisioned are as follows:

- NO FEC—No forward error correction
- FEC—Standard ITU-T G.975 Reed-Solomon algorithm
- I.4 E-FEC—Standard G.975.1 I.4 two interleaved codes (RS and BCH) super FEC codes
- I.7 E-FEC— Standard G.975.1 I.7 two orthogonally concatenated block (BCH) super FEC codes; this FEC scheme contains three parameterizations of the same scheme of two BCH codes, with the constructed code decoded iteratively to achieve the expected performance

Note G.709 OTN is enabled by default for all the trunk ports, except for a 4GFC transponder.

G.9 FEC and E-FEC Modes

As client side traffic passes through the TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, TXP_MR_10EX_C or MXP_2.5G_10EX_C card, it can be digitally wrapped using FEC mode, E-FEC mode, or no error correction at all. The FEC mode setting provides a lower level of error detection and correction than the E-FEC mode setting of the card. As a result, using E-FEC mode allows higher sensitivity (lower optical signal-to-noise ratio [OSNR]) with a lower bit error rate than FEC mode. E-FEC enables longer distance trunk-side transmission than with FEC.

The E-FEC feature is one of three basic modes of FEC operation. FEC can be turned off, FEC can be turned on, or E-FEC can be turned on to provide greater range and lower BER. The default mode is FEC on and E-FEC off. E-FEC is provisioned using CTC.

Caution Because the transponder has no visibility into the data payload and detect circuits, the TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, or TXP_MR_10EX_C cards do not display circuits in card view in CTC.

G.10 Client-to-Trunk Mapping

The TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, TXP_MR_10EX_C, AR_MXP, and AR_XP cards can perform ODU2-to-OCh mapping, which allows operators to provision data payloads in a standard way across 10-Gbps optical links. Additionaly, the AR_MXP, and AR_XP cards can perform ODU1-to-OCh mapping across 2.5 Gbps optical links.

Digital wrappers that define client side interfaces are called Optical Data Channel Unit 2 (ODU2) entities in ITU-T G.709. Digital wrappers that define trunk side interfaces are called Optical Channels (OCh) in ITU-T G.709. ODU2 digital wrappers can include Generalized Multiprotocol Label Switching (G-MPLS) signaling extensions to ITU-T G.709 (such as Least Significant Part [LSP] and Generalized Payload Identifier [G-PID] values) to define client interfaces and payload protocols.

G.11 Timing Synchronization

The TCC2/TCC2P/TCC3 card performs all system-timing functions for each ONS 15454. The TNC/TNCE/TSC/TSCE card performs all the system-timing functions for the 15454-M2 and 15454-M6 shelves.

The TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card monitors the recovered clocks from each traffic card and two BITS ports for frequency accuracy. The TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card selects a recovered clock, a BITS, or an internal Stratum 3 reference as the system-timing reference. You can provision any of the clock inputs as primary or secondary timing sources. A slow-reference tracking loop allows the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card to synchronize with the recovered clock, which provides holdover if the reference is lost. The TCC2P/TCC3/TNC/TNCE/TSC/TSCE card supports 64/8K composite clock and 6.312 MHz timing output.

Note The TNC/TNCE/TSC/TSCE card supports the BITS-1 and BITS-2 external timing interfaces on the ONS 15454 M6 shelf. The card supports the BITS-1 interface on the ONS 15454 M2 shelf.

The TNC/TNCE/TSC/TSCE card supports SNTP operation that allows the nodes to synchronize the system clock automatically with a reference SNTP server following system reboots, card resets, and software upgrades.

For more information on the timing function, see *Timing Reference* document.

The MXP_2.5G_10G card is synchronized to the TCC2/TCC2P/TCC3 clock during normal conditions and transmits the ITU-T G.709 frame using this clock. The TCC2/TCC2P/TCC3 card can operate from an external building integrated timing supply (BITS) clock, an internal Stratum 3 clock, or from clock recovered from one of the four valid client clocks. If clocks from both TCC2/TCC2P/TCC3 cards are not available, the MXP_2.5G_10G card switches automatically (with errors, not hitless) to an internal 19.44 MHz clock that does not meet SONET clock requirements. This will result in a clock alarm.

The MXP_2.5G_10E and MXP_2.5G_10EX_C cards are synchronized to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE clock and the MXP_2.5G_10E_C and MXP_2.5G_10E_L cards are synchronized to the TCC2/TCC2P/TCC3 clock during normal conditions and transmits the ITU-T G.709 frame using this clock. No holdover function is implemented. If neither TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE clock is available, the cards switch automatically (hitless) to the first of the four valid client clocks with no time restriction as to how long it can run on this clock. The cards continue to monitor the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card. If a TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card is restored to working order, the cards revert to the normal working mode of running from the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE clock. If no valid TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE clock is available and all of the client channels become invalid, the cards wait (no valid frames processed) until the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card supplies a valid clock. In addition, the cards can select the recovered clock from one active and valid client channel and supply that clock to the TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card.

The AR_MXP and AR_XP cards are able to transparently transport synchronization and timing information for payload enveloped within ODU-1 and ODU-2. The cards are synchronized to the TCC2/TCC2P/TCC3/TNC/TSC clock during normal conditions and transmit the ITU-T G.709 frame using this clock. The OTN ports configured as clients shall not be provisionable as timing source.

G.12 Multiplexing Function

The muxponder is an integral part of the reconfigurable optical add/drop multiplexer (ROADM) network. The key function of the MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards is to multiplex 4 OC-48/STM16 signals onto one ITU-T G.709 OTU2 optical signal (DWDM transmission). The AR_MXP and AR_XP cards multiplex the various client signals onto one ITU-T G.709 optical signal (DWDM transmission). The multiplexing mechanism allows the signal to be terminated at a far-end node by another similar card.

Termination mode transparency on the muxponder is configured using OTUx and ODUx OH bytes. The ITU-T G.709 specification defines OH byte formats that are used to configure, set, and monitor frame alignment, FEC mode, section monitoring, tandem connection monitoring, and termination mode transparency.

The card performs ODU to OTU multiplexing as defined in ITU-T G.709. The ODU is the framing structure and byte definition (ITU-T G.709 digital wrapper) used to define the data payload coming into one of the SONET/SDH client interfaces on the card. The term ODU1 refers to an ODU that operates at 2.5-Gbps line rate. On the card, four client interfaces can be defined using ODU1 framing structure and format by asserting an ITU-T G.709 digital wrapper.

The output of the muxponder is a single 10-Gbps DWDM trunk interface defined using OTU2. It is within the OTU2 framing structure that FEC or E-FEC information is appended to enable error checking and correction.

G.13 SONET/SDH Overhead Byte Processing

The MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_2.5G_10EX_C, AR_MXP, and AR_XP cards pass the incoming SONET/SDH data stream and its overhead bytes for the client signal transparently. The card can be provisioned to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.

G.14 Client Interface Monitoring

The following parameters are monitored on the MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_2.5G_10EX_C, AR_MXP, and AR_XP cards:

- Laser bias current is measured as a PM parameter
- LOS is detected and signaled
- Transmit (TX) and receive (RX) power are monitored

The following parameters are monitored in real time mode (one second):

- Optical power transmitted (client)
- Optical power received (client)

In case of loss of communication (LOC) at the DWDM receiver or far-end LOS, the client interface behavior is configurable. AIS can be invoked or the client signal can be squelched.

G.15 Jitter

For SONET and SDH signals, the MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_2.5G_10EX_C, AR_MXP, and AR_XP cards comply with Telcordia GR-253-CORE, ITU-T G.825, and ITU-T G.873 for jitter generation, jitter tolerance, and jitter transfer. For more information, see the "G.37 Jitter Considerations" section on page G-32.

G.16 Lamp Test

The MXP_2.5G_10E, MXP_2.5G_10E_C and MXP_2.5G_10E_L, MXP_2.5G_10EX_C, AR_MXP, AR_XP, TDC-CC, TDC-FC, TNC, TNCE, TSC, TSCE, RAMAN-CTP, and RAMAN-COP cards support lamp test function activated from the ONS 15454 front panel or through CTC to ensure that all LEDs are functional.

G.17 Onboard Traffic Generation

The MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, and MXP_2.5G_10EX_C cards provide internal traffic generation for testing purposes according to pseudo-random bit sequence (PRBS), SONET/SDH, or ITU-T G.709.

G.18 Performance Monitoring

GFP-T performance monitoring (GFP-T PM) in MXP_MR_2.5G, MXPP_MR_2.5G, AR_MXP, and AR_XP cards are available via remote monitoring (RMON), and trunk PM is managed according to Telcordia GR-253-CORE and ITU G.783/826. Client PM is achieved through RMON for FC and GE.

G.19 Distance Extension

In MXP_MR_2.5G and MXPP_MR_2.5G cards, buffer-to-buffer credit management scheme provides FC flow control. When this feature is enabled, a port indicates the number of frames that can be sent to it (its buffer credit), before the sender is required to stop transmitting and wait for the receipt of a "ready" indication The MXP_MR_2.5G and MXPP_MR_2.5 cards support FC credit-based flow control with a buffer-to-buffer credit extension of up to 1600 km (994.2 miles) for 1G FC and up to 800 km (497.1 miles) for 2G FC. The feature can be enabled or disabled, as necessary.

G.20 Slot Compatibility

You can install MXP_MR_2.5G, MXPP_MR_2.5G, AR_MXP, and AR_XP cards in Slots 1 to 6 and 12 to 17. The TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card is the only other card required to be used with these muxponder cards. Cross-connect cards do not affect the operation of the muxponder cards.

G.21 Interoperability with Cisco MDS Switches

You can provision a string (port name) for each fiber channel/FICON interface on the MXP_MR_2.5G and MXPP_MR_2.5G cards, which allows the MDS Fabric Manager to create a link association between that SAN port and a SAN port on a Cisco MDS 9000 switch.

G.22 Client and Trunk Ports

The MXP_MR_2.5G card features a 1550-nm laser for the trunk/line port and a 1310-nm or 850-nm laser (depending on the SFP) for the client ports. The card contains eight 12.5 degree downward tilt SFP modules for the client interfaces. For optical termination, each SFP uses two LC connectors, which are labeled TX and RX on the faceplate. In a MXP_MR_2.5G card, the trunk port is a dual-LC connector with a 45 degree downward angle. In a MXPP_MR_2.5G card, there are two trunk port connectors (one for working and one for protect), each a dual-LC connector with a 45-degree downward angle.

G.23 Communication and Control for Controller Cards

The following section describes the communication and control for the controller cards:

G.23.1 TCC2 Card

The TCC2 card terminates up to 32 DCCs. The TCC2 hardware is prepared for up to 84 DCCs, which will be available in a future software release. The node database, IP address, and system software are stored in TCC2 nonvolatile memory, which allows quick recovery in the event of a power or card failure.

G.23.2 TCC2P/TCC3 Card

The TCC2P/TCC3 card supports multichannel, high-level data link control (HDLC) processing for the DCC. Up to 84 DCCs can be routed over the TCC2P/TCC3 card and up to 84 section DCCs can be terminated at the TCC2P/TCC3 card (subject to the available optical digital communication channels). The TCC2P selects and processes 84 DCCs to facilitate remote system management interfaces.

The TCC2P/TCC3 card also originates and terminates a cell bus carried over the module. The cell bus supports links between any two cards in the node, which is essential for peer-to-peer communication. Peer-to-peer communication accelerates protection switching for redundant cards.

G.23.3 TNC and TNCE Cards

The TNC and TNCE cards act as node controller and shelf controller. The control tasks include system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection, and resolution. The control tasks also include SONET and SDH data communications channel (DCC) termination, 84 section SDCC and multiplex section MSDCC terminations, 28 SDCC tunnels or SDCC-to-line LDCC terminations, and system fault detection for the 15454-M2 and 15454-M6 shelves.

The system initialization tasks include assigning the network parameters to the system and loading the system with the provisioning data stored in the database. The line cards in the system do not boot without the TNC or TNCE card.

The TNC and TNCE cards support and provide the following:

- OSC communication to implement the Optical DCN, User Data Channels and Voice over IP interface.
- Supervisory data channel (SDC) for communication between the nodes.
- Two point-to-point Ethernet channels at 10 Mbps to carry Voice over IP traffic.
- Two point-to-point Ethernet channels at 10/100 Mbps to carry UDC traffic.
- Passive inventory of external devices on the 15454-M2 and 15454-M6 shelves.
- Supports OSC, UDC, and VoIP traffic. Two UDC/VoIP ports are present on the external connection unit that can be configured to carry UDC/VoIP traffic.

Note The TNC and TNCE cards support UDC and VoIP configuration only when OSC is configured on the ports. To delete the OSC channel on a port, delete the UDC and VoIP configuration on that port. For more information, refer the *Cisco ONS 15454 Hardware Installation Guide*.

On the 15454-M2 and 15454-M6 shelves, the TNC and TNCE cards must adhere to the following rules for SDCC/LDCC allocation:

- SDCC + SDCC Tunnels <= 68
- LDCC <= 28

- IP Tunnels <= 10
- SDCC + SDCC tunnels + (LDCC * 3) <= 84

G.23.4 TSC and TSCE Cards

The TSC and TSCE cards act as a shelf controller. The control tasks include system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection, and resolution. The control tasks also include SONET and SDH data communications channel (DCC) termination, 84 section SDCC and multiplex section MSDCC terminations, 28 SDCC tunnels or SDCC-to-line LDCC terminations, and system fault detection for the ONS 15454 M2 and ONS 15454 M6 shelves.

The system initialization tasks include assigning the network parameters to the system and loading the system with the provisioning data stored in the database. The line cards in the system do not boot without the TSC and TSCE cards.

The TSC and TSCE cards support and provides the following:

- Passive inventory of external devices on the 15454-M2 and 15454-M6 shelves.
- 100 Mbps UDC on the 15454-M6 shelf.

On the 15454-M2 and 15454-M6 shelves, the TSC and TSCE cards must adhere to the following rules for SDCC/LDCC allocation.

- SDCC + SDCC Tunnels <= 68
- LDCC <= 28
- IP Tunnels <= 10
- SDCC + SDCC tunnels + (LDCC * 3) <= 84

G.24 Interface Ports

The TCC2 card has two built-in interface ports for accessing the system: an RJ-45 10BaseT LAN interface and an EIA/TIA-232 ASCII interface for local craft access. It also has a 10BaseT LAN port for user interfaces via the backplane.

The TCC2P/TCC3 card has two built-in Ethernet interface ports for accessing the system: one built-in RJ-45 port on the front faceplate for on-site craft access and a second port on the backplane. The rear Ethernet interface is for permanent LAN access and all remote access via TCP/IP as well as for Operations Support System (OSS) access. The front and rear Ethernet interfaces can be provisioned with different IP addresses using CTC.

Two EIA/TIA-232 serial ports, one on the faceplate and a second on the backplane, allow for craft interface in TL1 mode.

Note To use the serial port craft interface wire-wrap pins on the backplane, the DTR signal line on the backplane port wire-wrap pin must be connected and active.

The TNC/TNCE/TSC/TSCE card has three built-in interface ports:

- RJ-45 LAN port
- RJ-45 console port
- RS-232 port (serial port)

The RJ-45 LAN port and RS-232 port are located on the faceplate of the TNC/TNCE/TSC/TSCE card. The RJ-45 console port is behind the faceplate of the TNC/TNCE/TSC/TSCE card.

The front access RJ-45 LAN port provides 10/100 BASE-T Ethernet connectivity to the system. The RJ-45 LAN port has LEDs to provide link and activity status. The RJ-45 LAN port provides local and remote access to the Cisco Transport Controller through a common Web interface.

The RJ-45 console port is used to launch a debug session on the TNC/TNCE/TSC/TSCE card.

The RS-232 port is used to connect to the Transaction Language 1 (TL1) management interface. In TL1 mode, the RS-232 port runs at 9.6 Kbps without any flow control.

The front access LAN port and RJ-45 EMS LAN port can be provisioned with different IP addresses by configuring the TNC and TNCE cards in secure mode using CTC. On 15454 M2, the EMS port is on the power module. On 15454 M6, the EMS port is on the ECU.

The two SFP ports (SFP1 and SFP2) are used for primary OSC and secondary OSC connections. SFP1 supports OC-3/STM-1, FE, or GE payloads; SFP2 supports FE or GE payloads.

The two SFP ports on the TNC/TNCE/TSC/TSCE card are in IS,AINS administrative state during payload creation. In this state, only the following alarms are raised:

- AS-MT alarm on PPM
- AS-CMD alarm on PPM and facility
- Prov-Mismatch alarm on PPM

The TX power is -40 and RX power is -50 for Ultra long-haul SFPs. The TX power is -40 and RX power is -40 for other SFPs. When the OSC is created, the two SFP ports move to IS state. In this state, all the supported alarms are raised.

Note VLAN tagged traffic is not supported on UDC or VoIP ports that are present on the external connection unit.

G.25 External Alarms and Controls

The TNC/TNCE/TSC/TSCE card provides customer-defined (environmental) alarms and external controls on the ONS 15454 M6 shelf. The card provides input/output alarm contact closures. The TNC/TNCE/TSC/TSCE card operates in two modes:

- External alarms mode - This is the default mode and up to 14 alarm input ports can be configured. External alarms (input contacts) are typically used for external sensors such as open doors, temperature sensors, flood sensors, and other environmental conditions.
- External control mode - Up to 10 alarm input ports and four alarm output ports can be configured. External controls (output contacts) are typically used to drive visual or audible devices such as bells and lights, but they can control other devices such as generators, heaters, and fans.

To configure the external alarms and external controls, go to Provisioning -> Alarm Extenders tab in the CTC node view. To view the external alarms and external controls, go to Maintenance -> Alarm Extenders tab in the CTC node view. For information on how to configure and view the external alarms and external controls, refer the Alarm and TCA Monitoring and Management document.

Note The LCD module must be present in the ONS 15454 M6 shelf assembly to provision alarms from the ECU, fan-tray assembly, or power modules.

For information on pinouts of external alarms and external controls, see the "ONS 15454 ANSI Alarm, Timing, LAN, and Craft Pin Connections" section in the *Cisco ONS 15454 Hardware Installation Guide*.

G.26 Digital Image Signing (DIS)

The TNC/TNCE/TSC/TSCE card provides services that authenticate the origin of the software running on the Cisco ONS 15454 M2 and Cisco ONS 15454 M6 platforms, see the "3.8 Digital Image Signing" section on page 3-20.

G.27 Database Storage

The node database, IP address, and system software are stored in TCC2P/TCC3 card nonvolatile memory, which allows quick recovery in the event of a power or card failure.

The TNC/TNCE/TSC/TSCE card provides 4 GB of non-volatile database storage (IDE Compact Flash Module) for communication, provisioning, and system control. This allows full database recovery during power failure.

The TNC/TNCE/TSC/TSCE card supports writing and reading to and from an external non-volatile memory device. The card also communicates with the non-volatile memory device through a USB 2.0 standard interface.

The USB-WRITE-FAIL alarm may be raised on the TNC and TNCE cards when synchronization occurs between Compact Flash and USB Flash. If this alarm does not clear even after 20 minutes duration, it is recommended to contact TAC.

For information on USB-WRITE-FAIL alarm, see the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

Note The configuration details are stored in the database of the TNC/TNCE/TSC/TSCE card. The database restore from a TNC/TNCE/TSC/TSCE card to a TSC/TSC/TSCE card or vice versa is not supported.

G.28 Redundant Controller Card Installation

Cisco does not support operation of the ONS 15454 with only one TCC2/TCC2P/TCC3 card. For full functionality and to safeguard your system, always operate with two TCC2/TCC2P/TCC3 cards.

Install TCC3 cards in Slots 7 and 11 for redundancy. If the active TCC3 card fails, traffic switches to the protect TCC3 card. All TCC3 card protection switches conform to protection switching standards when the bit error rate (BER) counts are not in excess of 1 * 10 exp – 3 and completion time is less than 50 ms.

On the ONS 15454 M6 shelf, the TNC/TNCE/TSC/TSCE card operates in either simplex or duplex (redundant) control mode. In redundant control mode, high availability is achieved.

When a second TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE card is inserted into a node, it synchronizes its software, its backup software, and its database with the active TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE. If the software version of the new TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE does not match the version on the active TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE, the newly inserted TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE copies from the active TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE, taking about 15 to 20 minutes to complete. If the backup software version on the new TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE does not match the version on the active TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE, the newly inserted TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE copies the backup software from the active TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE again, taking about 15 to 20 minutes. Copying the database from the active TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE takes about 3 minutes. Depending on the software version and backup version the new TCC2/TCC2P/TCC3/TNC/TNCE/TSC/TSCE started with, the entire process can take between 3 and 40 minutes.

G.29 Optical Service Channel

The TNC and TNCE cards support two optical service channels (OSC) through two small-form factor pluggable (SFP) ports. The two SFP ports are named SFP1 and SFP2. The supported SFPs on TNC and TNCE ports are ONS-SC-OSC-ULH, ONS-SE-155-1510, and ONS-SC-Z3-1510.

Note When you replace SFPs on the TNC and TNCE cards, provisioning for the current SFP has to be deleted before the new SFP is plugged in.

SFP1 supports the following payloads:

- OC-3/STM-1
- Fast Ethernet (FE)
- Gigabit Ethernet (GE)

SFP2 supports the following payloads:

- Fast Ethernet (FE)
- Gigabit Ethernet (GE)

G.30 MultiShelf Management

The TNC/TNCE/TSC/TSCE card supports multishelf management of up to 30 shelves including the node controller. The card supports up to 29 subtending shelves. The subtending shelves can be the ONS 15454 M6 or ONS 15454 shelves. This allows network administrators to isolate faults and provision new services across the DWDM network.

In the ONS 15454 M6 shelf, there are six FE RJ45 ports on the ECU and each TNC/TNCE/TSC/TSCE card supports three FE RJ45 connections to connect subtending shelves.

G.31 Protection Schemes

The TNC/TNCE/TSC/TSCE card supports active and redundant architecture. The ONS 15454 M6 shelf supports 1:1 equipment protection with one TNC/TNCE/TSC/TSCE card acting as active and the other TNC/TNCE/TSC/TSCE card as redundant.

The 15454-M2 shelf supports simplex control mode. In this mode, the active TNC/TNCE/TSC/TSCE card operates without a redundant TNC/TNCE/TSC/TSCE card.

The 15454-M6 shelf supports both simplex and redundant control mode. In redundant control mode, the active TNC/TNCE/TSC/TSCE card operates with a redundant TNC/TNCE/TSC/TSCE card as the backup. If the active TNC/TNCE/TSC/TSCE card is removed, system traffic switches to the redundant TNC/TNCE/TSC/TSCE card. If the redundant TNC/TNCE/TSC/TSCE card is not present or not in the standby state, removing the active TNC/TNCE/TSC/TSCE card results in loss of system traffic and management connectivity.

In redundant control mode, a TNC/TNCE/TSC/TSCE card can protect another TNC/TNCE/TSC/TSCE card. However, a TNC/TNCE/TSC/TSCE card cannot protect a TNC/TNCE/TSC/TSCE card or vice versa.

G.32 Cards Supported by TNC/TNCE/TSC/TSCE

The TNC/TNCE/TSC/TSCE card supports 15454 MSTP line cards except the following cards:

- OSCM
- ISC
- AIC
- AIC-I

The TNC/TNCE/TSC/TSCE card is not interoperable with TCC2 /TCC2P/TCC3 cards. The TNC/TNCE/TSC/TSCE and TCC cards cannot be inserted in the same shelf.

The line cards such as Transponder and Muxponder cards can be inserted in the 15454-M2 and 15454-M6 shelves along with the TNC/TNCE/TSC/TSCE card.

G.33 Automatic Power Control

A transient gain range of 20 to 23 dB is available to APC in order to permit other amplifiers to reach their expected set points. However, operation in this range is not continuous. At startup, the OPT-AMP-17-C card caps the gain at a maximum of 20 dB.

Note When the OPT-AMP-17-C operates as a booster amplifier, APC does not control its gain.

G.34 Alarms and Thresholds

Table G-16 lists the alarms and its related thresholds for the OSC-CSM card.

Table G-16 Alarms and Thresholds

Port	Alarms	Thresholds
LINE RX	LOS	None
	LOS-P	LOS-P Fail Low
	LOS-O	LOS-O Fail Low
LINE TX	None	None

Table G-16 Alarms and Thresholds

Port	Alarms	Thresholds
OSC TX	OPWR-DEG-HIGH	OPWR-DEG-HIGH Th
	OPWR-DEG-LOW	OPWR-DEG-LOW Th
	OPWR-FAIL-LOW	OPWR-FAIL-LOW Th
OSC RX	None	None
COM TX	None	None
COM RX	LOS-P	LOS-P Fail Low

G.35 Card Protection

G.35.1 Y-Cable and Splitter Protection

Y-cable and splitter protection are two main forms of card protection that are available for TXP, MXP, AR_MXP, AR_XP, and Xponder (GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, and OTU2_XP) cards when they are provisioned in TXP or MXP mode. Y-cable protection is provided at the client port level. Splitter protection is provided at the trunk port level.

Note GE_XP, 10GE_XP, GE_XPE, and 10GE_XPE cards use VLAN protection when they are provisioned in L2-over-DWDM mode. For information, see the "G.35.3 Layer 2 Over DWDM Protection" section on page G-31. The ADM-10G card uses path protection and 1+1 protection. For more information, see the "11.15.10 Protection" section on page 11-90.

G.35.1.1 Y-Cable Protection

Y-cable protection is available for the following ONS 15454 TXP, MXP, and Xponder cards:

- TXP_MR_10G
- TXP_MR_10E
- TXP_MR_2.5G
- 40E-TXP-C
- 40ME-TXP-C
- MXP_2.5G_10G
- MXP_2.5G_10E
- MXP_2.5G_10E_C
- MXP_2.5G_10E_L
- MXP_MR_2.5G
- MXP_MR_10DME_C
- MXP_MR_10DME_L
- 40G-MXP-C

- 40E-MXP-C
- 40ME-MXP-C
- GE_XP and GE_XPE (when in 10GE or 20GE MXP card mode)
- 10GE_XP and 10GE_XPE (when in 10GE TXP card mode)
- OTU2_XP (when in Transponder card configuration)
- AR_MXP
- AR_XP

To create a Y-cable protection, create a Y-cable protection group for two TXP, MXP, or Xponder cards using the CTC software, then connect the client ports of the two cards physically with a Y-cable. The single client signal is sent into the RX Y-cable and is split between the two TXP, MXP, or Xponder cards. The two TX signals from the client side of the TXP, MXP, or Xponder cards are combined in the TX Y-cable into a single client signal. Only the active card signal passes through as the single TX client signal. The other card must have its laser turned off to avoid signal degradation where the Y-cable joins.

On the GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, and OTU2_XP cards, the Y-cable protection mechanism is provisionable and can be set ON or OFF (OFF is the default mode). When a signal fault is detected (LOS, LOF, SD, or SF on the DWDM receiver port in the case of ITU-T G.709 mode) the protection mechanism software automatically switches between paths. Y-cable protection also supports revertive and nonrevertive mode.

When an MXP_MR_2.5G, MXP_MR_10DME_C, MXP_MR_10DME_L, AR_MXP, or AR_XP card that is provisioned with Y-cable protection is used on a storage ISL link (ESCON, FC1G, FC2G, FC4G, FICON1G, FICON2G, FICON4G, or ISC-3 1/2G), a protection switchover resets the standby port to active. This reset reinitialises the end-to-end link to avoid any link degradation caused due to loss of buffer credits during switchover and results in an end-to-end traffic hit of 15 to 20 seconds.

When using the MXP_MR_10DME_C or MXP_MR_10DME_L card, enable the fast switch feature and use it with a Cisco MDS storage switch to avoid this 15 to 20 second traffic hit. When enabling fast switch on the MXP_MR_10DME_C or MXP_MR_10DME_L card, ensure that the attached MDS switches have the buffer-to-buffer credit recovery feature enabled.

You can also use the TXP_MR_2.5G card to avoid this 15 to 20 second traffic hit. When a Y-cable protection switchover occurs, the storage ISL link does not reinitialize and results in an end-to-end traffic hit of less than 50 ms.

AR_MXP and AR_XP cards support Y-cable protection on the client ports, which are part of an unprotected card mode. The Y-cable protection is not supported for video and auto payloads.

When using the AR_MXP or AR_XP card on storage ISL link, use it with a Cisco MDS storage switch to avoid this 15 to 20 second traffic hit.

When the active AR_MXP or AR_XP card is removed from a Cisco 15454 M2 or Cisco 15454 M6 shelf, there is a traffic hit of 60 to 100 miliseconds.

Note Y-cable connectors will not work with electrical SFPs because Y-cables are made up of optical connectors and there is no way to physically connect them to a electrical SFP. Y-cable protection is not supported on IB_5G.

Note There is a traffic hit of upto a couple hundred milliseconds on the MXP_MR_2.5G and MXP_MR_10DME cards in Y-cable configuration when a fiber cut or SFP failure occurs on one of the client ports.

Note If you create a GCC on either card of the protect group, the trunk port stays permanently active, regardless of the switch state. When you provision a GCC, you are provisioning unprotected overhead bytes. The GCC is not protected by the protect group.

Figure G-14 on page G-29 shows the Y-cable signal flow.

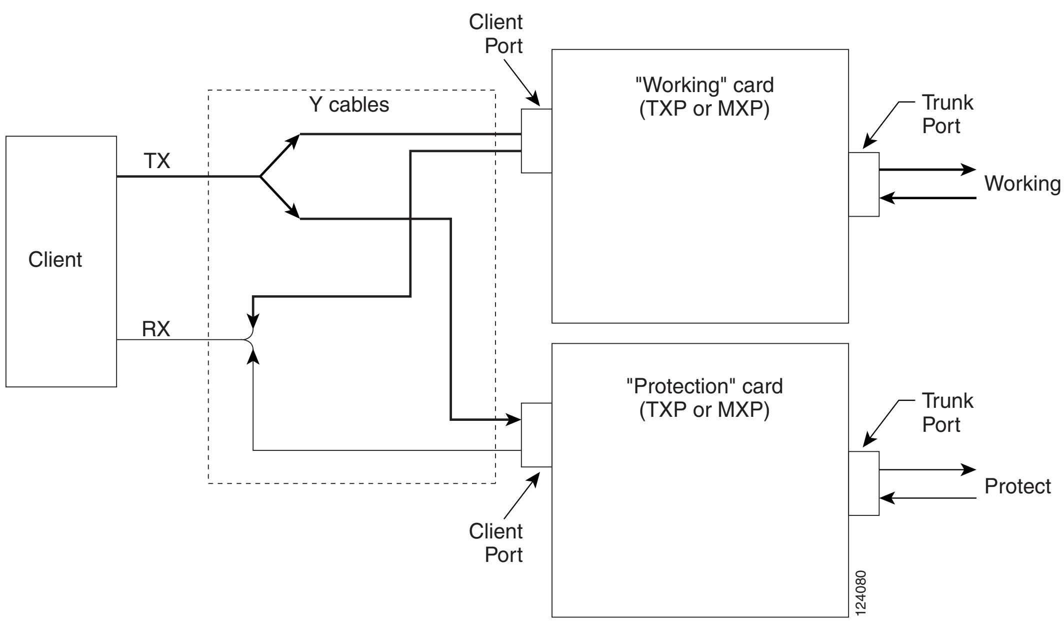
Note Loss of Signal–Payload (LOS-P) alarms, also called Incoming Payload Signal Absent alarms, can occur on a split signal if the ports are not in a Y-cable protection group.

Note Removing an SFP from the client ports of a card in a Y-cable protection group card causes an IMPROPRMVL (PPM) alarm. The working port raises the IMPROPRMVL alarm and the protected port raises the IMPROPRMVL alarm. The severity on the client ports is changed according to the protection switch state.

Note On the OTU2_XP card, when the 10G Ethernet LAN Phy to WAN Phy conversion feature is enabled, Y-cable protection is not supported on the LAN to WAN interface (ports 1 and 3).

Note When using fixed DWDM or tunable XFPs for Y-cable protection, the protection switch time may exceed 50ms.

Figure G-14 Y-Cable Protection



G.35.1.2 Splitter Protection

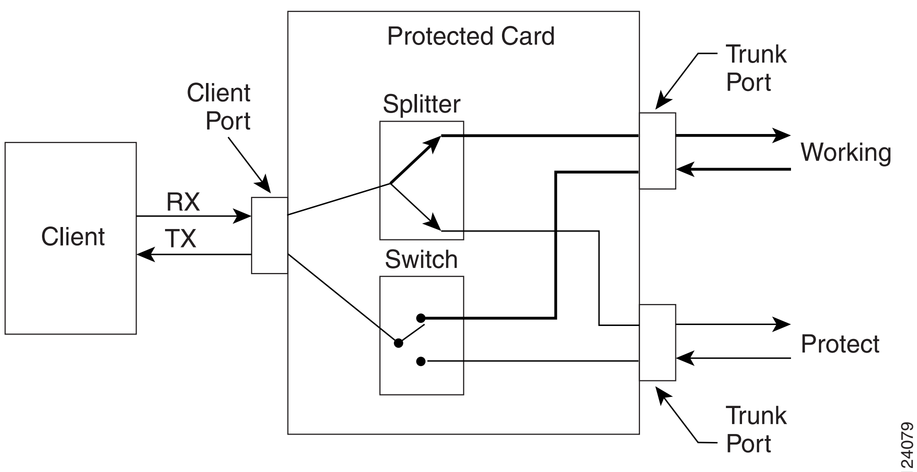
Splitter protection, shown in Figure G-15, is provided with TXPP cards, MXPP cards, and OTU2_XP cards (on trunk ports that are not part of a regenerator group). You can create and delete splitter protection groups in OTU2_XP card.

To implement splitter protection, a client injects a single signal into the client RX port. An optical splitter internal to the card then splits the signal into two separate signals and routes them to the two trunk TX ports. The two signals are transmitted over diverse optical paths. The far-end MXPP or TXPP card uses an optical switch to choose one of the two trunk RX port signals and injects it into the TX client port. When using splitter protection with two MXPP or TXPP cards, there are two different optical signals that flow over diverse paths in each direction. In case of failure, the far-end switch must choose the appropriate signal using its built-in optical switch. The triggers for a protection switch are LOS, LOF, SF, or SD.

In the splitter protected 10G Ethernet LAN Phy to WAN Phy mode, AIS-P and LOP-P acts as trigger (when G.709 is enabled) for the Protection Switch, in addition to the existing switching criteria.

In the OTU2_XP card, the STS parameters such as, SF /SD thresholds, Path PM thresholds, and Path Trace is set for the working path (Port 3). The same parameters are also applicable for the protected path (Port 4).

Figure G-15 Splitter Protection



G.35.2 1+1 Protection

The 1+1 protection is available for the GE_XP, GE_XPE, 10GE_XP, and 10GE_XPE cards:

The 1+1 protection is provided in the Layer 2 (L2) card mode to protect against client port and card failure. 1+1 protection is supported in both single shelf and multishelf setup. This means that the working card can be in one shelf and the protect card can be in another shelf of a multishelf setup. Communication between the two cards is across 10 Gigabit Ethernet interconnection interface using Ethernet packets. The Inter link (ILK) trunk or internal pathcord must be provisioned on both the cards. This link is used to transmit protection switching messages and data.

> **Note** With 1+1 protection mechanisms, the switch time of a copper SFP is 1 second.

With 1+1 protection, ports on the protect card can be assigned to protect the corresponding ports on the working card. A working card must be paired with a protect card of the same type and number of ports. The protection takes place on the port level, and any number of ports on the protect card can be assigned to protect the corresponding ports on the working card.

To make the 1+1 protection scheme fully redundant, enable L2 protection for the entire VLAN ring. This enables Fast Automatic Protection Switch (FAPS). The VLAN configured on the 1+1 port must be configured as protected SVLAN.

1+1 protection can be either revertive or nonrevertive. With nonrevertive 1+1 protection, when a failure occurs and the signal switches from the working card to the protect card, the signal remains on the protect card until it is manually changed. Revertive 1+1 protection automatically switches the signal back to the working card when the working card comes back online. 1+1 protection uses trunk ports to send control traffic between working and protect cards. This trunk port connection is known as ILK trunk ports and can be provisioned via CTC.

The standby port can be configured to turn ON or OFF but the traffic coming to and from the standby port will be down. If the laser is ON at the standby port, the other end port (where traffic originates) will not be down in a parallel connection. Traffic is blocked on the standby port.

1+1 protection is bidirectional and nonrevertive by default; revertive switching can be provisioned using CTC.

G.35.3 Layer 2 Over DWDM Protection

The Layer 2 Over DWDM protection is available for the following cards:

- GE_XP and GE_XPE
- 10GE_XP and 10GE_XPE

When the card is in L2-over-DWDM card mode, protection is handled by the hardware at the Layer 1 and Layer 2 levels. Fault detection and failure propagation is communicated through the ITU-T G.709 frame overhead bytes. For protected VLANs, traffic is flooded around the 10 Gigabit Ethernet DWDM ring. To set up the Layer 2 protection, you identify a node and the card port that is to serve as the master node and port for the VLAN ring on the card view Provisioning > Protection tab. If a failure occurs, the node and port are responsible for opening and closing VLAN loops.

> **Note** The Forced option in the Protection drop-down list converts all the SVLANs to protected SVLANs irrespective of the SVLAN protection configuration in the SVLAN database. This is applicable to a point-to-point linear topology. The SVLAN protection must be forced to move all SVLANs, including protected and unprotected SVLANs, to the protect path irrespective of provisioned SVLAN attributes.

A FAPS switchover happens in the following failure scenarios:

- DWDM line failures caused by a fiber cut
- Unidirectional failure in the DWDM network caused by a fiber cut
- Fiber pull on the master card trunk port followed by a hard reset on the master card
- Hard reset on the master card
- Hard reset on the slave card

- An OTN failure is detected (LOS, OTUK-LOF, OTUK-LOM, OTUK-LOM, OTUK-SF, or OTUK-BDI on the DWDM receiver port in the case of ITU-T G.709 mode)
- Trunk ports are moved to OOS,DSBLD (Locked,disabled) state
- Improper removal of XFPs

A FAPS switchover does not happen in the following scenarios:

- Slave card trunk port in OOS,DSBLD (Locked,disabled) state followed by a hard reset of the slave card
- OTN alarms raised on the slave card trunk port followed by a hard reset of the slave card

G.36 Far-End Laser Control

The 15454 DWDM cards provide a transparent mode that accurately conveys the client input signal to the far-end client output signal. The client signal is normally carried as payload over the DWDM signals. Certain client signals, however, cannot be conveyed as payload. In particular, client LOS or LOF cannot be carried. Far-end laser control (FELC) is the ability to convey an LOS or LOF from the near-end client input to the far-end client output.

If an LOS is detected on the near-end client input, the near-end trunk sets the appropriate bytes in the OTN overhead of the DWDM line. These bytes are received by the far-end trunk, and cause the far-end client laser to be turned off. When the laser is turned off, it is said to be squelched. If the near-end LOS clears, the near-end trunk clears the appropriate bytes in the OTN overhead, the far-end detects the changed bytes, and the far-end client squelch is removed.

FELC also covers the situation in which the trunk port detects that it has an invalid signal; the client is squelched so as not to propagate the invalid signal.

Payload types with the 2R mode preclude the use of OTN overhead bytes. In 2R mode, an LOS on the client port causes the trunk laser to turn off. The far end detects the LOS on its trunk receiver and squelches the client.

FELC is not provisionable. It is always enabled when the DWDM card is in transparent termination mode. However, FELC signaling to the far-end is only possible when ITU-T G.709 is enabled on both ends of the trunk span.

G.37 Jitter Considerations

Jitter introduced by the SFPs used in the transponders and muxponders must be considered when cascading several cards. With TXP_MR_2.5G, TXPP_MR_2.5G, MXP_MR_2.5G, MXPP_MR_2.5G, TXP_MR_10E, AR_MXP, and AR_XP cards several transponders can be cascaded before the cumulative jitter violates the jitter specification. The recommended limit is 20 cards. With TXP_MR_10G cards, you can also cascade several cards, although the recommended limit is 12 cards. With MXP_2.5G_10G and MXP_2.5G_10E cards, any number of cards can be cascaded as long as the maximum reach between any two is not exceeded. This is because any time the signal is demultiplexed, the jitter is eliminated as a limiting factor.

The maximum reach between one transponder and the other must be halved if a Y cable is used. For more information on Y-cable operation, see the "G.35.1.1 Y-Cable Protection" section on page G-27.

G.38 Termination Modes

Transponder and muxponder cards have various SONET and SDH termination modes that can be configured using CTC (see the "11.23 Procedures for Transponder and Muxponder Cards" section on page 11-142). The termination modes are summarized in Table G-17.

Table G-17 Termination Modes

Cards	Termination Mode	Description
All TXP, MXP, and OTU2_XP cards, with the exception of the MXP_2.5G_10G card (see next section of this table)	Transparent Termination	All the bytes of the payload pass transparently through the cards.
	Section Termination	In line termination mode, the section and line overhead bytes for SONET and the overhead bytes for the SDH multiplex and regenerator sections are terminated. None of the overhead bytes are passed through. They are all regenerated, including the SONET SDCC and line DCC (LDCC) bytes and the SDH RS-DCC and multiplexer section DCC (MS-DCC) bytes.
MXP_2.5G_10G[1]	Transparent Termination	All client bytes pass transparently except the following: B1 is rebuilt, S1 is rewritten, A1 to A2 are regenerated, and H1 to H3 are regenerated.
	Section Termination	The SONET TOH section bytes and the SDH regenerator section overhead bytes are terminated. None of these section overhead bytes are passed through. They are all regenerated, including the SONET TOH section DCC bytes and the SDH RS-DCC bytes. In the section termination mode, the SONET TOH line and SDH multiplex section overhead bytes are passed transparently.
	Line Termination	In the line termination mode, the section and line overhead bytes for SONET and the overhead bytes for the SDH multiplex and regenerators sections are terminated. None of the overhead bytes are passed through. They are all regenerated, including the SONET SDCC and LDCC bytes and the SDH RS-DCC and MS-DCC bytes.

1. Clients operating at the OC48/STM16 rate are multiplexed into an OC192/STM64 frame before going to OTN or DWDM.

For TXP and MXP cards, adhere to the following conditions while DCC termination provisioning:

- For SDCC/RS-DCC provisioning, the card should be in the Section/RS-DCC or Line/MS-DCC termination mode.
- For LDCC/MS-DCC provisioning, the card should be in the Line/MS-DCC termination mode.

For more information on enabling termination modes, see the "11.23 Procedures for Transponder and Muxponder Cards" section on page 11-142.

APPENDIX H

Network Element Defaults

The information in this chapter is in a new location. See Network Element Defaults for information related to factory-configured (default) network element (NE) settings for the Cisco ONS 15454, Cisco ONS 15454 M2, and Cisco ONS 15454 M6 platforms.