



## **Cisco Transport Planner DWDM Operations Guide, Software Release 10.6**

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## Preface

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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](#), page [xiii](#)
- [Document Objectives](#), page [xiii](#)
- [Audience](#), page [xiii](#)
- [Document Organization](#), page [xiv](#)
- [Related Documentation](#), page [xiv](#)
- [Document Conventions](#), page [xiv](#)
- [Obtaining Optical Networking Information](#), page [xvi](#)
- [Obtaining Documentation and Submitting a Service Request](#), page [xvii](#)

## Revision History

This is the first release of this publication.

## Document Objectives

The *Cisco Transport Planner DWDM Operations Guide, R10.6.1* explains how to design networks using the Cisco Transport Planner design tool for the Cisco ONS 15454 DWDM systems. It contains information about how to design an optical network. Use the *Cisco Transport Planner DWDM Operations Guide, R10.6.1* in conjunction with the appropriate publications listed in the [Related Documentation](#) section.

## Audience

This publication is intended for experienced network system engineers who are responsible for planning and ordering equipment for Cisco optical networking systems.

# Document Organization

This Cisco Transport Planner DWDM Operations Guide, R10.6.1 is organized into the following chapters:

- Chapter 1, "[Introduction, on page 1](#)" provides a list of features, an overview of the network design process, a description of the internal architecture, and the Cisco Transport Planner procedural flow.
- Chapter 2, "[Creating and Analyzing Networks, on page 47](#)" provides instructions for using the Cisco Transport Planner tool to create a network design.
- Chapter 3, "[Viewing Network Reports, on page 135](#)" provides instructions for generating reports and bills of materials.
- Chapter 4, "[Editing a Project, on page 175](#)" provides instructions for adjusting and optimizing design components.
- Chapter 5, "[Modeled Network Examples, on page 355](#)" provides examples of typical optical networks that you can model using Cisco Transport Planner.
- Appendix A, "[GUI Information and Shortcuts, on page 361](#)" provides Cisco Transport Planner graphical user interface shortcuts.
- Appendix B, "[Cards and Pluggables, on page 385](#)" provides a list of card types that can be used to build a network, and the corresponding Cisco product identifier.
- Appendix C, "[Troubleshooting, on page 401](#)" provides a list of troubleshooting procedures.
- Appendix D, "[Third-Party DWDM Wavelength Interface Model, on page 417](#)" provides reference information on third-party DWDM interface calculation.
- Appendix E, "[Configuring CTP to Run on a Server, on page 425](#)" provides instructions to run CTP on a server.
- Appendix F, "[Pay As You Grow Licensing, on page 427](#)" provides information about the composition of each PAYG bundle.
- Appendix G, "[OSMINE Layout Rules, on page 431](#)" provides information about the OSMINE layout rules.

## Related Documentation

Use this Cisco Transport Planner DWDM Operations Guide, R10.6.1 in conjunction with the referenced Release 10.5.2 publications listed in the following doc roadmaps:

- *Cisco ONS Documentation Roadmap for Release 10.x.x*
- *Cisco NCS Documentation Roadmap for Release 10.x.x*
- *Release Notes for Cisco Transport Planner*

## Document Conventions

This document uses the following conventions:

| Convention                          | Description  |
|-------------------------------------|--|
| <code>^</code> or <code>Ctrl</code> | Both the <code>^</code> symbol and <code>Ctrl</code> represent the Control (Ctrl) key on a keyboard. For example, the key combination <code>^D</code> or <code>Ctrl-D</code> means that you hold down the Control key while you press the D key. (Keys are indicated in capital letters but are not case sensitive.) |
| <b>bold font</b>                    | Commands and keywords and user-entered text appear in <b>bold font</b> .   |
| <i>Italic font</i>                  | Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic font</i> .  |
| <code>Courier font</code>           | Terminal sessions and information the system displays appear in <code>courier font</code> .  |
| <b>Bold Courier font</b>            | Bold Courier font indicates text that the user must enter.   |
| [x]                                 | Elements in square brackets are optional.  |
| ...                                 | An ellipsis (three consecutive nonbolded periods without spaces) after a syntax element indicates that the element can be repeated.  |
|                                     | A vertical line, called a pipe, indicates a choice within a set of keywords or arguments.  |
| [x   y]                             | Optional alternative keywords are grouped in brackets and separated by vertical bars.  |
| {x   y}                             | Required alternative keywords are grouped in braces and separated by vertical bars.  |
| [x {y   z}]                         | Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.  |
| string                              | A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.  |
| <>                                  | Nonprinting characters such as passwords are in angle brackets.  |
| [ ]                                 | Default responses to system prompts are in square brackets.  |
| !, #                                | An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.  |

### Reader Alert Conventions

This document uses the following conventions for reader alerts:

**Note**

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

**Tip**

Means *the following information will help you solve a problem*.

**Caution**

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

**Timesaver**

Means *the described action saves time*. You can save time by performing the action described in the paragraph.

**Warning**

Means *reader be warned*. In this situation, you might perform an action that could result in bodily injury.

**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**

## 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 and Submitting a Service Request](#) section.

## Where to Find Safety and Warning Information

For safety and warning information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* 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 and Submitting a Service Request

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, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

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.





# Introduction

Cisco Transport Planner (CTP) provides a way to model and test wavelength division multiplexing (WDM) optical networks in a graphical environment. The primary purpose of Cisco Transport Planner is to help sales engineers (SEs) design and validate networks of Cisco Optical Networking System (ONS) 15454 Multiservice Transport Platforms (MSTP) and NCS. Using the CTP, an SE can create multiple instances of a network to modify different parameters in each instance for comparison. Cisco Transport Planner generates a shelf view of all the sites deployed in the optical network and provides a complete bill of materials (BoM) for the network and the differences between instances of a network.



**Note**

In this guide, M2 chassis refers to the Cisco ONS 15454 M2 chassis, M6 chassis refers to the Cisco ONS 15454 M6 chassis, M12 chassis refers to the Cisco ONS 15454 M12 chassis, and M15 chassis refers to the Cisco NCS 2015 M15 chassis.

This chapter describes how you use Cisco Transport Planner to design, analyze, and optimize new or existing Cisco optical networks and contains the following sections:

- [Overview, page 1](#)
- [Installing Cisco Transport Planner, page 16](#)
- [Uninstalling Cisco Transport Planner, page 17](#)
- [Launching the Cisco Transport Planner, page 17](#)
- [Performing Software Updates in CTP, page 20](#)
- [Setting Cisco Transport Planner Options, page 22](#)
- [Understanding Hybrid Configuration, page 44](#)
- [Understanding the Pay As You Grow Feature, page 45](#)

## Overview

This section describes the Cisco Transport Planner, Release 10.6.1 features, network design process, process flow, traffic planning, traffic services, and parameter states.

## Cisco Transport Planner, Release 10.6.1 Features

Cisco Transport Planner software provides a simple tool set for designing optical networks with Cisco ONS 15454 MSTP and NCS products. You enter all network parameters, or minimal information, such as site distance, and Cisco Transport Planner models the network you need to build and generate a detailed BOM with ordering information. Designing optical networks requires the verification of multiple constraints such, as optical budget limitations and platform architectural restrictions. A single Cisco Transport Planner project can contain multiple copies of a network. This duplication allows you to change parameters in one network copy, and then analyze and compare it with another network copy to study the differences. CTP uses 5us/km for fiber and DCU as a length-based latency.

The new features of Cisco Transport Planner, Release 10.6.1 are listed in below table.

**Table 1: New Features in Cisco Transport Planner, Release 10.6.1**

| Features  | Description   |
|---|---|
| Support for NCS2K-400G-XP Card                    | <p>400G-XP-LC card is a double-slot transponder and muxponder card with 400G bandwidth and can be used in Flex, MSTP, or hybrid configurations.</p> <p>This card supports the following characteristics:</p> <ul style="list-style-type: none"> <li>• Two trunk ports, each support 100G or 200G</li> <li>• 10 client ports</li> <li>• 10GE, 100GE service types</li> <li>• 25% and 15% SD-FEC</li> <li>• M6 and NCS 2015</li> <li>• Only Client 1+1 protection</li> </ul>  |
| Support for new pluggables                        | <p>The following pluggables are supported for 400G-XP-LC:</p> <ul style="list-style-type: none"> <li>• QSFP-100G-SR4-S—This is the default pluggable and is for 100G client traffic.</li> <li>• ONS-QSFP28-LR4—This pluggable is for 100G client.</li> <li>• QSFP-100G-LR4-S—This pluggable is for 100G client.</li> <li>• QSFP-4X10G-LR-S—This pluggable is for 10G client.</li> <li>• ONS-CFP2-WDM—This pluggable is for 100G and 200G trunk.</li> </ul> <p>All the above pluggables except QSFP-4X10G-LR-S are QSFP+28 pluggables. These pluggables can handle 100G traffic.</p> |
| Support for OTU4 service type on 200G-CK-LC cards | <p>OTU4 service type is supported on 200G-CK-LC in the FEC, EFEC, and SD-FEC modes.</p>   |

| Features   | Description   |
|--|---|
| Support for OTU2 and OTU2e service type support on 200G-CK-LC and 10x10G-LC combinations | OTU2 and OTU2e service types are supported on 200G-CK-LC and 10x10G-LC combinations in the FEC, EFEC, and SD-FEC modes.   |
| Support for NCS2K-MF-8X10G-FO passive module   | NCS2K-MF-8X10G-FO passive module is supported only for 10G on the client-side of the NCS2K-400G-XP card. By default this passive module is enabled in CTP.<br><br>The NCS2K-MF-8X10G-FO unit uses a ONS-12MPO-MPO-8 cable to connect to the client ports of the NCS2K-400G-XP card. |
| Support for TNCS controller card on M2 chassis   | TNCS controller card is supported on M2 chassis.  |
| Support for MR-MXP breakout cable  | ONS-MPO-MPOLC-10 breakout cable interconnects the client ports of the MR-MXP card with the NCS2K-MF-MPO-20LC passive module when the MR-MXP card is configured as a 10X10GE fan-out.  |

## Important Notes

- In Release 10.6.1, the TCC2P card can be used only on a standalone Network Element (NE) or as subtended shelf of an MSM having node controller with TCC3 card in M12 or TNCE/TNCS in NCS 2006 or NCS 2015.
- In Release 10.6.1, an MS-ISC card is not supported in a shelf with a TCC2P card.

## Network Design Process

To generate a network design, the SE enters the following parameters:

- The topology of the network—ring, linear, or meshed
- The type of equipment used at each site
- The distance separating the sites
- The type of fiber connecting the sites
- Service demands, including the service type, the protection type, and the number of channels between nodes
- The number of network sites

When the network parameters are entered, Cisco Transport Planner finds the best routing, defines the required add/drop filters, places optical amplifiers with dispersion compensation units (DCUs) or tunable dispersion compensation units (TDCU) to fit the user traffic demands at a minimum cost. The TDCU operates only over the C-band. Optimization is performed to meet the boundary conditions. The optimization includes attenuation and amplification.

Finally, Cisco Transport Planner generates a BOM, which includes the product codes, the quantities, and pricing information. In addition, it creates other reports, such as a shelf-level view of the configuration, which can be printed. This information helps the SE understand how the shelf is built and helps to avoid confusion and errors during the actual deployment. Within the BOM is the total network cost, which allows a quick comparison of various design options. The total network cost is the cost of the equipment for all of the sites in the designed network.

## Network Design Constraints

Cisco Transport Planner searches for the best solution to a designed network using an optimization algorithm.

A network design must meet the optical budget and receiver overload criteria to operate efficiently. An analysis of the optical budget and receiver overload evaluates the strength of the signal traversing the ring. If a design solution satisfies the constraints, it is a valid design. The Cisco Transport Planner optimization algorithms generate multiple solutions and verifies the constraints against those solutions. If the constraints are satisfied, the solution with the lowest cost-to-utilization ratio is selected as the optimal solution.

If the network design solution fails to satisfy all the constraints, Cisco Transport Planner makes adjustments to parameters such as signal attenuation and amplification. Amplification is achieved using an erbium-doped fiber amplifier (EDFA). Attenuation is achieved using the variable optical attenuator (VOA) modules integrated into the platform. Cisco Transport Planner corrects the optical budget using an algorithm that includes automatic placement of EDFAs and VOA regulation.

For each internodal demand, Cisco Transport Planner performs an optical budget and receiver overload analysis and displays the results in various reports in the Graphical User Interface (GUI). If the network design algorithms are not able to provide a solution, then you can modify the input data (for example, by relaxing some user constraints) and run the analysis again.

## Platform Support

Cisco Transport Planner Software Release 10.6.1 supports the Cisco ONS 15454 DWDM optical platform Software Releases 9.0, 9.1, 9.2, 9.2.1, 9.3, 9.4, 9.6.0.3, 9.8, 10.0, 10.1, 10.5, and 10.5.2.

## Topology Support

The Cisco Transport Planner supports the following network topologies:

- Linear (single-span or multispan)
- Ring (open or closed)
- Meshed

For more information on network topologies, see the [Supported Cisco Transport Planner Topologies, on page 355](#).

The Cisco Transport Planner enables you to design flexible networks with up to 150 site locations. A flexible network uses ROADM nodes to allow traffic modification or reconfiguration, or both as traffic requirements change.

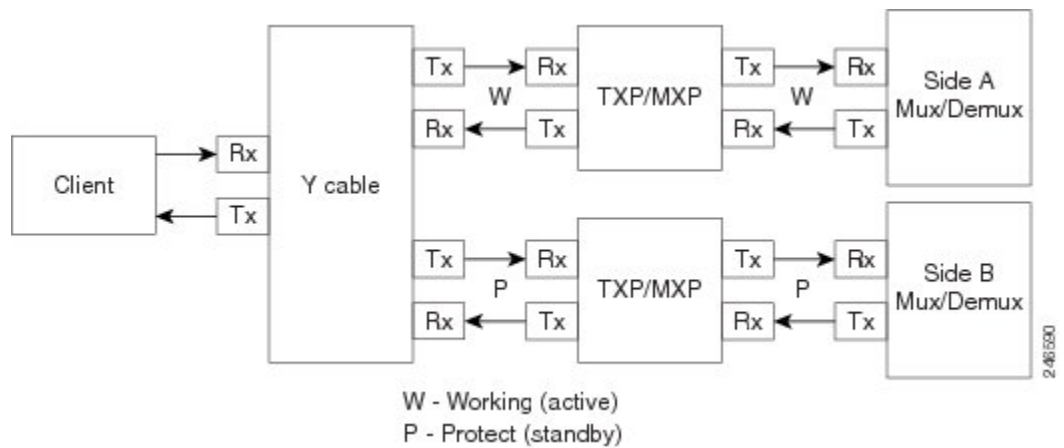
In Cisco Transport Planner Software R10.1, the maximum number of locations where the optical service channel (OSC) is terminated is 40. The maximum number of add/drop locations supported is 40.

## Protection Scheme Support

Cisco Transport Planner designs support the following protection schemes:

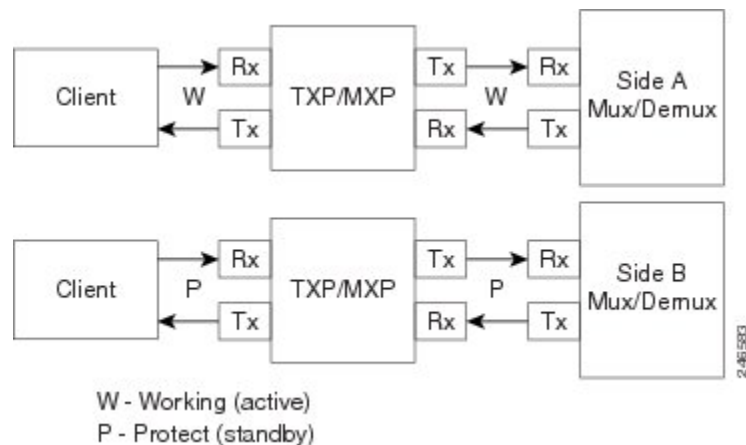
- Y-cable protected—In Y-cable protection, one transponder card is designated as active and the other as standby. The standby transponder card has the client-side laser turned off to avoid corrupting the signal transmitted back to the client. The active transponder monitors the signal from the trunk side and in the event of loss or signal failure, the system switches to the standby path. The following figure shows an example of a Y-cable protected link.

**Figure 1: Y-cable protection**



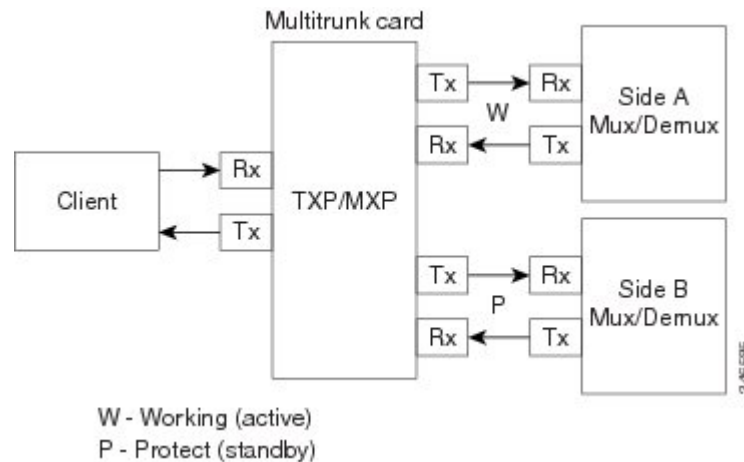
- Client-based 1+1—Two client signals are transmitted to separated line cards or transponder cards instead of using a Y-cable to split one client signal into two line cards or transponder cards. In client 1+1 protection, the failure and switchover is controlled by the client system. The following figure shows an example of a 1+1 protected link.

**Figure 2: 1+1 Protection**



- Fiber-switched protection—The single client signal is injected into the client receive (Rx) port. It is then split into two separate signals on the two trunk transmit (Tx) ports. The two signals are transmitted over diverse paths. The far-end card chooses one of the two trunk Rx port signals and injects it into the Tx client port. The following figure shows an example of a fiber-switched protected link.

**Figure 3: Fiber-switched Protection**



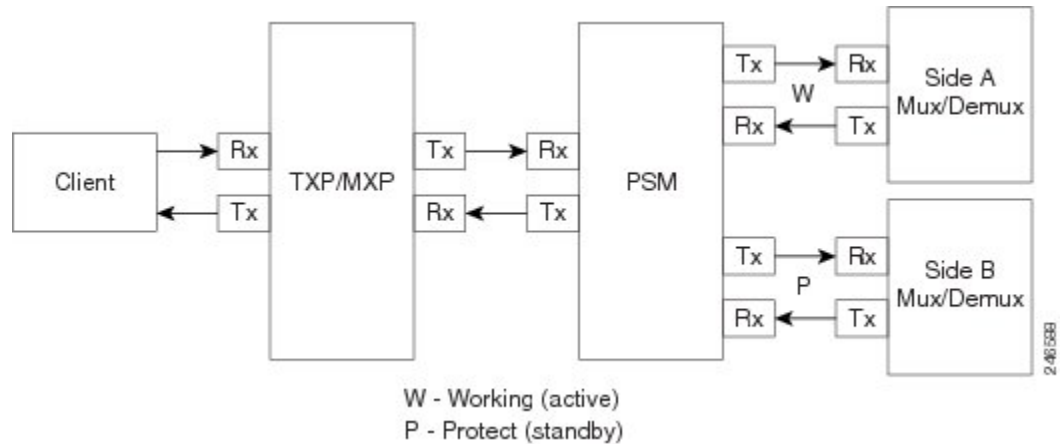
From CTP Release 10.5, fiber-switched protection is supported on a 10x10G-LC card. For more information, see [Fiber-Switched Protection on a 10x10G-LC Card, on page 7](#).

- PSM-OCH—Channel protection configuration provides protection at trunk level (like Fiber-Switched protection) for TXP/MXP that do not have dedicated Fiber-Switched cards. PSM splits the traffic originated by transponder trunk on working and protected TX ports. Working Tx (W-Tx) and protected TX (P-Tx) are connected to the add ports of Add-Drop stages adding the channel in two different directions. On the receiving direction PSM W-RX and P-RX are connected to the drop ports of Add-Drop stages receiving the channel from the two different directions. PSM switch selects a path among W-Rx and P-Rx ports so that only one direction at a time is connected to COM-RX ports and therefore to the TXP/MXP. The following figure shows an example of a PSM-OCH protected link.



From CTP Release 10.5, networks with PSM-OCH protection can be imported into CTP.

**Figure 4: PSM-OCH Protection**



- Unprotected—Protection is not used.
- External card switch—Protection not used.

### Fiber-Switched Protection on a 10x10G-LC Card

CTP Release 10.5 supports fiber-switched protection on a 10x10G-LC card. The 10x10G-LC cards support up to two splitter protection groups with one client and two trunk ports:

- First instance: Port 3 (client), Port 4 (Working trunk) and Port 6 (Protect trunk)
- Second instance: Port 7 (client), Port 8 (Working trunk) and Port 10 (Protect trunk)

You can also provision one instance of the fiber-switched protection with port 3 or port 7 as the client port, and up to 3 trunk ports. The operational mode of the card for fiber-switched protection is TXPP-10G. Fiber-switched protection is supported only for 10GE traffic with trunk mode set to Disable (NOFEC), Standard (FEC), or Enhanced (EFEC).

You can configure different wavelengths, threshold crossing alerts (TCAs), alarms threshold, facility and terminal loopbacks on the working and protect trunk ports.

Y-cable protection and fiber-switched protection cannot be configured on the same card.

To configure fiber-switched protection on a 10x10G-LC card, use the following procedure:

When you create a demand, choose Fiber Switched as the protection type from the **Protection** drop-down list in the **Demand Editor** dialog box.

## Service Support

Cisco Transport Planner can support any subset of the following services:

- Alien (third-party DWDM interface)
- Cisco ONS 15530 2.5 Gbps Aggregated

- ONS 15530 10 Gbps Aggregated
- ONS 15530 Multirate (MR) Transport
- ONS 15530 Data Multiplexer (MXP)
- 2R Any Rate
- 3G-SDI
- Gigabit Ethernet
- 10GE—10 Gigabit Ethernet (LAN and WAN)
- D1 Video
- DVB-ASI—Digital Video Broadcast-Asynchronous Serial Interface
- DV-6000
- DPSK—Different Phase Shift Keying
- ESCON—Enterprise System Connection
- Fast Ethernet
- Fiber Channel 1G
- Fiber Channel 2G
- Fiber Channel 4G
- Fiber Channel 8G
- Fiber Channel 10G
- FICON—Fiber Connection 1G
- FICON Express 2G
- FICON 4G
- FICON 8G
- FICON 10G
- E3 over FE
- T3 over FE
- DS3 over FE
- High Definition Television (HDTV)
- ISC-3 Peer (1G)
- ISC-3 Peer (1G with STP)
- ISC-3 Peer (2G)
- ISC-3 Peer (2G with STP)
- ISC-3 Peer (2R)
- ISC-3 Peer (2R)

- ISC-Compat (ISC-3 Compatibility mode)
- HD-SDI
- HDTV
- OC-3
- OC-12
- OC-48
- OC-192
- OC-768
- OTU2
- SD-SDI
- SDI—Serial Data Input
- STM-1
- STM-4
- STM-16
- STM-64
- STM-256
- 10GE WAN-Phy
- 10GE LAN PHY
- 10GE LANtoWAN
- 100GE
- 40GE LAN PHY
- OTU1
- OTU2
- OTU2e
- OTU3
- OTU4
- Sysplex CLO—control link oscillator
- Sysplex ETR—external throughput rate
- LAN-WAN Conversion

The Sysplex CLO and Sysplex ETR services are supported only on the following topologies:

- Single span—Two terminal sites with 32MUX-O and 32DMX-O cards, 40MUX-O and 40DMX-O cards, 40WSS and 40DMX, or 32WSS and 32DMX or 32DMX-O cards installed and no intermediate sites in between.

- Point-to-Point—Two terminal sites with 32MUX-O and 32DMX-O cards. 40MUX-O and 40DMX-O cards, 40WSS and 40DMX, or 32WSS and 32DMX or 32DMX-O cards installed. Line amplifiers can be installed between the terminal sites, but intermediate (traffic terminating) sites cannot be installed.
- Two hubs—Two hub nodes in a ring with 32MUX-O, 32DMX-O, 32WSS, 40MUX-O, 40DMX, 40DMX-O, 40WSS, and 32DMX cards or 32DMX-O cards installed. Line amplifiers can be installed between the hubs.

For more information about the supported topologies for the ETR and CLO services, refer the *Cisco ONS 15454 DWDM Configuration Guide*.

The following features are available only when 100GE or OTU4 is selected as the service type during network creation:

- CRS line card 1-100GE-DWDM (FEC, EFEC [default], or HG-FEC) is available for Point-to-Point, P-Ring, and ROADM demands.
- (For Release 9.6.03 and later) MPO-MPO cables are available in the Net view and Site view of the BoM report. MPO-MPO cables are not available for combination cards. For example, MPO-MPO cables are not available if you have chosen 100G-LC-C+CFP-LC or 100G-LC-C+ASR as card type.

The encryption feature is available only:

- When 10GE LAN PHY, OTU2e, or OTU2 is selected as the service type during network creation.
- When 100GE is selected with TXP-100G operating mode cards.

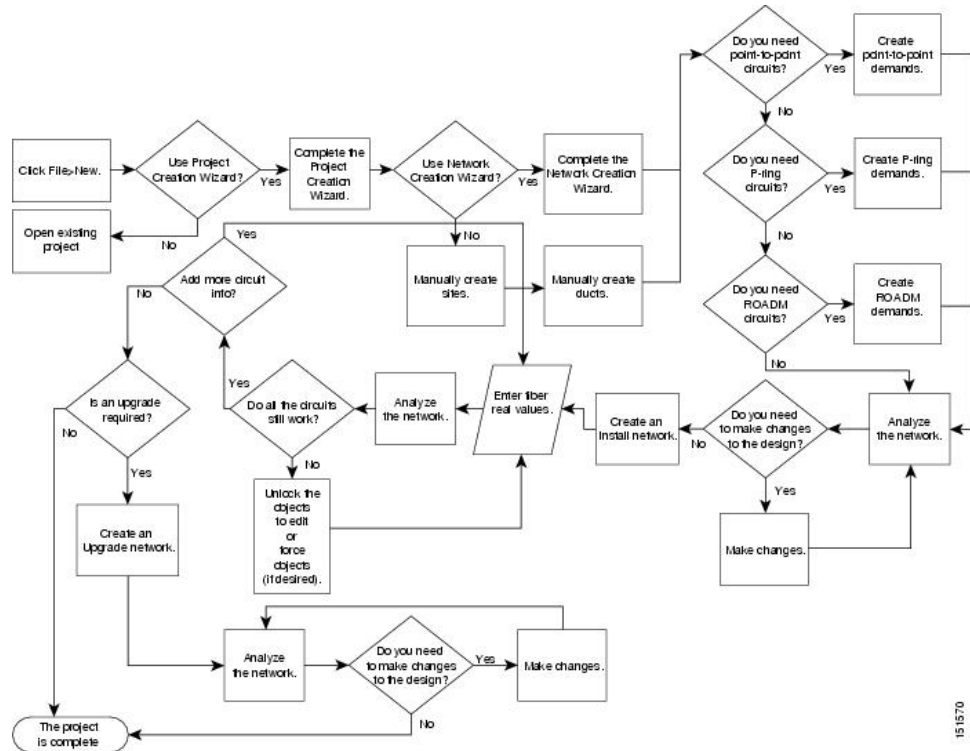
## Cisco Transport Planner Process Flow

The following stages are used to complete a network design.

- 1 Create a project using the Project Creation wizard.
- 2 Create a network using the Create Network wizard. The Create Network wizards adds sites and places the fiber spans between the sites. A span represents a pair of fibers.
- 3 Create a point-to-point, Aggregated Ethernet, TDM Aggregated, protected ring (P-ring), and/or ROADM service demand.
- 4 Analyze the network design.
- 5 If you would like to force automatic tool choices, adjust the design and repeat the analysis until you have reached the desired configuration.
- 6 Create an Install copy of the network and update the parameters with real data from the field.
- 7 Analyze the Install network.
- 8 Create an upgrade copy of the network, as needed, to add forecasted channels.

The following figure shows the process flow.

**Figure 5: Cisco Transport Planner Process Flow**



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## Planning Traffic in Cisco Transport Planner

Traffic in Cisco Transport Planner is defined as an optical path for each pair of nodes requiring a service demand. An optical path is the combined channels between the two nodes. The following list gives definitions for some basic traffic items:

- **Circuit**—A single channel between a pair of source and destination nodes. In addition to the source and destination nodes and all the attributes that are common to the service containing the circuit, a circuit has the following attributes:
  - Present/forecast indication
  - Routing direction for unprotected service
  - ITU channel
  - Optical bypass indication
- **Demand**—A set of circuits with common characteristics, such as:
  - Service demand label
  - Number of existing circuits
  - Number of forecasted circuits
  - Client service type

- Protection type
  - Optical bypass (number of channels and/or sites)
  - Present/forecast indication WDM interface type (TXT or ITU-LC)
  - WDM card type
  - Source client interface (SR, IR, or LR)
  - Destination client interface (SR, IR, or LR)
- Traffic demand—All traffic between the same set of nodes. Both L-band and C-band are supported. The following traffic demands are supported: P-ring, Fixed (point-to-point), and Any-to-any (ROADM).
    - In P-ring traffic demands, all the demands are used to support traffic topologies similar to bidirectional line switched rings (BLSRs) or multiplex section-shared protection rings (MS-SPRings). Each P-ring demand is between a pair of added/dropped nodes where BLSR-like (or MS-SPRing-like) traffic must exist. The number of circuits is the same for each demand, and is user-specified (from 1 to 40).
    - In fixed (point-to-point) traffic demands, the set of nodes is restricted to two sites. The number of circuits is user-specified (from 1 to 40).
    - In any-to-any (ROADM) traffic demands, a minimum of two nodes and a maximum of 40 ROADM nodes are supported. The any-to-any traffic demand allows each node to establish one or more circuits with the other nodes, either as a hub or meshed configuration. In a meshed configuration, each node defined in the set is connected to each of the nodes. This is the most common traffic type. In a hub configuration, the user-defined hub node is connected to each of the other nodes. ROADM circuits have the same protection types and services. The number of circuits is not user-specified and can vary from 0 to 40.




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**Note** In any-to-any (ROADM) traffic demand, the default routing strategy is Unprotected minimum hop count.

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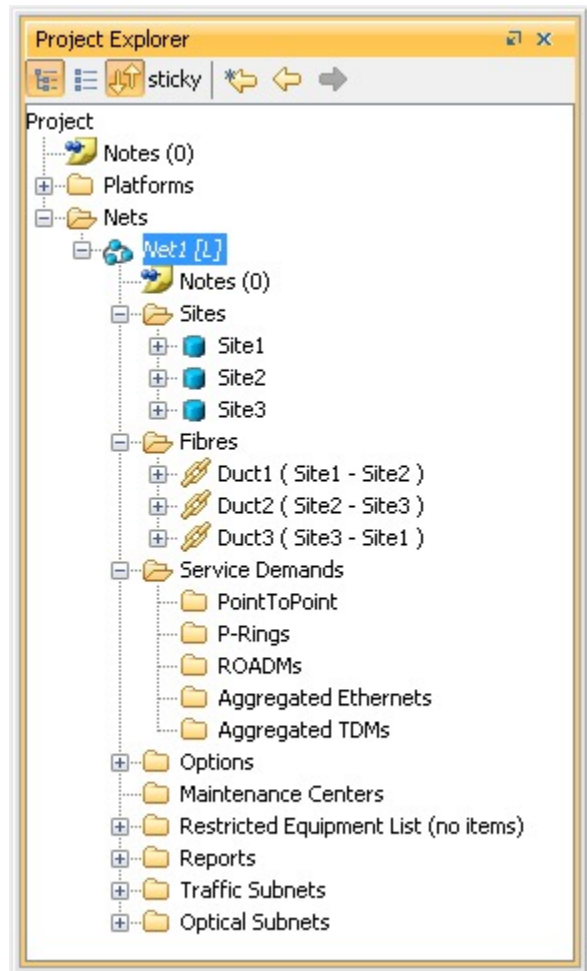
A ROADM demand can have multiple client service types and support multiple DWDM card interfaces for each client service type. A ROADM demand supports the following routing strategies:

- Protected (Default)—Each node pair in the traffic demand is connected using two connections.
- Unprotected optimum optical path—Each node pair is connected using one connection. The unprotected optimum optical path minimizes the number of required optical amplifiers, but also restricts the number of channels that can be deployed among the nodes of the traffic demand (maximum of 40 channels between each node pair) in the installed network.
- Unprotected minimum hop count—Each node pair in the traffic demand is connected by one connection. The unprotected minimum hop count maximizes the number of channels (for unprotected traffic types only) that can be deployed among the nodes of the traffic demand, but requires a higher number of optical amplifiers on the unprotected optimum optical path (maximum of 40 channels between each node pair) in the installed network.
- Unprotected subnet—Each node pair in the traffic demand is connected using one connection. You can manually force connections on only one branch of the ring. For unprotected subnets, you must manually select one starting node of the branch and the direction the ring must be traversed to define the subnet, starting from the initial site. The branch direction is specified by defining the outgoing side first, referred to as the starting node. This routing strategy option allows you to exclude some critical paths and (with ROADM traffic demands containing two sites) to force each ROADM connection clockwise or counterclockwise.

## Project Explorer Pane

The Project Explorer pane shows all of the open project information, including networks, network dependencies, sites, fibers, services, and so on. The user-defined traffic services are displayed as folders and icons in the Project Explorer pane, as shown in the following figure.

**Figure 6: Project Explorer View**



After you analyze a network design, the colors of the icons change according to the error/warning condition of the network design. The icons display in red if there are errors in the network design; orange if there are warnings but no errors; and green if there are no warnings or errors. The icon shows the color of the most severe condition. For more information about analyzing the network, see the [Analyzing the Network, on page 98](#).

The Project Explorer pane provides the following options to edit the parameters:

- Right-click the folder/icon in the Project Explorer pane to edit the parameters.
- Click **sticky** to select multiple items in the Project Explorer pane. Edit the properties that are common to the selected items in the Properties pane.

## Multiple Selection

Click **sticky** in the Project Explorer pane toolbar to select multiple folders and icons in the Project Explorer tree or the Network View. Alternatively, hold the **Ctrl** key on the keyboard and select multiple folders and icons. The folders and icons corresponding to the selection in the Project Explorer pane are highlighted in the Network View and vice-versa. You can also select similar folders and icons by right-clicking them and choosing **Select Similar** in the menu. For example, by right-clicking a site choosing **Select Similar** in the menu, you can select all the sites in the Project Explorer pane. The Select Similar option is available only for the folders and icons in the Project Explorer pane that have properties. The properties that are common to the selected items are displayed in the Properties pane. If any property has a different value than the others, that value is highlighted in a different color in the Properties pane.

The following options are available when multiple folders and icons are selected:

- Sites
  - Delete, Unlock, and Unlock Pay As You Grow Bundles
  - Edit properties
- Ducts
  - Delete, Insert Site, and Unlock
  - Edit properties
- Service Demands
  - Delete and Unlock
  - Edit properties

## Cisco Transport Planner Traffic in the Project Explorer Pane

Cisco Transport Planner represents all of the user-defined traffic services as folders and icons within the Project Explorer pane.

### Point-to-Point Traffic Demands

Point-to-point traffic demands appear in the **Service Demands > PointToPoint** folder in the Project Explorer pane. Each point-to-point traffic demand is categorized by its source and destination site names. All of the point-to-point services between the two sites appear under the designated demand name.

A point-to-point traffic demand includes the following information:

- Client service type
- Site# – Site# (source and destination site labels for this demand)

### P-Ring Traffic Demands

Each protected ring (P-ring) traffic demand appears in the Project Explorer pane under the **Service Demands > P-Rings** folder.

All the P-ring channels between each site pair are listed under each P-ring traffic demand. Each demand is labeled with the following information:



- P-ring number
- Client service type
- Site# – Site# (source and destination site labels for this demand)

### ROADM Traffic Demands

Each ROADM traffic demand appears in the Project Explorer pane under the **Service Demands > ROADMs** folder. The ROADM folder contains each defined ROADM demand. You can define more demands for the same ROADM for the same set of nodes.

In the **Project Explorer** pane, each ROADM includes the ROADM demand name and a list of DWDM card types that support the client service types. Protection types appear in parentheses.

### Aggregated Ethernet Demand

Each aggregated ethernet traffic demand appears in the **Project Explorer** pane under the **Service Demands > Aggregated Ethernet** folder. The Aggregated Ethernet folder contains each defined aggregated ethernet demand. Aggregated Ethernet demands are supported on ring and linear traffic subnets.

### TDM Aggregated Demand

Each TDM aggregated demand appears in the **Project Explorer** pane under the **Service Demands > Aggregated TDMs** folder.



**Note**

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TDM aggregated demands are supported only on a ring traffic subnet.

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## Auto, Forced, and Locked Parameters

Parameters in CTP can be in one of three states:

- Auto— This parameter allows the highest degree of flexibility to CTP in designing a network. When you select Auto, CTP chooses the parameter value during network analysis.
- Forced—When you set a specific parameter value, other than Auto, CTP designs the network using these constraints. When a setting is forced, the item appears in blue italics in the Project Explorer pane.
- Locked—The state of a parameter after network analysis. The next time the analyzer is run, Cisco Transport Planner cannot change the value when it is in the Locked state. You can unlock an item using the Unlock command. For more information, see [Unlocking Parameters in the Network Design, on page 103](#) and [Forcing Manager, on page 103](#).



**Note**

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For the WSE card, the encryption option can be modified even when the demand is in locked state. This is available in the Upgrade or Release-upgrade networks and on A2A finalized demands that can be edited from A2A Finalized Circuits. When modifications are made without the unlock, the encryption parameter on the specific port of the WSE card is updated on analysis.

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Depending on the initial state, the network analyzer will:

- Move the parameter into the Locked state if the unit or parameter was set to Auto.
- Leave the parameter in the same state if the user forced a specific value for the unit or parameter.

## Installing Cisco Transport Planner

Use the following procedure to install Cisco Transport Planner:

### Procedure

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- Step 1** To download the installer, go to the Cisco software download site.
- Step 2** Navigate to the location where you want to save the CTP executable file to a local hard drive.
- Step 3** Click **Save**.
- Step 4** To start the installation of CTP:
- Windows—Navigate to the folder containing the CTP executable file and double-click it.
  - Linux—Assuming the CTP.bin file is accessible from the current shell path, navigate to the directory containing the CTP.bin file and enter: % ./CTP.bin

The graphical CTP installation wizard is displayed.

- Step 5** Click **Next**. The license agreement is displayed.
- Step 6** To accept the license, select the I accept the terms of the License Agreement radio button.
- Step 7** Click **Next**.
- Step 8** Specify the installation folder. On Windows 7, the default is C:\Program Files\Cisco\CTP\_10.6.1. To choose a different folder, click the **Choose...** button and browse to the required folder. To restore the default path, click the **Restore Default Folder** button.
- Step 9** Click **Next**.
- Step 10** Specify the shortcut folder by choosing any one of the following options:
- In a new Program Group—Specify a new folder. The default option is CTP\_10.6.1.
  - In an existing Program Group—Select a folder from the list of existing folders.
  - In the Start Menu
  - On the Desktop
  - In the Quick Launch Bar
  - Other—Use this option to specify a commonly used folder.
  - Don't create icons—Choose this option if you do not want to create a shortcut.

**Note** Check the Create Icons for All Users check box if you want to create shortcuts for all the users of a system.

- Step 11** Click **Next**. The pre-installation summary is displayed.
- Step 12** Review the pre-installation summary. If no changes are required, click **Install**; otherwise, click **Previous** to make modifications.  
A progress bar displays the installation status. Click **Cancel** at any time to stop the installation.  
When the installation process is complete, a screen indicates whether the installation succeeded or failed.
- Step 13** Click **Done** to exit the installation wizard.
- 

## Uninstalling Cisco Transport Planner

Use the following procedure to uninstall Cisco Transport Planner:

### Procedure

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- Step 1** Click the Uninstall CTP icon available at the location selected in Step 10 of the [Installing Cisco Transport Planner, on page 16](#).  
The graphical Uninstall CTP wizard is displayed.
- Step 2** Click **Uninstall**.
- Step 3** A progress bar displays the uninstallation status. Click **Cancel** at any time to stop the uninstallation.  
When the uninstallation process is complete, a screen displays the files that could not be uninstalled.
- Step 4** Click **Done** to exit the uninstallation wizard.
- 

## Launching the Cisco Transport Planner

Before you start the Cisco Transport Planner (CTP), you need to save the user profiles provided by Cisco Systems to the profiles folder available at the installation location. Access to CTP features depends on the user profile you select when you start CTP. The default profile is Base Network Designer.

To launch the CTP, perform the following steps:

### Procedure

---

- Step 1** Launch Cisco Transport Planner using any of the following options:
- Click the CTP icon in the **Start > All Programs > CTP** menu.
  - Double-click the CTP icon in the quick launch bar.
  - Double-click the CTP icon on the desktop.
  - Browse to the installation folder and double-click the ctp.jar file.

CTP validates the installed Java version in the system. If the installed version is Java 1.6 or Java 1.7, the CTP login dialog box is displayed.

**Note** If Java 1.6 or Java 1.7 is unavailable, CTP displays the JVM Version Error dialog box that lists the incompatible Java versions. Install the required Java version from the <http://www.oracle.com/technetwork/java/index.html> website. Repeat Step 1.

**Step 2** From the Current selected profile drop-down list, select the user profile.

**Step 3** Click **Continue** to open the Cisco Transport Planner.  
The login profile type appears in the lower-right corner of the CTP window.

The Start Page is displayed. The Start Page provides the following options:

- **New**—Click to create a new project.
- **Open**—Click to open an existing project.
- **Import Network**—Click to import node parameters from a network.
- **Recent Network Files** area—Select an existing project to open it.

Selecting any of the above options opens a new tab.

**Step 4** Check the **Do not show Start Page at startup** check box to disable viewing the start page when Cisco Transport Planner is started.  
Check **View Start Page** check box under **Tools > Option > Graphic > Start Page** to enable displaying the Start Page when launching the CTP.

## Opening a Project

Use the following procedure to open an existing Cisco Transport Planner project. To create a new project, see [Creating a Project](#), on page 47.

### Procedure

**Step 1** Click the project name under Open in the Tasks Pane. The project opens. If you do not see the project name listed, continue with Step 2.

**Step 2** Click **Open** in the Start Page, click **Open** under Project in the Tasks Pane, or in the File menu.

**Step 3** In the Open Project dialog box, navigate to the desired folder and choose the project. Click **Open**. The Cisco Transport Planner project appears.

**Note** You cannot open an existing CTP project in multiple CTP instances. The saved project (.MPZ file) is locked for the use of that CTP. If you try to open the project in another instance of CTP, an error message is displayed. The .MPZ project file is unlocked and released only after you close the Network.

## Loading and Unloading Networks

Each network in a project requires memory. To save memory, when Cisco Transport Planner opens a project, all networks are in the Unloaded state. An unloaded network appears in the Project Explorer pane with a “U” next to the network identifier. To load an unloaded network, double-click on the network folder in the Project Explorer pane, or right-click the network and choose **Load** from the shortcut menu.

**Figure 7: Unloaded Network in the Project Explorer pane**



A loaded network appears in the Project Explorer pane with an “L” next to the network identifier. To unload a loaded network, right-click the network icon in the **Project Explorer** pane and choose **Unload** from the shortcut menu.



### Note

When you load a network containing an alien interface that is not present in the parts database (DB), warning messages are displayed.

**Figure 8: Loaded Network in the Project Explorer pane**



## Saving a Project

Use the following procedure to save a project:

### Procedure

- 
- Step 1** Choose one of the following:
- To save an existing project with the same filename, choose **File > Save**. You have completed this procedure.
  - To save a new project, choose **File > Save** and go to Step2.
  - To save an existing project with a different filename, choose **File > Save As** and go to Step2.
- Step 2** In the Save Project dialog box, navigate to the desired folder and enter the filename. Click **Save**. Cisco Transport Planner saves projects as zipped files with the MPZ extension.

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## Closing a Project

Use the following procedure to close a Cisco Transport Planner project:

### Procedure

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- Step 1** From the File menu, choose **Close**.
  - Step 2** In the Save Project dialog box, click **Yes** to save or **No** to close without saving changes.
  - Step 3** If you clicked Yes and have not previously saved the project, the Save Project dialog box appears. Enter the name of the project and click **Save**. The project closes.
  - Step 4** To exit Cisco Transport Planner, choose **Exit** from the File menu.
- 

## Deleting the CTP Cache

To delete the CTP cache, perform the following steps:



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**Note** CTP must be restarted to delete the CTP cache.

---

### Procedure

---

- Step 1** From the Tools menu, choose **Delete Cache**.
  - Step 2** Click **Yes** to delete the CTP cache or **No** to postpone cache deletion.
  - Step 3** When you click **Yes**, an information message is displayed prompting you to restart CTP now or later. If you do not want to restart CTP immediately, cache deletion is postponed to the next restart.
  - Step 4** Before you restart, save your project and choose **File > Close** to close the project.
  - Step 5** If you click on **Restart Now**, CTP cache is deleted and CTP restarts automatically.
  - Step 6** To restart CTP later, choose **File > Restart**.  
A message is displayed prompting you to continue with restart. Click **Yes** to restart CTP. A message is displayed prompting you to continue with cache deletion now or later.
  - Step 7** Click **Yes** to delete the CTP cache or **No** to postpone cache deletion.
- 

## Performing Software Updates in CTP

CTP enables you to update the CTP software automatically or manually.

## Performing Automatic Software Updates in CTP

This section explains how to perform an automatic software update.

### Procedure

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- Step 1** When CTP is launched, it checks for the latest software update automatically. If available, the following dialog box appears: **Online Update Available, Would you like to Update CTP?** Click **Yes**.
  - Step 2** The Software Update Dialog box appears listing the applicable software updates. Select the required software update and click **Apply**.
  - Step 3** The Update Successful message appears. Click **OK**.
- Note** The Update dialog box appears every time CTP is launched until the software update is applied.
- 

## Performing Manual Software Updates in CTP

Contact the Cisco Sales/Account team to get the software update files.

This section explains how to perform a manual software update.

### Procedure

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- Step 1** In the CTP Help menu, go to **Help > Check updates**. The update CTP dialog box appears.
  - Step 2** Click **Browse**.
  - Step 3** Select the .upz update file and click **OK**.
  - Step 4** The Software Update Dialog box appears listing the applicable software updates. Select the required software update and click **Apply**.
  - Step 5** The Update Successful message appears. Click **OK**.
  - Step 6** Delete the cache and restart CTP.
- 

## Performing Software Update Rollback

CTP allows rollback of software updates. A single rollback moves the CTP software to the previous state (prior to the software update). For example, if there are two updates applied one by one—Update 1 and Update 2, after the first rollback, CTP removes Update 2 and retains Update 1. Further rollback(s) are needed if multiple updates are present.

This section explains how to perform a rollback.

## Procedure

**Step 1** Press **R** while CTP is launching. The CTP launch is interrupted to perform a software rollback.

**Step 2** Click **Yes** to confirm software rollback. The rollback successful dialog box appears.

- Note**
- Delete CTP Cache before and after applying update. Procedures about deleting cache are mentioned in the CTP Operations Guide. Take a backup of the required files (User preferences, CTP Design Files (.mpz), NeUpdate File, Alien Files, and so on) before deleting CTP cache.
  - Automatic Update can be performed only when you are connected to the Cisco network. If you are not on a Cisco network, try to connect to Cisco VPN first. Otherwise, the software update file should be manually provided by a Cisco representative and manually updated.
  - Changes caused by the software update is applicable even if the CTP Cache is deleted after the update. To remove an update, follow the rollback procedure mentioned in the previous section.
  - Multiple rollbacks are not supported in this release. Re-install CTP if required.
  - In the Java Control Panel, set the Java security to **medium** and mention the CTP installation directory in the Exception Site List (if there are issues with the rollback). If the screen is unresponsive, end CTP process and restart CTP.
  - For MAC, force quit the process and restart CTP (if there are issues with the rollback).
  - After uninstallation, delete all the files under the directory where CTP is installed manually.
    - Default location on Windows OS: C:\Program Files\Cisco\CTP\_10.6.1
    - Default location on Mac OS: Applications/CiscoCTP10.6.1

# Setting Cisco Transport Planner Options

Cisco Transport Planner provides numerous options for customizing the tool and the design.



**Note** The following procedures for setting options using the Tools menu apply to new projects during project creation. To change an existing (open) project, click the desired item in the Project Explorer pane Subnets folder and edit the parameter in the Properties pane.

## Setting the Graphical Display

Use the following procedure to set the Cisco Transport Planner graphical display:



## Procedure

---

- Step 1** From the Tools menu, choose **Options**.
- Step 2** In the Options Explorer dialog box, right-click the Graphic folder and choose **Expand** from the shortcut menu.
- Step 3** Click **Chart Panel** and complete the following:
- In the Colors area, to change the colors of Border Paint, Background Paint, Line Paint, Plot Background Paint, and Plot Outline Paint, click the relevant fields in the Colors list, and click the drop-down arrow to display a color swatch popup window. Then, click the desired color.
  - In the Strokes area, to change the strokes of Border Stroke, Outline Stroke, and Default Line Stroke, click the relevant fields in the Strokes list, and click the drop-down arrow. Then click the desired stroke.
  - In the Font area, click the Font drop-down box to display a font popup window. Then select the desired Font, Size and Style.
  - In the Alfa area, enter numeric values for Background Alfa and Foreground Alfa.
  - In the Shapes area, click the Line Shape drop-down box. Then click the desired line shape.
  - In the Gridlines area, check the Range Gridlines and Domain Gridlines check boxes to view the gridlines for the same.
- Step 4** To change the color scheme for Cisco Transport Planner, click **Look & Feel** and choose the desired scheme from the drop-down list.
- Step 5** To enable displaying the Start Page when launching Cisco Transport Planner, check the **View Start Page** checkbox.
- Step 6** To change the appearance of the Project Explorer tree, click **Project Explorer** and complete the following tasks as needed:
- Overlapping—Check to reorder sites for a selected network.
  - Alarm Mode—Choose **Single** for an alarm icon to report only the condition of that item or choose **Cumulated** for an alarm icon to summarize the most critical alarm of the item and its children.
  - Bottom Right Icon—(Display only) Displays Locking to indicate that the lock icon appears at the bottom right of each locked item in the Project Explorer pane.
  - Top Right Icon—(Display only) Displays Alarm to indicate that the alarm icon appears at the top right of each alarmed item in the Project Explorer pane. The alarm icon will be green, yellow, orange, or red to indicate the alarm severity.
- Step 7** To change the NtView Name tab appearance, click **Network View** and complete the following tasks as needed:
- In the Site area, complete the following tasks:
    - Site Color—To set the default site color when no forcing is done, click the drop-down arrow to display a color swatch popup window. Click the desired color.
    - Site Selection Color, and Highlight Color—To change the site colors, click in the Color, Selection Color, and/or Highlight Color fields in the Site list. Click the drop-down arrow to display a color swatch popup window. Click the desired color.
    - Show Name—Check to display the site name on the NtView Name tab.

- Pass Through, OSC, Add/Drop, Hub, Gain equalizer, R-OADM, Line Amplifier, OXC, OIC, Background Amplified Color, Background Raman Amplified Span Color—To change the colors, click in the relevant fields in the Site list. Click the drop-down arrow to display a color swatch popup window. Click the desired color.
- Show Amplifiers—Check to display the amplifier icon for a site on the NtView *Name* tab.
- Show Raman Amplified Span—Check to display the Raman amplified span on the NtView *Name* tab.
- In the Fiber area, complete the following tasks, as needed.
  - True wave Reach Color, Dispersion Shifted Color, Metro Core Color, true wave, True Wave Plus Color, True Wave Minus Color, True wave Classic Color, Free Light Color, LS Color, Tera Light Color, E LEAF Color, TRUE WAVE RS Color, G 652 SMF Color, and Selection Color—To change the fiber color, click in the relevant fields in the Fiber list and then click the drop-down arrow.
  - Show Name—Check to display the fiber name on the NtView *Name* tab.
  - Show Length—Check to display the fiber length on the NtView *Name* tab.
  - Show total SOL Loss—Check to display start of life (SOL) loss on the NtView *Name* tab.
  - Show total EOL Loss—Check to display end of life (EOL) loss on the NtView *Name* tab.
  - Show CD C-band—Check to display C-band chromatic dispersion (CD) on the NtView *Name* tab.
  - Show CD L-band—Check to display L-band chromatic dispersion (CD) on the NtView *Name* tab.

The duct details displayed in the NtView Name tab is shown in the following figure .

**Figure 9: Duct Details Shown on the NtView Name Tab**



- In the Wavelength Usage (%) area, complete the following tasks, as needed.

The ducts in a network carry a predefined number of wavelengths (2, 4, 8, 16, 32, 64, or 80). Wavelength usage is the percentage of wavelength used by these ducts.

The percentage of wavelength used in individual ducts are displayed in various colors. Use the Wavelength Usage (%) option to assign any one of the four predefined colors to the different percentage of wavelength used. The custom values remain until the cache is deleted. After the cache is deleted, CTP populates the following default values:

- Green—25%
- Yellow—50%
- Orange—75%
- Red—100%

For example, the wavelength usage in an 80 wavelength duct that uses 40 wavelengths is 50%. This duct is displayed in yellow.

The valid values range from 1 to 100. If you enter a value greater than 100, it is considered as 100, negative value is considered as 1, while 0 is ignored.

The ducts that do not carry any wavelength are displayed in grey.

**Note** The Wavelength Usage (%) option is not supported on remote spur ducts.

For more information on wavelength usage, see Table "Menu and Toolbar Option".

- To change the color of the traffic demands on the NtView Name tab, in the Point To Point, P-Ring, and Any To Any areas, click in the Color and Selection Color fields, and then click on the drop-down arrow to display a color swatch popup window. Click the desired color.

**Step 8** To change the Network Mgmt Tree tab appearance, complete the following tasks as needed:

- In the Network area, click in the Color and Selection fields. Click the drop-down arrow to display a color swatch popup window. Click the desired color.
- In the Link area, complete the following tasks:
  - To change the link color, click the Color field in the Link list and then click the drop-down arrow. Choose the desired line width from the drop-down list.
  - To change the link appearance, click the Stroke field in the Link list and then click the drop-down arrow. Choose the desired line appearance from the drop-down list.

**Step 9** To change the layout appearance, click **Layout View** and complete the following tasks as needed:

- In the General area, click in the Background and Selection Color fields. Click the drop-down arrow to display a color swatch popup window. Click the desired color.
- In the Any/Present View area, complete the following tasks:
  - To change the color for Foreground, Locked & Unlocked View, Locked Elements Background, and Locked Elements Foreground, click the relevant field and click the drop-down arrow to display a color swatch popup window. Click the desired color.
- In the Alarmed View area, complete the following tasks:
  - To change the color for Unalarmed Elements Background, Unalarmed Elements Foreground, and Alarmed Elements, click the relevant field and click the drop-down arrow to display a color swatch popup window. Click the desired color.

**Step 10** Click **Ok**.

---

## Setting the Default Software Release

Use the following procedure to set the default software release for CTP. This release will be used as the default software release when creating a project. See [Creating a Project](#), on page 47.

### Procedure

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- Step 1** From the Tools menu, choose **Options**.
  - Step 2** In the Options Explorer dialog box click **General**.
  - Step 3** In the column on the right, click the **Default CTP Software Release** option. A drop-down list appears.
  - Step 4** Click an option in the list to choose the software release.
  - Step 5** Click **Ok**.
- 

## Setting the Default Platform Values

Use the following procedure to establish the default traffic mapping, dense wavelength division multiplexing (DWDM) design, and default layout settings for a particular platform and system release. The default settings appear during project creation. All options that you specify can be changed after project creation on a per-span basis.

### Procedure

---

- Step 1** From the Tools menu, choose **Options**.
- Step 2** In the Options Explorer dialog box, right-click **Platform** and choose **Expand** from the shortcut menu.
- Step 3** Click the desired **System Release** folder and complete the following tasks as needed:

**Note** Default changes apply only to the specified system release.

Choose the required settings:

- Shelf Management—The options available are Auto, Multi Shelf Integrated Switch, Multi Shelf External Switch, and Individual Shelf. These options allow you to specify the type of management to be used for the sites on the network.
  - Auto—Sets the default option of the Multi Shelf Switch for all the nodes with more than one shelf. For M6/M15 chassis, the default option is Multi Shelf Integrated Switch.
  - Multi Shelf Integrated Switch—Configures all the Multiservice Transport Platform (MSTP) optical units (OADMs and amplifiers) in different shelves connected through a LAN. The LAN is implemented with switches plugged into the MSTP shelves. These switches are used to connect to the external chassis. For this option, Multi-Shelf Integrated Switch Cards (MS-ISC) are used to support the multishelf configuration. M15 uses RJ 45 and optical ports to connect to an external chassis.
  - Multi Shelf External Switch—Configures all the MSTP optical units (OADMs and amplifiers) in different shelves connected through a LAN. The LAN is implemented with switches external to the MSTP shelves.

For this option, two external Ethernet switch units (Cisco Catalyst 2950 and Cisco Catalyst 3650) are used to support the multishelf configuration. Cisco Catalyst 2950 supports 12 subtending shelves and Cisco Catalyst 3650 supports 24 subtending shelves.

CTP supports a maximum of 50 shelves, including the node controller shelf, in a multishelf configuration when the TNC, TNCE, TSC, TSCE, TNCS, TNCS-O, or TCC3 card is used as the node controller.

CTP supports a maximum of 5 shelves, including the node controller shelf, in a multishelf configuration when TCC2P card is used as the node controller.

– Individual Shelf—Configures all the MSTP optical units (OADMs and amplifiers) in the same shelf.

#### Important Notes for Shelf Management:

- 1 When you choose **Multi Shelf External Switch** from the **Shelf Management** drop-down list, the multi-shelf external switch is placed in the layout irrespective of the node controller.
- 2 Shelf management is disabled for HYBRID 15454 ONS configuration from Release 9.1 and later.
- 3 The M6 chassis, when used as node controller with Integrated Switch, can support three subtended shelves. The subtended M6 chassis can subtend two more shelves.
- 4 The Cisco NCS 2015 M15 chassis, controlled by two TNCS cards, can act as a node controller that manages other subtended M15 shelves. Up to three M15 shelves can be subtended directly to the Master shelf, and the number of subtended M15 shelves can be increased up to 10 in a daisy chain connection.
- 5 In a mixed Multi Shelf Management configuration, M15 shelves can be used as subtended shelves with M6 as a node controller only when TNCE or TSCE control units are used.
- 6 Multi Shelf Management mixed configurations can extend up to 25 shelves for M6 and M15 chassis.
- 7 Multi Shelf Management configurations with M15 as node controller and M6 as subtended shelf are not supported in CTP 10.5.
- 8 Multi Shelf Management configurations with M15 and M12 in any combination (node controller or subtended shelf) are not supported in CTP 10.5.
- 9 Cisco NCS 2015 as the node controller with NCS 2015 as subtended shelves.
- 10 Cisco NCS 2015 as the node controller with a mix of NCS 2015, NCS 2006, and ONS 15454 as subtended shelves.
- 11 Cisco NCS 2006 as the node controller with a mix of NCS 2015, NCS 2006, and ONS 15454 shelves as subtended shelves.
- 12 Cisco ONS 15454 as the node controller with a mix of NCS 2015, NCS 2006, and ONS 15454 shelves as subtended shelves.

**Note** The ONS 15454 shelves must have TCC3 cards installed for the configurations. Warning message appear if the number of shelves exceed 10 for pure MSM and 15 for mix MSM configuration that include NCS 2015.

- Node Protection—The options available are Same Shelf, Separated Shelves, and Node Split. Select Same Shelf to configure the optical units (amplifiers and OADM) on side A (CW direction) and side B (CCW direction) in the same shelf.

**Note** Node protection is disabled for HYBRID 15454 ONS configuration in Release 9.1 and later.

Select Separated Shelves to configure the optical units (amplifiers and OADM) on side A (CW direction) in one shelf and those on side B (CCW direction) in a second shelf.

- C-band Rules—Select the options from the drop-down list. The options appear in the following format: C 64 Chs 50 GHz (+2 dBm/Ch). The channels available are 80, 72, 64, 40, 32, 20, 16, and 8; the reference per channel power options available are -1 dBm, -2 dBm, 1 dBm, 2 dBm, 4 dBm, 5 dBm, 7 dBm and 8 dBm; and the spacing options available are 100 GHz and 50 GHz. You can use even wavelengths for 80, 72, and 64 channel design.

For HYBRID 15454 ONS configuration, the available options are 8, 16, 20, 32, 40, 48, 64, 72, 80, and 96 channels.

- **L-band Rules**— Select the options from the drop-down list. The options appear in the following format: 32 Ch. 100 Ghz +5 dBm. The options available are: None, Expand, and channels available are 32; the reference per channel power options available are 2 dBm and 5 dBm; and the only spacing options available is 100 GHz.

Select **Expand** to indicate that the L-band rules are upgradable.

**Note** L-band is not applicable to HYBRID 15454 ONS configuration in Release 9.1 and later.

- **Installation w/o CTP**—Check this check box to install the network with default parameters. If you choose this option, CTP designs the network according to a set of predefined conditions, so that the selected node can be installed without the Cisco Transport Planner configuration files (thresholds and setpoints).
- **Dithering Lower Limit**—Enter a value that satisfies the following conditions:
  - Not lower than zero
  - Not higher than 32
  - Not higher than the dithering upper-limit value

The dithering value is the site identifier that CTP uses to adjust power on 80-WXC cards. Dithering value is provided only for sites with 40-WXC cards, that is, for sites with multidegree site structure and with the functionality “OXC” or “Auto”. This parameter is not displayed for non-OXC sites.

- **Dithering Upper Limit**—Enter a value that is not lower than zero and not higher than 32.
- **Insulators**—Check this check box to protect the Express Add/Drop (EAD) colorless ports of the 80-WXC-C cards configured as demux units.
  - Note** The Cisco ONS 15216-FLD-2-ISO optical insulator is not supported in CTP Releases 9.3 and later releases.
  - Note** Optical insulator connections are displayed only in the Patchcord Installation tab in the Internal Connections report.
- **Structure**—Choose the site structure from this drop-down list. If the network topology does not support the selected site structure, then the selection made in this drop-down list is ignored.
- **MSM External Switch**—Choose the multi shelf external switch type, from the drop-down list.
- **Use Payg**—Check this check box to enable the Pay As You Grow feature. For more information about the Pay As You Grow feature, see [Understanding the Pay As You Grow Feature, on page 45](#).
- **Service Level**—Choose the service level from the drop-down list.
- **Service Level Num of Years**—Choose the maintenance service level length (in years), from the drop-down list.
- **Enable NCS**—Check this check box to use NCS PIDs. For more information, see table “NCS PIDs”.
- **Redundant Power**—This drop-down list enables you to choose whether the redundant power supply is to be added.
- **UTS AC Power Cables**—Choose the type of cables to be used for the AC power supply, from the drop-down list. Cables are listed based on the country type. M15 does not support AC power supply.
- **Filler Card Type**—Choose the type of card to be placed in the empty slots of a chassis, from the drop-down list. The options available are:

- Blank—CTP places only blank cards.
- UTS Filler—CTP places blank cards in M12 chassis and Universal Transport System (UTS) filler cards in the M2 and M6/M15 chassis. The two type of UTS filler cards placed by CTP are 15454-M-T-FILLER (in TNC and TSC card slots) and 15454-M-FILLER (in other slots).
- Node Controller—Choose a chassis to act as the node controller, from the drop-down list.
- M6 Chassis in Use—Enter an integer value for the number of M6 chassis to be used.
- M12 Chassis in Use—Enter an integer value for the number of M12 chassis to be used.
- Redundant Controller Card—This drop-down list enables you to choose whether to use a redundant controller card.
- Side/Side cabling—Choose the loss value between the west and east side of the site, from the drop-down list. It is useful in case of multi shelf node protection when the racks are not located close to each other.
- Anti ASE— The options available in the drop-down list are:
  - Auto—CTP decides if the site should be configured as anti-amplified spontaneous emissions (anti-ASE).
  - Yes—The site is configured such that all the express channels on the site are optically dropped and reinserted. In addition, all the patch cords between the West and East sections are removed.
  - No—The site is not configured as anti-ASE.

**Step 4** Click the **Layout** folder and complete the following settings as required:

- OSMINE Compliant—Check this check box to instruct CTP to ensure that all the sites placing transponder and line cards are compliant with OSMINE.

**Note** OSMINE is supported in R9.2.1 and R9.6.0.x only.

- Hybrid Node—Check this check box to notify CTP to ensure that cross-connect, SDH, and SONET cards are not placed within the optical transport section (OTS) shelf.
- Max Num of Shelves—Specify the maximum number of shelves per rack. The maximum number of shelves you can specify is 4.
- Fan Tray—Select the type of fan tray to be placed within each node, from the drop-down list.
- AIC—Choose Yes from the drop-down list to instruct CTP to put the AIC card in slot 9 of the first shelf in each site.
- Fiber Storage—Choose Yes from the drop-down list to instruct CTP to put the fiber storage within the rack below the optical shelf.
- Y-Cable—The the Y-cable options from the drop-down list. The options available are:
  - Auto—Instructs CTP to set the default value for the Y-Cable option.
  - 1RU FlexLayer Shelf Assembly—Instructs CTP to use the ONS 15216 Splitter/Combiner FlexLayer modules to implement the required Y-cable protections.
  - 2RU Y-Cable Panel—Instructs CTP to use the new ADC Splitter/Combiner modules to implement the required Y-cable protections.
- TXP/MXP/XP in OTS—The options in the drop-down list enable you to choose whether to place client cards in OTS shelves.

- **Etsi Rack Width**—Choose the ETSI rack width from the drop-down list. The 19 inches option adds 15454E-19IEC-KIT for each ETSI shelf.
- **Rack Height in RU**—Enter an integer value for the rack height. The default option is Auto, which assigns 44 rack units (RU) for ANSI and 40 RUs for ETSI.
- **Alien Shelf Height**—Enter the height of the alien shelves in RU. If the alien shelf height is greater than the rack height, alien shelves will not be added to the site, and an error message will be displayed in the summary report.

- **Number of Alien Shelves**—Enter the number of alien shelves that are to be added to the site.

Number of alien shelves can vary based on the alien shelf height. Maximum number of alien shelves that can be added is 600, if the alien shelf height is 1 Rack Unit (RU) and there are no other shelves in the layout.

The maximum number of racks supported for a site is 15. If the addition of alien shelves require more than 15 racks, an error message will be displayed in the summary report and the layout is not built for the site.

- **Alien Shelf Name**—Enter the name of the alien shelves that are added to the site. This name will be displayed in the Layout reports.
- **Populate Shelves From Bottom**—Check this check box to notify CTP to place the shelves in the rack starting from the bottom. This is useful in installing shelves in tall racks. For more information about the order in which CTP fills the rack, see the [General Placement Rules](#), on page 285.
- **Chassis Type**—Choose the type of chassis from the drop-down list. The options available are Auto, M12 Chassis, M6 Chassis, M15 Chassis, and M2 Chassis. The default option is Auto, which selects combinations of the chassis in an optimized manner.
- **Power Supply**—Choose the type of power supply from the drop-down list. The options available are Auto, AC Power, AC2 Power, DC Power, DC20 Power, and DC40 Power. From Release 10.1, the default option is Auto (DC40). M2 does not support AC2 Power.

**Note** The AC2 power cables are present in the BoM only when AC2 Power and Auto or AC2 Power and Data Center options are selected in the Power Supply and UTS AC Power Cables sections respectively.

- **TCC Type (Release 9.4 and later releases)**—Choose the type of TCC card from the drop-down list. The options available are Auto, TCC2P, and TCC3. The default option is Auto, which selects the TCC3 card.

**Note** When used as the node controller, the M12 chassis with TCC2P cards cannot subtend the M6 chassis.

- **M6/M2 Controller Type**—Choose the type of controller card from the drop-down list. The options available are Auto, TNC/TSC, TNCS-O, TNCS, and TNC-E/TSC-E. The default option is Auto, which selects the TNC-E/TSC-E card. When you choose TNCS-O, it is configured for the node controller and not the subtended shelf.

**Note** You can select a different M2/M6 controller type for a network in the release upgrade or upgrade state by unlocking the TSCE/TSC or TNCE/TNC card in the site layout.

- **M15 Controller Type**—Choose the type of M15 controller from the drop-down list. The options available are Auto, TNCS-O, and TNC-S. When you choose TNCS-O, it is configured for the node controller and not the subtended shelf. The default option is Auto, which selects the TNC-S card.
- **M15 Chassis in Use**—Enter an integer value for the number of M15 chassis to be used.



- **Redundant power scheme**—Choose the redundant power scheme from the drop-down list. The options available are 1+1, 2+1, 3+1, 2+2. You can choose the redundant power scheme to configure the number of working and protected power units for the chassis. 3+1 is the default redundancy power scheme for M15 DC chassis and 2+2 is the default redundancy power scheme for M15 AC chassis.

For example, if you choose 3+1 redundant power scheme, there will be 3 working power units and 1 protected power unit.

- **SFPs for multi-chassis**—Specify the number of small form-factor pluggables (SFPs) that you want to use for Multi Shelf Management configuration. The number of SFPs you specify here will appear in the BOM.
- **DCC Shelves Management**—Check this check box to notify CTP to reserve Slot 12 for equipping 15454-MR-L1 units to implement data communication channel (DCC) shelf management.
- **Door**—Choose the type of door from the drop-down list. The default option is Auto, which does not add any door type. Door and deep doors are two types of front doors that act as protective panels in the ONS 15454 M2, ONS 15454 M6, and NCS 2015 M15 chassis. The deep door provides additional space in front of the shelf to accommodate cables that do not fit inside the standard door.
- **M12 Shelves**—Enter an integer value for the number of empty M12 shelves to be added to the node layout. CTP supports a maximum of 29 extra M12 shelves. The default option is Auto, which does not add any shelves.
- **M6 Shelves**—Enter an integer value for the number of empty M6 shelves to be added to the node layout. CTP supports a maximum of 29 extra M6 shelves. The default option is Auto, which does not add any shelves.
- **M2 Shelves**—Enter an integer value for the number of empty M2 shelves to be added to the node layout. The default option is Auto, which does not add any shelves.
- **M15 Shelves**—(Release 10.5 and later releases) Enter an integer value for the number of empty shelves to be added to the node layout. The Auto option does not add any shelves.

The above values are applied to all the sites in the newly created network. The values can be modified for individual sites after the network creation.

**Step 5** Click the **Restricted Equipment** folder. To restrict a unit, check the corresponding check box in the Restricted column for that unit.

To change the setting back to unrestricted, uncheck the check box. To apply restricted list changes to an open project, complete the following:

- 1 Right-click the folder for the network that you want to update and choose **Expand** from the shortcut menu.
- 2 Right-click the desired platform and release folder under RestrictedEqptListFolder in the Project Explorer pane and choose **Edit List** from the shortcut menu. The Restricted Equipment list for MSTP 454 DWDM [*Release Number* ] dialog box appears.
- 3 Click **Update**. The modified Restricted Equipment List is replaced with the global restricted equipment List.
- 4 Click **OK** to close the dialog box.

**Step 6** Click the **Fiber Options** folder and specify the fiber parameters as required:

- **Span Label Tag**—Enter the desired span label; the default label is Duct.

- Span Length—Enter the span length. The displayed unit of measure is retrieved from the Span Measurements Units field.
- EOL Ageing loss [dB]—Enter the EOL aging loss value. The EOL loss-per-span value is added at the end of life to each discrete fiber in the network (for example, to add an EOL margin for splicing).
- EOL Ageing Factor—Enter the number to use when factoring fiber aging. This factor is multiplied by the SOL total span loss without connectors.
  - Note** Enter a value in either EOL Ageing Factor or EOL Ageing loss; you do not need to enter a value in both fields.
- Connector loss [dB]—Enter the concentrated loss at the end of the span.
- Length Based Loss—If checked, the fiber loss is determined by multiplying the Span Length by the Loss Factor. If this check box is unchecked, you must enter the total loss of the span.
- Tot SOL loss w/o conn [dB]—Enter the total start of life (SOL) link fiber loss value for each span, excluding the connector concentrated loss. This value is applicable only if the Length Based Loss check box is unchecked.
- DCN Extension (With Software R8.0 and later releases)—Check this check box to enable the default use of data connection network (DCN) extension on each span in the project. This setting implies that the OSC channel is not used to connect the two nodes. This default can be overridden on the network wizard pane.
  - Note** Use one of the following formulas to calculate the fiber loss at SOL:  

$$\text{SOL} = \text{km} * \text{dB/km} + (2 * \text{connector loss})$$

$$\text{SOL} = \text{user entered loss} + (2 * \text{connector loss})$$
 Use one of the following formulas to calculate the fiber loss at EOL:  

$$\text{EOL} = \text{km} * \text{dB/km} * \text{EOL Aging Factor} + (2 * \text{connector loss}) + \text{EOL Aging Loss},$$
 or  

$$\text{EOL} = \text{user entered loss} * \text{EOL Aging Factor} + (2 * \text{connector loss}) + \text{EOL Aging Loss}$$
  - Select the Fiber Type of each span of the network. You can specify a fiber type even if the fiber type is not supported for the design.
  - PMD at Fiber—Enter the polarization mode dispersion (PMD) value. PMD is always entered in ps/nm/km.
  - Loss—Enter the value of the SOL fiber loss per kilometer used to calculate the loss of each span in the network. The fiber loss factor is always entered in dB/km.

**Step 7** Click the **Traffic Mapping** folder and complete the following tasks as needed.

- In the Fixed traffic area, choose the unprotected routing strategy from the drop-down list:
  - Auto—CTP automatically selects the minimum number of channels that can be deployed among the nodes of the traffic group.
  - Unprotected optimum optical path—Each node pair is connected using one connection. The unprotected optimum optical path minimizes the number of required optical amplifiers.

– Unprotected minimum hop count—Each node pair in the traffic group is connected by one connection. The unprotected minimum hop count minimizes the number of channels (for unprotected traffic types only) that can be deployed among the nodes of the traffic group.

- In the General area, complete the following tasks as needed.

– Force Mesh Algorithm—For CTP Software Release 8.5, check this check box to force the mesh algorithm.

– Allow Different Wavelengths—Check this check box to allow different wavelengths to be used for regeneration.

– Coloring Priority Option—Check this check box to assign the wavelength from the left side of the available band, that is, from 1528.7 nm. If this option is unchecked, the wavelength is assigned from the right side of the available band, that is, from 1566.7 nm.

– Flat Grid Filling Option—Check this check box to assign the wavelength in a flat grid, allocating each free wavelength without any guard band. If this option is unchecked, the wavelength is assigned according to the actual assignment rules.

**Note** Guard band is an unused part of the wavelength spectrum, for the purpose of preventing interference between the wavelength channels.

– Maximum Separation Option—Check this check box to assign the wavelengths for 40 G and 100 G CP-DQPSK service types from the first wavelength in the C-band (1528.7 nm) and for other service types from the last wavelength of the C-band (1566.7 nm) to overcome interference in demands where the wavelength selection is set to Auto.

– Activate AR-XPE—Check this check box to use the AR-XPE card in the network. When this option is checked, the AR-XP card is replaced by the AR-XPE card in the exported BoM report. The AR-XPE card does not support the client PAYG license. When the **Activate AR-XPE** check box is checked, uncheck the **Use Client Payg** check box in the Properties pane to avoid error during network analysis.

**Step 8** Click the **DWDM Design Rules** folder and complete the following tasks as needed:

- OSNR Alarm For Regeneration—Check this check box to define the optical signal-to-noise ratio (OSNR) alarm severity. When this limit is reached, CTP suggests a channel at an appropriate site on the network. After the network is designed and analyzed, in the Tasks pane (under Reports), click Optical Results to see if any site requires regeneration. The regeneration column will suggest the site where Regeneration is required.

- Run Quick Analysis—Check this check box to use a quick but less accurate algorithm to analyze the network in a short time. After the analysis, Cisco Transport Planner displays the following warning message: “Dcu design not optimized due to Run Quick Analysis option.”

- No-Tilt-Network-Design—Check this check box to force Cisco Transport Planner to operate the amplifiers inside the gain range where no tilt is generated and to determine the type and number of amplifiers in each site of the network accordingly. This option sets all the intermediary points of the network so that channels are always at the reference power level. The default value is Disabled.

**Note** Long spans (with insertion loss greater than 25 dB) might not be supportable.

- No In-line Bulk Attenuator Design—Check this check box to design the network without using any inline bulk attenuators. If the network cannot be designed without using external in-line attenuators, Cisco Transport Planner displays the following error message: “Unfeasible Network design. Site X should require usage of in-line attenuator. Leave unchecked to allow inline bulk attenuators.”

- No TXT/Line-Card Bulk Attenuator Design—Check this check box to design the network without using any external receive (Rx) bulk attenuators on transponder or line cards. If any of the clients require Rx bulk attenuators, then the related channel is shown with the working condition (flagged red, orange, or yellow). No Rx bulk attenuator will be shown in any of the reports (such as Optical Channel Results, Internal Connections, or BoM). Leave unchecked to allow bulk attenuators.
- Prevent Use of E-LEAF Dispersion Compensation Unit on E-LEAF Dispersion spans—Check this check box to prevent Cisco Transport Planner from using Extended -Large Effective area fiber (E-LEAF) dispersion compensation units (DCUs) on E-LEAF spans for the overall network. Leave unchecked if you want the algorithm to automatically optimize the usage of the E-LEAF DCUs.
- No DCU Design—Check this check box to avoid automatic placement of DCU units.
- Max Scalability Placement —Check this check box to scale up or expand the network made in your network design. You can add new sites and demands depending on your requirements, thus, CTC automatically creates the flexibility of the possible expansion of your network. It also checks to force the CTP to choose an EDFA/DCU placement that is best suited for future expansion of the designed network without any hardware changes.
- TDCU—From the drop-down list, select one of options to place the TDCU units (TDCU Coarse and TDCU Fine) in the network are:
  - Auto—Places the fixed DCU units in the network.
  - All Positions—Places the TDCU units wherever the fixed DCU units can be placed.
  - Never Place—Does not place the TDCU units in the network.
  - Selected Positions—Places the TDCU units in ROADM, WXC, and Dynamic Gain Equalizer (DGE) nodes.
- FDCU—From the drop-down list, select one of the options to place the FDCU units in the network.
  - Auto—Places standard DCUs in the network, automatically. The FDCU option can be set to “Always” at the network level for a specific network. FDCU units can also be forced on specific nodes in the network.
  - Always—Places the FDCU units in the network. The FDCU option for new networks is set to “Always”. Standard DCUs are placed if FDCU units are not available. Standard DCU units can also be forced on specific nodes in the network.
- Turbo Simplex—Check to achieve faster results by optimizing a subset of the total channels based on type and path rather than optimizing every channel. Unchecking this option can result in longer analysis times for large networks, especially with any-to-any ROADM traffic.
- Max Sc Value—Enables you to enter the maximum slope compensation value.
- Enable Connector Loss—Check this check box to apply the default connector loss values to the fiber. The applied value depends on the type of site where the fiber is connected:
- Pass through Connector Loss—Enter the connector loss value for a pass-through site.
- OXC Connector Loss—Enter the connector loss value for an OXC site.
- ROADM Connector Loss—Enter the connector loss value for a ROADM site.
- OSC Connector Loss—Enter the connector loss value for an OSC site.
- Line Amplifier Connector Loss—Enter the connector loss value for a line amplifier site.

**Note** The Pass through Connector Loss, OXC Connector Loss, ROADM Connector Loss, OSC Connector Loss, and Line Amplifier Connector Loss properties are enabled only if the Enable Connector Loss check box is checked.

The values of these properties can also be specified in the Properties pane for the Options>DWDM Design Rules>System Release option in the Project Explorer pane and are applicable to the current network.

**Step 9** Click **OK**.

---

## Setting the Default Project Values

Use the following procedure to set the default project settings and repair time. These defaults will appear during project creation.

### Procedure

---

**Step 1** From the Tools menu, choose **Options**.

**Step 2** In the Options Explorer dialog box, click **Project** and complete the following tasks to set the defaults that appear in the Project Creation wizard:

- Customer—Enter the default customer name (128-character maximum).
- Created by—Enter the default user name (128-character maximum).
- Measurement Units—Choose the default span length unit of measure from the drop-down list, either **Km** or **Miles**.
- Price List—Choose the default price list.
- Restricted Analysis—Check to use Restricted Analysis in the project.
- ANSI/ETSI—Choose either **ANSI** (American National Standards Institute) or **ETSI** (European Telecommunications Standards Institute) from the drop-down list.

**Step 3** Click **General** and complete the following tasks:

- MTTR (hours)—Enter the mean time to repair (MTTR) for all sites in the network. This value will apply to every site in the network. If you change the MTTR value after creating sites, the new value will only apply to sites you create after the change.
- Restocking Time (days)—Enter the number of days required (including transportation time) to restock the units into the maintenance center.
- Confidence Level (%)—Choose the confidence level for finding the spare units in the maintenance center (50, 75, 95, or 99 percent).
- Default CTP Software Release—Choose a release to be set as the default CTP software release. This release will be used as the default release when creating a project. See [Creating a Project](#), on page 47.
- Wavelength Display—Select your preference for wavelength display.

- Hide Network Details—Check this check box to hide network details.
- View FEC Mode Correction Messages—Check this check box to view FEC mode correction messages.
- View Copy Operation—Check this check box to view the copy operation details.
- View Upgrade Operation—Check this check box to view the upgrade operation details.
- View Release Upgrade Operation—Check this check box to view the release upgrade operation details.
- View Upgrade To Design Operation—Check this check box to view the upgrade to design operation details.
- View High Latency Messages—Check this check box to view the high latency details.

**Step 4** Click **BoM** and complete the following:

- Use Bundles—(Multishelf configuration only) Check this check box to use the Multishelf Management Integrated Kit bundle when generating the BoM instead of the single items. As a bundle, a common price is quoted, which is lesser than when the items are listed individually.
- Use Global Discount—Check this check box to allow you to edit the discount box (Global Discount).
- Global Discount—Enter the global discount to be applied to the whole BoM.
- Use Client Payg—Check this check box to include license for client cards. This option is applicable to AR-MXP, AR-XP, 100G-LC-C, 100G-CK-LC-C and 10X10G-LC cards. This check box is checked by default.
- Enable NCS—Check this check box to use NCS PIDs. For more information, see table "NCS PIDs".
- Include SW License(s)—This check box is checked by default. The software license for the release is shipped with the Cisco ONS 15454 chassis.
- Include Paper Documentation—Check this check box to ship paper documentation separately with the product and listed in BoM.
- Include CD Documentation—Check this check box to ship CD documentation separately with the product and listed in BoM.
- Hide BoM price/discount—Check this check box to hide the BoM discount and the individual unit price. Only the final price is displayed.
- WSON PID—Check this check box to display the WSON PIDs in the BoM report.
- Service Level—Choose the service level from the drop-down list.
- Service Level Num of Years—Choose the maintenance service level length (in years) from the drop-down list.

**Step 5** Click **OK**.

---

## Defining Third-Party DWDM Interfaces

Cisco Transport Planner allows you to define a third-party DWDM interface to be used in project creation. After you define third-party DWDM interfaces, you can choose them when creating traffic demands. For more information on defining third-party interfaces, see Appendix D, [Third-Party DWDM Wavelength Interface Model](#), on page 417.



**Note** If you create a network design with a third-party interface and need to share the design with other users, you must provide not only the saved network MPZ file but also the exported database file containing the third-party interface definition. To view this project, the other user first must import the database with the third-party interface values.

Use the following procedure to define a third-party DWDM interface:

### Procedure

- Step 1** Click **Tools > DB Parts Mgmt.** The DB Parts Manager dialog box appears.  
**Note** You cannot open the DB Parts Manager if a project is open or if you are using the Base Network Designer profile.
- Step 2** Right-click **Platform Parts** and choose **Expand** from the shortcut menu.
- Step 3** Right-click **Group** and choose **New Group** from the shortcut menu. The new group appears under Group and in each system release under parts DB.
- Step 4** In the Group Editor dialog box, complete the following information:
  - Name of group—Enter the name of the new database.
  - Note—(Optional) Enter a description of the group.
- Step 5** In the parts DB for the desired system release, click the group that you created.
- Step 6** In the Parts tab of the DB Parts Manager dialog box, right-click and choose **Client** and then **Alien** from the shortcut menu. A new row appears on the Parts tab for the client hardware.
- Step 7** Double-click the row to open the Alien dialog box.
- Step 8** In the General tab of the Alien dialog box, type the name of the card in the **Name** field and then enter the Label name.
- Step 9** Click the **Instance** tab and complete the following:
  - Ansi PID—Enter the product identifier of the ANSI system, as needed. If you select BoM visible for this third-party interface with ANSI PID completed, the third-party interface is included in the BoM with the related product identifier.
  - Etsi PID—Enter the product identifier of the ETSI system, as needed. If you select BoM visible for this third-party interface with ETSI PID completed, the third-party interface is included in the BoM with the related product identifier.
  - TAG—(Display only) For internal use.
  - SYS. NAME ANSI—Not applicable for third-party interfaces.
  - SYS. NAME ETSI—Not applicable for third-party interfaces.

- **WL START**—Choose the wavelength starting range that the third-party interface supports from the drop-down list.
- **WL END**—Choose the wavelength ending range that the third-party interface supports from the drop-down list.

**Step 10** Click the **Physical Ports** tab and in the Label column, type a label for each port. The CTC Ports and TL1 Ports tabs are not applicable for third-party interfaces.

**Step 11** Click **Ok**.

**Step 12** In the Parts tab of the DB Parts Manager dialog box, right-click and choose **Software** and then **Alien** from the shortcut menu. A new row appears on the Parts tab for the client software.

**Step 13** Double-click the row to open the AlienSoft dialog box.

**Step 14** In the General tab, complete the following:

- **Name**—Enter the name in the Name field.
- **Related Item**—Choose the client card that you created in Step 7 to Step 11.

**Step 15** Click any of the following depending on the client card that you choose and proceed to Step 16:

- **Default - OCh** tab
- **DPSK-OCh** tab
- **QPSK-OCh** tab

**Step 16** Complete the following (see *"Supported Combination for 40 Gbps Third Party Interface"* table through *"Supported Combination for 10 Gbps Third Party Interface"* table for supported value combinations):

- In the Rules area, choose the C-band or L-band design rule from the Design Rule drop-down list.
- In the Technology area, complete the following:
  - **Modulation Format**—Choose **NRZ** (Non Return to Zero) or **Duo Binary**.
  - **Transmitter Type**—Choose **MZ** (Mach Zehnder), **DML** (Direct Modulated Laser), or **EML** (Electro-absorption Modulated Laser).
  - **Receiver Threshold**—Choose **Optimal** (minimum BER) or **Average** (average received power).  
For DPSK—Choose the Receiver Threshold as **Optimal**.  
For QPSK—Choose the Receiver Threshold as **Average**.
  - **Regeneration Type**—Choose **3R** or **2R** regeneration mode.
  - **FEC Mode**—Choose **FEC** (Forward Error Correction), **no FEC**, or **E-FEC** (Enhanced FEC). For DPSK or QPSK, set the FEC Mode to E-FEC.
  - **Transmitter Stability**—Choose the maximum wavelength error allowed (pm). The values are 12.5, 25, 50, or 100 pm.
- **Bit Rate**—Choose the desired bit rate from the drop-down list. For DPSK or QPSK, choose the Bit Rate as 40 Gb/s.
- In the TX Power Range area, complete the following:
  - **TX Max Power**—Enter the maximum power output level (dBm).

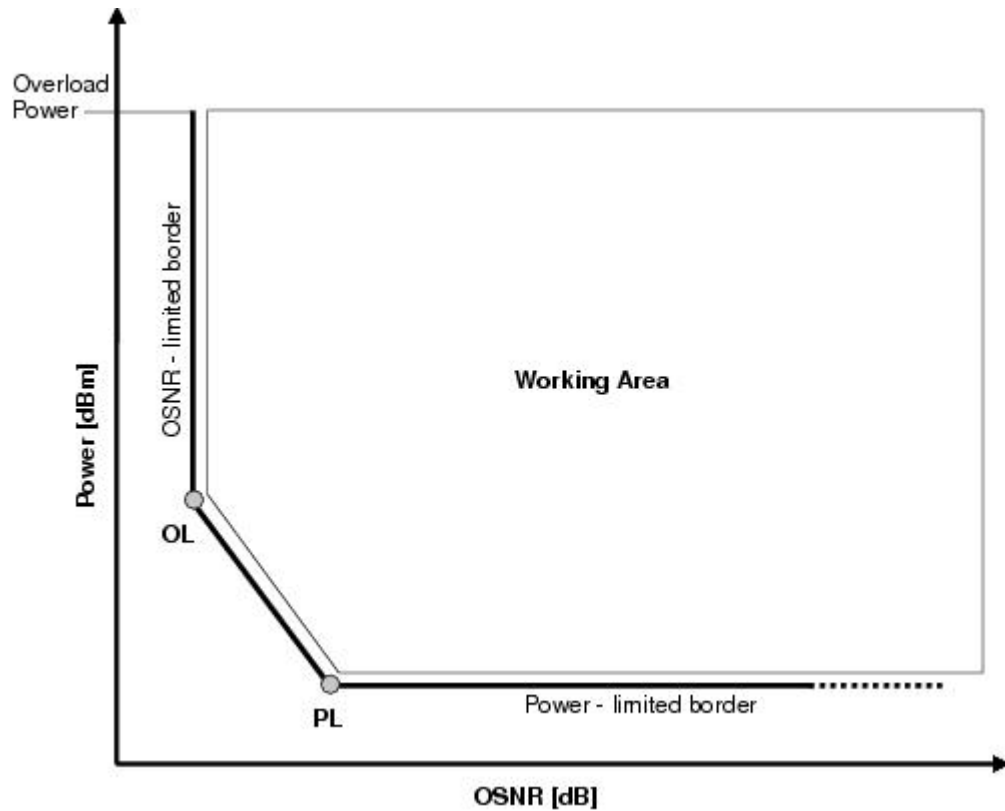


- TX Min Power—Enter the minimum power output level (dBm).
- In the Back to Back Receiver Sensitivity area, complete the following as needed to define the working interface area for Back to Back. Back to Back is a configuration where the receiver is placed in front of the transmitter and no other equipment exists between the two. Back to Back is used to measure characteristics of the TX and RX pair. See Figure *"Interface Operative Area"*.
  - Overload Power [ps/nm]—Enter the overload power level.
  - OL\_Power [dBm]—Enter the minimum power level in the OSNR-limited range.
  - OL\_OSNR [dB] on 0.5 nm RBW—Enter the minimum OSNR level in the OSNR-limited range (measured in 0.5 increments).
  - PL\_Power [dBm]—Enter the minimum power level in the power-limited range.
  - PL\_OSNR [dB] on 0.5 nm RBW—Enter the minimum power level in the OSNR-limited range (measured on 0.5 nm bandwidth).
- In the Chromatic Dispersion area, complete the following as needed:
  - Customize CD Robustness—Check to enable the CD Robustness field, as needed. Chromatic dispersion (CD) refers to the broadening of a light pulse after traveling a distance in the fiber.
  - CD Robustness [ps/(nm\*km)]—If Customize CD Robustness is checked, choose the maximum positive dispersion, Dmax\_pos [ps/(nm\*km)], tolerable by the interface: 0 dB, 1 dB, 1.5 dB, 2 dB, or 3 dB.
- Customize Penalties—Check to enable the Gaussian cross-talk Penalties, Single-Interfering Cross-Talk Penalties, and Scale Q factors fields as needed.
- If Customize Penalties is checked, enter the values to determine the Gaussian cross-talk Penalties in the A\_GXt and B\_GXt fields, as needed. Gaussian cross talk refers to random power that interferes with a signal. The A\_GXt and B\_GXt values are the coefficients for the exponential curves that estimate P-penalty (PL), P-penalty (OL), OSNR-penalty (PL), and OSNR-penalty (OL) for Gaussian cross-talk levels in the OL and PL regions of the interface model with dispersion margins added (see Figure *"Interface Operative Area"*). The formula is  $\text{Penalty (GXt)} = A\_GXt * \exp(B\_GXt * GXt)$ .
- If Customize Penalties is checked, enter the values to determine the Single-Interfering Cross-Talk Penalties in the A\_SIXt and B\_SIXt fields, as needed. Single-interfering cross talk refers to interference caused by a single signal. The A\_SIXt and B\_SIXt values are the coefficients for the exponential curves that estimate P-penalty (PL), P-penalty (OL), OSNR-penalty (PL), and OSNR-penalty (OL) for single-interfering cross-talk in the OL and PL regions of the interface model with dispersion margins added (see Figure *"Interface Operative Area"*). The formula is  $\text{Penalty (IXt)} = A\_SIXt * \exp(B\_SIXt * IXt)$ .
- If Customize Penalties is checked, enter Scale Q values in the F-P(PL), F-P(OL), F-OSNR(PL), and F-OSNR(OL) fields, as needed. The scale factors measure how efficient a card is in recovering the signal distortion. The slope of the Q-factor curve versus OSNR or RX power determines how a BER increase could be recovered with an increase of OSNR, power, or both (depending in which OSNR/power working point the card is). In general, the scale factors are two values (one in OSNR and one in power) for each working point OL and PL of the interface model (see Figure *"Interface Operative Area"*). The the F-P(PL), F-P(OL), F-OSNR(PL), and F-OSNR(OL) values translate a Q-penalty (that is, a BER increase) into power and OSNR penalties. The formulas follow:
  - $\text{P-penalty(PL)} = \text{Q-penalty} * \text{F-P(PL)}$
  - $\text{P-penalty(OL)} = \text{Q-penalty} * \text{F-P(OL)}$
  - $\text{OSNR-penalty(PL)} = \text{Q-penalty} * \text{F-OSNR(PL)}$

$$- \text{OSNR-penalty(OL)} = \text{Q-penalty} * \text{F-OSNR(OL)}$$

F-P(PL) and F-OSNR(PL) are evaluated in the PL working region, while F-P(OL) and F-OSNR(OL) are evaluated in the OL working region of the curve with the dispersion margins added.

**Figure 10: Interface Operative Area**



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**Step 17** Click **Ok**.

The following table lists the supported combinations for 40-Gbps third party interfaces.

**Table 2: Supported Combination for 40-Gbps Third-Party Interface**

| Modulation Format | TX Type | RX Threshold | FEC   | TX Stability [pm] | Chromatic Dispersion Penalties [dBm] |                   |                |                   |
|-------------------|---------|--------------|-------|-------------------|--------------------------------------|-------------------|----------------|-------------------|
|                   |         |              |       |                   | P-penalty (OL)                       | OSNR-penalty (OL) | P-penalty (PL) | OSNR-penalty (PL) |
| Duo Binary        | MZ      | Optimal      | E-FEC | ± 12              | 0                                    | 1                 | 0              | 1                 |

The following table lists the supported combinations for 10-Gbps third party interfaces.

**Table 3: Supported Combinations for 10-Gbps Third-Party Interface**

| Modulation Format | TX Type | RX Threshold | FEC    | TX Stability [pm] | Chromatic Dispersion Penalties [dBm] |                   |                |                   |
|-------------------|---------|--------------|--------|-------------------|--------------------------------------|-------------------|----------------|-------------------|
|                   |         |              |        |                   | P-penalty (OL)                       | OSNR-penalty (OL) | P-penalty (PL) | OSNR-penalty (PL) |
| NRZ               | MZ      | Optimal      | E-FEC  | ± 25              | 0                                    | 2                 | 1              | 0                 |
| NRZ               | MZ      | Optimal      | FEC    | ± 25              | 0                                    | 1.5               | 1              | 0                 |
| NRZ               | MZ      | Average      | no FEC | ± 25              | 2                                    | 0                 | 2              | 0                 |
| NRZ               | EML     | Average      | no FEC | ± 100             | 0                                    | 3                 | 3              | 0                 |

The following table lists the supported combinations for 2.5-Gbps third party interfaces.

**Table 4: Supported Combinations for 10-Gbps Third-Party Interface**

| Modulation Format | TX Type | RX Threshold | FEC    | TX Stability [pm] | Chromatic Dispersion Penalties [dBm] |                   |                |                   |
|-------------------|---------|--------------|--------|-------------------|--------------------------------------|-------------------|----------------|-------------------|
|                   |         |              |        |                   | P-penalty (OL)                       | OSNR-penalty (OL) | P-penalty (PL) | OSNR-penalty (PL) |
| NRZ               | DML     | Average      | FEC    | ± 25              | 0                                    | 2                 | 2              | 0                 |
| NRZ               | DML     | Average      | no FEC | ± 25              | 0                                    | 2                 | 2              | 0                 |
| NRZ               | DML     | Average      | no FEC | ± 25              | 3                                    | 0                 | 3              | 0                 |
| NRZ               | DML     | Average      | no FEC | ± 25              | 3                                    | 3                 | 3              | 3                 |
| NRZ               | EML     | Average      | no FEC | ± 25              | 0                                    | 2                 | 2              | 0                 |
| NRZ               | DML     | Average      | no FEC | ± 100             | 0                                    | 3                 | 3              | 0                 |

## Exporting User Options, Price Lists or Alien Definitions

Use the following procedure to export user options, price lists, maintenance contracts, and the parts database files. The export command creates a ZIP file that includes all of the created files.

### Procedure

---

- Step 1** From the Tools menu, choose **Export**. The Export dialog box appears.
- Step 2** In the Export dialog box, enter a file path and name in the file name field. To export to an existing file, click the ... button and navigate to the desired folder and file. Click **Select** to choose the file.
- Step 3** To select the items to export, complete the following as needed:
- User Option—Check to export the user options set using the Tools > Options command.
  - PartsDB—Check the desired platforms.
  - PriceDB—Check **All Price DB** to export all price lists, or expand All Price DB and check the individual price lists that you want to export.
- Step 4** Click **Ok**.
- 

## Importing User Options, Price Lists or Alien Definitions

Use the following procedure to import user options, price lists, maintenance contracts, and the parts database files. You can import a ZIP file of multiple exported items or an individual TXT file.

### Procedure

---

- Step 1** From the Tools menu, choose **Import**. The Import dialog box appears.
- Step 2** In the Import dialog box, click the ... button and navigate to the desired folder and file. Click **Select** to choose the file to import.
- Step 3** Click **load**.
- Step 4** If you selected a single TXT file, skip this step and go to Step 5. If you selected a ZIP file with multiple exported options, complete the following as needed:
- User Option—Leave checked to import a file with the user options that were set with the Tools > Options command.
  - PartsDB—Leave checked to import the parts database for the desired platform.
  - PriceDB—Leave **All Price DB** checked to import all price lists, or uncheck and check the desired individual price lists.
- Step 5** Click **OK**.
- Step 6** In the confirmation dialog box, click **OK**.
-

## Importing the OSMINE Configuration File

The OSMINE configuration updates are provided in an OSMINE configuration file. When a new OSMINE configuration file is available, use this procedure to import it. The networks analyzed after the import operation will be OSMINE compliant as per the configurations provided in the OSMINE configuration file.

### Procedure

---

- Step 1** From the Tools menu, choose **OSMINE File Import**. The Select OSMINE Config File dialog box is displayed.
  - Step 2** Browse and select the OSMINE configuration XML file.
  - Step 3** Select the MSTP release from the drop-down list.
  - Step 4** Click OK. The new configuration is loaded into CTP.
- 

## Resetting the Default Layout

Your graphical layout settings are saved when you exit Cisco Transport Planner. The next time that you launch Cisco Transport Planner, the layout appears as it did upon exiting. The default graphical layout includes items such as whether the panes are visible and/or docked.

To return to the Cisco Transport Planner default layout, choose **Default Layout** from the View menu. To restore the user modified layout, choose **My Default View** from the View menu.

## Adding User Profiles

A user profile is a set of privileges used for running Cisco Transport Planner. Each profile offers different capabilities. Cisco Transport Planner is packaged with the Network Designer profile, but you can add other user profile types provided by Cisco. All the procedures in the *Cisco Transport Planner DWDM Operations Guide* are written for users with Network Designer access.

Use the following procedure to add a user profile to Cisco Transport Planner:

### Procedure

---

- Step 1** Close all open instances of Cisco Transport Planner.
  - Step 2** Identify the folder where Cisco Transport Planner is installed on your computer, see [Launching the Cisco Transport Planner, on page 17](#), section on page 1-16.
  - Step 3** Create a profile folder; if profile folder already exists, go to Step 4.
  - Step 4** Copy the profile JAR file provided by Cisco Systems into the profile folder.
  - Step 5** Launch Cisco Transport Planner. For more information, see [Launching the Cisco Transport Planner, on page 17](#), section on page 1-16. The new profile will appear in the **Current Selected Profile** drop-down list.
-

## Understanding Sides Labeling

In Cisco Transport Planner Software R8.5 and later, the label for each supported site structure is different from the labels that have been used in the previous releases. The following table summarizes the labeling format in Cisco Transport Planner.

**Table 5: Sides Labeling in Cisco Transport Planner**

| Sites                      | Labeling in Previous Releases                         | Default labeling in Cisco Transport Planner Software R8.5 and later                                       |
|----------------------------|---|---|
| Terminal/Terminal+         | Only one side is created and labeled, T.              | Label A is used for the existing side.  |
| Line/Line+                 | Two sides are created and are labeled, West and East. | Labels A and B are used for the existing sides.   |
| Multidegree with PP-MESH-4 | —   | Labels A, B, C, and D are used for the existing sides.  |
| Multidegree with PP-MESH-8 | —   | Labels A, B, C, D, E, F, G, and H are used for the existing sides.  |
| PSM Line                   | —   | Labels Aw and Ap are used for the existing sides, where w stands for working and p stands for protection. |
| PSM Section                | —   | Labels Aw and Ap are used for the existing sides, where w stands for working and p stands for protection. |



**Note**

The default labels applied to the sides can be edited. For more information about editing side labels, see [Editing Side Labels](#), on page 233.

## Understanding Hybrid Configuration

Typically a node has ONS 15454 MSTP configuration with add/drop units like 40-MUX-C/40-DMX-C, ROADM units and so on. However, the node configuration can also have ONS 15454 amplifiers along with ONS 15216 FlexLayer add/drop units like FLB-2s, FLA-8s, and FLD-4s, and is known as Hybrid 15454 ONS configuration. A network design can have up to 80 channels in a typical MSTP configuration; however, in a Hybrid configuration the number of channels is restricted to 40. In a Hybrid configuration, the Data Connection Network (DCN) manages the traffic instead of Optical Service Channel (OSC). Hybrid nodes are add/drop nodes with express traffic and are comparatively less expensive than MSTP nodes.

# Understanding the Pay As You Grow Feature

The Pay As You Grow (PAYG) feature enables you to implement a cost effective solution when the wavelength requirements are comparatively less than the maximum capacity of the network. Instead of purchasing a standard card that is configured to work on maximum supported wavelengths, you can purchase a PAYG license that comprises of license restricted cards and a base license. The license restricted cards support only a number of wavelengths for which the licenses are installed on the card. The base license supports only 10 wavelengths. Therefore, a license restricted card having only the base license will support only ten wavelengths even if its maximum capacity is to support 40 wavelengths. The cost of the PAYG license is less than the cost of the standard card. For more information about the PAYG licenses, see [Pay As You Grow Licensing](#), on page 427.

When there is a need of more than ten wavelengths, additional licenses can be purchased to support the increased demand. Each new license supports ten additional wavelengths. Therefore, the PAYG functionality significantly reduces the initial setup cost and enables the purchase of additional wavelength capacity on a need basis.

During the analysis of the network, the CTP algorithm decides on whether to use a standard card or a PAYG license depending on the lower implementation cost.

The cards and units that support a PAYG bundle are:

- 40-SMR1-C
- 40-SMR2-C
- 80-WXC-C
- AR-MXP
- AR-XP
- 100G-LC-C
- 100G-CK-LC-C
- 10X10G-LC
- 15216-MD-40-ODD
- WSE
- 15216-EF-40-ODD
- 400G-XP-LC

The PAYG licensing is applied to each side of every site. The license depends on the cards placed on that side and the wavelengths that are added, dropped, or expressed. The PAYG licensing is not dependent on site, type, or functionality.

The applied PAYG bundle is displayed in the Bill of Material of the site. To view it, right-click the site in the Project Explorer pane and select the Bill of Material option from the shortcut menu.

The PAYG bundle to which a card is associated is displayed in the card property. To view it, select the card in the Project Explorer pane; the PAYG bundle name is displayed for the Payg Bundle property in the Properties pane.

## Unlock Pay As You Grow Bundles

When a license restricted card is associated with a PAYG bundle, the association is maintained for future analysis. Therefore, if the network is analyzed with increased wavelength demands, CTP adds additional licenses even though using a standard card is cost effective.

During a network upgrade, the association of the license restricted card with the PAYG bundle is not modified unless the Unlock Pay As You Grow Bundle option is selected. Right-click the site either in the Project Explorer pane or in the NtView Name tab, and select the Unlock Pay As You Grow Bundles option from the shortcut menu. On selecting the Unlock Pay As You Grow Bundle option all the PAYG bundle information from a previous analysis are deleted and are recalculated when the network is analyzed again.

**Note**

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The Unlock Pay As You Grow Bundle option is enabled only in the Upgrade or Install mode.

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## Forcing PAYG Bundles On a Card

The Developer and Optical Designer profile users can decide whether to associate a card with the PAYG bundle or not. Select the card in the Project Explorer pane; the Force Payg drop-down list is displayed in the Properties pane. The options available are:

- Auto—The PAYG bundle or the standard card is used based on cost effectiveness.
- Yes—The card is always associated with the PAYG bundle even if using the PAYG bundle is not the most cost effective solution.
- No—The card is never associated with a PAYG bundle even if using the PAYG bundle is a more cost effective solution.

**Note**

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The Force Payg drop-down list is enabled only in the Upgrade and Install modes, when the card is in the locked state.

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## Creating and Analyzing Networks

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A project consists of a single network or multiple networks that you analyze and compare. In a project, you can have multiple copies of a single network with the same customer input data, but use different options in each to investigate multiple solutions.

- [Creating a Project, page 47](#)
- [Adding Sites , page 61](#)
- [Adding Fiber Spans, page 63](#)
- [Creating an Optical Subnet, page 64](#)
- [Adding Notes to a Project, page 65](#)
- [Creating Traffic Subnet, page 66](#)
- [Creating a Demand, page 66](#)
- [Viewing Circuits in a Network, page 97](#)
- [Analyzing the Network, page 98](#)
- [Managing the Network Design, page 99](#)
- [Viewing a BoM, page 106](#)
- [Managing the Price List, page 112](#)
- [Importing Designs Created in the Sherpa Tool, page 116](#)
- [Bidirectional Communication with the Network Element, page 119](#)
- [Split ROADM, page 125](#)
- [Flex SMR with Inline DCU, page 132](#)
- [Connection Verification, page 133](#)

### Creating a Project

Use the following procedure to create a single network in a project. A new network is in the Design state. For more information about the different network states, see the [Managing the Network Design, on page 99](#).



**Note** All options that the Project Creation wizard sets can be changed as needed, except Measurement Units and ANSI/ETSI.

### Procedure

- Step 1** From the File menu, choose **New** or click **New** in the Start Page. The Project Creation wizard appears.
- Step 2** In the Project Parameters area complete the following:
- Created By—Enter a user name. You can enter a maximum of 128 character.
  - Customer Name—Enter the name of the customer requiring this network design. You can enter a maximum of 128 character.
  - Network Platform Layout—Choose **ANSI** (the North American standard) or **ETSI** (the international standard) from the drop-down list to indicate the platform type. ANSI networks will not allow you to define SDH (ETSI) service demands. ETSI networks will not allow you to define SONET (ANSI) service demands.
  - Span Measurement Units—Choose **Km** (kilometers) or **Miles** from the drop-down list to set the unit of measure used for span length.
  - Price List—Choose a price list from the drop-down list.
- Step 3** Click **Next**. The Choose Platform area appears.
- Step 4** In the Choose Platform area, check the desired platform and click **Next**. The Choose Release area appears.
- Step 5** In the Choose Release area, check the desired software release for the network design and click **Next**. The Subnet Options area appears. To set a default software release, see the [Setting the Default Software Release, on page 25](#).
- Step 6** In the Subnet Options area, complete the following:
- Traffic Mapping Algorithm Release 10.6.1—Check to select the ONS 15454 Software Release 10.6.1 version of the interface and the wavelength routing optimization algorithm to be used in the network design. Software R10.1 is backward compatible: it allows you to manage Software Releases 9.0, 9.1, 9.2, 9.2.1, 9.3, 9.4, 9.6.0.3, 9.8, 10.0, and 10.1 and load 7.0 and 8.0.
  - Design Rules Release 10.6.1—Check to select DWDM Design Rules Release 10.6.1.
  - Layout Release 10.6.1—Check to define the ONS 15454 Software Release 10.6.1 version of the algorithm used to generate the layout of each site within the subnetwork. Software Release 10.6.1 is backward compatible: it allows you to manage Software Releases 9.0, 9.1, 9.2, 9.2.1, 9.3, 9.4, 9.6.0.3, 9.8, 10.0, 10.1, 10.3, 10.6.
  - Bundle Licensing Release 10.6.1—Check this check box to select the PAYG bundle licensing for Release 10.6.1. For more information about the Pay As You Grow (PAYG) feature, see the [Understanding the Pay As You Grow Feature, on page 45](#).
- Step 7** Click **Next**.
- Step 8** Complete one of the following:
- To run the Network Creation wizard, check the **Run the Network Wizard Now** check box and click **Finish**. Continue with Step 9.

- To create an empty project to add sites and fibers manually, un-check the **Run the Network Wizard Now** check box and click **Finish**. Project Creation wizard creates the project and an empty network and subnetwork where you can manually add sites and fibers. Skip the remaining steps in this procedure. To add sites manually, see the [Adding Sites](#) , on page 61.

**Step 9** In the Topology area of the Network Creation wizard, choose one of the following options from the Network-Topology drop-down list:

- Ring—Supports MSTP 15454 ONS, HYBRID 15454 ONS, and NG-DWDM configurations.

**Note** In HYBRID 15454 ONS configuration, at least one node must be hub for the ring topology.

- Linear—Supports MSTP 15454 ONS, HYBRID 15454 ONS, and NG-DWDM configurations.
- PSM Line—Supports only MSTP 15454 ONS configuration.
- PSM Section—Supports only MSTP 15454 ONS configuration.

**Step 10** To instruct Cisco Transport Planner to automatically create a traffic subnet associated with the created network, check the Create Traffic Subnet check box. Cisco Transport Planner creates (in addition to the Traffic\_ALL) an additional traffic subnet (Traffic\_Ring or Traffic\_Linear) depending on the topology value you specify in the Network Creation wizard.

**Step 11** Click Next. The Configuration page appears.

**Step 12** Choose one of the following options from the node type drop-down list:

- Legacy MSTP 15454 ONS—To create an MSTP 15454 configuration.
- HYBRID 15454 ONS—To create a 15216 FlexLayer Hybrid configuration.
- Flex NG-DWDM—To create an NG-DWDM configuration.
- 15216 FlexLayer Hybrid configuration cannot be mixed with the 15454 MSTP configuration. However, a network can have two clusters one being MSTP and the other 15216 hybrid, without any connection between the two. In the same way, an NG-DWDM configuration cannot be mixed with any other configuration.

**Note** For PSM Line and PSM Section topologies, the only possible configuration is MSTP 15454 ONS and the node type drop-down list is disabled.

**Step 13** Enter the number of sites in the fields displayed depending on the network topology selected in Step 9. The following options are available:

| Network topology | Fields to be entered... | Maximum, Minimum, and Default Number of Sites |
|------------------|-------------------------|---|
| Ring or Linear   | Number of Sites         | Maximum: 150<br>Minimum: 2<br>Default: 3      |

| Network topology | Fields to be entered...  | Maximum, Minimum, and Default Number of Sites                                    |
|------------------|--|--|
| PSM Line         | <ul style="list-style-type: none"> <li>Intermediate Sites on Working path</li> <li>Intermediate Sites on Protected path</li> </ul> | Both for working and protected paths:<br>Maximum: 74<br>Minimum: 0<br>Default: 0 |
| PSM Section      | <ul style="list-style-type: none"> <li>Intermediate Sites on Working path</li> <li>Intermediate Sites on Protected path</li> </ul> | Both for working and protected paths:<br>Maximum: 74<br>Minimum: 0<br>Default: 0 |

The maximum number of locations where the optical service channel (OSC) can be terminated in a network is 150. The maximum number of add/drop locations (equipped with WSS, WXC, multiplexer/demultiplexer, or OADM cards) traversed by an optical circuit is by default limited to 40. However, this maximum limit can be customized to 150.

**Step 14** On the Site Name and Topology area, choose the topology for each site from the drop-down list. For multi-degree sites, choose the number of sides from the drop-down list or see the [Adding Sites](#), on page 61. For corresponding options for NG-DWDM nodes, see Topology and Scalable Upto Degree for NG-DWD table. Available Site Topology options are:

| Structure | Supported Configurations  | Description   |
|-----------|---|---|
| Line      | <ul style="list-style-type: none"> <li>MSTP 15454 ONS</li> <li>HYBRID 15454 ONS</li> <li>NG-DWDM</li> </ul> | Site with two sides facing two fiber spans. The default site value for ring topology is Line.                     |
| Terminal  | <ul style="list-style-type: none"> <li>MSTP 15454 ONS</li> <li>HYBRID 15454 ONS</li> <li>NG-DWDM</li> </ul> | Site with one side facing one fiber span.   |
| Line+     | MSTP 15454 ONS  | Site with two sides facing two fiber spans that can provide multidegree expansion capability through an MMU unit. |

| Structure                                   | Supported Configurations  | Description  |
|---|---|--|
| Terminal+                                   | MSTP 15454 ONS  | Site with one side facing one fiber span that can provide multidegree expansion capability through an MMU unit. Terminal+ is not allowed for ring network or linear network topology intermediate sites.           |
| Multi-degree                                | <ul style="list-style-type: none"> <li>• MSTP 15454 ONS</li> <li>• NG-DWDM</li> </ul> | Sites have two or more sides and face two or more fiber spans. The default is two and you can choose up to eight sides for a site.   |
| PSM Terminal - Optical Path Protection      | MSTP 15454 ONS  | Provides protection for terminal sites at line level through an optical protection switching module (PSM). In this configuration, the PSM is directly connected to the fibers after the amplification stage.       |
| PSM Terminal - Multiplex Section Protection | MSTP 15454 ONS  | Provides protection for terminal sites at multiplex level through an optical protection switching module (PSM). In this configuration the PSM is equipped between the mux/demux stage and the amplification stage. |

The site topology options displayed depend upon the restrictions listed in the following table.

**Table 6: Site Topology Restrictions**

| If the Network Topology is... | then...   |
|-------------------------------|---|
| Ring                          | You cannot choose the following options: <ul style="list-style-type: none"> <li>• Terminal</li> <li>• Terminal+</li> <li>• PSM Terminal - Optical Path Protection</li> <li>• PSM Terminal - Multiplex Section Protection</li> </ul> |

| If the Network Topology is... | then...   |
|-------------------------------|---|
| Linear                        | You cannot choose the following options: <ul style="list-style-type: none"> <li>• Terminal for the intermediate sites</li> <li>• Terminal+ for the intermediate sites</li> <li>• PSM Terminal - Optical Path Protection</li> <li>• PSM Terminal - Multiplex Section Protection</li> </ul> |
| PSM Line                      | You cannot set any topology for the sites. CTP automatically sets the site topology as follows: <ul style="list-style-type: none"> <li>• PSM Terminal - Optical Path Protection for the two PSM sites</li> <li>• Line for the intermediate sites</li> </ul>                               |
| PSM Section                   | You cannot set any topology for the sites. CTP automatically sets the site topology as follows: <ul style="list-style-type: none"> <li>• PSM Terminal - Optical Path Protection for the two PSM sites</li> <li>• Line for the intermediate sites</li> </ul>                               |

The Topology and Scalable upto Degree options for NG-DWDM node are given in the following table.

**Table 7: Topology and Scalable Upto Degree for NG-DWDM**

| If the Network Topology is... | then the network is scalable upto... |
|-------------------------------|--------------------------------------|
| Line                          | 2 degrees                            |
| Terminal                      | 1 degree                             |
| Multi-degree                  | 4, 8, and 12 degrees                 |

**Step 15** To enable the Split Node feature in any site, check the corresponding check box. The Split Node feature is available only for MSTP 15454 node type.

**Step 16** Click NextThe Options area appears.

**Step 17** The Options area allows you to define C-band and L-band rules for the network design. In the Options area complete the following:

- C-band rules—The C-band options appear in the following format: 80Ch. 50 GHz +1dBm. The channels available are 96, 80, 72, 64, 48, 40, 32, 20, 16, or 8; the reference per channel power options available

are -1 dBm, +1 dBm, 2 dBm, -2 dBm, +4 dBm, 5 dBm, 7 dBm and 8 dBm; and the spacing options available are 100 GHz or 50 GHz. You can use even wavelengths for the following channel designs:

- 80 (40 even wavelengths + 40 odd wavelengths)
- 72 (40 even wavelengths + 32 odd wavelengths)
- 64 (32 even wavelengths + 32 odd wavelengths)

**Note** L-band Expand is also supported in the 50 GHz even wavelengths design.

**Note** For the HYBRID 15454 ONS configuration, 32 channels is the default value. The channels available are 8, 16, 20, 32, and 40.

- L-band Rules— The L-band options appear in the following format: 32 Ch. 100 Ghz +5dBm. The options available are: None, Expand, and channels available are 32; the reference per channel power available are 2 dBm and 5 dBm; and, the spacing options available is 100 GHz.

**Note** L-band is not applicable for the HYBRID 15454 ONS and NG-DWDM configurations.

**Note** If you use a Line+ or Multidegree site, you must select design rules based on 100 GHz channel spacing, and in the case of Line+, you must also select 32-channel rules. If these conditions are not met, Cisco Transport Planner will provide an error message when you attempt to analyze the network. See Table 4-2 and Table 4-3 for additional details on site design rules.

**Step 18** Click Next.

The Site Management area appears.

**Step 19** In the Site Management area, complete the following.

- Shelf Management—Choose one of the shelf management configurations:
  - Auto—External switch is placed if node controller is M12. If M6 is the node controller, the external switch is placed only if it is required.
  - Multi Shelf Integrated Switch—All the Multi Service Transport Platform (MSTP) optical cards (optical add/drop multiplexers [OADMs] and amplifiers) reside in different shelves connected by a LAN. The LAN is implemented with switches connected to the MSTP shelves. For this option, the Multi Shelf Integrated Switch Cards (MS-ISC) are used to support the multishelf configuration.
  - Multi Shelf External Switch—All the MSTP optical cards (OADMs and amplifiers) reside in different shelves connected by a LAN. The LAN is implemented with switches external to the MSTP shelves (Cisco Catalyst 2950). For this option, two external Ethernet switch units (Cisco Catalyst 2950 and Cisco Catalyst 3650) are used to support the multishelf configuration. The Cisco Catalyst 2950 supports 12 subtending shelves and Cisco Catalyst 3650 supports 24 subtending shelves. CTP supports a maximum of 50 shelves, including the node controller shelf, in a multishelf configuration when the TNC, TNCE, TSC, TSCE, or TCC3 card is used as the node controller. CTP supports a maximum of 5 shelves, including the node controller shelf, in a multishelf configuration when TCC2P card is used as the node controller.
- Note** When the Multi Shelf External Switch is forced, the Multi Shelf External switch is placed in the layout irrespective of the node controller.
- Note** The M6 chassis, when used as node controller with Integrated Switch, can support three subtended shelves. The subtended M6 chassis can subtend two more shelves.
- Individual Shelf—All the MSTP optical cards (OADMs and amplifiers) reside in the same shelf. For this option, the multishelf management is not supported; every shelf is managed as an independent shelf.
- Note** Shelf Management is disabled for HYBRID 15454 ONS configuration.

**Note** If you select the Shelf Management type as Multi Shelf Integrated Switch or Multi Shelf External Switch, you can modify the MSM Shelf ID for Multi Shelf Management Configuration. To modify the MSM Shelf ID, refer [Viewing the Layout of Single Site, on page 149](#).

- **Node Protection**—Choose **Same Shelf** (single shelf configurations) or **Separated Shelves** (multishelf configurations). Same Shelf configuration places all the OADM/ROADM units in a single shelf, and does not provide any protection at the shelf level in the node. Separated Shelves places OADM/ROADM units (west-facing and east-facing) in separate shelves in the node and it is selectable only if Multishelf management is selected. You can also set node protection for a multidegree node.

**Note** Node protection is disabled for HYBRID 15454 ONS configuration with an auto-selected value of Same Shelf.

- **Hybrid Site Config**—Check to create all the nodes configured as hybrid MSTP/Multi Service Provisioning Platform (MSPP) nodes. Hybrid Node is only available if you chose Individual Shelf as the Shelf Management type.
- **OSMINE Compliant**—Check this option to place the DWDM units in the shelves according to Operations Systems Modifications for Integration of Network Elements (OSMINE) placement rules.
- **DCC Chain**—Check to put a TXP(P)\_MR\_2.5G card in slot 12 on each shelf of each site to use DCC.
- **Max Shelves per Rack**—Choose the maximum number (from 1 to 4) of ANSI or ETSI shelves (equipping optical cards or TXP/MXP cards) that can be placed in each rack in the site when generating the layout of the site.
- **Installation w/o CTP**—Check this box to design a network that does not require the setup of configuration files (thresholds and setpoints). Installation without Cisco Transport Planner is also known automatic node turn up. When this feature is enabled, the software in the node will configure itself with parameters; XML configuration files are not required to configure the node. When this option is selected at the end of EDFA and DCU placement, Cisco Transport Planner will analyze the resulting network and verify that in each node, where the option installation w/o Cisco Transport Planner is enabled, has:
  - A preamplifier in each direction.
  - All amplifiers working in gain control mode.
  - A flat node output spectrum, that is, the resulting channel tilt at the exit of the node is 0.
  - A feasible set point forced during simulation.
- **Use Payg**—Check this check box to enable the Pay As You Grow feature on all the sites created in the current network. For more information about the Pay As You Grow feature, see the [Understanding the Pay As You Grow Feature, on page 45](#).
- **Enable NCS**—Check this check box to enable NCS feature on all the sites created in the current network. The existing MSTP PIDs are replaced with new NCS PIDs. The NCS PIDs corresponding to the existing MSTP PIDs are given in the following table.

**Table 8: NCS PIDs**

| NCS PID       | DESCRIPTION                  | MSTP PID       |
|---------------|------------------------------|----------------|
| NCS2006-SA=   | NCS 2006 Shelf Assembly      | 15454-M6-SA=   |
| NCS2006-DC=   | NCS 2006 30A DC Power Filter | 15454-M6-DC=   |
| NCS2006-DC20= | NCS 2006 20A DC Power Filter | 15454-M6-DC20= |



| <b>NCS PID</b>  | <b>DESCRIPTION</b>  | <b>MSTP PID</b>  |
|-----------------|---|------------------|
| NCS2006-DC40=   | NCS 2006 40A DC Power Filter                              | 15454-M6-DC40=   |
| NCS2006-AC=     | NCS 2006 1500W AC Power Supply                            | 15454-M6-AC2=    |
| NCS2006-PWRFLR= | NCS 2006 Power Filter/Supply Filter                       | 15454-M6-PWRFLR= |
| NCS2006-ECU=    | NCS 2006 External Connections Unit                        | None             |
| NCS2006-LCD=    | NCS 2006 LCD Display with Backup Memory                   | 15454-M6-LCD=    |
| NCS2006-FTA=    | NCS 2006 Fan Tray   | 15454-M6-FTA2=   |
| NCS2006-DR=     | NCS 2006 Standard Door                                    | 15454-M6-DR=     |
| NCS2006-DDR=    | NCS 2006 Deep Door  | 15454-M6-DDR=    |
| NCS2002-SA=     | NCS 2002 Shelf Assembly                                   | 15454-M2-SA=     |
| NCS2002-DC-E=   | NCS 2002 ETSI DC Power Filter                             | 15454-M2-SA=     |
| NCS2002-DC=     | NCS 2002 ANSI DC Power Filter                             | 15454-M2-DC-E=   |
| NCS2002-DC=     | NCS 2002 AC Power Supply with Backup Memory               | 15454-M2-DC=     |
| NCS2002-AC=     | NCS 2002 AC Power Supply with Backup Memory               | 15454-M2-AC=     |
| NCS2002-FTA=    | NCS 2002 Fan Tray   | 15454-M6-FTA2=   |
| NCS2002-DR=     | NCS 2002 Standard Door                                    | 15454-M6-DR=     |
| NCS2002-DDR=    | NCS 2006 Deep Door  | 15454-M2-DDR=    |
| Use MSTP PID    | Transport Node Controller for M2 and M6 Chassis           | 15454-M-TNC-K9=  |
| Use MSTP PID    | MSTP / NCS 2K Transport Node Controller with Ethernet PTP | 15454-M-TNCE-K9= |
| Use MSTP PID    | Transport Shelf Controller for M2 and M6 Chassis          | 15454-M-TSC-K9=  |

| NCS PID            | DESCRIPTION  | MSTP PID           |
|--------------------|--|--------------------|
| Use MSTP PID       | MSTP / NCS 2K Transport Shelf Controller with Ethernet PTP   | 15454-M-TSCE-K9=   |
| L-NCS2K-CH-10=     | NCS 2K / MSTP Lic ROADM Add/Drop or Exp - 10Chs e-Delivery   | 15454-LIC-CH-10=   |
| L-NCS2K-AR-10G-DM= | NCS 2K / MSTP Lic Any-Rate XP/MXP - 10G Data MXP e-Delivery  | 15454-LIC-10G-DM=  |
| L-NCS2K-AR10G-MXP= | NCS 2K / MSTP Lic Any-Rate XP/MXP - 4x2.5G MXP e-Delivery    | 15454-LICMXP4X2.5= |
| L-NCS2K-AR-MR-MXP= | NCS 2K / MSTP Lic Any-Rate XP/MXP - MultiRate MXP e-Delivery | 15454-LIC-MXP-AR=  |
| L-NCS2K-AR10G-REG= | NCS 2K / MSTP Lic Any-Rate XP/MXP - OTU2 Regen e-Delivery    | 15454-LIC-REG-10G= |
| L-NCS2K-AR-MR-TXP= | NCS 2K / MSTP Lic AnyRate XP/MXP - 8G FC/10GE TXP e-Delivery | 15454-LIC-TXP-8G=  |
| L-NCS2K-AR-VD-MXP= | NCS 2K / MSTP License Any-Rate XP - 3G Video MXP e-Delivery  | 15454-LIC-VD-XP=   |
| L-NCS2K-WSE-1=     | NCS 2K / MSTP License WSE - 1x Encryption Stream e-Delivery  | L-P-O-WSE-1=       |
| L-NCS2K-100G-10G=  | NCS 2K / MSTP License 100G MXP - 1x 10G MR Port e-Delivery   | 15454-M-LIC-10G=   |
| NCS2015-SA-DC=     | NCS 2015 Shelf Assembly - DC Power                           | NCS2015-SA-DC=     |
| NCS2K-TNCS-K9=     | Transport Node Controller for NCS2002, 2006 & 2015 chassis   | NCS2K-TNCS-K9=     |
| NCS2015-FTA=       | NCS 2015 Fan Tray  | NCS2015-FTA=       |
| NCS2015-ECU=       | NCS 2015 External Connections Unit                           | NCS2015-ECU=       |
| NCS2015-DOOR=      | NCS 2015 Door  | NCS2015-DOOR=      |

| <b>NCS PID</b>     | <b>DESCRIPTION</b>  | <b>MSTP PID</b>    |
|--------------------|---|--------------------|
| NCS2015-DDR=       | NCS 2015 Door   | NCS2015-DDR=       |
| NCS2015-FTF=       | NCS 2015 Fan tray Air Filter  | NCS2015-FTF=       |
| NCS4K-DC-PSU-V1=   | NCS 4000 DC Power System Unit<br>- 1750 W - Balanced A and B          | NCS4K-DC-PSU-V1=   |
| L-NCS2K-MRE100GK9= | NCS 2K / MSTP Lic for 100GE   | L-NCS2K-MRE100GK9= |
| L-NCS2K-MRELRGK9=  | NCS 2K / MSTP Lic for 10GE<br>LAN PHY                                 | L-NCS2K-MRELRGK9=  |
| NCS2K-TNCS-O-K9=   | NCS 2000 Transport Node<br>Controller w/2x OTDR/OSC                   | NCS2K-TNCS-O-K9=   |
| NCS2K-20-SMRFS-CV= | 20-port SMR - Switch. Gain Flex<br>Spectrum - Connection Verification | NCS2K-20-SMRFS-CV= |
| NCS2K-MF-6RU=      | Mechanical Frame for Passive<br>Units - 14slots w/USB Hub - 6RU       | NCS2K-MF-6RU=      |
| NCS2K-MF-DEG-5-CV= | 5 Degrees Mesh Interconnect with<br>Connection Verification           | NCS2K-MF-DEG-5-CV= |
| NCS2K-MF-UPG-4-CV= | 4-Deg Upgrade Mesh Interconnect<br>with Connection Verification       | NCS2K-MF-UPG-4-CV= |
| NCS2K-MF-M16LC-CV= | MPO-16 to 16xLC Fan-Out with<br>Connection Verification               | NCS2K-MF-M16LC-CV= |
| NCS2K-MF-MPO-20LC= | MPO-16 to 20xLC Fan-Out MF<br>Unit - With Integrated Monitoring       | NCS2K-MF-MPO-20LC= |
| NCS2K-MF10-6RU=    | Mechanical Frame for Passive<br>Units - 10slots w/USB Hub - 6RU       | NCS2K-MF10-6RU=    |
| NCS2K-MF-6RU-CVR=  | Cover for the 6RU Mechanical<br>Frame for Passive Units               | NCS2K-MF-6RU-CVR=  |
| NCS2K-MF-6RU-CVR=  | NCS 2006 External Connections<br>Unit - with 2x USB 3.0 Ports         | NCS2K-MF-6RU-CVR=  |
| NCS2K-MF-1SL-CVR=  | Cover for the Mechanical Frame<br>with USB cable holder - 1slot       | NCS2K-MF-1SL-CVR=  |
| NCS2K-USB3-CBL-2=  | USB 3.0 Cable - 2m  | NCS2K-USB3-CBL-2=  |
| NCS2K-USB3-CBL-3=  | USB 3.0 Cable - 3m  | NCS2K-USB3-CBL-3=  |

| <b>NCS PID</b>     | <b>DESCRIPTION</b>  | <b>MSTP PID</b>    |
|--------------------|---|--------------------|
| NCS2K-MF-2SL-CVR=  | Cover for the Mechanical Frame w/USB cable holder - 2slot                     | NCS2K-MF-2SL-CVR=  |
| NCS2K-MPO-LBK=     | 8-fiber MPO Loopback - Male connector   | NCS2K-MPO-LBK=     |
| NCS2K-LC-LBK=      | LC Loopback - Male connectors   | NCS2K-LC-LBK=      |
| NCS2K-MPO16-LBK=   | 16-fiber MPO Loopback - Male connector  | NCS2K-MPO16-LBK=   |
| NCS2015-SA-AC=     | NCS 2015 Shelf Assembly - AC Power  | NCS2015-SA-AC=     |
| NCS4K-AC-PSU=      | NCS 4000 AC Power System Unit - 3000 W  | NCS4K-AC-PSU=      |
| NCS4K-AC-CBL-IEC=  | NCS 4000 AC Power Cable - IEC compliant                                       | NCS4K-AC-CBL-IEC=  |
| NCS4K-AC-CBL-NEMA= | NCS 4000 AC Power Cable - NEMA compliant                                      | NCS4K-AC-CBL-NEMA= |
| SF-NCS2K-R1051FSK9 | NCS 2K/MSTP - R10.5.1 SW, TNCE, TSCE, TNCS/O - FlexSpectrum                   | SF-NCS2K-R1051FSK9 |
| NCS2K-M-R1051FSK9= | NCS 2K/MSTP - R10.5.1 SW, Media (DVD) SW RTU - FlexSpectrum                   | NCS2K-M-R1051FSK9= |
| CRS-AC-CAB-NA      | CRS AC Power Cord for Modular Power- North America                            | CRS-AC-CAB-NA      |
| CRS-AC-CAB-AU      | CRS AC Power Cord for Modular Power- Australia                                | CRS-AC-CAB-AU      |
| CRS-AC-CAB-EU      | CRS AC Power Cord for Modular Power- Europe                                   | CRS-AC-CAB-EU      |
| NCS2K-MF-8X10G-FO  | NCS2K-MF-8X10G-FO passive module  |                    |
| NCS2K-400G-XP      | NCS2K-400G-XP double-slot transponder and muxponder card with 400G bandwidth. |                    |

| NCS PID          | DESCRIPTION                                      | MSTP PID |
|------------------|--|----------|
| ONS-MPO-MPOLC-10 | ONS-MPO-MPOLC-10 breakout cable for MR-MXP card. |          |

- **Connection Verification**—Validates the correct optical interconnection between the optical cards inside a Flex ROADM. This feature also measures the insertion loss of the external passive path, validates the quality of the connections to the patch panel, and checks if the insertion loss is within expected value.

The SMR-20 FS CV cards provide the connection verification feature along with the passive modules MF-DEG-5-CV, MF-UPG-4-CV, and MF-M16LC-CV. For more information, see the [Connection Verification](#), on page 133.

**Step 20** Click **Next**. The Span Parameters area appears.

**Step 21** In the Span Parameters area, complete the following.

- **Span Label Tag**—Enter the desired span label.
- **Span Fiber Type**—Choose the fiber type for each span in the network.
- **Span Length**—Enter the span length. The displayed unit of measure is retrieved from the Span Measurements Units field.
- **EOL Ageing Factor**—Enter the number to use when factoring fiber aging. This factor is multiplied by the SOL total span loss without connectors.
- **EOL Ageing loss [dB]**—Enter the EOL aging loss value. The EOL loss-per-span value is added at the end of life to each discrete fiber in the network (for example, to add an EOL margin for splicing).

**Note** Enter a value in either EOL Ageing Factor or EOL Ageing loss; you do not need to enter a value in both fields. Use one of the following formulas to calculate the fiber loss at SOL:  $SOL = km * dB/km + (2 * connector\ loss)$   
 $SOL = user\ entered\ loss + (2 * connector\ loss)$   
 Use one of the following formulas to calculate the fiber loss at EOL:  $EOL = km * dB/km * EOL\ Aging\ Factor + (2 * connector\ loss) + EOL\ Aging\ Loss$   
 $EOL = user\ entered\ loss * EOL\ Aging\ Factor + (2 * connector\ loss) + EOL\ Aging\ Loss$

- **Connector loss [dB]**—Enter the concentrated loss at the end of the span.
- **CD factor [ps/mn/km]**—Enter the fiber chromatic dispersion (CD) factor. The default value is dependent on the selected fiber type. Any value that you enter in this field is lost whenever you change the fiber type. Chromatic dispersion is always entered in ps/nm/km. Fiber chromatic dispersion is defined for the middle of the wavelength band. C-band is defined at 1545.3 nm and L-band is defined at 1590.4 nm.
- **PMD factor [ps/sqrt(km)]**—Enter the polarization mode dispersion (PMD) factor. The default value is dependent on the selected fiber type. Any value that you enter in this field is lost whenever you change the fiber type. PMD is always entered per kilometer.
- **Length Based Loss**—If this check box is checked, the fiber loss is determined by multiplying the Span Length with the Loss Factor. If this check box is unchecked, you must enter the total span loss value for the Tot SOL Loss w/o Connectors property.
- **Loss factor [dB/km]**—Enter the value of the SOL fiber loss per kilometer that is used to calculate the loss of each span in the network. The fiber loss factor is always entered in dB/km.

- Tot SOL Loss w/o Connectors—Enter the start of life fiber loss value for each span, excluding the connector concentrated loss. This property is disabled if the Length Based Loss check box is checked.
- DCN extension—Check this check box to use DCN extensions on each of the spans in the network. This implies that the OSC channel is not used to connect the two nodes. All nodes facing a span with the DCN Extension option enabled require a ITU-T G.709 generic communications channel (GCC) access that must be provided by the customer.

**Note** For HYBRID 15454 ONS configuration, this option is disabled by default.

- OSC Frame Type—Choose the OSC frame type. The options available are Auto, OC3 Frame, GE Frame, and FE Frame. The default option is Auto. When set in Auto, CTP will use FE Frame as the preferred frame type.

**Note**

- CTP does not allow connecting different types of frames through a pass-through site.
- CTP does not allow removing a node if different frame types are used in the node.

**Step 22** Click **Finish**. CTP checks the validity of the fiber factor values. If the fiber factor values are within the valid range (see the following table), CTP creates a visual representation of the network. If the values are out of range, CTP issues a warning, asking you to confirm the input values.

**Note** All options set by the Network Creation wizard can be changed as needed per site and per span.

**Table 9: Valid Ranges for Fiber Factor Values**

| Fiber Type      | Parameter   | Min. Error Value | Min. Warning Value | Default Value | Max. Warning Value | Max. Error Value | Unit     |
|-----------------|---|------------------|--------------------|---------------|--------------------|------------------|----------|
| ITU-T G.652-SMF | Loss factor                                       | 0                | 0.2                | —             | 0.4                | 10               | dB/km    |
|                 | Chromatic dispersion factor at 1545.3 nm (C-band) | 0                | 16.2               | 16.7          | 17.1               | 30               | ps/nm/km |
|                 | Chromatic dispersion factor at 1590.4 nm (L-band) | 0                | 18.53              | 19.03         | 19.43              | 30               | ps/nm/km |
|                 | PMD factor  | 0                | 0.0                | 0.1           | 0.5                | 10               | ps/(√km) |

| Fiber Type                          | Parameter   | Min. Error Value | Min. Warning Value | Default Value | Max. Warning Value | Max. Error Value | Unit     |
|-------------------------------------|---|------------------|--------------------|---------------|--------------------|------------------|----------|
| ITU-T G.655-E-LEAF                  | Loss factor                                       | 0                | 0.2                | —             | 0.4                | 10               | dB/km    |
|                                     | Chromatic dispersion factor at 1545.3 nm          | 0                | 3.4                | 3.80          | 4.2                | 10               | ps/nm/km |
|                                     | PMD factor  | 0                | 0                  | 0.1           | 0.5                | 10               | ps/(√km) |
| ITU-T G.655-True Wave               | Loss factor                                       | 0                | 0.2                | —             | 0.4                | 10               | dB/km    |
|                                     | Chromatic dispersion factor at 1545.3 nm          | 0                | 3.8                | 4.19          | 4.6                | 10               | ps/nm/km |
|                                     | PMD factor  | 0                | 0                  | 0.1           | 0.5                | 10               | ps/(√km) |
| ITU-T G.652-DS (Dispersion shifted) | Loss factor                                       | 0                | 0.2                | —             | 0.4                | 10               | dB/km    |
|                                     | Chromatic dispersion factor at 1590.4 nm (L-band) | 0                | 2.43               | 2.83          | 3.23               | 30               | ps/nm/km |
|                                     | PMD factor  | 0                | 0                  | 0.1           | 0.5                | 10               | ps/(√km) |

## Adding Sites

Use the following procedure to add new sites to an existing network. A site is a customer premise equipment (CPE) where any equipment can be co-located in a rack within a building. The Cisco Transport Planner supports up to 150 sites in a network. The number of racks and nodes in a site is independent of the number of sites in the network. The maximum number of locations where the OSC can be terminated in a network is 40. When the number of locations where the OSC is terminated exceeds the maximum supported value, the tool completes the design, but in the summary report an alarm is reported to indicate this situation. The maximum number of add/drop locations in a network is 40. The maximum number of add/drop locations (equipped with WSS, WXC, multiplexer/demultiplexer, or OADM) traversed by an optical circuit is limited to 40.



**Note** Every new site added to a design is automatically configured as Multi-Shelf Integrated Switch with Same Shelf protection. To change this, you can edit the site properties after adding it to the network design. See the [Editing Site Parameters](#), on page 178.

### Procedure

- 
- Step 1** Right-click the network folder in the Project Explorer pane and choose **Expand** from the shortcut menu.
- Step 2** Right-click the Sites folder and choose **New Site** from the shortcut menu. The Site Creation wizard appears. As an alternative, if sites already exist in the network design and you have the NtView Name tab open, click the Create a new site icon in the toolbar. For more information about the Cisco Transport Planner icons, see the [GUI Information and Shortcuts](#), on page 361.
- Step 3** Choose the **type of node from the Node Type drop-down list. The options available are:**
- MSTP 15454 ONS
  - HYBRID 15454 ONS
  - NG-DWDM
- Step 4** Choose the type of interface from the **Select line or terminal site drop-down list. The options available are:**
- Line—Two pairs of fibers are terminated at the node.
  - Terminal—A single pair of fibers is terminated at the node.
  - Line+—Two pairs of fibers are terminated at the node but the number of fibers can be increased. An MMU card (topology upgrade) must be installed.
  - Terminal+—A single pair of fibers is terminated at the node but the number of fibers can be increased. An MMU card (topology upgrade) must be installed.
  - Multi-degree—Nodes have two or more sides and face two or more fiber spans.
  - PSM Terminal - Optical Path Protection—Provides protection for terminal sites at Line level through an optical protection switching module (PSM). In this configuration, the PSM is directly connected to the fibers after the amplification stage.
  - PSM Terminal- Multiplex Section Protection—Provides protection for terminal sites at multiple levels through an optical protection switching module (PSM). In this configuration the PSM is equipped between the mux/demux stage and the amplification stage.
- Note** In the HYBRID 15454 ONS configuration, the supported interface types are line and terminal. In NG-DWDM configuration, the supported topologies are Terminal, Line and Multi-degree.
- Step 5** If you chose multi-degree in Step 4, choose the number of sides from the No of Sides drop-down list. The default option is two.
- Step 6** Enable NCS—Check this check box to use NCS PIDs for the selected site. For more information, see [Table 8: NCS PIDs](#), on page 54.
- Step 7** Click **Finish**.
-



# Adding Fiber Spans

Use the following procedure to manually add fiber spans between sites. A fiber span consists of a pair of fibers (one transmit and one receive) between two sites. A span is represented by a fiber duct in the NetViewName tab. Within a fiber duct, more than one fiber pair can exist.



**Note** The number of fiber spans that each site can support is defined in the site properties. See the [Adding Sites](#), on page 61 or the [Editing Site Parameters](#), on page 178.

## Procedure

- Step 1** In the NtView Name tab, click the Create a new duct icon in the toolbar. For more information about the Cisco Transport Planner icons, see the [GUI Information and Shortcuts](#), on page 361.
- Step 2** Click one of the sites that you want to connect with a fiber span. This site becomes the source site for network analysis output, later.
- Step 3** Click the destination site. The New Duct dialog box appears. The selected site becomes the destination site for network analysis output, later. For the first span, the source site is set as A and the destination site is set as B. Cisco Transport Planner automatically adjusts East and West for additional spans. HYBRID 15454 ONS configuration cannot be connected to the 15454 MSTP configuration. However, a network can have two clusters, one being the 15454 MSTP and the other being the 15216 hybrid without any connections between the two.
- Note** To connect any two sites using a duct, both the source and destination sites must have at least one unconnected side.
- Note** For NG-DWDM nodes, the number of new ducts created is limited to the scalable upto degree value.
- Step 4** Choose the Connection Type:
- Line
  - Remote Add/Drop
- A Remote Add/Drop duct can be created only between a terminal site and the Remote Add/Drop side of any non-terminal site. The remote terminal site to which the remote add/drop side is connected must fulfill the following site functionality type, and equipment constraints in addition to the rules in Table Site Design Rules for MSTP 15454 ONS Configuration and table Site Design Rules for HYBRID 15454 ONS Configuration (with FlexLayer Modules):
- Site functionality must be Auto or Add/Drop.
  - Site type must be Auto or Mux/Demux.
  - Add/Drop units can be 40-MUX-C/40-DMX-C, 15216-MD-40-ODD, 15216-MD-40-EVEN, 15216-EF-40-ODD, or 15216-EF-40-EVEN.
- For more information see [Modifying Site Properties](#), on page 342.
- Step 5** Choose the sides of the source and destination site to connect. If you chose **Line** in Step 4, only the line sides are displayed here. If you chose **Remote Add/Drop**, the line side is displayed for the terminal site, while the pane of the other site lists the unconnected Remote Add/Drop ports of the site.

## Creating an Optical Subnet

An optical subnet is a collection of spans with certain associated, defined, common properties. You can define distinct optical subnets on the same network and can also set a list of associated properties on each of them.

The following properties are supported in an optical subnet:

- C-band Rules—Allows you to define rules for the C-band channels, the maximum per channel power, and the channel spacing for the design.
- L-band Rules—Allows you to define, for the L-band channels, the maximum per channel power, and the channel spacing for the design.

When you create a new project (see the [Creating a Project, on page 47](#)), Cisco Transport Planner automatically creates an optical subnet associated to the network. At least one optical subnet (even if empty) must exist for each network in a project.

You can create an optical subnet using the Project Options (default) Optical Subnet property (Design Rules) values. To do this:

### Procedure

- Step 1** Select the Optical Subnet folder in the Project Explorer pane. The Optical Subnet Pane appears in the Task Pane on the right side of the screen.
- Step 2** Click **Create**. The Create Optical Subnet dialog box appears. Alternatively, right-click the **Optical Subnets** folder and select **Create**. The default name, which is a combination of the user-created C-band and L-band rules, and the wizard-created default C-band and L-band rules are displayed.
- Step 3** Select C-band and L-band design rules from the C Design Rule and L Design Rule drop-down lists for the new optical subnet that you want to create.
- Step 4** Click OK. A new optical subnet with the design properties you selected is created and placed in project explorer under the Optical Subnets folder.

**Note** You cannot create more than one optical subnet with the same properties values and each span must be part of only one optical subnet.

**Note** OPT-AMP-C amplifier is supported on FLEX NG-DWDM Line Amplifier nodes for all the Optical subnet rules except for the 48 and 96 subnet rules.

Cisco Transport Planner allows you to do the add or remove spans, edit designs rules, define an optical subnet as current, and to delete an optical network. To do these, select the optical subnet you want to change under Optical Subnets in the Project Explorer pane. In the Tasks Pane, choose the following:

- Add/Remove Spans—Adds or removes the spans that are included in a given optical subnet.
- Edit Design Rule—Modifies the property value of the design rule of a new or existing optical subnet.
- Set as Current—CTP automatically defines the optical subnet with the greatest number of spans.
- Delete—Deletes the optical subnets in the Tasks Pane.

**Note** When you delete an optical subnet, all the spans contained in the deleted optical subnet are placed within the current optical subnet. In case the current optical subnet is deleted, all their spans will be automatically placed within the optical subnet with the greatest number of spans. When the current optical subnet is removed, the tool automatically defines as current the optical subnet with the greatest number of contained spans.

## Adding Notes to a Project

Use the following procedure to add a note to any item in the Project Explorer pane. Each network has a Notes folder in the Project Explorer pane. After you have created a note, it appears in the Notes folder for that particular network.

### Procedure

- Step 1** Right-click the desired item in the Project Explorer pane and choose **Edit Note** from the shortcut menu.
- Step 2** In the Edit Note creation box, enter the desired text.
- Step 3** To close the Edit Note creation box and to save the note, click the **X** in the upper right corner of the window.
- Step 4** To view notes, double-click the **Notes** folder. The Notes window appears. The following table lists the columns in the Notes window.

**Table 10: Notes Window**

| Column | Description   |
|--------|---|
| Header | Displays the note text. To view the entire note, click the plus (+) sign next to the header to expand the text. |
| Action | Click <b>Go</b> to open the item in the Project Explorer pane where the note was created.                       |
| Source | Displays the location of the note, for example, ProjectManager.Nets.Net2.Sites.Site2.W.                         |

- Step 5** To close the Notes window, click the **X** in the upper right corner of the window.

# Creating Traffic Subnet

## Procedure

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- Step 1** In the Project Explorer pane, scroll down to Traffic Subnets.
- Step 2** Right-click Traffic Subnets, and select **Create**.  
The Traffic Subnet Creation wizard appears.
- Step 3** Select the Topology for the subnet from the drop-down list (**Ring**, **Linear**, and **Mesh**), then click **Next**.  
**Note** If Ring or Linear topology is selected for the subnet, the spans in the subnet must be adjacent and also ordered.
- Step 4** Click **Press** to build new subnet. The Traffic Subnet Builder Wizard appears.
- Step 5** Select the ducts that should be a part of the subnet from the list displayed on the left handside, and click **OK**.  
This takes you back to the Traffic Subnet Creation Wizard.
- Step 6** Click **Finish** to complete the creation of the traffic subnet. The created subnet appears under Traffic Subnets in the Project Explorer pane.
- 

# Creating a Demand

Cisco Transport Planner provides five types of service demands:

- Point-to-point
- Protected ring (P-ring)
- ROADM
- Ethernet aggregated
- TDM aggregated

You can also create regeneration sites while creating a service demand.

CTP allows you to create property templates to design a set of property configurations for a demand. When you have a network that has similar sites, you can use these property templates to quickly and accurately set up common properties. For more information, see [Property Template](#), on page 353.

# Manual Regeneration

In optical networks, as the fiber length increases, a loss in the signal ratio and power could occur due to attenuation and dispersion. A regenerator is required to recreate the weak and distorted optical signals through reamplification, regeneration, and retiming processes. The regenerators remove noise and distortion, convert the optical signal to an electrical signal, and then convert the signals back to optical signals (O-E-O conversion).

Cisco Transport Planner supports the creation of regeneration sites in the network. Regeneration is supported for the following demands:

- Point-to-point
- P-ring
- Ethernet Aggregated
- TDM Aggregated

The demand is displayed in the following manner:

Demand > Service > Trail > Section

- “Service” is the circuit through which traffic flows between nodes.
- “Trail” is the network section joining two traffic nodes. By default, a trail has only one section. The trail can be split in different regeneration sections.
- “Section” is a contiguous subset of the span.

A new section is added whenever a regeneration site is created. The sections can have different wavelengths based on availability. Regeneration can be performed using any two cards back-to-back (OTU2\_XP, TXP, or MXP) or with a dedicated regenerator card.

## Understanding Omnidirectional Functionality

The omnidirectional functionality on a side enables you to connect the side to a local multiplexer and demultiplexer that can add or drop traffic to or from any of the node directions. Omnidirectional traffic can be added or dropped only on the omnidirectional side.

Omnidirectional sides are different from standard add/drop sides in the following ways:

- Omnidirectional sides are internal sides that cannot be connected through fibers or ducts.
- Amplifiers on omnidirectional sides are placed between the 80-WXC-C card (bidirectional mode) and the Add/Drop (Mux/Demux) units.
- Raman amplification is excluded on omnidirectional sides, as the amplification depends on the Raman Amplified option on a duct.

Multi-degree sites that use the OXC functionality and are equipped with the following equipment can support omnidirectional sides:

- 40-WXC-C/MESH-PP-4
- 40-WXC-C/MESH-PP-8
- 80-WXC-C/MESH-PP-4
- 80-WXC-C/MESH-PP-8
- Flexible (nodes equipped with 80-WXC-C and 40-WXC-C equipment)
- 40-SMR2-C

Multi-degree OXC sites equipped with 40-WXC-C or 40-SMR2-C units can support both omnidirectional sides and the Omnidir Entry Point options. However, both options cannot be used on the same side.

For more information see the [Modifying Site Properties](#), on page 342.

## Omnidirectional Demands

In all service demands (except ROADM demands), the value of the omnidirectional property is independent for each section or trail of a service.

You can perform operations at the trail level. The following are some examples:

- Terminate a working trail on the omnidirectional stage, and connect the protected trail to a standard add/drop stage.
- Terminate a trail on a line side and regenerate the trail in an intermediate omnidirectional side.
- Force both working and protected trails (or consecutive trails in the case of a P-Ring demand) to terminate on the same omnidirectional side. By default, traffic from all demands (except ROADM demands) terminates on two different omnidirectional sides.

The omnidirectional property is available for the source and destination of each section of a service trail. A section terminating on an omnidirectional side can be routed in all possible directions. If multiple omnidirectional sides are available for a site, you can force the section to terminate on a specific side.

## Understanding Colorless Functionality

The colorless property enables tuning of channel wavelengths without changing the optical interface of the port. A colorless side is connected to two 80-WXC-C cards configured as a multiplexer and demultiplexer.

A colorless stage is available at the local add/drop stage on line, terminal, or multi-degree sites. In line and terminal sites, you can implement colorless sides using the following configurations:

- Line or terminal ROADM site with 80-WXC-C cards



### Note

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For line sites, you must have 80-WXC-C cards on both sides even when only one of the ports is forced as colorless.

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- Line or terminal sites equipped with 40-SMR1-C
- Line or terminal sites equipped with 40-SMR2-C

In multi-degree sites you can implement colorless sides through a node having OXC functionality and are equipped with the following:

- 40-WXC-C/MESH-PP-4
- 40-WXC-C/MESH-PP-8
- 80-WXC-C/MESH-PP-4
- 80-WXC-C/MESH-PP-8
- 40-SMR2-C

## Colorless Demands

In all service demands (except ROADM) the colorless property is available separately for each trail and section of a service demand. For example, in a P-ring demand you can terminate one trail on a colorless mux/demux stage and connect the other trail to a standard (colored) mux/demux stage. Colorless sections must be associated to an 80-WXC-C colorless port and can be terminated on sides having colorless add/drop ports to achieve full wavelength tuning capability on fixed physical ports.

## Understanding Colorless Omnidirectional Functionality

A colorless and omnidirectional side is connected to a multiplexer (80-WXC-C card) and demultiplexer (80-WXC-C card) that can add or drop traffic to or from any of the node directions. You can define an omnidirectional colorless side by adding one or more colorless ports to an omnidirectional side.

In all service demands (except ROADM), you can configure colorless termination points as omnidirectional, to achieve full routing capability for all possible wavelengths.

**Note**

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In a 50GHz design, an omnidirectional demand can be dropped only on a colorless omnidirectional side.

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## Understanding Contentionless Functionality

The contentionless functionality on a site refers to the contentionless add/drop ability of an N-degree ROADM node to accommodate N wavelengths of the same frequency from a single add/drop device. For a ROADM to be contentionless, the number of drop units should be equal to ROADM degrees.

Multi-degree sites that use the OXC functionality and are equipped with the following equipment can support contentionless sides:

- 12-AD-CCOFS
- 16-AD-CCOFS

For more information see the [Modifying Site Properties](#), on page 342.

## Creating a Point-to-Point Demand

Use the following procedure to add a point-to-point traffic demand:

## Procedure

- 
- Step 1** In the NtView Name tab, click the **Create new Point-to-Point demand** icon in the toolbar. For more information about the Cisco Transport Planner icons, see the [GUI Information and Shortcuts](#), on page 361.
- Step 2** Click the source site of the demand.
- Step 3** Click the destination site of the demand. The Point to Point Demand Creation wizard appears.
- Step 4** From the drop-down list, select Traffic Subnet ALL or any of the previously created traffic subnets to which this service demand should be part of, and proceed to Step 5. If you wish to create a new traffic subnet see the [Creating Traffic Subnet](#), on page 66.
- Step 5** Click Next.
- Step 6** On the General Parameters page, complete the following:
- Label—Enter the name of the demand.
  - Source—(Display only) Displays the source site name.
  - Destination—(Display only) Displays the destination site name.
  - Service Type—Choose the service type from the drop-down list. For a list of services, see the [Service Support](#), on page 7.
  - Present # ch—Enter the number of channels to be created. The Forecast # ch field automatically updates with the number entered in this field.
  - Forecast # ch—Enter the number of channels to be installed at a later date. This value includes the Present # ch value. For example, if you entered 4 in the Present # ch value and want to add two channels in the future, enter 6.
- Step 7** Click **Next**. The Platform Parameters page appears.
- Step 8** On the Platform Parameters page, complete the following in the Platform area:
- Protection—Choose the protection type from the drop-down list: **Client 1+1**, **Y-Cable**, **Fiber Switched**, **Unprotected**, or PSM-OCH. For more information on protection types, see the [Protection Scheme Support](#), on page 5.

**Note** Y-cable protection is not available for encrypted traffic types.

- Path—(Unprotected only) Choose the routing type from the drop-down list:
- **Auto**—Allows the highest degree of flexibility in routing the channels. Cisco Transport Planner routes the channels with the lowest possible cost, given the other constraints.
- **A**—Select this for a Terminal or a Terminal+ site.
- **A or B**—Select either of these for a Line or a Line+ site.
- A, B, C, or D—Select either of these for a Multidegree site if four ducts are connected.
- A, B, C, D, E, F, G, or H—Select either of these for a Multidegree site if eight ducts are connected.
- Aw or Ap—Select either of these for a PSM Terminal - Optical Path Protection or PSM Terminal - Multiplex Section Protection site.



- **Optical Bypass**—(Unprotected only) Choose the site where the channels for the current demand will be optically bypassed. A channel in optical bypass is dropped on one side of the node and added on the other side of the same node to allow the future use of that node as an add/drop location.

**Note** Optical Bypass cannot be performed for an NG-DWDM node.

- **Colorless**— Choose an option from the colorless drop-down list. For more information on colorless property see the [Understanding Colorless Functionality, on page 68](#).
  - **Auto**—(Default) Disables colorless functionality on the demand.
  - **Yes**—Enables colorless functionality on the demand.
  - **No**—Disables colorless functionality on the demand.
- **Omni-directional**— Choose an option from the Omni-directional drop-down list. For more information on omnidirectional property see the [Understanding Omnidirectional Functionality, on page 67](#).
  - **Auto**—(Default) Dynamically enables omnidirectional functionality on a colorless demand, when the colorless demand needs to be dropped on an omnidirectional side with colorless ports, due to lack of any other colorless port on the side.
  - **Yes**—Enables omnidirectional functionality on the demand.
  - **No**—Disables omnidirectional functionality on the demand.
- **Contentionless**—Choose an option from the contentionless drop-down list. For more information on contentionless property see the [Understanding Contentionless Functionality, on page 69](#).
  - **Auto**—(Default) Disables contentionless functionality on the demand.
  - **Yes**—Enables contentionless functionality on the demand.
  - **No**—Disables contentionless functionality on the demand.
- **Encryption**—Choose an option from the Encryption drop-down list.
  - **Yes**—Enables encryption functionality on the demand.
  - **No**—Disables encryption functionality on the demand.

**Note** The Encryption option is available only if you have selected 100GE, 10GE LAN PHY, OTU2e, or OTU2 as Service Type in Step 6.

- When the **Encryption Always ON** option is checked in the Network properties and the value of Encryption is Yes, the NCS2K-MR-MXP-K9 PID is used instead of the NCS2K-MR-MXP-LIC PID.
- When the **Encryption Always ON** option is unchecked and the value of Encryption is Yes for 100GE demands, CTP uses the L-NCS2K-MRE100GK9 PID along with the 200G-CK-LC and MR-MXP PIDs.
- When the **Encryption Always ON** option is unchecked and the value of Encryption is Yes for 10GE or 40GE demands, CTP uses the L-NCS2K-MRELRGK9 PID along with the 200G-CK-LC and MR-MXP PIDs.

**Step 9** In the Platform Parameters page, complete the following fields in the Interface/Card Type area. The options available are based on the service type selected in Step 6.

- **Transponder**—Click to expand, then check the Card Type check box to select the card at the end sites of the service channels.
  - If you have selected 10G FICON, 10GE WAN PHY, Fiber Channel 10G, 8G FICON, 8G Fiber Channel, OC192/STM64, 10GE LAN PHY, OTU2e, or OTU2 as Service Type in Step 6 and enabled encryption

in Step 8, then, the encryption feature is available in the WSE-TXP Mode card. If you choose not to encrypt, this card is still available and is used without encryption.

If you have chosen 100GE or OTU4 as Service Type in Step 6, then the 100G-CK-LC-C card is available as a standalone card. If you have chosen 100GE as Service Type in Step 6, then the 100GS-CK-LC (with SD-FEC) card is available as a standalone card. For other service types, 100G-CK-LC-C and 100GS-CK-LC cards are available only in combination with the 10X10G-LC card.

– A 100 G demand which goes through a Cisco Aggregation Services Router (ASR) is labelled as an ASR demand in CTP. A one-port ASR demand contains one 100G-LC-C card, one pluggable and one cable associated with it. A two-port ASR demand contains two 100G-LC-C cards, two pluggables and two cables associated with it. To create an ASR demand, select the Service Type as 100GE in Step 6. From the Transponder folder, select 100G-LC-C+ASR (with FEC, with EFEC, or with HG-FEC) or 100G-LC-C+ASR2 (with FEC, with EFEC, or with HG-FEC) demand and proceed to Step 11.

– ASR demands are available for ROADM demands and Point-to-Point demands with protection. To view the ASR bundle, see the [Viewing the ASR Bundle in the Site BoM, on page 109](#).

If you have selected the Service Type as LAN-WAN Conversion in Step 6, when you expand the Transponder folder, select any one of the following OTU2-XP LAN-WAN modes and then proceed to Step 10:

OTU2-XP- Mixed Mode—Select this mode if the Protection type is either Unprotected, Client 1+1, or PSM-OCH.

OTU2-XP- Txp Mode—Select this mode if the Protection type is either Unprotected, Client 1+1, or PSM-OCH.

OTU2-XP- Splitter Mode—Select this mode if the Protection type is Fiber-Switched.

**Note** Y-cable protection is not supported on the LAN to WAN interface (ports 1 and 3).

– From Release 10.6, you can choose Sub OpMode cards for 100GE, 10GE and 40GE service types. 200G-CK-LC+MR-MXP cards support MXP-100G+10x10G sub OpMode for 100 GE and 10 GE LAN PHY. 200G-CK-LC+MR-MXP+MR-MXP cards support the OPM-2x40G-2x10G sub OpMode for 10GE LAN PHY and 40GE LAN PHY.

– From CTP 10.6.1, you can choose the NCS2K-400G-XP-LC card with no Differential Encoding (DE) in the trunk ports.

– Line Card—Click to expand the Line Card folder and then check the Card Type check box to select the card at the end sites of the service channels. For a list of line cards supported for specific service types, see the [Service Support, on page 7](#).

– Alien Card—Appears only if you created a third-party interface as described in the [Defining Third-Party DWDM Interfaces, on page 37](#). Click to expand the Alien Card folder and then check the card type check box to select the card at the end sites of the service channels.

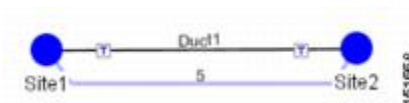
– Pluggable Card—Click to expand the Pluggable Card folder and then check the card type check box to select the card at the end sites of the service channels.

**Step 10** In the Client Interface area, define the client interface type for the source (SR, ZR, ER, or LR) and destination (EW, SW, or LW) from the Source and Destination drop-down list. This option is available for transponder and muxponder interfaces that have pluggable client interfaces that depend on the selected service type and card type.

**Note** In the LAN-WAN conversion mode, CTP automatically selects the Source and Destination client interface type if you have not selected the Source and Destination client interface type.

- Step 11** Click **Finish**. The Demand Editor dialog box appears listing the present and forecast channels. The demand appears in the NtView name tab and in the Project Explorer pane in the Service Demands > Point To Point folders. A demand is a solid line when selected and a dotted line when not selected. The line has a number above it that indicates the number of channels that are present. The following figure shows a selected point-to-point demand with five channels between sites 1 and 2.

**Figure 11: Point-to-Point Demand Between Two Sites**



- Step 12** To add a new service, click the **Add new service** icon in the toolbar. A new row appears. Complete the parameters for the new channel.
- Step 13** To delete an existing channel, select the row and click the **Delete service** icon in the toolbar.
- Step 14** To set path constraints, click the **Path Constraints Editor** icon in the toolbar and complete the following as required:
- Output Node Interface—Choose from the drop-down list, the side through which the demand must be routed.
  - Exclude Sites—Choose the sites that must be excluded from the demand route.
  - Exclude Ducts—Choose the ducts that must be excluded from the demand route.

Click **OK** to save the changes and **Cancel** to close the dialog box without saving the changes.

- Step 15** This icon is available only at the trail level of the service demand.
- Step 16** To add a regeneration site, click the **Regeneration...** icon in the toolbar. The Regeneration editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site](#), on page 90.
- Step 17** Click **OK** to save the changes to the channels and close the Demand editor dialog box, or **Cancel** to close the dialog box without saving the changes.
- Note** To make changes to the demand parameters, see the [Editing a Point-to-Point Demand](#), on page 236, or click **Cancel** to close the Demand Editor dialog box.
- Note** For each network, Cisco Transport Planner automatically creates a default subnet that exactly matches the overall network topology. This cannot be deleted.

## Creating a Protected Ring Demand

Use the following procedure to create a P-ring traffic demand.

## Procedure

- 
- Step 1** Create a ring network using either the procedures in [Creating a Project, on page 47](#) or by manually placing sites into a ring configuration.
- Step 2** In the Native Net# tab, click the **Create new P-Ring demand** icon in the toolbar. The P-Ring Creation wizard appears. For more information about the Cisco Transport Planner icons, see Appendix A, “GUI Information and Shortcuts.”
- Step 3** For each network, the tool automatically creates, a default subnet that exactly matches the overall network topology. This cannot be deleted. From the drop-down list, select any previously created traffic subnet with a ring topology that this circuit should be part of and proceed to Step 4. If you wish to create a new traffic subnet see the [Creating Traffic Subnet, on page 66](#).
- Step 4** On the General Parameters page, complete the following:
- **Label**—Enter the name of the demand.
  - **Service Type**—Choose the service type from the drop-down list. For a list of services, see the [Service Support, on page 7](#).
  - **Present # ch**—Enter the number of channels to be created. The Forecast # ch field automatically updates with the number entered in this field.
  - **Forecast # ch**—Enter the number of channels to be installed at a later date. This value includes the Present # ch value. For example, if you entered 4 in the Present # ch value and want to add two channels in the future, enter 6.
- Step 5** Click **Next**.
- Step 6** On the Sites Selection page, in the Protection Sites area, press **Ctrl** and click the sites that you want to add to the P-ring. A P-ring requires at least two sites. Click the right arrow button. To remove a site added to the list, click the site and click the left arrow button. In the Optical Bypass area, press **Ctrl** and click the sites that you want to add to the P-ring. Click the right arrow button. To remove a site added to the list, click the site and click the left arrow button.
- Step 7** Click **Next**. The WDM Client Selection page appears.
- Step 8** On the WDM Client Selection page, enter the following Platform Parameters:
- **Colorless**— Choose an option from the colorless drop-down list. For more information on colorless property see the [Understanding Colorless Functionality, on page 68](#).
    - **Auto**—(Default) Disables colorless functionality on the demand.
    - **Yes**—Enables colorless functionality on the demand.
    - **No**—Disables colorless functionality on the demand.
  - **Omni-directional**— Choose an option from the Omni-directional drop-down list. For more information on omnidirectional property see the [Understanding Omnidirectional Functionality, on page 67](#).
    - **Auto**—(Default) Dynamically enables omnidirectional functionality on a colorless demand, when the colorless demand needs to be dropped on an omnidirectional side with colorless ports, due to lack of any other colorless port on the side.
    - **Yes**—Enables omnidirectional functionality on the demand.
    - **No**—Disables omnidirectional functionality on the demand.

- Encryption—Choose an option from the Encryption drop-down list.
    - **Yes**—Enables encryption functionality on the demand.
    - **No**—Disables encryption functionality on the demand.
- Note** The Encryption option is available only if you have selected 10GE LAN PHY, OTU2e or OTU2 as Service Type in Step 4.

**Step 9** Complete the following in the Interface/Card Type area. The options available are based on the service type selected in Step 4.

- Transponder—Click to expand, then check the Card Type check box to select the card at the end sites of the service channels.
  - If you have selected 10GE LAN PHY, OTU2e, or OTU2 as Service Type in Step 4 and enabled encryption in Step 8, then, the encryption feature is available in the WSE-Txp Mode card. If you choose not to encrypt, this card is still available and is used without encryption.

If you have selected the Service Type as LAN-WAN Conversion in Step 4, when you expand Transponder, select any one of the following OTU2-XP LAN-WAN modes:

  - OTU2-XP- Mixed Mode—Select the card type as OTU2-XP Mixed Mode if the Protection type is either Unprotected, Client 1+1, or PSM-OCH.
  - OTU2-XP- Txp Mode—Select the card type as OTU2-XP Txp Mode if the Protection type is either Unprotected, Client 1+1, or PSM-OCH.
  - OTU2-XP- Splitter Mode—Select the card type as OTU2-XP Splitter Mode if the Protection type is Fiber-Switched.
- Line Card—Click to expand, then check the card type check box to select the card at the end sites of the service channels. For a list of line cards supported for specific service types, see the [Service Support, on page 7](#).
- Alien Card—Appears only if you created a third-party interface as described in the [Defining Third-Party DWDM Interfaces, on page 37](#). Click to expand, and then check the card type check box to select the card at the end sites of the service channels.
- Pluggable Card—Click to expand, then check the card type check box to select the card at the end sites of the service channels.

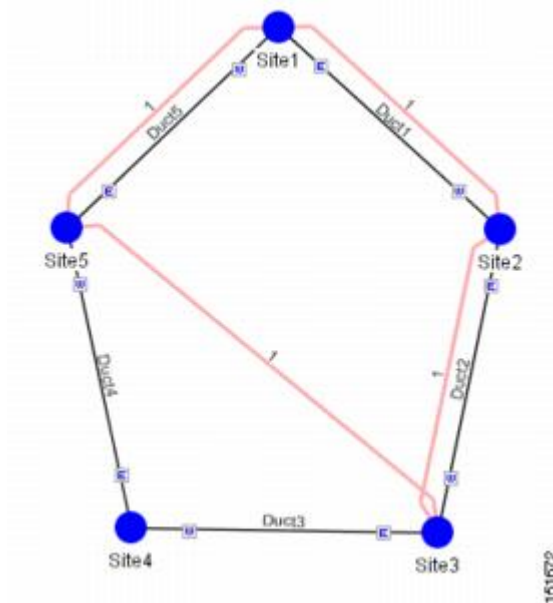
In the Client Interface area, define the client interface type for the source (SR, ZR, ER, or LR) and destination (EW, SW, or LW) from the Source and Destination drop-down list. This option is available for transponder and muxponder interfaces that have pluggable client interfaces that depend on the selected service type and card type.

**Note** In the LAN-WAN Conversion mode, CTP automatically selects the Source and Destination client interface type if you have not selected the Source and Destination client interface type.

**Step 10** Click **Finish**. The Demand Editor dialog box appears. The demand appears in the NtView name tab and in the Project Explorer pane in the Service Demands > P-Rings folders. A demand is a solid line when selected and a dotted line when not selected. The line has a number above it that indicates the number of channels present. The below figure shows a selected one-channel P-ring between sites 1, 2, 3, and 5 with an optical bypass of site 4.

- Step 11** To add a new service, click the **Add new service** icon in the toolbar. A new row appears. Complete the parameters for the new channel.
- Step 12** To delete an existing channel, select the row and click the **Delete service** icon in the toolbar.
- Step 13** To add a regeneration site, click the **Regeneration...** icon in the toolbar. The Regeneration editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site](#), on page 90.
- Step 14** Click **OK** to save the changes to the channels and close the Demand Editor dialog box, or **Cancel** to close the dialog box without saving the changes.
- Note** To make changes to the demand parameters, see the [Editing a P-Ring Demand](#), on page 239, or click **Cancel** to close the Demand Editor dialog box.

*Figure 12: P-Ring Demand*



## Creating a ROADM Demand

Use the following procedure to create ROADM traffic groups and demands:

## Procedure

- Step 1** In the Project Explorer pane, under Nets, right-click the **ROADM** folder and choose New ROADM Group. The ROADM Group Creation wizard appears.
- Step 2** Select the desired traffic subnet from the Traffic Subnet field. You can create a new traffic subnet if desired using the [Creating Traffic Subnet, on page 66](#).
- Step 3** Enter the ROADM traffic group name in the Group Name field.
- Step 4** Check the desired sites.
- Step 5** Click **Finish**. The new ROADM traffic group appears under the ROADM folder in the Project Explorer pane.
- Step 6** Right-click the new ROADM traffic group and choose **Create new ROADM demand** from the shortcut menu. The Create ROADM Demand dialog box appears.
- Step 7** (Optional) If you copied properties of an existing ROADM demand, click Use Template to use the properties of the copied ROADM demand.
- Step 8** Enter a name for the demand in the Demand Name field.
- Step 9** Select a traffic pattern type (Hub, Meshed, or Ring) from the Traffic Type drop-down list:
- Hub—If you select Hub, select the originating site from the First Site drop-down list.
  - Meshed—If you select Meshed, go to Step 10.
  - Ring—If you select Ring, select **Routing Strategy** as either **Unprotected Minimum Hop**, **Unprotected Optimum Path**, or **Unprotected Subnet**, and proceed to Step 11
- Note** Refer to the [ROADM Traffic Demands, on page 15](#) for more information on the connectivity choices.
- Step 10** Select a routing strategy from the **Routing Strategy** drop-down list: **Protected**, **Unprotected Minimum Hop**, **Unprotected Optimum Path**, or **Unprotected Subnet**. If you chose Unprotected Subnet, continue with the next step; otherwise proceed to Step 12.
- Step 11** If you chose Unprotected Subnet, choose the starting site and the direction the ring must be traversed from the drop-down lists.
- Step 12** In the Service Types list, check the boxes for one or more client service types for the ROADM demand. The client interfaces that support each service type appear in the table to the right of the Service Types list. For a list of line cards supported for specific service types, see the [Service Support, on page 7](#).
- Step 13** Check the OmniDirection check box to enable the omnidirectional property for the ROADM demand.
- Note**
- The omnidirectional property is applied to the unprotected ROADM demand only when all the sites in the ROADM group have a minimum of one omnidirectional side with two colorless ports on each side.
  - The omnidirectional property is applied to the protected ROADM demand only when all the sites in the ROADM group has minimum two omnidirectional sides with two colorless ports on each side.
  - When the ROADM demand is finalized, CTP shows the omnidirectional property as Yes irrespective of the source or destination.
- Step 14** Check the Colorless check box to enable the colorless property for the ROADM demand.

- Note**
- The colorless property is applied to the unprotected ROADM demand only when one line side with one colorless port is available in each site.
  - The colorless property is applied to the protected ROADM demand only when two line sides with one colorless port are available in each site.
  - If there are no colorless ports on the line side but available on the omnidirectional side, CTP displays an error message.
  - When the ROADM demand is finalized, CTP shows the colorless property as Yes irrespective of the source or destination.

**Step 15** Check the Contentionless check box to enable the contentionless property for the ROADM demand.

**Step 16** To further define the client interfaces, complete the following options for each client interface listed in the table. Check boxes in gray are not available for selection.

- Yes/No—Check to select this card to implement the service type.
- Client Interface—(Display only) Displays the card type for the selected service type.
- Y Protected—Check to select Y-cable protection if the connectivity type is Protected.

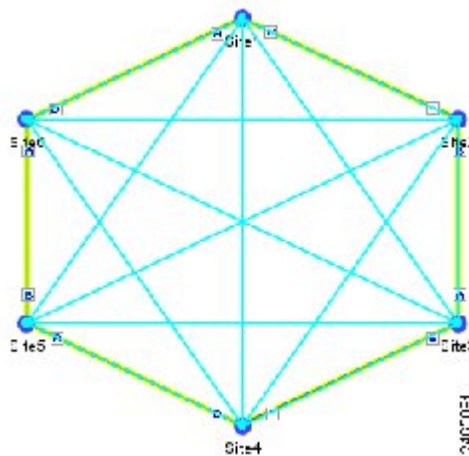
**Note** Y-cable protection is not available for encrypted traffic types.

- 1+1 Protected—Check to select 1+1 protection if the connectivity type is Protected.
- Fiber Switched—Check to select fiber-switching protection if the connectivity type is Protected.
- Supported Service—(Display only) Displays the service types supported for the card.

You can select more than one client interface to support the same service type. By default, Cisco Transport Planner checks the best client interface to support each service.

**Step 17** Click OK to create the demand. The following figure shows an example of ROADM Demand.

**Figure 13: ROADM Demand**



**Step 18** Copy ROADM demand properties. The following properties are copied:



- Traffic Type
- Routing Strategy
- Service Types
- OmniDirection
- Colorless
- Contentionless
- DWDM Card Interface table (Yes/No, Client Interface, and Protection Type columns)

These properties can be used as a template while creating a new ROADM demand or editing an existing one. To copy the properties, select the ROADM demand, right-click, and choose the Copy Properties option. When the ROADM demand properties are copied, the Use Template button is enabled in the Create ROADM Demand and Edit ROADM Demand dialog boxes.

**Note**

- The Copy Properties option is not available when you log out of the CTP session.
- ROADM demand properties copied from Release 8.5 and later can be used in an upgraded network up to Release 10.1.
- ROADM demand properties copied in the later releases (for example, Release 10.1) is not available in the earlier releases (for example, Release 9.1).

**Step 19** Analyse the network.

Click the Analyze Network icon in the toolbar.

**Step 20** Finalize the Any-to-Any demand. Perform one of the following:

To finalize Any-to-Any demand in design-analyzed state, complete Step 21.

To finalize Any-to-Any demand in upgrade state, complete Step 22.

**Step 21** To finalize Any-to-Any demand in design-analyzed state, complete the following steps:

- a) Click the **Finalize Any-to-Any traffic** icon in the network view toolbar or right-click the ROADM group in the Project Explorer and choose the **Finalize Connectivity** option. The Finalize Any-to-Any Traffic window appears.
- b) Click **Please select a Site or Click here** in the left pane to select the required connectivity (for example, Site1 - Site2). Click **OK**.
- c) Select a card listed under the ROADM demand and click the **Finalize** button. The ROADM Finalize Connectivity wizard appears.
- d) On the General Parameters page, complete the following:
  - Label—Enter the name of the demand.
  - Service Type—Choose the service type from the drop-down list. For a list of services, see the [Service Support, on page 7](#).
  - Present # ch—Enter the number of channels to be created. The Forecast # ch field automatically updates with the number entered in this field.
  - Forecast # ch—Enter the number of channels to be installed at a later date. This value includes the Present # ch value.

- e) In the Platform area of the Platform Parameters page, complete the following:
  - Choose the protection type from the drop-down list: Y-Cable Protected, or Client 1+1. For more information on protection types, see the [Protection Scheme Support](#), on page 5.
  - Encryption—Choose an option from the Encryption drop-down list.
- f) In the 454DWDM area, complete the following:
  - Transponder—Click to expand, then check the card check box to select the card at the end sites of the service channels. If you have chosen Yes for Encryption in the platform area, select the WSE-Txp Mode card to enable encryption.
- g) In the Client Interface area, define the client interface type (SR, IR, or LR) for the source and destination from the Source and Destination drop-down lists. This option is available for transponder and muxponder interfaces that have pluggable client interfaces, which depend on the selected service type and card type.
- h) Click **Finish**. The Demand Editor dialog box appears listing the present and forecast channels.
- i) To add a new service, click the **Add new service** icon in the toolbar. A new row appears. Complete the parameters for the new channel.
- j) To delete an existing channel, select the row and click the **Delete service** icon in the toolbar.
- k) To add a regeneration site, click the **Regeneration...** icon in the toolbar. The Regeneration editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site](#), on page 90.
- l) Click **OK** to save the changes to the channels and close the Demand Editor dialog box, or **Cancel** to close the dialog box without saving the changes.
- m) Click **Close** to exit the Finalize Any-to-Any Traffic window.
- n) Analyse the network again. The A2A Finalization Report appears.
- o) Click **OK** to complete the finalization.

**Note** When the network state is changed, demands that were finalized before the change in the network state are deleted.

**Step 22** To finalize Any-to-Any demand in upgrade state, complete the following steps:

- a) Upgrade the analysed network.
- b) In the upgraded network, go to the card listed under the ROADM demand, select the required connectivity (for example, Site1 - Site2), right-click and select the Finalize connectivity option. The ROADM Finalize Connectivity wizard appears.
- c) Perform Steps 21d through 21l.
- d) Analyse the upgraded network again.
- e) The demands that were finalized appear in the reports.

**Step 23** To edit any Any-to-Any finalized demand, complete the following steps:  
Click the Mgmt Tree tab and right-click the analyzed network.

Choose **A2A Finalized Circuits** from the drop-down list. The A2A Finalized Circuits tab appears.

Select any Any-to-Any Finalized demand and click **Edit** on the toolbar or double-click the demand in The A2A Finalized Circuits tab. CTP prompts to unlock the network. Choose **Yes** to open the demand editor. The network is set to Any-to-Any Finalization mode on unlocking the demand. Modify as required and click **OK** to close the demand editor.

- Note**
- CTP does not allow the card type to be edited in Any-to-Any Finalized demand.
  - When multiple demands are selected in the A2A Finalized Circuits tab, the Edit option is disabled.

**Step 24** Finalize the demand again for the changes to be reflected in the A2A Finalized Circuits report.

**Step 25** To delete any Any-to-Any finalized demand, complete the following steps:

- a) Click the Mgmt Tree tab and right-click the analyzed network.
- b) Choose **A2A Finalized Circuits** from the drop-down list. The A2A Finalized Circuits tab appears.
- c) Select any Any-to-Any Finalized demand and click **Delete** on toolbar in The A2A Finalized Circuits tab. CTP prompts to confirm deletion. Choose **Yes** to delete the selected demand.

**Note** When multiple demands are selected in the A2A Finalized Circuits tab, the Delete option is disabled.

## Creating Ethernet Aggregated Demands

An Ethernet aggregated demand is a collection of low-rate Gigabit Ethernet/10Gigabit Ethernet services that can be aggregated on a single 10-Gbps wavelength division multiplexing (WDM) trunk. This demand is supported only by the GE\_XP, 10GE\_XP, GE\_EXP, and 10GE\_EXP cards when configured as an L2-Switch.

The Ethernet Aggregation Creation wizard allows you to:

- Create one WDM transport channel at a time over a predefined traffic subnet.
- Specify the wavelength to be used for the channel, and define a list of locations with add/drop VLAN circuit capability.
- Create a set of desired VLAN circuits on this WDM transport channel.
- The check functionality generates a report showing for each section of the subnet where the WDM transport channel is over allocated and then perform corrective action when required.
- The clone functionality creates an identical copy of the current WDM transport channel with the same add/drop sites and WDM channel configuration parameters. You can then start filling this channel with the desired circuits.

Use the following procedure to create Ethernet aggregated demands:

### Procedure

- Step 1** In the NtView name tab, click the **Create new AggregatedEthernet demand** icon in the toolbar. For more information about Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361. The EthernetAggr Creation wizard appears.
- Step 2** Choose the desired traffic subnet from the Traffic Subnet drop-down list. You can create a new traffic subnet if desired (see [Creating Traffic Subnet](#), on page 66).
- Step 3** Click Next. The General Parameters page appears.
- Step 4** In the General Parameters pane, enter values in the following fields:
  - Label—Enter the name of the demand. The default value is EthernetAggr1.
  - Present/Forecast—Check this box if this demand will be needed in the future; uncheck this box if this demand is needed now. This parameter drives the list of pluggable port modules to be equipped on the card and will affect BoM reports.

- Colorless— Choose an option from the colorless drop-down list. For more information on colorless property see [Understanding Colorless Functionality, on page 68](#).
  - **Auto**—(Default) Disables colorless functionality on the demand.
  - **Yes**—Enables colorless functionality on the demand.
  - **No**—Disables colorless functionality on the demand.
- Omni-directional—Choose an option from the Omni-directional drop-down list. For more information on omnidirectional property see [Understanding Omnidirectional Functionality, on page 67](#).
  - **Auto**—(Default) Dynamically enables omnidirectional functionality on a colorless demand, when the colorless demand needs to be dropped on an omnidirectional side with colorless ports, due to lack of any other colorless port on the side.
  - **Yes**—Enables omnidirectional functionality on the demand.
  - **No**—Disables omnidirectional functionality on the demand.

**Step 5** Click Next.

**Step 6** In the Sites selection pane, complete the following tasks:

- In the Protection Sites area, press **Ctrl** and click the sites that you want to add to the Ethernet aggregated demand. An Ethernet aggregated demand requires at least two sites. Click the right arrow button. To remove a site added to the list, click the site and click the left arrow button.
- In the Optical Bypass area, press **Ctrl** and click the sites that you want to add to the Ethernet aggregated demand. Click the right arrow button. To remove a site added to the list, click the site and click the left arrow button. If the Present/Forecast check box is checked, you cannot select Optical Bypass sites. A channel in optical bypass is dropped on one side of the node and added on the other side of the same node to allow the future use of that node as an add/drop location.

**Step 7** In the Node Configuration selection pane, enter values for the following options:

- DWDM Trunk—Select the DWDM trunk type. You can specify the kind of WDM trunk interface for the card in each add/drop site. Allowed values are:
  - Auto
  - w/EFEC
  - w/FEC
  - w/o FEC
- Wavelength—Select the WDM transport channel wavelength. This option allows you to force the current WDM transport channel wavelength. Wavelengths are listed based on the selected band. Allowed values are:
  - Auto—Allows CTP to assign a wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - C band-32 ch.odd
  - L band- 32 ch.odd
  - C band- 40 ch
  - C band- 64 ch

- C band-72 ch
- C band- 80 ch
- New CFG—Choose the desired card type for each of the protected sites.

**Step 8** Click Finish. The *name* Demand window appears.

**Step 9** Click Close.

**Step 10** To add a circuit, right-click the Ethernet Demand in the Project Explorer pane and choose **New point to point request**. The New Request window appears.

**Step 11** The **New Request** window contains four areas of information: Quantity, General, Src, and Dest.

#### Quantity Area

Quantity—Enter the number of circuits to be created.

#### General Area

- Label—Enter the label for the circuit. By default, VLAN\_Circuit\_x is used.
- Trunk Protection—Enter the trunk protection type. Allowed values are:
  - Unprotected
  - Protected
- P/F—Select Forecast if this demand will be needed in the future. Select Present if this demand is needed now. This parameter drives the list of pluggable port modules to be equipped on the card and affects BoM reports.
- Path Forcing—This option allows you to force the circuit routing on the traffic subnet associated with this demand. Allowed values are:
  - Auto—(Default) Causes the tool to automatically define the trunk path.
  - Side x—Represents the label of the side on the Src site where the circuit is routed.
- Client Protection—Allowed values are:
  - Unprotected
  - Client 1+1
- Circuit rate—Displays the allowed circuit rates.

#### Src Area

- Site—Select the source site. Allowed values include the list of sites added in the WDM traffic channel.
  - SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.
  - Card—Select the Card. Allowed values are Auto, 10GE-XP, 10GE-EXP, GE-XP, and GE-EXP. Auto allows the tool to select an appropriate card type based on other constraints.
- The Src area contains Working and Protected subareas.

#### Working sub-area

- Port CIR—Select the Committed Information Rate (CIR), with 1 being the highest and 0.1 being the lowest.

- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.
- Port Num—Select the port number. Allowed values are Auto, 1, and 2. Auto allows the tool to select an appropriate port number based on other constraints.

#### Protected sub-area

These fields are enabled only if client protection is enabled in the Client Protection field.

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.
- Port Num—Select the port number. Allowed values are Auto, 1, and 2. Auto allows the tool to select an appropriate port number based on other constraints.

#### Dest Area

- Site—Select the destination site. Allowed values include the list of sites added in the WDM traffic channel.
- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.
- Card—Select the card. Allowed values are Auto, 10GE-XP, 10GE-EXP, GE-XP, and GE-EXP. Auto allows the tool to select an appropriate card type based on other constraints.
- The Dest area contains Working and Protected subareas.

#### Working sub-area

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.
- Port Num—Select the port number. Allowed values are Auto, and 1 to 20. Auto allows the tool to select an appropriate port number based on other constraints.

#### Protected sub-area

These fields are enabled only if the client protection is enabled in the Client Protection field.

- Port CIR—Select the CIR, with 1 being the max and 0.1 being the lowest.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.
- Port Num—Select the port number. Allowed values Auto, 1, to 20. Auto allows the tool to select an appropriate port number based on other constraints.

**Step 12** Click **OK**.

**Step 13** The **Traffic** tab displays the following details about the circuit:

- AL—Displays the alarm (if any) for the circuit.

- Label—Displays the name of the circuit.
- F—If checked, it is a forecast circuit. If unchecked, it is a present circuit.
- Src Site—Displays the source site.
- Dst Site—Displays the destination site.
- Rate—Displays the circuit rate/bandwidth.
- Client Prot—Displays the client protection scheme.
- Trunk Prot—Displays the trunk protection scheme.
- Message—Displays a message related to the circuit.

**Step 14** If you want to clone this demand, click the Clone button in the left corner of the screen. A new demand, which is a copy of this demand, is created and appears in the Project Explorer pane.

**Step 15** Click the Check tab in the left corner of the window to generate a report showing the circuit path in the WDM traffic channel and to check any over-allocation of bandwidth. The **Report** tab displays, in a row, each of the sites on the subnet, and each span in between.

**Step 16** The **Traffic Result** tab displays the following:

- Label—Displays the name of the circuit.
- F—If checked, it is a forecast circuit. If unchecked, it is a present circuit.
- Src Site—Displays the source site.
- Dst Site—Displays the destination site.
- Trunk Protection—Displays the trunk protection scheme.
- Path Forcing—Displays the output Node interface. If no client or trunk protection is used, displays NA.
- Client Protection—Displays the client protection scheme.
- Circuit Rate—Displays the circuit rate/bandwidth.
- Src Wrk Port Num—Displays the source working port number.
- Src Prt Port Num—Displays the source protect port number.
- Dst Wrk Port Num—Displays the destination working port number.
- Dst Prt Port Num—Displays the destination protect port number.
- Src Wrk Port CIR—Displays the source working port CIR. The highest is 1 and 0 the lowest.
- Src Prt Port CIR—Displays the source protect port CIR. The highest is 1 and 0 the lowest.
- Dst Wrk Port CIR—Displays the destination working port CIR. The highest is 1 and 0 the lowest.
- Dst Prt Port CIR—Displays the destination working port CIR. The highest is 1 and 0 the lowest.
- Src Wrk Port Rate-Reach—Displays the PPM for the source working port. For example, Rack 1.Shelf 1. Slot 5.
- Src Prt Port Rate-Reach—Displays the PPM for the source protect port. For example, Rack 1.Shelf 1. Slot 4.

- Dst Wrk Port Rate-Reach—Displays the PPM for the destination working port.
- Dst Prt Port Rate-Reach—Displays the PPM for the destination protect port.
- Src Card—Displays the source card.
- Dst Card—Displays the destination card.
- Working Src Card Rack-Shelf-Slot—Displays the rack, shelf, and slot position of the working source card.
- Working Dst Card Rack-Shelf-Slot—Displays the rack, shelf, and slot position of the working destination card.
- Protecting Src Card Rack-Shelf-Slot—Displays the rack, shelf, and slot position of the protect source card.
- Protecting Dst Card Rack-Shelf-Slot—Displays the rack, shelf, and slot position of the protect source card.
- Alarm—Displays the alarm status.

**Step 17** To add a regeneration site, click the **Regeneration...** icon in the toolbar of the DWDM channel tab. The Regeneration Editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site](#), on page 90.

**Step 18** Click **Close**. To edit circuits, see the [Editing an Ethernet Aggregated Demand](#), on page 243.

## Creating TDM Aggregated Demands

A TDM aggregated demand is a collection of low-rate SONET and Gigabit Ethernet services that is aggregated on a single 10-G WDM trunk. The TDM aggregated demand is a specific service demand that is carried only by the ADM-10G card.

The TDM Aggr Creation wizard allows you to:

- Create one WDM transport channel at a time over a predefined traffic subnet
- Specify the wavelength to be used for the channel, and define a list of locations with add/drop STS circuit capability.
- Create a set of STS circuits on this WDM transport channel to pass traffic.
- The check functionality generates a report showing, for each section of the subnet, where the WDM transport channel is over allocated and then perform, when required, the corrective action.

The total amount of bandwidth used by all the defined circuits in each section of the WDM transport channel cannot exceed the maximum channel capacity of STS-192c. Sections exceeding the maximum capacity are colored red in the report. Demands that fail the check are flagged as invalid demands and the Analyzer stops.

The clone functionality allows you to create an empty copy of the current WDM transport channel, with the same add/drop sites and WDM channel configuration parameters. You can then start filling this channel with the desired circuits.

Use the following procedure to create TDM aggregated demands:



## Procedure

- Step 1** In the NtView *name* tab, click the Create new TDM Aggregated demand icon in the toolbar. For more information about CTP icons, see the [GUI Information and Shortcuts](#), on page 361. The TDMAggr wizard appears.
- Step 2** Select the desired traffic subnet from the Traffic Subnet drop-down list. You can create a new traffic subnet if desired using (see the [Creating Traffic Subnet](#), on page 66).
- Step 3** Click Next. The General Parameters page appears.
- Step 4** In the General Parameters pane, complete the following tasks:
- **Label**—Enter the name of the demand. The default value is TDMAggr1.
  - **Present/Forecast**—Check this box if this demand will be needed in the future; uncheck this box if this demand is needed now. This parameter drives the list of pluggable port modules to be equipped on the card and will affect BoM reports.
  - **Colorless**— Choose an option from the colorless drop-down list. For more information on colorless property see the [Understanding Colorless Functionality](#), on page 68.
    - **Auto**—(Default) Disables colorless functionality on the demand.
    - **Yes**—Enables colorless functionality on the demand.
    - **No**—Disables colorless functionality on the demand.
  - **Omni-directional**— Choose an option from the Omni-directional drop-down list. For more information on omnidirectional property see the [Understanding Omnidirectional Functionality](#), on page 67.
    - **Auto**—(Default) Dynamically enables omnidirectional functionality on a colorless demand, when the colorless demand needs to be dropped on an omnidirectional side with colorless ports, due to lack of any other colorless port on the side.
    - **Yes**—Enables omnidirectional functionality on the demand.
    - **No**—Disables omnidirectional functionality on the demand.
- Step 5** Click Next.
- Step 6** In Sites selection pane, complete the following tasks:
- In the Protection Sites area, press **Ctrl** and click the sites that you want to add to the TDM aggregated demand. A TDM aggregated demand requires at least two sites. Click the right arrow button. To remove a site added to the list, click the site and click the left arrow button.
  - In the Optical Bypass area, press **Ctrl** and click the sites that you want to add to TDM aggregated demand. Click the right arrow button. To remove a site added to the list, click the site and click the left arrow button. If the Present/Forecast check box is checked, you cannot select Optical Bypass sites. A channel in optical bypass is dropped on one side of the node and added on the other side of the same node to allow the future use of that node as an add/drop location.
- Step 7** In the Node Configuration selection pane, complete the following tasks:
- **DWDM Trunk**—Select the DWDM trunk type to specify the kind of WDM trunk interface for the card in each allowed add/drop site. Allowed values are:
    - Auto

- w/EFEC
- w/FEC
- w/o FEC
- Wavelength—Allows you to force the current WDM transport channel wavelength. Allowed values are:
  - Auto—Allows CTP to assign a wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - C band-32 ch.odd
  - L band- 32 ch.odd
  - C band- 40 ch
  - C band- 64 ch
  - C band- 72 ch
  - C band- 80 ch

**Step 8** Click Finish. The *name* Demand window appears.

**Step 9** Click Close.

**Step 10** To add a circuit, right-click the Ethernet Demand in the Project Explorer pane and choose **New point to point request**. The **New Request** window appears.

**Step 11** The **New Request** window contains four areas of information: Quantity, General, Src, and Dest.

#### Quantity Area

Quantity—Enter the number of circuits to be created.

#### General Area

- Label—Enter the label for the circuit. By default, VLAN\_Circuit\_x is used.
- Trunk Protection—Enter the trunk protection type. Allowed values are:
  - Unprotected
  - UPSR
- P/F—Select Forecast if this demand will be needed in the future. Select Present if this demand is needed now. This parameter drives the list of pluggable port modules to be equipped on the card and affects BoM reports.
- Path Forcing—This option allows you to force the circuit routing on the traffic subnet associated with this demand. Allowed values are:
  - Auto—(Default) Causes the tool to automatically define the trunk path.
  - Side x—Represents the label of the side on the Src site where the circuit is routed.
- Client Protection—Allowed values are:
  - Unprotected
  - 1+1 APS
- Circuit rate—Displays the allowed circuit rates.

#### Src Area

- Site—Select the source site. Allowed values include the list of sites added in the WDM traffic channel.
- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.
- Card—Select the Card. Allowed values are Auto and ADM-x. Auto allows the tool to select an appropriate card type based on other constraints.

The Src area contains Working and Protected sub-areas.

#### Working sub area

- Port Num—Select the port number. The allowed values are Auto, and from 1 to 17. Selecting Auto allows the tool to select an appropriate port number based on other constraints.

In addition to ports 1 to 16, port 17 also acts like a client port in TDM aggregated demands. Following are the guidelines to use port 17:

- Port 17 must be selected only when the ADM-10G card is used in a single-card configuration.
- Port 17 supports the circuit rates VC4-64C/STS-192C. It also supports the circuit rates from STS1/VC4 to STS-48c/VC4-16c or a combination of them.
- For circuit rates VC4-64C/STS-192C with the port number as Auto, port 17 automatically becomes the source and the destination port. Port 17 will not be selected for any other circuit rate unless the user specifically forces the port.
- Port 17 supports UPSR Client Protection on ANSI platform and SNCP client protection on ETSI platform, except for the circuit rates VC4-64C/STS-192C.

- Port Rate-Reach—Select the desired PPM for this port or set it to Auto to allow the tool to select an appropriate value.

#### Protected sub area

The following fields are available only if client protection is enabled:

- Port Num—Select the port number. The allowed values are Auto, and from 1 to 17. Selecting Auto allows the tool to select an appropriate port number based on other constraints.

You can force port 17 as protected source or destination port for Client UPSR/SNCP protection with circuit rates less than VC4-64/STS-192c.

- Port Rate-Reach—Select the desired PPM for this port or set it to Auto to allow the tool to select an appropriate value.

#### Dest Area

- Site—Select the destination site. Allowed values include the list of sites added in the WDM traffic channel.
- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.
- Card—Select the card. Allowed values are Auto and ADM-x. Auto allows the tool to select an appropriate card type based on other constraints.
- The Dest area contains Working and Protected sub areas.

#### Working sub area

- Port Num—Select the port number. The allowed values are Auto, and from 1 to 17. Selecting Auto allows the tool to select an appropriate port number based on other constraints.
- In addition to ports 1 to 16, port 17 also acts like a client port in TDM aggregated demands. The guidelines to use the port are the same as given in the Working sub area for source ports.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

#### Protected sub-area

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

**Step 12** Click **OK**.

**Step 13** If you want to clone this demand, click the Clone button in the left corner of the screen. A new demand, which is a copy of this demand, is created and appears in the Project Explorer pane.

**Step 14** Click the Check tab on the left corner of the window to generate a report showing the circuit path in the WDM traffic channel and to check any over-allocation of bandwidth. The report shows, in a row, each of the sites on the subnet, and each span in between.

**Step 15** To add a regeneration site, click the **Regeneration...** icon in the toolbar of the DWDM channel tab. The Regeneration Editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site, on page 90](#).

**Step 16** Click Close. To edit circuits, see the [Editing a TDM Aggregated Demand, on page 246](#).

## Creating a Regeneration Site

A regeneration site is required when the optical communications link has to span long distances. The optical signal has to be regenerated when the optical signal-to-noise ratio (OSNR) goes beyond a critical limit. After a network is analyzed, the Optical Results highlights if any site requires regeneration. For more information about optical results, see the [Viewing Optical Results, on page 157](#).

Use the following procedure to create a regeneration site in the network.



**Note** A regeneration site cannot be a site with the functionality as OLA, OSC, pass-through, or hub.



**Note** The **Regeneration...** icon is active only when you select a trail in the Demand Editor.

## Procedure

- 
- Step 1** In the Demand Editor, click the **Regeneration...** icon in the toolbar. The Regeneration Editor appears. For more information about Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361.
- Step 2** In the Available Sites area, choose the site and click the down arrow icon. To remove a site added to the Regeneration Sites list, choose the site and click the up arrow icon.
- Note** When adding more than one regeneration site to the path, ensure the regeneration sites are added in the correct sequence to avoid unfeasible routing. For example, if you create a point-to-point demand from site1 (source) to site 3 (destination), the sites available in the path are site 4 and site 5. Site 5 must be selected first, followed by site 4, because site 5 is closer to site 1.
- Step 3** To sort the regeneration sites in the list, use the up and down arrow icons located on the left.
- Step 4** If you chose a source or destination card for a regeneration site, choose the card type for the site from the drop-down list. The regeneration cards that are compatible with the source and destination cards are displayed in the interface.
- Note** The OTU2\_XP card has four modes. For more information on these modes, refer to the [Configurations for OTU2\\_XP](#), on page 91.
- Note** The encryption card (WSE-Txp Mode) is available in the card drop-down list only if you have selected OTU2e as the service type during demand creation.
- Step 5** Colorless— Choose an option from the drop-down list. Colorless traffic demands are terminated at colorless add/drop ports, so that, these demands can be tuned in all possible wavelengths without changing the optical interface of the port.
- Note** These values apply only to the selected trail.
- Auto—(Default) Disables colorless functionality on the demand.
  - Yes—Enables colorless functionality on the demand.
  - No—Disables colorless functionality on the demand.
- Step 6** Omnidir Src Side, Omnidir Dest Side— Choose an option to enable omnidirectional functionality on a source or destination side. An omnidirectional side allows routing of the added and dropped traffic in all the possible directions associated to Line sides.
- Auto—(Default) Disables omnidirectional functionality on the sides.
  - Yes—Enables omnidirectional functionality on the sides.
  - No—Disables omnidirectional functionality on the sides.
- Step 7** Click **OK**.
- Note** To allow different wavelengths to be used for regeneration, choose the Allow different wavelengths option in the Properties pane in Net > Options > Traffic Mapping > System Release 10.5.
- 

## Configurations for OTU2\_XP

The OTU2\_XP card operates in six different configurations as shown in the following table:

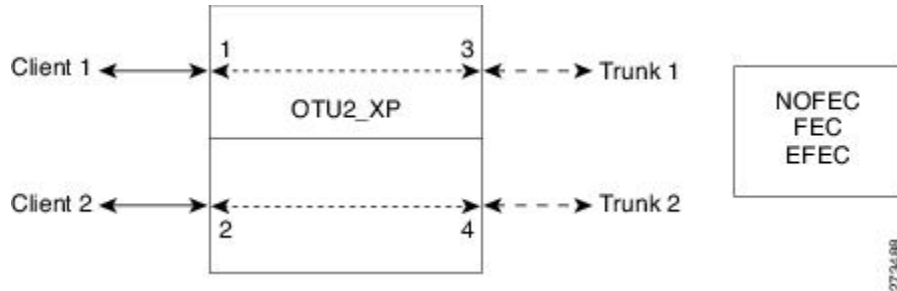
| Configuration  | Card listed as                                  | Port 1        | Port 2  | Port 3   | Port 4  |
|--|---|---------------|---|--|---|
| <b>Dual Transponder</b><br>(2 x 10G transponder)   | OTU2-XP-Txp mode                                | Client port 1 | Client port 2   | Trunk port 1   | Trunk port 2  |
| <b>Dual Regenerator</b><br>(2 x 10G standard regenerator with enhanced FEC [E-FEC] only on one port) | OTU2-XP-Regen mode                              | Trunk port 1  | Trunk port 2  | Trunk port 1   | Trunk port 2  |
| Single Regenerator<br>(1 x 10G E-FEC regenerator with E-FEC on two ports))                           | OTU2-XP-Single Regen mode                       | Not used      | Not used  | Trunk port   | Trunk port  |
| 10 GE LAN Phy to WAN Phy   | OTU2-XP-Txp mode<br>Mixed mode<br>Splitter mode | Client port   | Client port in transponder or trunk port in regenerator configuration | Trunk port<br><b>Note</b> In a Multi trunk card, the LAN port is always on Port1, and not on port 2. | Trunk port in transponder or regenerator configuration. |
| <b>Protected Transponder</b><br>(1 x 10G splitter protected transponder)                             | OTU2-XP-Splitter mode                           | Client port   | Not used  | Trunk port (working)   | Trunk port (protect)                                    |

| Configuration   | Card listed as     | Port 1      | Port 2                               | Port 3  | Port 4  |
|---|--------------------|-------------|--------------------------------------|---|---|
| <b>Mixed Mode</b><br>(1 x 10G transponder and 1 x 10G standard regenerator) | OTU2-XP-Mixed mode | Client port | Trunk port 4 without FEC or with FEC | Trunk port 1 without FEC or with FEC or E-FEC | Trunk port 2 without FEC or with FEC or E-FEC |

**Dual Transponder (OTU2-XP-Txp)**

You can configure the OTU2\_XP card as a dual transponder as shown in the below figure. When configured as a dual transponder (OTU2-XP-Txp), the card supports two completely independent bidirectional 10-Gbps services. Port 1 and Port 2 support traffic from or to port 3 and port 4, respectively. Both paths are completely independent and can support different services. G.709 wrapping or unwrapping and FEC correction capability can be independently activated on each path.

**Figure 14: Dual Transponder Configuration**



You can assign one the following service types as the client:

- OC-192/STM64
- 10GE WAN-PHY
- 10GE LAN-PHY
- 10G-FC
- LAN-WAN Conversion

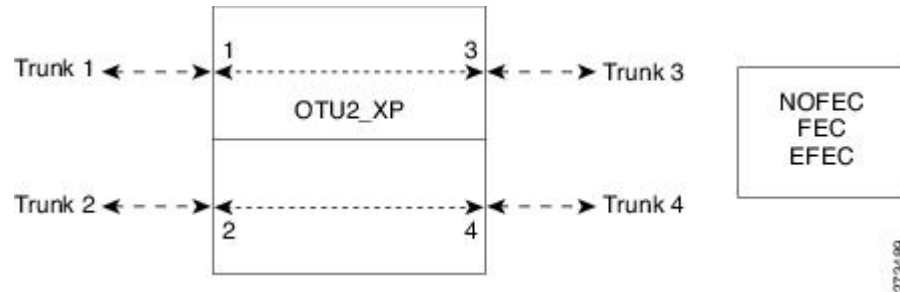
You can set one of the following trunk modes on both trunks for any of the service types:

- No FEC
- FEC
- E-FEC

## Dual Regenerator (OTU2-XP-Regen)

You can configure the OTU2\_XP card as a dual regenerator as shown in the below figure. When configured as a dual regenerator (OTU2-XP-Regen), the unit regenerates two completely independent bidirectional 10-Gbps signal paths (similar to the OTU2-XP-Txp configuration). In this configuration, all four ports support DWDM XFPs. You can also independently set G.709 framing and FEC capability for all four ports. You can enable E-FEC encoding only on ports 3 and 4.

**Figure 15: Dual Regenerator Configuration**



You can use the following combinations of trunk modes according to the framing of the service to be regenerated:

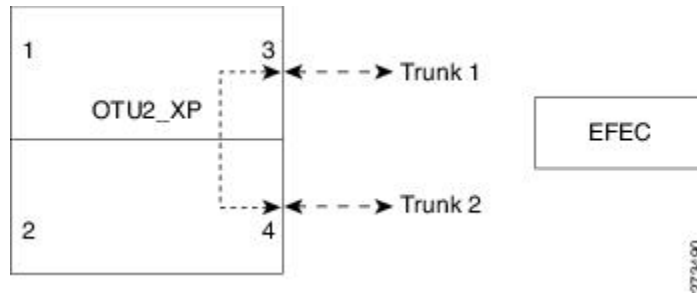
- OC-192/STM-64 service type:
  - Trunk ports 1 and 2: No FEC
  - Trunk ports 3 and 4: No FEC
- OTU-2 service type:
  - Trunk ports 1 and 2: FEC
  - Trunk ports 3 and 4: FEC
  - or
  - Trunk ports 1 and 2: E-FEC
  - Trunk ports 3 and 4: FEC



**Single Regenerator (OTU2-XP- Single Regen)**

You can configure the OTU2\_XP card as a single regenerator as shown in the below figure. When configured as a single regenerator (OTU2-XP- Single Regen), the card regenerates only one bidirectional 10-Gbps signal path. The ports 3 and 4 support DWDM XFPs and G.709 framing as well as E-FEC.

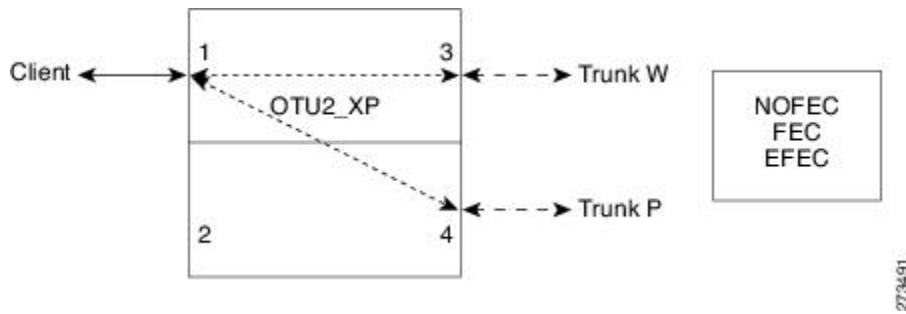
**Figure 16: Single-Regenerator Configuration**



**Protected Transponder (OTU2-XP- Splitter)**

You can configure the OTU2\_XP card as a protected transponder as shown in the below figure. When configured as a protected transponder (OTU2-XP- Splitter), the card implements the fiber-switched protection. In this configuration, the client service on port 1 is transmitted to ports 3 and 4 and then on to both trunks. Only one signal received from the two trunks on ports 3 and 4 is transmitted to port 1 (the signal from the other port is only monitored). After detecting a failure on one trunk, the unit automatically switches on the other port, which restores the signal on port 1. In protected-transponder configurations, port 2 is always disabled.

**Figure 17: Protected-Transponder Configuration**



You can set one of the following service type for the client port:

- OC-192/STM64
- 10GE WAN-PHY
- 10GE LAN-PHY
- 10G-FC
- LAN-WAN Conversion

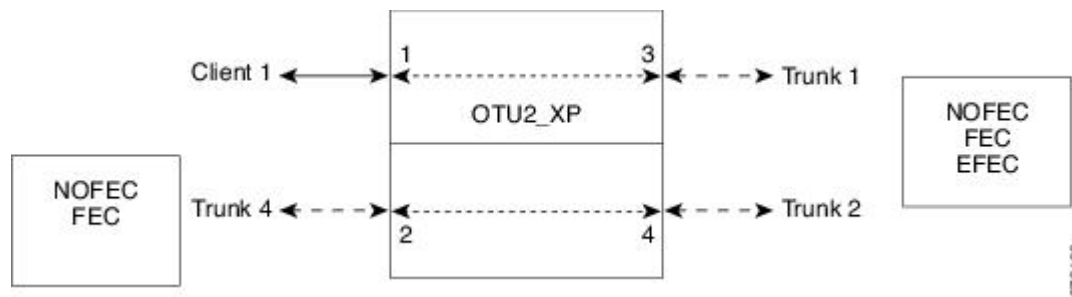
You can set one of the following trunk modes on both trunks for any of the service types:

- No FEC
- FEC
- E-FEC

### Mixed Mode (OTU2-XP- Mixed)

You can configure the OTU2\_XP card in mixed mode (See Mixed-Mode Configuration figure). When configured in mixed mode (OTU2-XP- Mixed), the card is a regenerator on one set of the ports and a transponder on the other set. The two sets are completely independent and can be configured to transmit or regenerate different services. You can independently set G.709 framing and FEC capability on each trunk port, but ports 1 and 2 cannot have E-FEC encoding.

**Figure 18: Mixed-Mode Configuration**



You can swap the configuration of the two sets, that is, ports 1 to 3 set as the regenerator and ports 2 and 4 as the transponder.

You can set one of the following service types for the client port:

- OC-192/STM64
- 10GE WAN-PHY
- 10GE LAN-PHY
- 10G-FC
- OTU2
- LAN-WAN Conversion

You can set one of the following trunk modes on all the trunks for all service types:

- No FEC (all)
- FEC (all)
- E-FEC (only to ports 3 and 4)

CTP does not automatically select mixed mode for OTU2\_XP cards. You need to select mixed mode for an OTU2\_XP card to force it.

**Note**

The FI and FC demands are not supported on port 2 as a source when the LAN-WAN traffic is fed as a source on port 1.

For further information on the OTU2\_XP card, refer to the *Cisco ONS 15454 DWDM Configuration Guide, Release 9.6.x*.

## Viewing Circuits in a Network

You can view all the circuits that have been created in any of the Service Demands folders in the **Traffic** tab of the **Net1** tab.

The following columns are displayed:

- SA—Indicates the system alarms that affect the circuit. This indication is available only after the network is analysed.
- AL— Indicates the optical alarms that affect the circuit. This indication is available only after the network is analysed.
- F—Indicates if the demand will be needed in the future.
- Demand —Displays the name of the demand.
- Group—Displays the demand group to which the circuit belongs.
- Label —Displays the label of the circuit.
- TMSubnet—Displays the name of the traffic subnet in which the circuit is defined.
- SrvType— Displays the service type value.
- Sites—Lists the add/drop site.
- Card/TrunkType—Displays the card type and trunk type.
- Protection type— Displays the protection type of the demand.
- Wavelength —Displays the assigned wavelength.
- Encryption—Displays whether the traffic is encrypted or not.

You can edit the circuits for any demand by double-clicking the circuit or by choosing the circuit and clicking the **Edit** button in the toolbar.

Use any one of the following options to group and order the circuits:

- Type\Demand\Group— The circuits are first grouped and ordered by demand name. Each set of circuits with the same demand name is then ordered by the group name.
- SrvType\Type\group—The circuits are first grouped and ordered by service type. Each set of circuits with the same service type is then ordered by the group name.

**Note**

You can also select a set of fields in a particular order in the Group by dialog box to build a grouping rule to be applied to the table.

## Analyzing the Network

After you have created the desired sites, fiber spans, and service demands, you must analyze the network to determine network performance. The network must be in the Design, Install, or Upgrade state before you can analyze it. Cisco Transport Planner automatically optimizes the design and summarizes the optical transmission performance. If there are problems with the design, Cisco Transport Planner lists the problems and descriptions in the Analyzer Messages pane.

Use the following procedure to analyze the network:

### Procedure

- 
- Step 1** Click the **Mgmt Tree** tab, and click the network that you want to analyze.
- Step 2** Click the Analyze Network icon in the toolbar. For more information about the Cisco Transport Planner icons, see [GUI Information and Shortcuts, on page 361](#). As an alternative, click **Analyze** in the Tasks Pane. The Cisco Transport Planner analysis status bar indicates when the network analysis is complete.
- Step 3** If any problems occur during the analysis, click the **Analyzer** tab to view the results on the Analyzer Messages pane. The Summary report appears. See the [Viewing the Summary Report, on page 136](#) for more information. Warning and error messages help you identify problems with your current design. For a list of all system messages, see [Troubleshooting, on page 401](#).
- Step 4** If necessary, resolve the problems listed in the Summary report. After you resolve the problems in the network, you can analyze the network again.
- Note** You can return a Design-Analyzed network to the design state to make further changes by clicking the network icon in the Mgmt Tree and clicking **Design** in the Tasks Pane.
- 

## Viewing the Site Functional View

The Site Functional View displays a graphical view of the circuit connections, optical power, alarms, and signal loss of a selected site. After you have created the desired sites, fiber spans, and service demands, and analyzed the network, you can now view the Site Functional View. All the cards in each side are grouped together.

You can view the site functional view in either of the following ways:

- Right-click on the Site in the Project Explorer pane and select **Open Site Functional View**.
- In the Network view, right-click on the Site and select **Open Site Functional View**.
- Select the Site in the Network view and click **Open Site Functional View** in the **Tasks Pane**.

The Site Functional View of a selected site is displayed in a new tab. Double-click a side to see the details of that side. To return to the normal view, right-click on the side and click **Close Node**.

## Changing the View

You can change the view of the graphical display to view the layout information in detail. Right-click on the sides of the image (grey area outside the image) to change the view.

You can select the following:

- Fit to View—Fits the side view into the available display space.
- Zoom In—Magnifies the view of the graphical display.
- Zoom Out—Shrinks the view of the graphical display

## Alarm Information

Within the side display, an alarm box is shown that gives the alarm count for the Critical (CR), Major (MJ), and Minor (MN) alarms that affect that side. The alarm associated with the card is indicated to reflect the severity of the alarm (red, orange, and yellow).

## Transponder and Muxponder Connections

All the transponder and muxponder cards with the patchcords are grouped together. To open and view the transponder and muxponder connections, right-click the patch panel and select **Open Patch Panel**.

# Managing the Network Design

After creating and analyzing a network design, you must prepare the design for installation at a customer site. After a network has been installed, you can reanalyze to correct any problems.

A tooltip is displayed when a network is selected for a copy, upgrade, release upgrade, install, or upgrade to design operation.

Network designs have several possible states:

- Design—The initial state for any new network design. You can add, delete, or change any aspect of the network design. In the Design state, no locks exist. After analyzing a design, you can put it back into the Design state to modify it by choosing Design in the Tasks Pane.
- Design-Analyzed—The state of the network design after you run the network analyzer. All reports are available and updated. You cannot change any aspect of the network design. You can modify the BoM, such as changing global discounts and spare parts. You can return to the Design state after analyzing the network by choosing Design in the Tasks Pane.
- Copy—A copy of a network. You can create a copy of a network in any state. A copy is useful for testing different design options. You can copy a network before or after analyzing it. A copied network inherits the set of project options defined in the original network. For more information, see the [Creating a Copy of the Network](#), on page 100.
- Install—A network is initially designed with theoretical fiber values (such as loss, length, etc.). When a network is installed in the field, you can move the network into the Install state so that you can enter and check the real fiber parameter values. You can create an Install network from a network in the Design-Analyzed or Upgrade-Analyzed state. A network in the Install state inherits the set of project

options defined in the analyzed network. All sites in an Install network are locked. You cannot modify any aspect of the network design except the span parameters and (on unlocked sites) amplifiers. You can, however, modify the BoM. All routed circuits are fixed, and cannot be changed while in this state. For more information, see the [Creating a Network in the Install State, on page 100](#).

- **Install-Analyzed**—The state of the Install network design after you run the network analyzer. All reports are available and updated. Cisco Transport Planner locks all sites, spans, demands, and equipment when a network is in the Install-Analyzed state.
- **Upgrade**—During network design, you define a number of the channels to be implemented at the present time and a number of channels to be implemented in the future (forecast). After installing the network, you might decide to implement the forecast circuits. To do this, you create an Upgrade network and then select the forecast or traffic demand services that you want to implement. You can create an Upgrade network from a network in the Design-Analyzed or Install-Analyzed state. You can unlock specified parameters to alter the design to include forecasted channels and traffic demands. A network in the Upgrade state inherits the set of project options defined in the analyzed network. For more information, see the [Creating an Upgrade Network, on page 101](#).
- **Upgrade-Analyzed**—The state of the Upgrade network design after you run the network analyzer. All reports are available and updated. Cisco Transport Planner locks all sites, spans, demands, and equipment when a network is in the Upgrade state.

To complete the procedures in this section, you must have a project open and the network(s) loaded. See the [Opening a Project, on page 18](#) and the [Loading and Unloading Networks, on page 19](#).

## Creating a Copy of the Network

To create a copy of a network in any state, right-click the network and choose **Copy** from the shortcut menu. A new copy appears in the Network Mgmt Tree tab.

## Creating a Copy of the Network in Design State

To create a copy of a network in the design state, right-click the network and choose the **Upgrade to Design** option from the shortcut menu or click **Copy & Go back to Design Mode** on the toolbar. A new copy appears in the Network Mgmt Tree tab. This copy retains all the forcing options and removes the reports, BoM, and output data.

The **Upgrade to Design** and **Copy & Go back to Design Mode** options are available only for networks in “Upgrade” or “Upgrade Analyzed” state from Release 8.5 and later.

## Creating a Network in the Install State

Use the following procedure to create a network in the Install state:

### Procedure

---

- Step 1** If the network is not analyzed, complete the [Analyzing the Network](#), on page 98.
- Step 2** Click the **Mgmt Tree** tab.
- Step 3** Right-click the network and choose **Install** from the shortcut menu. A new network appears in the Mgmt Tree in the Install state. All results from the analyzed network are imported into the Install network and are placed in the Locked mode.
- Step 4** Make the necessary changes to the Install network. You can edit the following fiber parameters: fiber loss value, fiber CD, fiber PMD, and fiber length. See the [Editing Fiber Spans, Fiber Pairs, and Fibers Using the Fibers Dialog Box](#), on page 253. Cisco Transport Planner also allows you to unlock site parameters for modification. To change site parameters, see the [Editing Site Parameters](#), on page 178.
- Step 5** In the Mgmt Tree view, click the **Analyze Network** icon in the toolbar. For more information about the Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361. The Transport Planner Analyzer status window appears to indicate the progress. As an alternative, click **Analyze** in the Tasks Pane. The Cisco Transport Planner analysis status bar indicates when the network analysis is complete. The network now appears in the Install-Analyzed state.
- Note** If you have changed parameters that are inconsistent with the present network layout (for example, if you set an output tilt value that the amplifier cannot reach), during network analysis an error message on the Analyzer Messages pane identifies which parameter is causing the problem. Warning and error messages help you identify problems with your current design. For a list of all system messages, see [Troubleshooting](#), on page 401.
- Step 6** When you have analyzed the network and are satisfied with the results, import the new generated installation parameters to each site of the network. For more information, see the [Saving the NE Update File](#), on page 138.
- 

## Creating an Upgrade Network

Use the following procedure to put a network in the Upgrade state:

### Procedure

---

- Step 1** If the network is not analyzed, complete [Analyzing the Network](#), on page 98.
- Step 2** Click the **Mgmt Tree** tab.
- Step 3** Right-click the analyzed network and choose **Upgrade** from the shortcut menu. A new Upgrade network appears in the Mgmt Tree tab. All results from the analyzed network are imported into the Upgrade network.
- Step 4** Make the necessary changes to the Upgrade network. For more information, see the [Editing Fiber Spans, Fiber Pairs, and Fibers Using the Fibers Dialog Box](#), on page 253, and the [Editing Site Parameters](#), on page 178.
- Step 5** In the Mgmt Tree view, click the **Analyze Network** icon in the toolbar. For more information about Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361. The Transport Planner Analyzer status window appears to indicate the progress. As an alternative, click **Analyze** in the Tasks pane in any view. The Cisco Transport Planner analysis status bar indicates when the network analysis is complete. The network now appears in the Upgrade-Analyzed state.

**Note** If you have changed parameters that are inconsistent with the present network layout (for example, if you set an output tilt value that the amplifier cannot reach), during network analysis an error message on the Analyzer Messages pane identifies which parameter is causing the problem. Warning and error messages can help you identify problems with your current design. For a list of all system messages, see [Troubleshooting](#), on page 401.

---

### What to Do Next

In an Upgrade network, you can perform the following tasks:

- Modify the fiber span properties (such as length, dispersion, PMD coefficient, excess losses, and aging).
- Add or delete traffic
- Convert forecasted traffic to present traffic
- Finalize ROADM traffic to present traffic
- Modify the type of a node
- Force the presence or the absence of a card or a module (this includes amplifiers, OSC modules, OADM cards, and DCU modules)

In an Upgrade network, you can force certain installation parameters:

- Amplifier per-channel output power setpoint
- Amplifier output tilt setpoint
- Full multiplexer/demultiplexer or ROADM output power setpoint



---

**Note**

If a network is analyzed in the Upgrade state when the cards are in the unlocked state, CTP replaces any existing TCC2P card with a TCC3 card in the M12 shelf.

---

You cannot change the following parameters when in Upgrade state:

- Node input channel fail threshold
- Node OSC channel fail threshold
- Preamplifier input power threshold
- OADM card aggregate input power setpoint
- Full muxponder/demuxponder or ROADM input power setpoint
- Channel drop power

When upgrading a network that has a point-to-point demand, you can:

- Move Future circuits to become Present. This move can be done without unlocking the circuit.
- Add new, present, or future point-to-point services to the existing demand.
- Delete any present or future channel originally defined in the baseline network.
- Change any unlocked point-to-point circuit or unlocked point-to-point service demand parameter.



When upgrading a network that has an any-to-any demand, you can:

- Move any of the Any-to-Any (future) services to become Present. This move can be done without unlocking the circuit.
- Create a new Any-to-Any demand on an already existing Any-to-Any group.
- Create a new Any-to-Any group.
- Delete an existing Any-to-Any demand from an Any-to-Any group.
- Delete an Any-to-Any group with all of its Any-to-Any demands.



**Note**

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Any-to-Any services that have been moved to Present will be represented as Point-to-Point services.

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## Unlocking Parameters in the Network Design

The Locked state occurs when no value is set for a parameter and Auto option is selected. During network analysis, Cisco Transport Planner assigns a value for each parameter set with Auto and puts them in the Locked state. The Locked state indicates that the next time the network is analyzed, the analyzer cannot change the value. Locking a site forces the presence or absence of all preamplifiers, boosters, add/drop filters, TDCU, and DCU units that the site/network requires as a result of running the analyzer previously.

Locked elements are indicated by a closed padlock icon in the Project Explorer pane. For more information on the Auto, forced, and locked states, see the [Auto, Forced, and Locked Parameters](#), on page 15.

To unlock network components, right-click the desired element in Upgrade or Install mode in the Project Explorer pane and choose **Unlock** from the shortcut menu. You can unlock at the network level or the site level or the element level. Unlocking items at higher level unlocks all elements under that level.

### Forcing Manager

Forcing Manager enables you to unlock multiple interfaces connected to various ducts and sites. This helps you unlock a group of sites and ducts based on individual units such as amplifiers, DCUs, add/drop units, band parameters, and node layout.

For example, you can unlock all the amplifiers, TDCUs, and DCUs of all the sites in the network in one go, with the help of Forcing Manager.

Use the following procedure to unlock multiple units in different sites/ducts:

#### Procedure

- 
- Step 1** Right-click the network folder in the **Project Explorer** pane and choose **Forcing Manager** from the shortcut menu. The **Forcing Manager** dialog appears.  
To create a network in design mode, see [Creating a Copy of the Network in Design State](#), on page 100.  
To create an upgrade network, see [Creating an Upgrade Network](#), on page 101.  
Forcing Manger can be used in both the design mode and the upgrade mode.
- Step 2** Choose any one of the following options from the left pane of the **Forcing Manager** dialog box:

- Sites—When a site is selected, all the interfaces under that site will be selected.
- Ducts—When a duct is selected, both the interfaces associated with the duct are selected.

The list of sites and ducts available for selection is displayed in the left pane. If you choose the option sites, the list of ducts are disabled. When you choose ducts, the list of sites are disabled.

- Step 3** Choose the required sites/ducts that need to be unlocked.  
The network layout is displayed in the right pane of the **Forcing Manager** dialog. The chosen sites/ducts are highlighted in a different color.
- Step 4** Click **Select** to select the individual units from the site/duct.
- Step 5** Click **Close** to close the **Forcing Manager** dialog box.
- Step 6** Click **Help** to display the Help content for CTP.
- Step 7** Click **Select** to open the **Select Units to Force** dialog box.
- Step 8** Select any one of the following options from the **Select Units to Force** dialog box:
- Unlock Tree—Unlocks all the units from the selected sites/ducts.
  - Unlock Individual Item—From the chosen sites/ducts, you can unlock one or more of the following items:
    - Amplifier units—Unlocking an amplifier will unlock the DCUs in a particular interface.
    - TDCU—Can be unlocked without unlocking amplifiers.
    - DCUs—Can be unlocked without unlocking amplifiers.
    - Add/Drop units
    - WDM-ANS Optical Parameters
    - NodeLayout—Unlocking a node unlocks all its children. This option is not available for ducts, as it is a site parameter.
  - Reset to Auto—Choose one or more of the following items to reset the values:
    - Amplifier units
    - DCUs
    - Add/Drop units
- Step 9** Click **Apply** to apply the changes to the network.
- Step 10** Click **Cancel** to cancel the changes and close the dialog box.
- Step 11** Click **Help** to display the Help content for CTP.
- Step 12** Click **OK** to close the **Forcing Manager** dialog box.
- 

## Creating a JPEG of the Network Design

Use the following procedure to create a snapshot of your network design in JPEG format:

### Procedure

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- Step 1** Click the **NtView Name** tab.
  - Step 2** Complete the [Arranging Sites](#), on page 337 as necessary so that the sites in the network appear in the tab in the desired arrangement.
  - Step 3** Click the Save network view image icon in the toolbar.
  - Step 4** In the Save network view image dialog box, navigate to the desired directory.
  - Step 5** Enter the file name in the File Name field and click **Save**.
- 

## Upgrading to CTP Software Release 10.6.1

Use the following procedures to upgrade a release to CTP Software Release 10.6.1:



### Note

- You can upgrade a software release only to its next highest supported release. For example, Release 7.0 can be upgraded to Release 8.0 but not to Release 8.5.
- If you upgrade from an OSMINE compatible release to a non-OSMINE compatible release and attempt to analyze the network, CTP displays an error message. To correct this, do one of the following:

Continue upgrading till you reach an OSMINE compatible release and then analyze the network.

Remove the OSMINE compliance (uncheck the OSMINE compliance option under the Layout section in the Properties pane) from all the nodes and unlock the site layout in the existing network. Then, analyze the network.

---

### Procedure

---

- Step 1** From the **File** menu, click Open to load the saved CTP project.
  - Step 2** Right-click on the network loaded in the **Project Explorer** pane and choose Release Upgrade. CTP automatically creates a copy of the initially loaded network and updates the system release to the next highest release. The newly created copy is moved into the Upgrade administrative state.
  - Step 3** Repeat Step 2 until the release is upgraded to Release 10.6.1.
- Note** CTP allows you to manually enter the details of a deployed network even if the Cisco Transport Planner design file is not available. You can perform a release upgrade only on a network that has been analyzed.
  - Note** If a network is analyzed in the Release Upgrade state when the cards are in the unlocked state, CTP replaces any existing TCC2P card with a TCC3 card in the M12 shelf.
-

## Viewing a BoM

You can generate a BoM when a network is in the Install or Upgrade state or after you have successfully analyzed your network design. The price database selected during project creation is used to generate the BoM.

The BoM can be exported in BoM to Excel spreadsheet. The Excel spreadsheet contains the following tabs:

- Net View (BoM)
- Site View (BoM)
- Salesforce BOM (BoM)

In addition to the above tabs, the Excel spreadsheet contain the following tabs when the Use Spare Parts check box is checked in the BoM report.

- Net View (Spare)
- Site View (Spare)
- Salesforce BOM (Spare)



### Note

When the unit discount or the quantity of a unit of any site is updated in the Net View (BoM) or the Site View (BoM) tab of the Excel spreadsheet, the associated fields such as the total price, discounted total price, and the quantity of the unit are updated. The cumulative BoM price and the cumulative discounted BoM price are also updated.

To complete the procedures in this section, you must have a project open and the network(s) loaded. See the [Opening a Project](#), on page 18 and the [Loading and Unloading Networks](#), on page 19.

## Viewing BoM Report Totals

Use the following procedure to view the BoM report totals:

### Procedure

- Step 1** Click the **Mgmt Tree** tab and click the network.
- Step 2** In the **Tasks Pane**, click **Bill of Material**. The Bill of Material tab appears. As an alternative, you can access this report by choosing **Bill of Materials** from the Reports folder in the Project Explorer pane. The upper section of the BoM tab (in the Net view, Site view, and Spare subtabs) displays the following information:
- **BoM total discounted**—Displays the price for the overall network (without spare parts) for each item in the BoM. If Use global discount is checked, the total includes the discount from the Global discount percentage field.
  - **Spare total discounted**—Displays the price for all of the recommended spare parts in all of the maintenance centers for the overall network. It is the sum of each spare item using the discounted price. The total appears after you check the Spare Part Report check box.

- BoM + Spare total discounted—Displays the sum of the BoM total discounted price and spare total discounted price.
- Price List—Displays the name of the price list database selected for the project.
- Price List last update—Displays the date that the selected price list was last updated.
- Currency—Displays the value of the currency used for each of the price values as specified within the selected price list database.

- Step 3** To use the Multishelf Management Integrated Kit bundle when generating the BoM instead of the single items, check **Use MSM bundle**.
- Step 4** Check **Use Spare Parts** to include the spare parts in the report totals.  
**Note** You can check the Use Spare Parts check box only if the network is in Design mode.
- Step 5** The Global discount percentage field shows the percentage from the Global Discount Percentage option in the Default Project Options window. To change the global discount for the entire network, check **Use global discount** and enter a new global discount in the form of a percentage in the **Global discount percentage** field. The global discount is applied to all components in the BoM and will overwrite any discount specified in the Global Price List.

## Viewing a Network BoM

Use the following procedure to generate a BoM for the network:

### Procedure

- Step 1** Click the **Mgmt Tree** tab and click the network.
- Step 2** In the **Tasks Pane**, click **Bill of Material**. The Bill of Material tab appears. The Net View subtab is selected by default. Items that are not found appear in yellow in the BOM.  
 The following table describes the Net view subtab columns. See the [Viewing BoM Report Totals, on page 106](#) for a description of the data, check boxes, and fields at the top of the window.

**Table 11: BoM Net View Columns**

| Column Label | Description  |
|--------------|--|
| Product ID   | Displays the ordering code used to order the BoM from Cisco. |
| Description  | Displays a description of the product.                       |
| Quantity     | Displays the number of specific products in the BoM.         |

| Column Label           | Description   |
|------------------------|---|
| Unit price             | Displays the price for each unit. If the price does not appear, Invalid will display. This occurs when the price list reports "NaN" (Not a Number) for the item because the price list has never been updated. Invalid items appear in the list in red. Items that have not been updated from CCO appear in yellow. |
| Unit Discount          | Displays the per-unit discount amount that you assigned in the Global Discount Percentage field. If you leave the field blank, the field displays the default value from the Price List database.   |
| Total price            | Displays the total price of the products before applying the discount.  |
| Discounted Total Price | Displays the total price of the products after applying the discount.   |
| Site #                 | Displays the number of products to be assigned to a particular site. The number of Site columns is the same as the number of sites in the network.  |

**Step 3** To close the Bill of Material report, click the **X** in the upper right corner of the Bill of Material tab.

---

## Viewing a Site BoM

A site BoM lists all of the hardware and software parts required for the system to work as designed at a given site. Use the following procedure to generate a BoM for a site:

### Procedure

---

- Step 1** Click the **NtView Name** tab and click the site.
- Step 2** In the **Tasks** Pane, click **Bill of Material**. The **Site view** subtab is selected by default. Items that do not appear in the price list appear in red.  
The following table describes the Site view subtab columns. See the [Viewing BoM Report Totals, on page 106](#) for a description of the data, check boxes, and fields at the top of the window.

**Table 12: BoM Site View Columns**

| Column Label           | Description   |
|------------------------|---|
| Name                   | Displays the site name. Click the plus (+) sign to expand the site and display the categories. Click the plus (+) sign to expand each category to view the items in the BoM.  |
| Product ID             | Displays the ordering code used to order the BoM from Cisco.  |
| Quantity               | Displays the number of that specific item in the BoM.   |
| Unit price             | Displays the price for each unit. If the price does not appear, Invalid will display. This occurs when the price list reports "NaN" (Not a Number) for the item because the price list has never been updated. Invalid items appear in the list in red. Items that have not been updated from CCO appear in yellow. |
| Unit Discount          | Displays the per-unit discount amount that you assigned in the Global Discount Percentage field. If you leave the field blank, the field displays the default value from the Price List database.   |
| Total Price            | Displays the total price of the products before applying the discount.  |
| Discounted Total Price | Displays the total price of the products after applying the discount.   |

**Step 3** To close the Bill of Material report, click the **X** in the upper-right corner of the **Bill of Material** tab.

## Viewing the ASR Bundle in the Site BoM

Use the following procedure to view the BoM for 100 G ASR demands. This is applicable for both ASR one-port and two-port demands. The following table displays the components of the ASR bundle in the Site view of the BoM.

## Procedure

- Step 1** Click the **NtView Name** tab and click the site.
- Step 2** In the **Tasks** Pane, click **Bill of Material**. The **Site view** subtab is selected by default. The various units and components associated with each site are displayed.
- Step 3** Locate **Payg Bundle** and click on the plus (+) sign next to it. The 100 G ASR demand is displayed. The associated pluggables, cables, 100 G transponder cards, and PID for the 100 G ASR demand are bundled together and displayed as a single component.
- Step 4** Click on the plus (+) sign next to the 100 G ASR demand to expand and display the items present in the bundle.

**Table 13: ASR Bundle in the Site View**

| Name   | PID               | Quantity |
|--|-------------------|----------|
| Payg Bundle of ASR one-port                        |                   |          |
| ASR 9K 1-port 100G IP+DWDM upgradable kit          | A9K-100G-WDM-1P-U | 1        |
| • ASR 9K 2-port 100GE - TR LC                      | A9K-2X100GE-TR    | 1        |
| • CXP-CFP MPO cable, 10m long                      | A9K-CCC-100G-10   | 1        |
| • CXP - 100GBASE-SR - Commercial temp              | A9K-CXP-100G-SR10 | 1        |
| • 100G OTU-4ITU-T CP-DQPSK Full C-band Tuneable LC | A9K-M-100G        | 1        |
| Payg Bundle of ASR two-port                        |                   |          |
| ASR 9K 2-port 100G IP+DWDM Starter kit             | A9K-100G-WDM-2P-K | 1        |
| • ASR 9K 2-port 100GE - TR LC                      | A9K-2X100GE-TR    | 1        |
| • CXP-CFP MPO cable, 10m long                      | A9K-CCC-100G-10   | 2        |
| • CXP - 100GBASE-SR - Commercial temp              | A9K-CXP-100G-SR10 | 2        |
| • 100G OTU-4ITU-T CP-DQPSK Full C-band Tuneable LC | A9K-M-100G        | 2        |



## Generating a Spare Parts Report

After you generate the BoM, use the following procedure to determine the spare parts required by the network. If the network is in the Upgrade state, the report includes the parts required to support the implemented services and the new additional present services. To generate a spare parts report, you must associate a site with a maintenance center before network analysis. For more information, see the [Editing Site Parameters, on page 178](#).

### Procedure

- Step 1** Click the **Mgmt Tree** tab and click the network.
- Step 2** In the **Tasks Pane**, click **Bill of Material**. Click the **Spare** subtab.  
The following table describes the Spare subtab columns. See the [Viewing BoM Report Totals, on page 106](#) for a description of the data, check boxes, and fields at the top of the window.

**Table 14: BoM Spare Subtab Columns**

| Column Label           | Description   |
|------------------------|---|
| Name                   | Displays the name of the item at the site. Right-click the maintenance center and choose <b>Expand All</b> from the shortcut menu to view all spare parts.  |
| Product ID             | Displays the ordering code used to order the BoM from Cisco.  |
| Quantity               | Displays the number of specific items in the BoM.   |
| Unit price             | Displays the price for each unit. If the price does not appear, Invalid will display. This occurs when the price list reports "NaN" (Not a Number) for the item because the price list has never been updated. Invalid items appear in the list in red. Items that have not been updated from CCO appear in yellow. |
| Unit Discount          | Displays the per-unit discount amount that you assigned in the Global Discount Percentage field. If you leave the field blank, the field displays the default value from the Price List database.   |
| Total Price            | Displays the total price of the parts before applying the discount.   |
| Discounted Total Price | Displays the total price of the parts after applying the discount.  |

**Step 3** To close the Bill of Material report, click the **X** in the upper right corner of the **Bill of Material** tab.

---

## Exporting a BoM

Use the following procedure to export the BoM to an external file in XML, Excel spreadsheet, HTML, or text format:

### Procedure

---

- Step 1** Click the **Mgmt Tree** tab and click the network.
  - Step 2** In the **Tasks Pane**, click **Bill of Material**. The **Bill of Material** tab appears.
  - Step 3** Click **Export**. The **BoM export** dialog box appears.
  - Step 4** In the **BoM export** dialog box, type the name of the file, choose the file type (**.xls** and **.html**) from the drop-down list, and navigate to the desired folder. Click **Save**.
- 

## Managing the Price List

A price list is defined for each project and is used to generate a BoM. Cisco Transport Planner can manage multiple price lists. You can even change a project price list after a project has been established. The Master Price list is the Global Price List in US dollars. You can download new price lists from Cisco Connection Online (CCO).

Only the selected price value is saved with a project; the actual price database is not saved with the project. When opening a saved project (for example, a project received from another designer), the associated price database might not be available. If this is the case, Cisco Transport Planner notifies you that the Master Price list will be used.

To save memory, Cisco Transport Planner automatically loads only the price list selected for the current project.

## Creating a New Price List

Use the following procedure to download a price list from CCO. You can download price lists from CCO if no projects are currently open.

## Procedure

---

- Step 1** If a project is open, close the project. See the [Closing a Project](#), on page 20.
  - Step 2** From the **Tools** menu, choose **Price List Mgmt**. The Price Manager dialog box appears.
  - Step 3** In the **Price Manager** dialog box, right click **PriceDBManager** and choose **New Price DB** from the shortcut menu.
  - Step 4** In the **Create a New Price DB** dialog box, enter the price list name.
  - Step 5** From the drop-down list, choose the desired CCO price list.
  - Step 6** Click **OK**.
  - Step 7** Click **OK** to update from CCO.
  - Step 8** In the **CCO User Name/Password** dialog box, type your user name and password, and click **OK**. Cisco Transport Planner downloads the CCO price list.
  - Step 9** When the update is complete, click **OK** to close the confirmation dialog box. The new price list appears in the PriceDBManager tree.
  - Step 10** Click **Close** to close the **Price Manager** dialog box.
- 

## Viewing a Price List

Use the following procedure to view and filter a price list:

### Procedure

---

- Step 1** From the **Tools** menu, choose **Price List Mgmt**. The **Price Manager** dialog box appears. The PriceDB Manager tree lists all of the created price lists. To save memory, Cisco Transport Planner automatically loads only the price list selected for the current project (unless the user requests otherwise). An L indicates that the price list is loaded in memory and is available. A U indicates that a price list is currently not loaded in memory and is not available.
- Step 2** To load or unload a price list, right-click a price list and choose **Load** or **Unload** from the shortcut menu.
- Step 3** Click **PriceList** under the desired price list identifier in the PriceDBManager tree. The list displays in the right pane of the Price Manager dialog box. The properties of the price list appear in the bottom left corner of the Price Manager dialog box:
  - Last update—Indicates the date of the last download from CCO for this price list. If Never appears, this indicates that the user created a price list without downloading from CCO.
  - Updated by—Identifies the way in which the price list was updated.

The price list displays the following columns:

- Price List ID—For internal use.
- Major Parent ID—Lists the platform.
- Minor Parent ID—Lists the equipment type.

- Product ID—Identifies the ordering code for the specific unit.
- Description—Provides detail about the item.
- Service Category—For future use.
- List Price—Indicates the price of the item. If NaN (Not a Number) appears in the field, the list has not been updated.
- Major ID—For internal use.
- Minor ID— For internal use.

Update Status—Identifies how the last update was made to an item:

- None—Indicates that the price list has never been updated.
- local\_file—Indicates that the price list has been updated from a local file.
- cco—Indicates that the price list has been updated from CCO.
- user—Indicates that the price list has been manually updated by the user who directly edited the price list. The user can modify the Discount field.
- Discount—If a discount applies, identifies the discount percentage. To modify this field, enter the new percentage.

**Step 4** To search for a specific item in a price list, type the desired item in the Search field at the top of the list. As you type, Cisco Transport Planner filters the list items to match your search entry. To choose Search options, click the Search Tool icon to the left of the Search field and choose one of the following:

- Column name—Searches only the specified column for the search string. The All option searches all columns.
- Case sensitive—Matches the case of the search string.
- Case insensitive—Disregards the case of the search string.
- Match from start—Searches only for the search string if it appears at the beginning of column text.
- Match any where—Searches for the search string if it appears anywhere in the price list.

**Step 5** To sort the items in the price list, click on a column to sort by that column.

**Step 6** Click **Close** to close the **Price Manager** dialog box.

---

## Loading and Unloading Price Lists

To save memory, Cisco Transport Planner automatically loads only the price list selected for the current project. An “L” by a price list in the Price Manager dialog box indicates that the price list is loaded; a “U” in the Price Manager dialog box indicates that the price list is not loaded. Use the following procedure to load or unload price lists in Cisco Transport Planner:

### Procedure

---

- Step 1** From the **Tools** menu, choose **Price List Mgmt.** The **Price Manager** dialog box appears.
  - Step 2** Right-click the price list and choose **Load** or **Unload** from the shortcut menu.
- 

## Updating a Price List from CCO

Use the following procedure to update a specified price list from CCO or from a local file. You can also update all price lists, even the lists that are not currently loaded. You can update a price lists from CCO if no projects are currently open.

### Procedure

---

- Step 1** If a project is open, close the project. See the [Closing a Project](#), on page 20.
  - Step 2** From the **Tools** menu, choose **Price List Mgmt.** The **Price Manager** dialog box appears.
  - Step 3** Right-click the desired price list identifier in the PriceDBManager tree and choose **Expand** from the shortcut menu.
  - Step 4** Right-click the desired price list in the expanded tree and choose **UpdateFromCCO** from the shortcut menu.
  - Step 5** In the Update from CCO dialog box, choose **Update single price list** to download data for the specified list or **Update all price lists** to download the latest data for all price lists.
  - Step 6** In the CCO User Name/Password dialog box, type your user name and password and click **OK**. Cisco Transport Planner downloads the price list.
  - Step 7** When the update is complete, click **OK** to close the confirmation dialog box.
  - Step 8** Click **Close** to close the **Price Manager** dialog box.
- 

## Copying a Price List

Use the following procedure to create a new price list by copying from an existing one. The new price list will have all of the attributes and values of the original price list (such as Updated By, Last Update, unit price, discounts, and so on). You can copy a price list if no projects are currently open.

### Procedure

---

- Step 1** If a project is open, close the project. See the [Closing a Project](#), on page 20.
  - Step 2** From the **Tools** menu, choose **Price List Mgmt.** The **Price Manager** dialog box appears.
  - Step 3** Right-click the desired price list in the PriceDBManager tree and choose **Copy** from the shortcut menu.
  - Step 4** Enter the name for the new price list and click **Ok**. The new price list appears in the PriceDBManager tree.
  - Step 5** Click **Close** to close the **Price Manager** dialog box.
-

## Deleting a Price List

Use the following procedure to delete a price list. You cannot delete the Master Price List or a price list that is in use by a project. You can delete a price list if no projects are currently open.

### Procedure

---

- Step 1** If a project is open, close the project. See the [Closing a Project](#), on page 20.
  - Step 2** From the **Tools** menu, choose **Price List Mgmt**. The **Price Manager** dialog box appears.
  - Step 3** Right-click the desired price list in the PriceDBManager tree and choose **Delete** from the shortcut menu.
  - Step 4** Click **Close** to close the **Price Manager** dialog box.
- 

## Viewing Maintenance Contracts

Use the following procedure to view maintenance contracts:

### Procedure

---

- Step 1** From the **Tools** menu, choose **Price List Mgmt**. The Price Manager dialog box appears.
  - Step 2** Right-click **Maintenance Contracts** and choose **Expand** from the shortcut menu.
  - Step 3** Click **ContractsList**. The Contract PID column lists the service contract identifiers for the hardware and software parts used by Cisco Transport Planner. The Contract Category column describes the service programs.
  - Step 4** Click **MapPidsContracts**. The PID column lists the product identifiers. The Contracts column lists the service contract identifier.
  - Step 5** Click **Close** to close the **Price Manager** dialog box.
- 

## Importing Designs Created in the Sherpa Tool

The Sherpa tool is used to create Layer 2 network designs using Cisco Carrier Packet Transport (CPT) system. These network designs can be saved as XML files and imported into CTP. Use the following procedure to import designs created in the Sherpa tool.

### Procedure

---

- Step 1** From the **Tools** menu, choose Import From Sherpa. The Sherpa file import wizard is displayed.
- Step 2** In the **Import XML** area:

- Click the Browse button to browse for the Sherpa generated XML file. Select the XML file and click Open. The file path is displayed in the Import field.
- Select one of the following radio buttons to define the import mode:
  - Custom—The Sherpa network is manually mapped to an existing CTP network that is in the Design or Upgrade mode.
  - Green Field—Sherpa design is imported into a new network in a new CTP project. Ensure that there is no project currently open in CTP, as two projects cannot be simultaneously open.

**Step 3** Click Next.

**Step 4** In the **Project/Network Options** area, these radio buttons are available under two categories—Project and Network:

- The following radio buttons define project creation:
  - Use existing CTP project—The Sherpa design is imported into an existing CTP project, which is currently open. This option is unavailable if Green Field is selected as the import mode.
  - Create a new project—The Sherpa design is imported into a new CTP project. This option is unavailable if Custom is selected as the import mode.
- The following radio buttons define network creation:
  - Use existing network—The sites in the Sherpa design are imported into an existing network, which can be selected in the adjacent drop-down list. This option is unavailable if Green Field is selected as the import mode.
  - Create a new Network—The sites in the Sherpa design are imported into a new network. This option is unavailable if Custom is selected as the import mode.

**Step 5** To complete importing the Sherpa file, do one of the following:

- If you have selected the Green Field option, click Finish. The Sherpa design is imported into CTP. The sites, ducts, and demands are created in CTP with the same parameters as defined in the Sherpa design.
- If you have selected the Custom option, click Next to choose the settings to map the Sherpa elements to CTP elements.

You can map sites, fibers, and demands. The elements present in the Sherpa project are displayed as a tree structure on the left side of the Sherpa file import wizard.

**Step 6** In the **Sherpa - CTP Site Mappings** area:

- Check the check box corresponding to the Sherpa site that needs to be mapped to a CTP site. By default, all the check boxes are selected.
- Click the cell in the CTP Match column. The list of available sites in the CTP network are displayed as a drop-down list. You can select:
  - Create New—A new site is created in CTP with the same name as that of the Sherpa site.
  - Site name—The Sherpa site is mapped to the selected CTP site. If there is any conflict between the fibers at the Sherpa site and the fibers at the CTP site being mapped, those fibers in the Sherpa

Project tree structure are displayed in red. The conflict is resolved once the fibers are correctly mapped, as described in step 8.

**Step 7** Click Next.

**Step 8** In the **Sherpa - CTP Fiber Mappings** area:

- Check the check box corresponding to the Sherpa fiber that needs to be mapped to a CTP fiber. By default, all the check boxes are selected.
- Click the cell in the CTP Match column. The list of available ducts in the CTP network are displayed as a drop-down list. You can select:
  - Create New—A new duct is created in CTP with the same name as that of the Sherpa duct.
  - Duct name—The Sherpa duct is mapped to the selected CTP duct.

**Step 9** Click on a duct in the Fibers Imported From Sherpa column. In the Fiber Property Chooser area, check the check box to retain either the Sherpa value or the CTP value for the duct parameters. No parameters are displayed in the Fiber Property Chooser area if the CTP match for the duct is set as Create New.

**Step 10** Click Next.

**Step 11** In the **Sherpa - CTP Demand Mappings** area:

- Check the check box corresponding to the Sherpa demand that needs to be mapped to a CTP demand. By default, all the check boxes are selected.
- Click the cell in the CTP Match column. The list of available demands in the CTP network are displayed as a drop-down list. You can select:
  - Create New—A new demand is created in CTP with the same name as that of the Sherpa demand. This is the only option available when the Sherpa design is being imported for the first time.
  - Demand name—The Sherpa demand is mapped to the selected CTP demand. This option is available only when the Sherpa design is reimported into the same CTP project.

**Step 12** Click the cell in the Circuits Imported From Sherpa column. In the **Demand Property Chooser** area, check the check box to retain either the Sherpa value or the CTP value for the demand parameters. No parameters are displayed in the Demand Property Chooser area if the CTP match for the demand is set as Create New.

**Step 13** Click Finish. The Sherpa design is imported into CTP. All the imported Sherpa elements are now converted as standard CTP elements.

**Note** The sites, fibers, and demands in the Sherpa Project tree structure are displayed in blue if the elements they are being mapped to are in the locked state in CTP. This can occur while importing a Sherpa design into a CTP network that is in the upgrade or release upgrade state. In case of locked fibers, and demands, a message window is displayed after clicking Next in the Fibre Options page or Finish in the Demand Options page, respectively. Click Yes to unlock the elements. However, the sites do not get unlocked during the import process. If the analysis generates any error due to the sites being locked, you have to unlock the sites manually.

**Note** The CPT cards like fabric card, line card, and CPT 50 panel are not included in CTP reports and layouts. However, CTP supports the two CPT trunk pluggables—ONS-XC-10G-C and ONS-XC-10G-EPxx.x. These pluggables are visible in Optical Results, Traffic Matrix, and Internal Connections reports.



# Bidirectional Communication with the Network Element

CTP communicates with the network element to import and export node parameters of the network. Use the following procedure to import a network from the node, analyze the network, and export the network to the node element.

## Important Notes

- CTP 10.6.1 supports importing 9.603, 9.604, 9.605, 9.8, 10.1, 10.3, 10.5, and 10.6 networks with hardware limited to 9.8 system release.
- From CTP 10.5.2, networks with PSM-OCH protection can be imported into CTP.
- From CTP 10.6, you can import omnidirectional and colorless configurations of a network. This feature is only MSTP nodes.

## Procedure

- 
- Step 1** From the CTP File menu choose **Import Network** or click **Import Network** in the Start Page. The Node Login dialog box appears.
- Step 2** In the **Node Login** dialog box, complete the following:
- Node IP—Enter the IP address of the Cisco Transport Controller (CTC) node.
  - Username—Enter the CTC username.
  - Password—Enter the CTC password.
- Step 3** Click **Ok**. The CTC window opens. The CTP window becomes inactive.
- Step 4** (Optional) Perform node provisioning as required in the CTC window.
- Step 5** In the network view, click **Circuits > Circuits** tabs. Verify that all the circuits are in the DISCOVERED state in Status column.
- Step 6** From the **Tools** menu in the CTC window, choose **Export XML** to export the node data to CTP. The Export Network Information into XML window appears listing all the nodes that are discovered. Verify that all nodes are discovered.
- Note** The **Export XML** option is available only when CTC is launched through CTP.
- Step 7** Select the nodes to be exported into XML and click **OK**. The Export Successful dialog box appears when all the node data is exported.
- For release 9.8 and later, CTP supports importing the following cards from CTC:
- 100G-LC-C, 100G-CK-LC-C and 10 X 10 G-LC standalone cards.
  - 100G-CK-LC-C + 10X10G-LC, 100G-CK-ME-C+10X10G-LC, 100G-CK-LC-C+CFP-LC, 100G-CK-ME-C+CFP-LC, 100G-LC-C + CFP -LC, 100G-ME-C + CFP-LC, 100G-ME-C + 10 X 10G TXP, and 100G-LC-C + 10 X 10 G-LC combination cards.
  - TNC-E and TSC-E cards.

**Step 8** Click **OK**.

**Step 9** Close the CTC window.

- 1 From the File menu, choose **Exit**.
- 2 Click **Yes** to confirm exit.

The CTC window closes, the CTP window becomes active, and the Import Network wizard appears. This may take about 1 minute depending on the size of the network.

**Step 10** In the **Project/Network Options** area, these radio buttons are available under two categories—Project and Network:

- The following radio buttons define project creation:
  - Use existing CTP project—This imports the node data from CTC into an existing CTP project. This option is disabled.
  - Create a new project—This imports the node data from CTC into a new CTP project.
- The following radio buttons define network creation:
  - Use existing network—This imports the sites from the CTC node into an existing network. This option is disabled.
  - Create a new Network—This imports the sites from the CTC node into a new network.

**Step 11** Click **Next** to choose the settings to map the node elements to CTP elements.

**Step 12** In the **Site Options** area, check the check box corresponding to the site that needs to be modelled to a CTP site. By default, all the check boxes are selected.

**Note** CTP does not support omnidirectional and colorless sites or cascading 80-WXC-C cards.

**Step 13** Click **Next**.

**Step 14** In the **Node - CTP Fibre Modelling** area, check the check box corresponding to the fiber that needs to be modelled to a CTP fiber. By default, all the check boxes are selected.

**Step 15** Click on a duct in the **Fibre Imported From Node** column. In the **Fiber Property Chooser** area, for fibre type, select the fiber type from the drop-down list in the **Node** column.

**Step 16** Click **Next**.

**Step 17** In the **Node - CTP Demand Modelling** area, check the check box corresponding to the demand that needs to be modelled to a CTP demand. By default, all the check boxes are selected.

**Note** CTP supports the import of only point-to-point demands.

**Step 18** Click **Finish**. The Network creation done dialog box appears indicating that the imported OCHNC circuits may not be associated with TXP/MXP properly and requires the card and client/trunk pluggables to be forced appropriately.

**Step 19** Click **OK**. The Importing Complete dialog box appears when the node properties are imported into CTP.

**Step 20** To view the import logs, click **Yes** else click **No**. All the imported node elements are now converted as standard CTP elements. The Log Viewer displays the import log. This log file is saved in the CTP cache directory. The network is imported in the design mode.

**Step 21** In the Project Explorer pane, the invalid demands are underlined in red. Double-click on the invalid OCHNC demands and edit the parameters as required.

**Note** An invalid OCHNC demand is one in which Traffic Type may be set to 10GE LAN PHY, Source and Destination Client Cards may be set to Auto and Protection Type may be set to Unprotected because their values could not be found. Therefore, set the values as required for these parameters and then validate the demand.

**Step 22** In the Project Explorer pane, right-click the edited demand and choose Validate. Next, proceed to *Step 25*.

**Step 23** To validate multiple demands, right-click the demand and choose Select Similar.

**Step 24** After multiple demands are selected, right-click the selected demands and choose Validate.

**Note** If you try to analyze the network when any demand is still invalid, a warning message is displayed indicating that the invalid demand must be validated before analysis.

**Step 25** (Optional/Not recommended) Modify the network in CTP as required.

**Step 26** Analyze the network for the imported node data to be applied. Perform the “Analyzing the Network” task described in the [Analyzing the Network](#) section. After the network is analyzed, CTP provides an option to export the CTP NE Update Configuration file to the node.

**Step 27** To export NE Update Configuration file to the node, right-click on any node in the analyzed network and choose **Provision Node**. The Node Login window appears.

**Step 28** In the Node Login window, complete the following:

- Username—Enter the CTC username.
- Password—Enter the CTC password.

**Note** The Node IP field is prepopulated with the node IP address.

**Step 29** Click **Ok**. The CTC window opens with the node setup selection window for the selected node. The CTP window becomes inactive.

**Step 30** In the node setup selection window for the selected node, choose the node to be provisioned. Click **OK**.

**Step 31** On the Node Setup for *node name* page, choose one or more of the following:

- Node/Shelves Layout—Choose to preprovision the slots when no DWDM cards are installed. The slots are preprovisioned in each shelf in CTC for the cards defined in the network plan. (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.
- Passive Units—Choose to preprovisions the passive units.
- Card Parameters—Check this check box to provision 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, GE\_XP, 10GE\_XP, GE\_XPE, and 10GE\_XPE cards—Provisions the card mode.
- Pluggable Port Modules—Check this check box to allow 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—Check this check box to allow creation of internal patchcords among cards provisioned in the node.
- Optical Sides—Check this check box to allow the provisioning of optical sides.

- **ANS Parameters**—Check this check box to install 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 so on.
- **Select All**—Check this check box to select all the options.
- **Skip Interactive Mode**—Check this check box to enable CTC to provision all the chosen setup components automatically without displaying the results after each step.
- **Save Installation Files (XML and log) On Node**—Check this check box to enable CTC to save the XML and log files on the node.

**Step 32** Click **OK**. The NE Update wizard appears. If you chose **Skip Interactive Mode** in *Step 31*, continue with *Step 33*. If not, the wizard page that appears depends on the options chosen in *Step 31*. The below table describes the NE Update wizard options.

**Table 15: NE Update Wizard Options**

| NE Update Function     | Action  |
|------------------------|---|
| Node/Shelves Layout    | <p>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. If the cards and slots match, click <b>Apply</b>. If not, click <b>Cancel</b> 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 <b>Next</b> and repeat this step for each shelf at the site.</p> <p>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.</p> <ol style="list-style-type: none"> <li>1 Click <b>Cancel</b>, then click <b>Yes</b> in the confirmation dialog box. The slot preprovisioning does not revert when you click <b>Cancel</b>.</li> <li>2 If a physical card is installed, remove it from the shelf.</li> <li>3 Perform one of the following steps: <ul style="list-style-type: none"> <li>• Delete all the preprovisioned slots.</li> <li>• Delete the slot where the Slot Not Empty error occurred. Provision the slot manually, then repeat <i>Steps 31 and 32</i> making sure to uncheck the Provision Node Layout option in <i>Step 33</i>.</li> </ul> </li> </ol> <p><b>Note</b> 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.</p> |
| Passive Units Layout   | <ol style="list-style-type: none"> <li>1 Review the passive unit settings.</li> <li>2 Click <b>Apply</b>.</li> <li>3 Click <b>Next</b>.</li> </ol>  |
| Pluggable Port Modules | <ol style="list-style-type: none"> <li>1 Review the PPM settings for each TXP, MXP, GE_XP, 10GE_XP, GE_XPE, 10GE_XPE, and OTU2_XP card.</li> <li>2 Click <b>Apply</b>.</li> <li>3 Click <b>Next</b>.</li> </ol>   |

| NE Update Function                            | Action  |
|---|---|
| Card Parameters                               | <ol style="list-style-type: none"> <li>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.</li> <li>2 Click <b>Apply</b>.</li> <li>3 Click <b>Next</b>.</li> </ol>   |
| Internal Patchcords                           | <ol style="list-style-type: none"> <li>1 Review the internal patchcords.</li> <li>2 Click <b>Apply</b>.</li> <li>3 Click <b>Next</b>.</li> </ol>  |
| Optical Sides                                 | <ol style="list-style-type: none"> <li>1 Review the optical side assignments.</li> <li>2 Click <b>Apply</b>.</li> <li>3 Click <b>Next</b>.</li> </ol>   |
| ANS Parameters                                | <ol style="list-style-type: none"> <li>1 Review the ANS parameters on the left half of the page.</li> <li>2 Click <b>Apply</b>. 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.</li> </ol> |
| Select All                                    | If checked, selects all the options.  |
| Skip Interactive Mode                         | If checked, CTC provisions all the chosen setup components automatically without displaying the results after each step.  |
| Save Installation Files (XML and log) On Node | If checked, CTC saves the XML and log files on the node.  |

**Step 33** Click **Finish**, then click **OK** in the Wizard Complete confirmation dialog box. The confirmation box indicates whether importing the NE Update Configuration file to the node was completed successfully.

**Note** Common control cards are not provisioned by CTP. Common control cards are not provisioned by CTP.

**Note** From release 10.1 onwards, CTP supports import of Span length and Span loss, and DCU.

## Limitations

The following limitations apply when CTP imports and exports node parameters of the network:

- Imports or exports node parameter data from the network element running Software Release 9.1 and later releases.
- Prompts to create a default rack layout when importing individual shelf configuration.

- Fails to import the internal patch cord connections in correctly if they are not provisioned completely in CTC.
- Fails to export omnidirectional and colorless properties of an optical side.
- Fails to export PSM unit data.
- Requires passive units like Mux/Demux units to be provisioned in CTC before importing the node parameters into CTP.
- Imports passive units like DCU only if the initial provisioning is made using the NeUpdate.XML file generated by CTP.
- Sets 10G-LAN-PHY as the default service rate for incomplete OCHNC circuits while the wavelength and path are forced appropriately.
- Defaults protection for OCHNC circuits to Unprotected. If there is a working and protected trail for the same demand, each will be a separate point-to-point demand.
- Displays any demands on muxponder cards as a single demand and aggregation is not visible.

The following limitations apply to Split ROADM:

- Supports hardware only till release 9.8.
- Supports only Fiber Switch Protection.
- Does not support import of dangling transponders/transponder only shelves.
- Does not support import of OCH-NC, OCHNC-DCN, STS/VCAT/VLAN/Partial circuits.
- Does not support Split ROADM nodes.
- Does not support attenuators.
- Does not support TNC/OTS/TXP/MXP port forcing.
- Does not support import of FLD-OSC based sites.
- Does not support Omni/Colorless/Remote Spur.
- Does not support OSMINE/Insulator.
- Does not support import of Shelf Management, Node protection, Regeneration, Fan tray, AC/DC power supply.
- Limitations in importing Optical/ANS parameters.

## Split ROADM

CTP supports node splitting. The ROADM node can be configured to have separate Network Elements for different Line Sides (Per-side NE). Split Node feature is available only for the below configurations:

- Line > ROADM > 80WXC
- Multi-degree > OXC > 80WXC MESH-PP-4
- Multi-degree > OXC > 80WXC MESH-PP-8
- Line > ROADM > SMR-1

When a node is split, each line side becomes a separate NE. TXPs/MXPs associated with specific side are placed under the specific NE side. TXPs/MXPs associated with multiple sides (multi-trunk, Y-cable, Fiber-Switched) are placed under a separate non co-located NE called as “Common NE”.

So, on applying node split on an N-degree site, CTP converts it into N separate Per-Side NEs with an optional Common NE (if needed).

A split node scenario is described in the following steps.

### Procedure

- 
- Step 1** Release upgrade the network to Release 10.1 or a later release and modify network (if required) except node-split.
  - Step 2** Go to the network tasks pane on the right side and click Copy to take a backup copy of the network (modified) created in Step 1.
  - Step 3** Node splitting can be done at any time (before and after analysis). For splitting a node before analysis go to Step 4. For splitting a node after analysis go to Step 6.
  - Step 4** To enable node splitting at the network level (all sites), check the node split check box in the network properties pane and analyze the network. The (s) next to the site indicates that the specific site is split.
  - Step 5** Or, to enable node splitting in a specific site, click on the site and check the node split check box in the site properties pane. To force the functionality and type parameters, see [Modifying Site Properties, on page 342](#).
  - Step 6** To enable node splitting at the network level (all sites), right-click on the network and select the Split Node option. Or, to enable node splitting in a specific site, right-click on the required site and select the node split option.
  - Step 7** During the analysis, the Split Roadm IP dialog box appears displaying the sites in which node split has been enabled.
  - Step 8** Expand each site to enter the IP address for each NE (optional). To assign the IP addresses at a later time, click Cancel. After analysis, expand the site in the project explorer and enter the IP addresses for each NE.
  - Step 9** To export the NeUpdate.xml file, click the NE Update link on the reports pane. To export the circuits in the XML, check mark the export circuit flag option in the “Network Element Update File” Dialog Box.
  - Step 10** To view the NE IDs, double-click on the layout. Each NE is colored differently.
  - Step 11** For protected cards (for example, Y - cable) and multi- trunk cards (for example, OTU2-XP), a common NE is created and the cards are moved to this common NE. The following table describes the card positions for various Protection cards.

**Table 16: Card Positions for Protection Cards**

| Protection Schemes | TXP/MXP position      | Common Card/Module Position |
|--------------------|-----------------------|-----------------------------|
| Unprotected        | Corresponding Side NE | -                           |
| Client 1+1         | Corresponding Side NE | -                           |
| Y-Cable            | Common NE             | Common NE (Y-Cable module)  |
| Fiber Switched     | Common NE             | -                           |



**Step 12** To view the common NE IDs, double-click on the layout. The common NE ID is displayed.

**Step 13** To view the Virtual PP-Mesh Unit IDs, click on the PP-MESH Unit in layout.

**Note** Virtual PP Mesh units are created to interconnect different NEs. These are visible only in the NeUpdate file.

The following tables display the ports for virtual PP Mesh 4 and virtual PP Mesh 8.

**Table 17: Ports for Virtual PP Mesh 4**

| VPASSIVE_1_PPMESH4 |               | VPASSIVE_2_PPMESH4 |               | VPASSIVE_3_PPMESH4 |               | VPASSIVE_4_PPMESH4 |               |
|--------------------|---------------|--------------------|---------------|--------------------|---------------|--------------------|---------------|
| 1                  | COM-RX<br>A   | 1                  | COM-RX<br>B   | 1                  | COM-RX<br>C   | 1                  | COM-RX<br>D   |
| 2                  | EXP-TX<br>A-1 | 2                  | EXP-TX<br>B-1 | 2                  | EXP-TX<br>C-1 | 2                  | EXP-TX<br>D-1 |
| 3                  | EXP-TX<br>A-2 | 3                  | EXP-TX<br>B-2 | 3                  | EXP-TX<br>C-2 | 3                  | EXP-TX<br>D-2 |
| 4                  | EXP-TX<br>A-3 | 4                  | EXP-TX<br>B-3 | 4                  | EXP-TX<br>C-3 | 4                  | EXP-TX<br>D-3 |
| 5                  | EXP-TX<br>A-4 | 5                  | EXP-TX<br>B-4 | 5                  | EXP-TX<br>C-4 | 5                  | EXP-TX<br>D-4 |
| 6                  | VEXP-RX-2     | 6                  | VEXP-RX-1     | 6                  | VEXP-RX-1     | 6                  | VEXP-RX-1     |
| 7                  | VEXP-TX-2     | 7                  | VEXP-TX-1     | 7                  | VEXP-TX-1     | 7                  | VEXP-TX-1     |
| 8                  | VEXP-RX-3     | 8                  | VEXP-RX-3     | 8                  | VEXP-RX-2     | 8                  | VEXP-RX-2     |
| 9                  | VEXP-TX-3     | 9                  | VEXP-TX-3     | 9                  | VEXP-TX-2     | 9                  | VEXP-TX-2     |
| 10                 | VEXP-RX-4     | 10                 | VEXP-RX-4     | 10                 | VEXP-RX-4     | 10                 | VEXP-RX-3     |
| 11                 | VEXP-TX-4     | 11                 | VEXP-TX-4     | 11                 | VEXP-TX-4     | 11                 | VEXP-TX-3     |

**Table 18: Ports for Virtual PP Mesh 8 (1 to 4)**

| VPASSIVE_1_PPMESH8 |               | VPASSIVE_2_PPMESH8 |               | VPASSIVE_3_PPMESH8 |               | VPASSIVE_4_PPMESH8 |               |
|--------------------|---------------|--------------------|---------------|--------------------|---------------|--------------------|---------------|
| 1                  | COM-RX<br>A   | 1                  | COM-RX<br>B   | 1                  | COM-RX<br>C   | 1                  | COM-RX<br>D   |
| 2                  | EXP-TX<br>A-1 | 2                  | EXP-TX<br>B-1 | 2                  | EXP-TX<br>C-1 | 2                  | EXP-TX<br>D-1 |
| 3                  | EXP-TX<br>A-2 | 3                  | EXP-TX<br>B-2 | 3                  | EXP-TX<br>C-2 | 3                  | EXP-TX<br>D-2 |

| VPASSIVE_1_PPMESH8 |               | VPASSIVE_2_PPMESH8 |               | VPASSIVE_3_PPMESH8 |               | VPASSIVE_4_PPMESH8 |               |
|--------------------|---------------|--------------------|---------------|--------------------|---------------|--------------------|---------------|
| 4                  | EXP-TX<br>A-3 | 4                  | EXP-TX<br>B-3 | 4                  | EXP-TX<br>C-3 | 4                  | EXP-TX<br>D-3 |
| 5                  | EXP-TX<br>A-4 | 5                  | EXP-TX<br>B-4 | 5                  | EXP-TX<br>C-4 | 5                  | EXP-TX<br>D-4 |
| 6                  | EXP-TX<br>A-5 | 6                  | EXP-TX<br>B-5 | 6                  | EXP-TX<br>C-5 | 6                  | EXP-TX<br>D-5 |
| 7                  | EXP-TX<br>A-6 | 7                  | EXP-TX<br>B-6 | 7                  | EXP-TX<br>C-6 | 7                  | EXP-TX<br>D-6 |
| 8                  | EXP-TX<br>A-7 | 8                  | EXP-TX<br>B-7 | 8                  | EXP-TX<br>C-7 | 8                  | EXP-TX<br>D-7 |
| 9                  | EXP-TX<br>A-8 | 9                  | EXP-TX<br>B-8 | 9                  | EXP-TX<br>C-8 | 9                  | EXP-TX<br>D-8 |
| 10                 | VEXP-RX-2     | 10                 | VEXP-RX-1     | 10                 | VEXP-RX-1     | 10                 | VEXP-RX-1     |
| 11                 | VEXP-TX-2     | 11                 | VEXP-TX-1     | 11                 | VEXP-TX-1     | 11                 | VEXP-TX-1     |
| 12                 | VEXP-RX-3     | 12                 | VEXP-RX-3     | 12                 | VEXP-RX-2     | 12                 | VEXP-RX-2     |
| 13                 | VEXP-TX-3     | 13                 | VEXP-TX-3     | 13                 | VEXP-TX-2     | 13                 | VEXP-TX-2     |
| 14                 | VEXP-RX-4     | 14                 | VEXP-RX-4     | 14                 | VEXP-RX-4     | 14                 | VEXP-RX-3     |
| 15                 | VEXP-TX-4     | 15                 | VEXP-TX-4     | 15                 | VEXP-TX-4     | 15                 | VEXP-TX-3     |
| 16                 | VEXP-RX-5     | 16                 | VEXP-RX-5     | 16                 | VEXP-RX-5     | 16                 | VEXP-RX-5     |
| 17                 | VEXP-TX-5     | 17                 | VEXP-TX-5     | 17                 | VEXP-TX-5     | 17                 | VEXP-TX-5     |
| 18                 | VEXP-RX-6     | 18                 | VEXP-RX-6     | 18                 | VEXP-RX-6     | 18                 | VEXP-RX-6     |
| 19                 | VEXP-TX-6     | 19                 | VEXP-TX-6     | 19                 | VEXP-TX-6     | 19                 | VEXP-TX-6     |
| 20                 | VEXP-RX-7     | 20                 | VEXP-RX-7     | 20                 | VEXP-RX-7     | 20                 | VEXP-RX-7     |
| 21                 | VEXP-TX-7     | 21                 | VEXP-TX-7     | 21                 | VEXP-TX-7     | 21                 | VEXP-TX-7     |
| 22                 | VEXP-RX-8     | 22                 | VEXP-RX-8     | 22                 | VEXP-RX-8     | 22                 | VEXP-RX-8     |
| 23                 | VEXP-TX-8     | 23                 | VEXP-TX-8     | 23                 | VEXP-TX-8     | 23                 | VEXP-TX-8     |

Table 19: Ports for Virtual PP Mesh 8 (5 to 8)

| VPASSIVE_5_PPMESH8 |            | VPASSIVE_6_PPMESH8 |            | VPASSIVE_7_PPMESH8 |            | VPASSIVE_8_PPMESH8 |            |
|--------------------|------------|--------------------|------------|--------------------|------------|--------------------|------------|
| 1                  | COM-RX E   | 1                  | COM-RX F   | 1                  | COM-RX G   | 1                  | COM-RX H   |
| 2                  | EXP-TX E-1 | 2                  | EXP-TX F-1 | 2                  | EXP-TX G-1 | 2                  | EXP-TX H-1 |
| 3                  | EXP-TX E-2 | 3                  | EXP-TX F-2 | 3                  | EXP-TX G-2 | 3                  | EXP-TX H-2 |
| 4                  | EXP-TX E-3 | 4                  | EXP-TX F-3 | 4                  | EXP-TX G-3 | 4                  | EXP-TX H-3 |
| 5                  | EXP-TX E-4 | 5                  | EXP-TX F-4 | 5                  | EXP-TX G-4 | 5                  | EXP-TX H-4 |
| 6                  | EXP-TX E-5 | 6                  | EXP-TX F-5 | 6                  | EXP-TX G-5 | 6                  | EXP-TX H-5 |
| 7                  | EXP-TX E-6 | 7                  | EXP-TX F-6 | 7                  | EXP-TX G-6 | 7                  | EXP-TX H-6 |
| 8                  | EXP-TX E-7 | 8                  | EXP-TX F-7 | 8                  | EXP-TX G-7 | 8                  | EXP-TX H-7 |
| 9                  | EXP-TX E-8 | 9                  | EXP-TX F-8 | 9                  | EXP-TX G-8 | 9                  | EXP-TX H-8 |
| 10                 | VEXP-RX-1  | 10                 | VEXP-RX-1  | 10                 | VEXP-RX-1  | 10                 | VEXP-RX-1  |
| 11                 | VEXP-TX-1  | 11                 | VEXP-TX-1  | 11                 | VEXP-TX-1  | 11                 | VEXP-TX-1  |
| 12                 | VEXP-RX-2  | 12                 | VEXP-RX-2  | 12                 | VEXP-RX-2  | 12                 | VEXP-RX-2  |
| 13                 | VEXP-TX-2  | 13                 | VEXP-TX-2  | 13                 | VEXP-TX-2  | 13                 | VEXP-TX-2  |
| 14                 | VEXP-RX-3  | 14                 | VEXP-RX-3  | 14                 | VEXP-RX-3  | 14                 | VEXP-RX-3  |
| 15                 | VEXP-TX-3  | 15                 | VEXP-TX-3  | 15                 | VEXP-TX-3  | 15                 | VEXP-TX-3  |
| 16                 | VEXP-RX-4  | 16                 | VEXP-RX-4  | 16                 | VEXP-RX-4  | 16                 | VEXP-RX-4  |
| 17                 | VEXP-TX-4  | 17                 | VEXP-TX-4  | 17                 | VEXP-TX-4  | 17                 | VEXP-TX-4  |
| 18                 | VEXP-RX-6  | 18                 | VEXP-RX-5  | 18                 | VEXP-RX-5  | 18                 | VEXP-RX-5  |
| 19                 | VEXP-TX-6  | 19                 | VEXP-TX-5  | 19                 | VEXP-TX-5  | 19                 | VEXP-TX-5  |

| VPASSIVE_5_PPMESH8 |           | VPASSIVE_6_PPMESH8 |           | VPASSIVE_7_PPMESH8 |           | VPASSIVE_8_PPMESH8 |           |
|--------------------|-----------|--------------------|-----------|--------------------|-----------|--------------------|-----------|
| 20                 | VEXP-RX-7 | 20                 | VEXP-RX-7 | 20                 | VEXP-RX-6 | 20                 | VEXP-RX-6 |
| 21                 | VEXP-TX-7 | 21                 | VEXP-TX-7 | 21                 | VEXP-TX-6 | 21                 | VEXP-TX-6 |
| 22                 | VEXP-RX-8 | 22                 | VEXP-RX-8 | 22                 | VEXP-RX-8 | 22                 | VEXP-RX-7 |
| 23                 | VEXP-TX-8 | 23                 | VEXP-TX-8 | 23                 | VEXP-TX-8 | 23                 | VEXP-TX-7 |

**Step 14** Before un-splitting a node, take a backup copy of the Split Node. To unsplit the nodes in a site after analysis, right-click on the site and select UnSplit. This can be performed in the project explorer pane also. When a node is unsplit:

- Per-side NEs are combined to single NE and reflected in site navigation and net view.
- Common NE is removed.
- Layout is unlocked.
- Unit IDs/MSM IDs are regenerated for the combined layout.
- Reserved Virtual-PPMesh unit IDs are removed.
- IP addresses are removed.

To unsplit or split multiple sites, select the sites and perform the required action.

## Limitations

The following limitations apply to Split ROADM for this release:

- No support for splitting of site having omnidirectional sides and/or colorless ports.
- No support for creating OCH-CC circuits for Ethernet aggregate and TDM aggregate demands. Creating OCH-NC circuits is recommended.
- No support for creating OCH-CC circuits with alien/line/pluggable cards. Creating OCH-NC circuits is recommended.
- No support for exporting PSM-OCH protected circuits in NeUpdate XML.
- No support for circuit regenerating on a split node. Delete such circuits before splitting the node to avoid invalid reports.
- No support for circuit having optical bypass on a split node. Delete such circuits before splitting the node to avoid invalid reports.
- Information related to PPC and virtual PP-MESH is available only in NeUpdate XML file.
- PPM port types are not available in NeUpdate XML for the following cards. Creating OCH-NC circuits is recommended.

- 40E-TXP-C
  - 40G-TXP-C
  - MXP\_MR\_10DMEX\_C
  - MXP\_2.5G\_10EX\_C
  - TXP\_MR\_10EX\_C
  - ADM\_10G
  - MXP\_MR\_10DME
  - TXP\_MR\_10E\_y
  - MXP\_2.5G\_10E\_y
  - TXP\_MR\_10E
  - 40G DWDM ITU-T MXP
  - 40G DWDM ITU-T TXP
  - MXP\_MR\_2.5G
  - MXPP\_MR\_2.5G
  - 530 MR MXP
  - 530 MR TXP
  - TXP\_MR\_10E
  - MXP\_2.5G\_10E
  - 530 MR TXP/MXP
  - TXP\_MR\_2.5G
  - TXPP\_MR\_2.5G
  - TXP\_MR\_10G
  - MXP\_2.5G\_10G
  - 15454-10GE-XPE
  - 15454-10GE-XP
  - 15454-GE-XPE
  - 15454-GE-XP
  - 15454-40EX-TXP-C
  - 15454-40G-TXP-C
- Virtual PP-MESH Unit IDs are not editable.
  - Merging two side NEs is not recommended.
  - All circuits originating or terminating from the same transponder/muxponder cards should be OCH-NC or OCH-CC or OCH-NCDCN.

- Circuits are exported in NeUpdate XML only if at least one of the nodes is split and the circuit is originating/terminating or expressing through the split node.

## Flex SMR with Inline DCU

The embedded amplifiers of the Flex SMR-9 and SMR-20 units, introduced in CTP 10.5, do not support DCUs. When 10G optical channels pass through the Flex SMR-9 or SMR-20 cards, you can use inline DCUs to provide the required chromatic dispersion compensation. An inline DCU provides chromatic dispersion compensation before a signal enters the node. You can either use a single inline DCU or cascade two inline DCUs for a higher chromatic dispersion compensation.



**Note** In CTP 10.6.1, inline DCU is supported only on SMR-9 and SMR-20 cards of Release 10.5.

To use an inline DCU along with an SMR-9 or SMR-20 card, use the following procedure:

### Procedure

- Step 1** Create a demand using the Point to Point Demand Creation wizard.
- Step 2** Complete any one of the following:
  - In the **Project Explorer pane**, right-click the site you want to modify and select **Edit**.
  - In the **NetView Name** tab, double-click the site icon.
  - In the **NetView Name** tab, right-click the site icon and select **Edit**.

The Site Edit dialog box appears.
- Step 3** From the **Structure** drop-down list, choose Terminal, Line, or Multidegree.
- Step 4** From the **Node** drop-down list, choose Flex NG-DWDM.
- Step 5** From the **Functionality** drop-down list, choose one of the following:
  - R-OADM or Gain Equalizer (for Line)
  - ROADM (for Terminal)
  - OXC (for Multidegree)
- Step 6** From the **Type** drop-down list, choose SMR-9, SMR-20, or Auto.
- Step 7** Click **Apply** and **OK**.
- Step 8** Click C-Band Amplifiers in the **Project Explorer pane**.
- Step 9** For C-Band Amplifiers, check the **Enable Inline DCU** check box in the **General** area of the **Properties** pane to use an inline DCU along with an SMR-9 or SMR-20 card.
- Step 10** For C-Band Amplifiers, choose an inline DCU from the **Inline DCU** drop-down list in the **From Fibre** area of the **Properties** pane. The different options are:
  - Auto—Sets the default option
  - None—No inline DCU

- DCU-100—Provides compensation level of 100 ps/nm
- DCU-350—Provides compensation level of 350 ps/nm
- DCU-450—Provides compensation level of 450 ps/nm
- DCU-550—Provides compensation level of 550 ps/nm
- DCU-750—Provides compensation level of 750 ps/nm
- DCU-950—Provides compensation level of 950 ps/nm
- DCU-1150—Provides compensation level of 1150 ps/nm
- DCU-1350—Provides compensation level of 1350 ps/nm
- DCU-1550—Provides compensation level of 1550 ps/nm
- DCU-1950—Provides compensation level of 1950 ps/nm

If you want a higher chromatic dispersion compensation, you can choose a second inline DCU from the **Inline DCU2** drop-down list. In this case, both DCUs are cascaded.

**Step 11** Click the **Analyze Network** icon in the toolbar. The Cisco Transport Planner analysis status bar indicates the completion of the network analysis. The Summary report appears.

- Click the Optical Results Report to view the Residual CD, which is the total dispersion value of the circuit.
- Click the site and click Layout in the **Tasks** pane to view the graphical representation of the layout for the single site in the analyzed network. You can view the selected DCU unit in the layout.
- Click Bill of Material in the **Tasks** pane to view the product ID and cost of the chosen inline DCU.

---

## Connection Verification

Connection Verification validates the correct optical interconnection between the optical cards inside a Flex ROADM. This feature also measures the insertion loss of the external passive path, validates the quality of the connections to the patch panel, and checks if the insertion loss is within expected value..

The SMR-20 FS CV cards provide the connection verification feature along with the passive modules MF-DEG-5-CV, MF-UPG-4-CV, and MF-M16LC-CV.

The highlights of this feature are:

- Validation of the SMR20 FS CV card connection with other nodes or local Add/Drop elements.
- Detection of any incorrect cabling of the ROADM network element.
- Collection of insertion losses of every possible optical path inside the network element, in order to predict any possible failure.
- Verification of the connection every six hours, by default.

To enable the connection verification feature on the network, use the following procedure:

### Procedure

---

- Step 1** In the Project Explorer pane, click the required network or site.
- Step 2** Check the **Connection Verification** check box in the **Bill of Material** area of the **Properties** pane.
- 

## Connection Verification Prerequisites

Following are the prerequisites for connection verification:

- Flex nodes must be present.
- Loopback caps must be installed on all the unused ports of the passive modules.
- At least one SMR20 FS CV card must be present in the node.
- All sides of the node must have a SMR20 FS CV card to test all cables and patchcords.
- All passive modules must be connected with an USB cable and associated so that power readings can be calculated.

### Supported Cards

The cards that support connection verification are:

- 16-AD-FS
- SMR20 FS CV
- MF-DEG-5-CV
- MF-MPO-16LC-CV
- MF-UPG-4-CV





## Viewing Network Reports

Cisco Transport Planner provides the reports listed in Report Availability table. Report availability depends on whether a network has been analyzed or whether it is in the Install or Upgrade state. Reports are also available by site. See Report Availability table in Types of Reports section for report availability details.

- [Types of Reports, page 135](#)
- [Viewing Reports, page 136](#)

## Types of Reports

The various reports available are listed in the table below.

**Table 20: Report Availability**

| Report                  | Network Availability           | Site Availability              |
|-------------------------|--------------------------------|--------------------------------|
| NE Update               | Analyzed                       | —                              |
| Installation Parameters | Analyzed                       | Analyzed                       |
| Traffic Matrix          | Analyzed                       | Analyzed                       |
| Layout                  | Install, Upgrade, and Analyzed | Install, Upgrade, and Analyzed |
| Link Availability       | Analyzed                       | Analyzed                       |
| Internal Connections    | Analyzed                       | —                              |
| Optical Results         | Analyzed                       | Analyzed                       |
| Wavelength Routing      | Analyzed                       | —                              |
| Summary                 | Install, Upgrade, and Analyzed | Install, Upgrade, and Analyzed |
| Bill of Material        | Install, Upgrade, and Analyzed | Install, Upgrade, and Analyzed |

| Report                        | Network Availability | Site Availability |
|-------------------------------|----------------------|-------------------|
| Ethernet Aggregated Demand    | Analyzed             | —                 |
| TDM Aggregated Demand         | Analyzed             | —                 |
| Any-to-Any Finalized Circuits | Analyzed             | Analyzed          |

For more information on the Bill of Materials report, see the [Viewing a BoM](#) section. In addition, you can compare the following reports using the Reports Diff tool: Bill of Material, Internal Connections, and Installation Parameters.

To complete the procedures in this section, you must have a project open and the network(s) loaded. See the [Opening a Project](#) section and the [Loading and Unloading Networks](#) section.

## Viewing Reports

The following procedures use the **Tasks** pane to access reports. You can also access reports by clicking the desired report in the Reports folder in the **Project Explorer** pane.

### Viewing the Summary Report

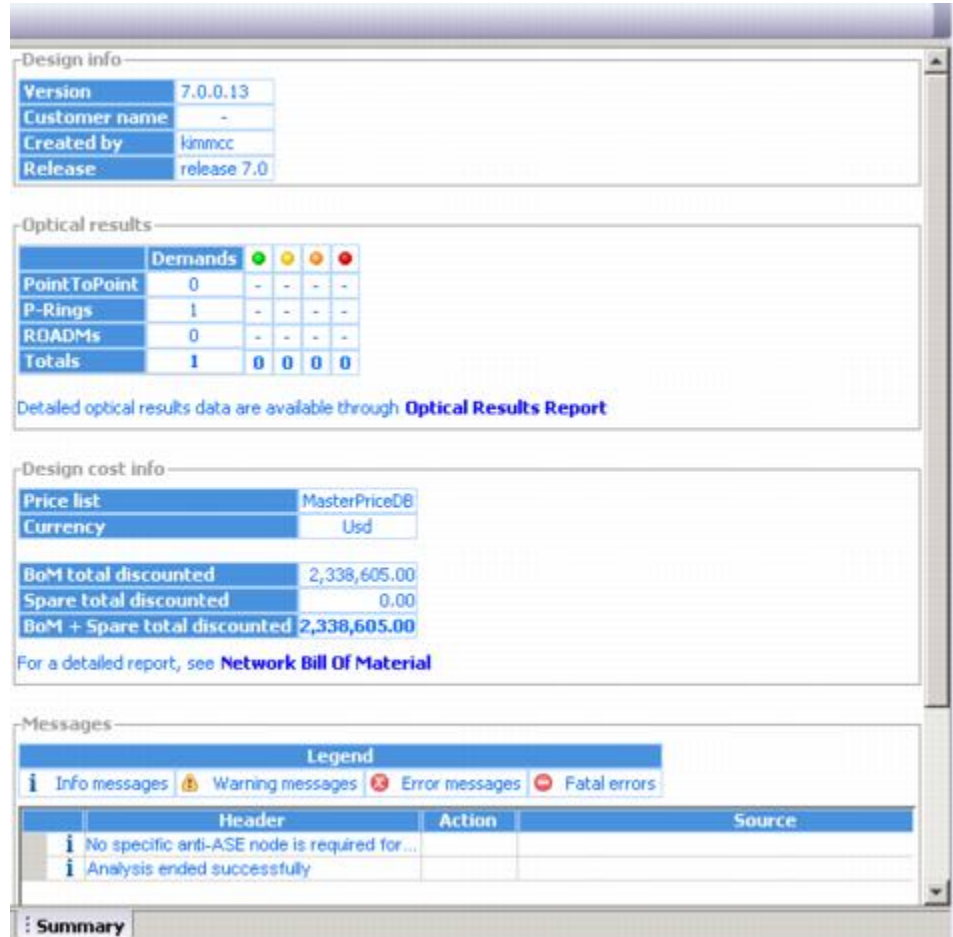
The Summary report summarizes design information, optical results, design cost, and analyzer messages. You can view it before or after you analyze a network. It automatically appears when you analyze a network. Use the following procedure to view the report at another time:

#### Procedure

- 
- Step 1** Complete one of the following:
- To view the Summary report for a network, click the **Mgmt Tree** tab and click the network.
  - To view the Summary report for a site, click the **NtView Name** tab and click the site.

**Step 2** In the **Tasks** pane, click **Summary**. The Summary tab appears.

**Figure 19: Summary Tab**



The following table lists the categories in the **Summary** tab and their descriptions.

**Table 21: Summary Tab Categories**

| Category    | Description  |
|-------------|--|
| Design info | <p>Displays the following information:</p> <ul style="list-style-type: none"> <li>Version—Displays the Cisco Transport Planner software release version.</li> <li>Customer name—Displays the name of the customer requiring this network design.</li> <li>Created By—Displays the user login name.</li> <li>Release—Displays the Cisco Transport Planner software release number.</li> </ul> |

| Category         | Description  |
|------------------|--|
| Optical results  | Indicates how many demands are included in the network, and identifies the number and severity of alarms for each demand.  |
| Design cost info | Displays the following information: <ul style="list-style-type: none"> <li>• Price list—Displays the price list used.</li> <li>• Currency—Displays the currency selected for the price list.</li> <li>• BoM total discounted—Displays the total price of the products (excluding spare parts) in the network with the discount applied.</li> <li>• Spare total discounted—Displays the total price of the spare parts in the network with the discount applied</li> <li>• BoM + Spare total discounted—Displays the total price of the products (including spare parts) in the network with the discount applied.</li> </ul> |
| Messages         | Displays any analyzer messages that occurred as a result of network analysis. Warning and error messages will help you identify problems with your current design. For a list of all system messages, see <a href="#">Troubleshooting</a>  |

## Saving the NE Update File

After Cisco Transport Planner completes network analysis, you can create a configuration file. If the Optical Networking System (ONS) Software Release is 7.0 or a later release, a single XML file is created including all the automatic node setup (ANS) parameters for all the sites in the network. If you have chosen the Per Side Installation Parameter option in the [Editing Network Parameters](#) task, the installation parameters will include information about each side of the site. This file can be directly imported to a site using the NE Update feature in the Cisco Transport Planner (CTP), which uses this file to preprovision a node.

The configuration file is named as NeUpdate.xml by default. The list of reported installation parameters depend on the system release selected for the designed network. You generally save this file after you analyze an installed network.

Use the following procedure to save the NE Update file:

## Procedure

---

- Step 1** Click the **Mgmt Tree** tab and click the analyzed network.
- Step 2** In the **Tasks** pane, click **NE Update**. The **Network Element Update File** dialog box appears.
- Step 3** (Only for ONS Software Release 9.4 and 9.6) Check the Per Side Installation Parameter check box in the Properties pane to include the side information of the sites in the NE Update XML file.
- Step 4** To save the file in a different directory than the Destination Folder, click **Change** and navigate to the desired directory. Click Save.
- Step 5** Click **Finish**.
- Step 6** Click Cancel to close the window without saving the configuration setup file.
- 

## Viewing the Installation Parameters

The Installation Parameters reports shows the values to be set (provisioned) at installation time on each site in the network. These parameters are grouped under the network elements (NE) that are created after network analysis. These parameters are exported when you save the NE Update file and are used to automatically provision a node using CTC.

The NE Update file provides details of the parameters used to provision the passive units. The passive units are individually identified using the unit ID. The unit ID starts from 1 and gets incremented with the list of passive units present in that particular NE.

Passive units are optical devices that the controller card cannot manage and that are not configurable using software. The passive units that are provisioned in the ANP are:

- DCU units
- 15216-MD-40-ODD
- 15216-MD-40-EVEN
- 15216-EF-40-ODD
- 15216-EF-40-EVEN
- 15216-MD-48-ODD
- 15216-MD-48-EVEN
- PP-MESH-4/PP-MESH-8
- 15454-PP-4-SMR patch panel



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**Note** CTP lists the passive units in Release 9.1 and later releases.

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**Note** CTP allows you to change the Unit ID of any unit. For information on changing the unit ID, see Step 5 in the [Viewing the Layout of Single Site](#) section.

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Use the following procedure to view the installation parameters after a network has been analyzed:

### Procedure

**Step 1** Complete one of the following:

- To view the Installation Parameters report for a network, click the **Mgmt Tree** tab and click the network.
- To view the Installation Parameters report for a site, click the **NtView Name** tab and click the site.

**Step 2** In the **Tasks** pane, click **Installation Parameters**. The **Installation Parameters** tab appears. The ANS view subtab appears by default. This tab displays the Automatic Node Setup information.

**Note** If a particular side does not have any demand and does not have traffic passing through that side, the ANS parameters related to that side will not be displayed in the Installation Parameters report. The NE Update XML file (in ANS tab) does not display any parameters of that side. When a side has a fiber connected, but has no demand passing through it, then the summary report displays an error stating that the installation parameters for that particular side cannot be generated. For additional information on the summary report refer to the [Viewing the Summary Report](#) section. The warning and error messages help you identify problems with your current design. For a list of all system messages, see [Troubleshooting](#).

The table below describes the columns on the ANS view tab of the Installation Parameters report.

**Table 22: Installation Parameters Report ANS View Tab Columns**

| Column           | Description   |
|------------------|---|
| Name             | Displays the name of the site.  |
| Side             | Displays the node interface.  |
| Position         | Displays the rack, shelf number (MSM Shelf ID), and slot position of the card where the patchcord originates. |
| Unit             | Displays the name of the card.  |
| Port #           | Displays the port number where the patchcord originates.  |
| Port ID          | Displays the port ID.   |
| Port Label       | Displays the name of the port.  |
| Parameter        | Displays the name of the parameter to be set, such as RX Power Low.   |
| Value            | Displays the name of the value to be set.   |
| Measurement Unit | Displays the measurement unit for the related installation parameter value, such as dBm.                      |

| Column     | Description  |
|------------|--|
| Manual Set | Indicates with a Yes or No which parameters must be manually set using the CTC interface. This column only applies to alarms. It does not apply to threshold crossing alerts (TCAs). |

- Step 3** Click the **ANP view** tab to view the Automatic Node Provisioning information. The table below describes the columns on the ANP view tab of the Installation Parameters report.

**Table 23: Installation Parameters Report ANP View Tab**

| Category       | Description   |
|----------------|---|
| Name           | Displays the name of the site.  |
| Unit ID        | Displays the unit (slot number) of the passive units in the shelf.<br><b>Note</b> The unit ID is not displayed for the active units.                        |
| Shelf ID       | Displays the shelf identifier.<br><b>Note</b> The Shelf ID displays the MSM shelf ID for an MSM configuration.  |
| Rack number    | Displays the rack number.   |
| Rack position  | Identifies the rack position in the shelf.  |
| Slot position  | Identifies the slot position in the shelf for the card.   |
| Equipment type | Displays the card type.<br><b>Note</b> The Equipment type lists the Fine TDCU (F TDCU) or Coarse TDCU (C TDCU) units, with the corresponding slot position. |
| Description    | Displays the details of the card type.  |

- Step 4** Click the **PP view** tab to view the Provisioning Parameters information. The table below describes the columns on the PP view tab of the Installation Parameters report.

**Table 24: Installation Parameters Report PP View Tab**

| Column  | Description                                      |
|---------|--|
| Name    | Displays the name of the site.                   |
| Unit ID | Displays the unit of the provisioning parameter. |

| Column        | Description   |
|---------------|---|
| Shelf ID      | Displays the shelf identifier.  |
| Slot position | Displays the slot number for the card with the PPM.   |
| Port position | Displays the port number.   |
| Ppm position  | Displays the PPM location on the card.  |
| Parameter     | Displays the name of the PPM.<br><b>Note</b> The TDCU compensation parameter and the corresponding wavelength value is displayed. |
| Value         | Displays the installation parameter value.<br><b>Note</b> The TDCU wavelength value is displayed.                                 |

**Step 5** To close the Installation Parameters report, click the **X** on the top right of the **Installation Parameters** tab.

## Viewing Internal Connections

Use the following procedure to view the network internal connections after a network has been analyzed.

Use this procedure to view patchcord connections related to optical amplifiers, optical filter units, connections with client interface units, transponders, line cards, pluggables, Multi-Shelf Management (MSM), and passive inventory units.

### Procedure

**Step 1** Click the **Mgmt Tree** tab, and click the analyzed network.

**Step 2** In the **Tasks** pane, click **Internal Connections**. The **Internal Connections** tab appears.

**Step 3** The **Internal Connections** tab has the following three options:

- Patchcord Installation—To view all the patchcord connections that the installer has to mechanically cable within the site between the different ports of the cards.
- SW Provisioning—To view the patchcord representation on the local CTC interface. This subtab contains all the connections to be manually set or removed with respect to the default connections that are automatically generated by the software running on the node. This view has the following sections:
  - To Be Manually Set—These patchcord connection are manually set by using the CTC local craft.
  - Automatically Set—These patchcord connections are set automatically on the site by the system software.
  - To Be Removed—These patchcord connections are automatically set on the node and must be manually removed by using the CTC.



- **MSM Connections**—To view patchcord connections related to multi-shelf management and passive inventory.

**Step 4** Click **Patchcord Installation**, **SW Provisioning** or **MSM Connections**.

The table below lists the columns in the Internal Connections Details window and their descriptions. Click a column to sort the table information by that column.

**Table 25: Internal Connections Tab Columns**

| Column Name  | Description   |
|--------------|---|
| Name         | Displays the name of the site. On the SW provisioning view subtab, this column indicates whether the connection should be manually set using the CTC interface or removed. In the MSM Connections tab this column indicates the name of the cable used in the connection. |
| Unit Type-1  | (MSM Connections subtab only) Displays the source unit. The source unit can be MS 100T card, Shelf Ethernet switch or an M6 chassis.  |
| Position-1   | Displays the rack, shelf, and slot position of the card from which the patchcord originates. In the MSM Connections subtab, this displays the position of the source unit.  |
| Unit-1       | Displays the name of the card.  |
| Port Num     | (SW provisioning view subtab only) Displays the port number where the patchcord terminates.   |
| Port ID-1    | (SW provisioning view subtab only) Displays the port ID.  |
| Id-1         | (MSM Connections subtab only) Displays the source unit ID.  |
| Port label-1 | Displays the name of the port. In the MSM Connections subtab this displays the name of the port from which the cable is connected.  |
| W/P          | Displays whether the port is a working or a protected port.   |
| Attenuator   | When indicated, this is the product ID of the bulk attenuator to be equipped on this connection. It also reports when an internal attenuator must be placed between the DC-TX and DC-RX ports on the preamplifier (when no DCU is equipped).                              |

| Column Name  | Description  |
|--------------|--|
| Unit Type-2  | (MSM Connections subtab only) Displays the destination unit. The destination unit can be MS 100T card, Shelf Ethernet switch or an M6 chassis.                             |
| Position-2   | Displays the rack, shelf, and slot position of the card where the patchcord terminates. In the MSM Connections subtab, this displays the position of the destination unit. |
| Unit-2       | Displays the name of the card.   |
| Port Num     | (SW provisioning view subtab only) Displays the port number where the patchcord terminates.  |
| Port ID-2    | (SW provisioning view subtab only) Displays the port ID.   |
| Id-2         | (MSM Connections subtab only) Displays the destination unit ID.  |
| Port Label-2 | Displays the name of the port. In the MSM Connections subtab this displays the name of the port to which the cable is connected.   |
| P/F          | Displays whether the connection relates to a present or forecast circuit.  |

**Step 5** To export the information to an external file, click **Export**. In the **Internal Connections Export** dialog box, type the name of the file and navigate to the desired folder. Click **Save**.

**Step 6** To close the Internal Connections tab, click the **X** in the upper right corner of the tab.

## Viewing the Traffic Matrix Report

The Traffic Matrix report displays the point-to-point, P-ring, ROADM, and aggregated demand channel data in the form of service, Och-CC, trail, and section information (see Report Details for a Point-to-Point Demand

figure and Report Details for a P-Ring Demand figure). The Och-CC row displays the circuit details from the source client card to the destination client card and does not include the regeneration points, if any.

**Figure 20: Report Details for a Point-to-Point Demand**

| Unprotected |        |       |         | 1+1/Y-Cable |          |       |         | Fiber-Switched |          |         |         |
|-------------|--------|-------|---------|-------------|----------|-------|---------|----------------|----------|---------|---------|
| Service     |        |       |         | Service     |          |       |         | Service        |          |         |         |
| +           | Och-CC |       |         | +           | Och-CC-W |       |         | +              | Och-CC-W |         |         |
|             | +      | Trail |         |             | +        | Trail |         |                | +        | Trail-W |         |
|             |        | +     | Section |             |          | +     | Section |                |          | +       | Section |
|             |        |       |         | +           | Och-CC-P |       |         | +              | Trail-P  |         |         |
|             |        |       |         |             | +        | Trail |         |                | +        | Section |         |
|             |        |       |         |             |          | +     | Section |                |          |         |         |

**Figure 21: Report Details for a P-Ring Demand**

| P-Ring  |        |       |           |
|---------|--------|-------|-----------|
| Service |        |       |           |
|         | Och-CC |       |           |
|         | +      | Trail |           |
|         |        | +     | Section 1 |
|         |        | +     | Section 2 |
|         | +      | Trail |           |
|         |        | +     | Section   |
|         | +      | Trail |           |
|         |        | +     | Section   |

Use the following procedure to view the traffic matrix report:

**Procedure**

- 
- Step 1** Complete one of the following tasks:
    - To view the Traffic Matrix report for a network, click the **Mgmt Tree** tab and click the network.
    - To view the Traffic Matrix report for a site, click the **NtView name** tab and click the site.
  
  - Step 2** In the **Tasks** pane under Reports, click **Traffic Matrix**. The Traffic Matrix tab appears. A default query opens.
 

**Note** To add a column to the report, right-click a column and choose the column name from the shortcut menu. The column names with checks in the shortcut menu appear on the report. To remove a column, right-click and choose the column (checked) from the shortcut menu.

Table 26: Traffic Matrix Tab Columns

| Column Label     | Description  |
|------------------|--|
| Demand           | Categorizes each demand type (Point-to-Point, P-ring, and ROADM). Each demand is further categorized into service, trails, and sections. Click the plus (+) sign by a demand type to expand and show the optical channels. |
| Section          | Displays the sections under every service.   |
| Src Site         | Displays the site name for the optical channel source.   |
| Src Position     | Displays the rack, shelf ID, and slot identifiers for the source of the optical channel. The format of the field is <i>Rack.Shelf.Slot..</i>   |
| Src Card         | Displays the unit name for the optical channel source.   |
| Src Client Port  | Displays the port for the source of the optical channel; for example, 1-RX.  |
| Src Client PPM   | Displays the pluggable port modules for the source port; for example ONS-XC-10G-S1.  |
| Src Trunk Port   | Displays the trunk port for the source of the optical channel; for example, DWDM-TX.   |
| Src Trunk PPM    | Displays the pluggable port module for the trunk port.   |
| Src Card OpMode  | Displays the source card operating mode; for example, for the OTU2_XP card, the mode is TxpMode or RegenMode.  |
| Src T/C OpMode   | Displays the trunk or client operating mode.   |
| A/D Src Position | Displays the rack, shelf, and slot identifiers for the source of the add/drop channel. The format of the field is <i>Rack.Shelf.Slot.</i>  |
| A/D Src Unit     | Displays the unit name for the add/drop channel source   |
| A/D Src Port     | Displays the port for the source of the add/drop channel   |
| Src Colorless    | Displays if the section is colorless capable at the source side.   |

| Column Label     | Description  |
|------------------|--|
| Src Omni-dir     | Displays the label of the omnidirectional side that the section uses from the source side of the demand. If the section does not use any omnidirectional side from the source side, then it displays None. |
| Dst Site         | Displays the site name for the optical channel destination.  |
| Dst Position     | Displays the rack, shelf ID, and slot identifiers for the destination of the optical channel. The format of the field is <i>Rack.Shelf.Slot</i> .  |
| Dst Card         | Displays the unit name for the optical channel destination.  |
| Dst Client Port  | Displays the port for the destination of the optical channel; for example, 1-TX.   |
| Dst Client PPM   | Displays the pluggable port modules for the destination port.  |
| Dst Trunk Port   | Displays the trunk port for the source of the optical channel; for example, DWDM-TX.   |
| Dst Trunk PPM    | Displays the pluggable port module for the trunk port.   |
| Dst Card OpMode  | Displays the source card operating mode; for example, for the OTU-XP card, the mode is TxpMode or RegenMode.   |
| Dst T/C OpMode   | Displays the trunk or client operating mode.   |
| A/D Dst Position | Displays the rack, shelf, and slot identifiers for the destination of the add/drop channel. The format of the field is <i>Rack.Shelf.Slot</i> .  |
| A/D Dst Unit     | Displays the unit name for the add/drop channel source.  |
| A/D Dst Port     | Displays the port for the destination of the add/drop channel.   |
| Dst Colorless    | Displays if the section is colorless capable at the destination side.  |

| Column Label                | Description  |
|-----------------------------|--|
| Dst Omni-dir                | Displays the label of the omnidirectional side that the section uses from the destination side of the demand. If the section does not use any omnidirectional side from the destination side, then it displays None.                             |
| Cl. Serv. Type              | Displays the client service type of the demand; for example, OC-48.  |
| Opt Bypass                  | Identifies where the optical channel is dropped and reinserted when it is not terminated on a TXP or MXP card (optical bypass). If "none" appears in the Op Bypass column, no optical bypass is defined for the optical channel.                 |
| Protection Type             | Displays the protection type of the demand; for example, P-ring or Y-cable.  |
| Wavelength (Wavelength No.) | Displays the wavelength value of the optical channel. Also, displays the serial number of the wavelength in the wavelength band. The alphabet "e" besides the wavelength serial number represents that it is an "even" wavelength in the C-band. |
| Latency                     | Displays the latency time for the current OCH-CC circuit. This value includes all the latency components for the OCH-CC circuit, including fiber and DWDM units on the path.   |

- Step 3** To create a new query, click New Query to open the Query Dialog box (see the following figure). The Query Dialog box allows you to filter the optical results using a variety of parameters and templates.



- Step 4** To perform a query using individual parameters, select the desired parameters from the drop-down lists in the Query Definition area. The selected parameters appear in the Query Preview area at the bottom of the screen. The following table describes the fields in the Query Dialog box.

**Table 27: Query Dialog Fields**

| Field Label    | Description   |
|----------------|---|
| Traffic Root   | Allows you to filter the report to include only the data for the selected level. You can query up to the service level.   |
| Clients & PPMs | Allows you to filter the report to include the data for the selected cards or PPM.  |
| Sites          | Allows you to filter the report to include only the results of incoming and outgoing services to or from a specific site. |
| Subnets        | Allows you to filter the report to include only the results of services in the selected subnet.                           |
| Wavelength     | Allows you to filter the report to include only services using the specified wavelength.                                  |
| Alarm          | Allows you to filter the report to include only services flagged with a green, yellow, orange, or red indicator.          |
| P/F            | Allows you to filter the report to include only present services, only forecast services, or both.                        |
| Virtual        | Allows you to filter the report to include or exclude virtual channels in the Optical Results table.                      |

**Step 5** Complete one of the following tasks, as needed:

- Click Run Query. The window closes, and the query results appear in the Traffic Matrix tab. The parameters of the query appear in the horizontal area just below the button bar.
- Click Reset Query to clear your selections in the Query Dialog box.
- Click Close to close the window without running a query.

**Step 6** To close the Traffic Matrix report, click the **X** in the upper right corner of the tab.

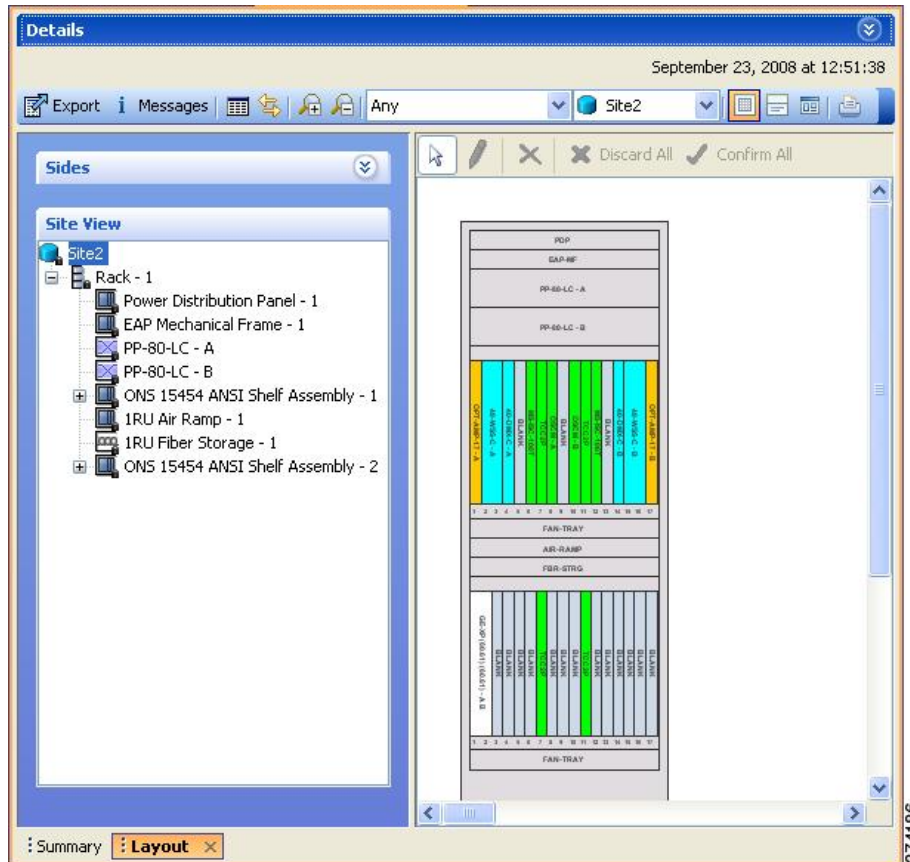
## Viewing the Layout of Single Site

Use the following procedure to view a graphical representation of the layout for a single site in an analyzed network. Additionally, you can modify the MSM Shelf ID for Multi Shelf Management Configuration.

## Procedure

- Step 1** In the Project Explorer pane, click the **NetView Name** tab and click the desired site.
- Step 2** In the **Tasks** pane, click **Layout**. The Layout tab appears, as shown in the figure below. To change sites, choose the desired site from the drop-down list.

**Figure 22: Layout Report**



- Step 3** From the **Site** drop-down list, double-click the site in the network to display in the layout report.
- Step 4** In the Site view in the left pane, right-click a rack and choose **Expand** to view a list of all shelves and cards in the rack.
- Note** Alien shelves are displayed only in the layout reports.
- Step 5** To modify the unit ID of any unit:
- 1 Double-click the unit. The Details dialog box appears.
  - 2 Update the unit ID and press Enter.

CTP allows you to set the same unit ID for PP mesh across all the sites (maximum value is 96). To do this, go to Step 6. Else, go to Step 7.



**Step 6** To change the unit ID of the PP mesh:

- 1 Double-click any PP mesh unit. The Details dialog box appears.
- 2 Update the unit ID as required (for example, 1) and press Enter. The PPMesh Unit ID Conflict dialog box appears indicating that if there is an identical unit ID in any other unit, then a swapping will take place.
- 3 Click Yes to proceed. The PPMesh unit ID All Sites dialog box appears.
- 4 To apply the swapping in all sites, click Yes. The PPMesh Report dialog box appears.
- 5 To view the report summarizing all the unit ID changes, click Yes.

**Step 7** To modify the ANSI/ETSI MSM Shelf ID configuration:

- 1 Double-click the shelf assembly. The Details dialog box appears.
- 2 Update the MSM Shelf ID and click Enter.

**Note** The valid values of shelf IDs range from 1 to 50 for Multi Shelf Integrated or External Switch with M6 as node controller, M12 as node controller with TCC3 card, and M15 as node controller with TNCS/TNCS-O .. The valid values of shelf IDs range from 1 to 30 for Multi Shelf Integrated or External Switch with M12 as node controller with TCC2P card.

- 3 Close the Details dialog box.

The MSM shelf ID is updated in the Layout report, Traffic Matrix report, Installation parameters report, and the NE Update file.

**Note** For the MSM Shelf ID to be updated across all the reports, ensure you close and reopen all the reports.

**Note** You can modify the MSM Shelf ID if you have selected the Shelf Management Type as either Multi Shelf Integrated Switch or Multi Shelf External Switch.

**Step 8** Click the desired rack or shelf to view it in the layout graphic.

**Step 9** To view details about a card, double-click the card. The **Details** dialog box opens with client information:

- Product ID—Displays the product ID of the card.
- Service Category—Future use.
- Description—Provides a brief description of the card functionality.
- Price—Lists the price for the card based on the price list selected during project creation.
- ITU Channel—Identifies the ITU channel wavelength for the card.

For transponder and muxponder cards, click the **Ports** subtab in the Details dialog box to view which pluggable port modules are to be used for each TXP/MXP unit:

- Type—Displays the type of pluggable port module.
- P/F—P refers to pluggable port modules that support the present client demand, while F refers to pluggable port modules that support the future client demand.
- PID—Displays the pluggable port module product ID.
- Wavelength—Displays the wavelength value.
- Rate—Displays the capacity of the port at the node. It is equal to or greater than the sum of the size of the circuits assigned to the port.

- Reach—Displays the reach value.
- Service1—Lists all the client services assigned to the particular port.
- Encryption—Displays whether the traffic is encrypted or not.

**Step 10** Click **Close** to close the **Details** dialog box.

**Step 11** To filter the layout display, choose one of the following from the drop-down list:

- All—Displays all cards for both the present and forecast traffic demand.
- Present—Displays cards for only the present traffic demand.
- Locked & Unlocked—Highlights the locked and unlocked cards in the layout.
- Alarmed—Highlights the alarmed cards in the layout.

**Step 12** After network analysis, all items are in locked mode. To unlock cards so that Cisco Transport Planner can rearrange the layout to optimize slot usage during network analysis, right-click locked card in the rack tree and choose **Unlock**.

**Note** You can unlock only on Upgrade networks in the Design state.

**Step 13** To export the graphical representation of the layout in JPEG format, click **Export**. In the Layout export dialog box, type the name of the file and navigate to the desired folder. Click **Save**. If you want to export the layout report for multiple sites, see [Exporting the Layout Report for Multiple Sites](#), on page 152.

**Step 14** To zoom the layout graphic in or out, click the Zoom In and Zoom Out icons. For more information about the Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361.

**Step 15** To close the Layout report, click the **X** in the upper right corner of the tab.

---

## Exporting the Layout Report for Multiple Sites

Use the following procedure to export the layout report of multiple sites in an analyzed network:

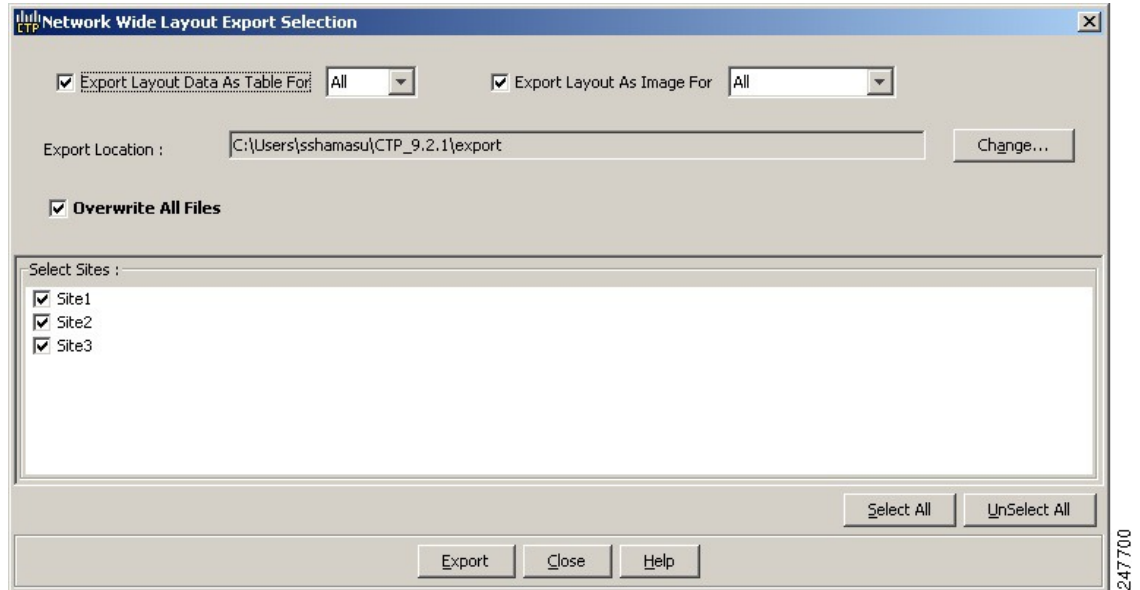
### Procedure

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**Step 1** In the **Project Explorer** pane, navigate to the Reports folder and click **Layout**. In the Details window, click the **Network Wide Layout Export** button.

The Network Wide Layout Export Selection dialog box opens. (See the following figure).

**Figure 23: Network Wide Layout Export Selection**



**Step 2** In the **Network Wide Layout Export Selection** dialog box, complete the following:

- **Export Layout Data As Table For**—Select to export the layout report of the selected sites in .xls format. Select the options from the drop-down list:

- **All**—Exports the layout report of the present and forecasted equipments of a site.
- **Present**— Exports the layout report of the equipments present in a site.

The .xls file lists the following information:

- The different cards used and slots where the cards are placed.
  - Maximum and average power consumption of the equipment.
  - Unit weights of the equipment.
- **Export Layout As Images For**—Select to export the layout report of the selected sites in JPEG format. The .jpg file provides a graphical representation of the site layout. Select the options from the drop-down list:
    - **All**—Exports the layout report of the present and forecasted equipments of a site.
    - **Present**—Exports the layout of the equipments present in a site.
    - **Locked and Unlocked**—Exports the layout of the equipments (in JPEG format) that are locked and/or unlocked in a site. Additionally, the layout report provides links of the cards or shelves movement.
    - **Alarmed** — Exports the report of the equipments that has alarms.

- Export Location—Specify the filename and the desired folder to save the export data.
- Overwrite All Files— Overwrites the existing exported reports.
- Select Sites— Select the sites to fetch the report.

**Step 3** Click **Export**. The Network Wide Layout Summary window opens. The summary page displays the location where the exported files are available for the selected sites.

**Note** The layout report of the sites are saved as separate files (.jpg and .xls) with the site label as the file name.

## Viewing Power Consumption from the Layout Report

Use the following procedure to view the power consumption for each unit of equipment in a site. Power consumption is available in report form from the Layout report.

### Procedure

- Step 1** Click the **NtView Name** tab and click the desired site.
- Step 2** In the **Tasks** pane, click **Layout**. The **Layout** tab appears (See Layout Report dialog-box in Viewing the Layout of Single Site section). To change sites, choose the desired site from the drop-down list.
- Step 3** Click the View layout as table icon in the report tool bar. The Layout Table report appears. The table below describes the information in the columns of the Layout Table report.

**Table 28: Layout Table (Power Consumption) Columns**

| Column Label              | Description   |
|---------------------------|---|
| Name                      | Lists the equipment at the site.  |
| Position                  | Identifies the rack, shelf, or slot location for applicable units of equipment.   |
| Description               | Describes each equipment type.  |
| Max Power Consumption (W) | Displays the maximum power consumption for each unit of equipment.<br><br><b>Note</b> For transponder/muxponder cards with pluggable port modules, the maximum power consumption shown is for the board fully equipped with the maximum number of pluggable port modules. |

| Column Label                  | Description  |
|-------------------------------|--|
| Average Power Consumption (W) | Displays the average power consumption for applicable units of equipment.<br><br><b>Note</b> For transponder/muxponder cards with pluggable port modules, the average power consumption shown is for the board fully equipped with the maximum number of pluggable port modules. |
| Unit Weights (kg/lb)          | Displays the weight of all the units of a site in kilograms in a ETSI network and in pounds in an ANSI network.  |

**Step 4** To export power consumption data, click **Export**. The **Layout Table Export** dialog box appears. Enter the name of the file and navigate to the desired folder. Click **Save**.

**Step 5** Click **Close** to close the Layout Table report.

## Viewing the Link Availability Report

Cisco Transport Planner determines link availability based on unit failure rate and time to repair. Use the following procedure to view the Link Availability report:

### Procedure

**Step 1** Complete one of the following:

- To view the Link Availability report for a network, click the **Mgmt Tree** tab and click the network.
- To view the Link Availability report for a site, click the **NtView Name** tab and click the site.

**Step 2** In the **Tasks** pane, click **Link Availability**. The Link Availability tab appears. Each row in the tab shows the performance of one optical path. The below table describes the information in the columns.

**Table 29: Link Availability Tab Columns**

| Column Label  | Description   |
|---------------|---|
| Group         | Categorizes each demand type (Point-to-Point, P-ring, and ROADM). Click the plus (+) sign by a demand type to expand and show the optical channels. |
| Serv. Circuit | Displays the optical channel label; for example, Site1-Site2.   |

| Column Label                   | Description  |
|--------------------------------|--|
| P/F                            | Identifies whether the channel is present and forecast (P/F) or forecast (F).  |
| DWDM Card Type                 | Identifies the type of transponder or line card used for the optical channel.  |
| Protection                     | Displays the protection type of the demand; for example, P-ring or Y-cable.  |
| Cl. Serv. Type                 | Displays the client service type of the demand; for example, OC-48.  |
| Source                         | Displays the site name for the optical channel source.   |
| Destination                    | Displays the site name for the optical channel destination.  |
| Link Availability (% Complete) | Displays the link availability percentage. Link availability is calculated based on the failure rate and time to repair. |

**Step 3** Click New Query to open the Query Dialog (See Query Dialog image in Viewing the Traffic Matrix Report section). The Query Dialog allows you to filter the link availability using a variety of parameters.

**Step 4** To perform a query using individual parameters, select the desired parameters from the drop-down lists in the Query Definition area. The selected parameters appear in the Query Preview area at the bottom of the screen. The below table describes the fields in the Query Dialog.

**Table 30: Query Dialog Fields**

| Field Label    | Description   |
|----------------|---|
| Traffic Root   | Allows you to filter the report to include only the data for the selected level. You can query up to the service level.   |
| Clients & PPMs | Allows you to filter the report to include the data for the selected cards or PPM.  |
| Sites          | Allows you to filter the report to include only the results of incoming and outgoing services to or from a specific site. |
| Subnets        | Allows you to filter the report to include only the results of services in the selected subnet.                           |
| Wavelength     | Allows you to filter the report to include only services using the specified wavelength.                                  |

| Field Label | Description  |
|-------------|--|
| Alarm       | Allows you to filter the report to include only services flagged with a green, yellow, orange, or red indicator. |
| P/F         | Allows you to filter the report to include only present services, only forecast services, or both.               |
| Virtual     | Allows you to filter the report to include or exclude virtual channels in the Optical Results table.             |

**Step 5** Choose one of the following, as needed:

- Click Run Query. The window closes, and the query results appear in the Link Availability tab. The parameters of the query appear in the horizontal area just below the button bar.
- Click Reset Query to clear your selections in the Query Dialog.
- Click Close to close the window without running a query.

**Step 6** To close the Link Availability report, click the **X** in the upper right corner of the tab.

## Viewing Optical Results

Use the following procedure to view the optical results of the network that you created and analyzed:

### Procedure

**Step 1** Complete one of the following:

- To view the Optical Results report for a network, click the **Mgmt Tree** tab and click Optical Results under Reports in the Project Explorer pane.
- To view the Optical Results report for a site, click the **NtView Name** tab and right click on the site and select Optical Results in the drop down menu.

**Step 2** In the **Tasks** pane, click **Optical Results**. The Optical Results tab appears. Each row in the tab shows the performance of one optical path. The following table describes the information in the columns.

**Table 31: Optical Results Tab Columns**

| Column Label | Description  |
|--------------|--|
| Name         | Displays the identification number automatically given to each path in the order that the channels were entered into the design. |

| Column Label              | Description  |
|---------------------------|--|
| Srv Demand                | Identifies the demand group for the optical channel.   |
| Protect                   | Displays the protection type of the channel. For a protected channel, both paths are shown. The path leaving the east side of the source is shown first.   |
| SOL                       | Displays the results summary of the analysis run with Start of Life fiber loss values. The indicator shows the optical performance for the each direction of the bidirectional OCH Trail. Green indicates success, yellow indicates success with a marginal failure risk (between 0 and 16 percent), orange indicates that the channel has a higher risk of failure (between 16 and 50 percent), and red indicates failure.  |
| EOL                       | Displays the results summary of the analysis run with End of Life fiber loss values. The indicator shows the optical performance for the each direction of the bidirectional Optical Channel Trail (OCH Trail). The indicator shows the optical performance for the path at the end of the fiber's life. Green indicates success, yellow indicates success with a marginal failure risk (between 0 and 16 percent), orange indicates that the channel has a higher risk of failure (between 16 and 50 percent), and red indicates failure. |
| SE                        | Indicates a system-related error exists that may impact the analysis of the design.<br><br>If the indicator is red, review the messages reported at the end of the analysis or determine which units or sites are having a problem.  |
| Regeneration              | Displays potential intermediate sites where a regeneration of the optical signal can be carried out, if necessary.   |
| Single-channel NLE Status | Displays the status of the single channel nonlinear effect (NLE) alarm check. Green indicates check passed. Yellow indicates marginal NLE; orange indicates consistent NLE, and red indicates failure.   |
| Multi-channel NLE Status  | Displays the status of the multiple channel NLE alarm check. Green indicates check passed. Yellow indicates marginal NLE; orange indicates consistent NLE, and red indicates failure.  |
| Wavelength                | Displays the assigned wavelength of the optical path.  |



| Column Label                | Description  |
|-----------------------------|--|
| Wavelength (Wavelength No.) | Displays the wavelength value of the optical channel. Also, displays the serial number of the wavelength in the wavelength band. The alphabet "e" besides the wavelength serial number represents that it is an "even" wavelength in the C-band. |
| P/F                         | Displays the present/forecast services indication.   |
| Source                      | Displays the name of the source site and side; for example, Site 1-E.  |
| Src Colorless               | Displays if the section is colorless capable at the source side.   |
| Src Omni-dir                | Displays the label of the omnidirectional side that the section uses from the source side of the demand. If the section does not use any omnidirectional side from the source side, then it displays None.                                       |
| Destination                 | Displays the name of the destination site and side; for example, Site 1-E.   |
| Dst Colorless               | Displays if the section is colorless capable at the destination side.  |
| Dst Omni-dir                | Displays the label of the omnidirectional side that the section uses from the destination side of the demand. If the section does not use any omnidirectional side from the destination side, then it displays None.                             |
| Span (km)                   | Displays the total span length (source -> destination) for this path in kilometers.  |
| Src Tx Type                 | Displays the type of DWDM unit or pluggable port module used at the source of the specific OCH Trail. The class of the DWDM unit is also displayed.  |
| Dst Tx Type                 | Displays the type of DWDM unit or pluggable port module used at the destination of the specific OCH Trail. The class of the DWDM unit is also displayed.   |
| BER target                  | Displays the bit error rate (BER) target for this channel based on the capability of the channel's optical interface. It is 1.0E-15 for the interfaces using forward error correction (FEC) and 1.0E-12 for interfaces without FEC.              |

| Column Label          | Description  |
|-----------------------|--|
| SOL OSNR (dB)         | Displays the start of life average OSNR value at the receiver. OSNR refers to the selected resolution bandwidth (RBW) bandwidth.   |
| EOL OSNR (dB)         | Displays the end of life average OSNR value at the receiver. OSNR refers to the selected RBW bandwidth.  |
| SOL OSNR Margin (dB)  | Displays the SOL OSNR margin calculation, which is the difference between the OSNR value at a certain power of the working point of the receiver client and the working area boundary.   |
| EOL OSNR Margin (dB)  | Displays the EOL OSNR margin calculation, which is the difference between the OSNR value at a certain power of the working point of the receiver client and the working area boundary.   |
| SOL RX (dBm)          | Displays the SOL received average power at the destination site in dBm.  |
| EOL RX (dBm)          | Displays the EOL received average power at the destination site in dBm.  |
| SOL Power margin (dB) | Displays the SOL power budget margin at the receiver in decibels. It is defined as the offset between the receiver working point and the BER curve with margin. A positive value indicates no power problems.  |
| EOL Power margin (dB) | Displays the EOL power budget margin at the receiver in decibels. It is defined as the offset between the receiver working point and the BER curve with margin. A positive value indicates no power problems.  |
| SOL Overload (dB)     | Displays the SOL overload margin at the receiver in decibels. A positive value indicates no overload problems.   |
| EOL Overload (dB)     | Displays the EOL overload margin at the receiver in decibels. A positive value indicates no overload problems.   |
| Residual CD [ps/nm]   | Displays the total dispersion value of the circuit. This total is the difference between the sum of CD robustness of the source and destination transponders, and the sum of fiber dispersion and dispersion compensation due to DCU units in the circuit. |

| Column Label          | Description  |
|-----------------------|--|
| CD Robustness [ps/nm] | Displays the chromatic dispersion robustness of the receiver.  |
| RX atten              | Displays the attenuation at the input of the receiver.   |
| TX atten              | Displays the attenuation at the output of the receiver.  |
| OSNR Penalties        | Displays the Linear and Nonlinear penalties seen on demand for OSNR. Select the OSNR Penalties option from the right menu of the Optical Results dashboard to see this column.   |
| POWER Penalties       | Displays the Linear and Nonlinear penalties seen on demand for Power. Select the POWER Penalties option from the right menu of the Optical Results dashboard to see this column.   |
| PMD (ps)              | Displays the calculated total PMD for each circuit. This total includes all the PMD components for the OCH Trail, including fiber and DWDM units on the path. If the overall PMD for the link overcomes the maximum allowed, the PMD value is colored red. The maximum allowed value depends on the client interface. For these special cases, the network must be manually resolved by contacting a Cisco optical sales engineer. |
| Min GB[GHz]           | Displays the minimum Guard Band (GB) requirement between channels on the 40G CP-DQPSK MXP and 40G CP-DQPSK ME MXP cards and other transponders in a mixed Any-to-Any connectivity.   |
| Filtering Penalty     | Displays the value of the penalties caused by the different filter types (OADM, ROADM, and arrayed waveguide grating [AWG]).   |

- Step 3** Click New Query to open the Query Dialog (See Query Dialog figure in Viewing the Traffic Matrix Report section). The Query Dialog allows you to filter the optical results using a variety of parameters.
- Step 4** To perform a query using individual parameters, select the desired parameters from the drop-down lists in the Query Definition area. The selected parameters appear in the Query Preview area at the bottom of the screen. The following table describes the fields in the Query Dialog.

**Table 32: Query Dialog Fields**

| Field Label    | Description  |
|----------------|--|
| Traffic Root   | Allows you to filter the report to include only the data for the selected level. You can query upto the service level. |
| Clients & PPMs | Allows you to filter the report to include the data for the selected cards or PPM                                      |
| Sites          | Allows you to filter the report to include only the results of incoming/outgoing services to or from a specific site.  |
| Subnets        | Allows you to filter the report to include only the results of services in the selected subnet.                        |
| Wavelength     | Allows you to filter the report to include only services using the specified wavelength.                               |
| Alarm          | Allows you to filter the report to include only services flagged with a green, yellow, orange, or red indicator.       |
| P/F            | Allows you to filter the report to include only present services, only forecast services, or both.                     |
| Virtual        | Allows you to filter the report to include or exclude virtual channels in the Optical Results Table.                   |

**Step 5** Choose one of the following tasks, as needed:

- Click Run Query. The window closes, and the query results appear in the Optical Results tab. The parameters of the query appear in the horizontal area just below the button bar.
- Click Reset Query to clear your selections in the Query Dialog.
- Click Close to close the window without running a query.

**Step 6** To close the Optical Results report, click the **X** in the upper-right corner of the tab.

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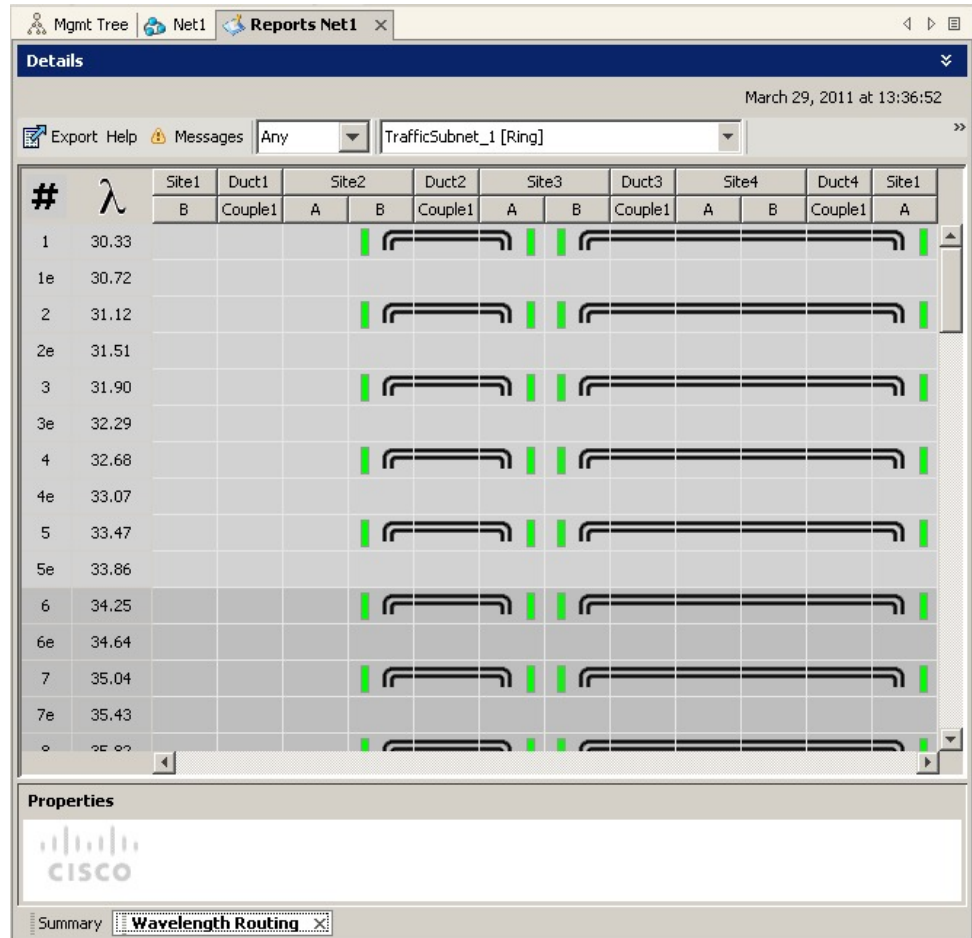
## Viewing Wavelength Routing

Use the following procedure to view the wavelength routing map for the network that was analyzed:

**Procedure**

- Step 1** Click the **Networks Mgmt Tree** tab, and click the analyzed network.
  - Step 2** In the **Tasks** pane, click **Wavelength Routing**. The Wavelength Routing tab appears. Each wavelength supported by the platform is represented by a row.
- Note** ROADM (Any-to-Any) demands are not shown in this report.

**Figure 24: Wavelength Routing Tab**



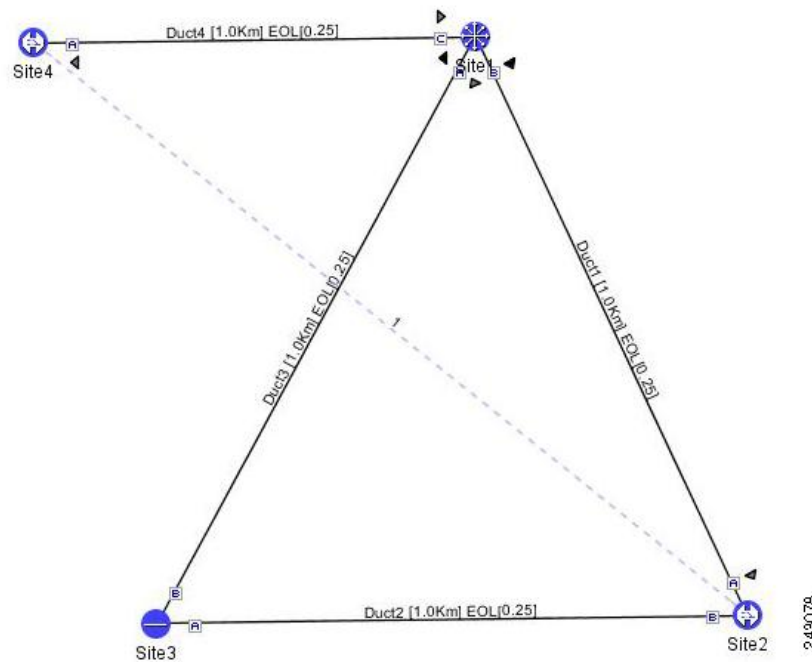
- Step 3** Choose one of the following from the Messages drop-down list:
  - **Any** (to view both forecast and present routing)  
When you select Any, forecast demands are shown with a grey background.
  - **Present** (to view only the present routing).
  - **Forecast** (to view only the forecast routing).

**Step 4** To view the routing map for a particular linear or ring subnet, expand the Traffic subnet ALL option in the traffic subnet drop-down list and choose the subnet.

**Note** In addition to the existing subnets, a linear subnet is created for every demand. Choosing a linear subnet from the Traffic Subnet ALL option displays the routing map for that particular demand only. You cannot view the routing maps for all the demands across subnets at the same time. You can view the routing map for any of the point-to-point demands by selecting it from the drop-down list.




**Note** The two ends of the circuit are indicated by the add/drop source and destination sites. See Circuit Icons in a Routing Map table.









**Figure 25: Point-to-point Demand**



The following table lists and explains the circuit icons present in the routing map:

**Table 33: Circuit Icons in a Routing Map**

| Component   | Description  |
|---|--|
|  | Indicates channel a add/drop source or destination site. |
|  | Indicates channel a add/drop source or destination site. |
|  | Indicates an express site.                               |

| Component   | Description   |
|---|---|
|    | Indicates alarms.   |
|    | Indicates the side of the site through which the demand exits the subnet. For example, in Point-to-point Demand figure, a point-to-point demand is created from site 2 to site 4. The demand exits the subnet at site 1 on side C. To view the complete circuit, select the linear subnet from the traffic subnet drop-down list. |
|    | Indicates the regeneration site.  |
|    | Indicates an omnidirectional side.  |
|    | Indicates the omnidirectional side of a regeneration site where the demand terminates.  |
|    | Indicates an omnidirectional demand.  |
|  | Indicates a colorless demand.   |
|  | Indicates a colorless omnidirectional demand.   |
|  | Indicates an optical bypass site.   |

The following table describes the columns in the Wavelength routing tab.

**Table 34: Wavelength Routing Tab Columns**

| Column Label | Description  |
|--------------|--|
| #            | Displays the serial number of the wavelength in the wavelength band. The alphabet “e” besides the wavelength serial number represents that it is an “even” wavelength in the C-band. |
| λ            | Lists the wavelengths supported by the platform.   |

| Column Label               | Description   |
|----------------------------|---|
| Site #                     | Represents a site in the network. The colors in the Site columns indicate for each side of the site the SOL/EOL channel status. <ul style="list-style-type: none"> <li>• Green indicates success.</li> <li>• Yellow indicates success with a marginal failure risk (between 0 and 16 percent).</li> <li>• Orange indicates that the channel has a higher risk of failure (between 16 and 50 percent)</li> <li>• Red indicates failure.</li> </ul> |
| Duct #                     | Represents a duct in the network.   |
| A                          | Represents a Terminal or a Terminal+ site.  |
| A and B                    | Represents a Line or Line+ site.  |
| A, B, C, and D             | Represents a multidegree site with PP-MESH-4.   |
| A, B, C, D, E, F, G, and H | Represents a multidegree site with PP-MESH-8.   |
| Couple                     | Represents a pair of fibers at a site.  |

**Note** Tool tips are available on this report. Move the cursor over a Site column for circuit information, card name, and product ID. Move the cursor over a Duct/Couple column for loss, length, and fiber type.

**Step 5** To export the graphical representation of the layout in JPEG format, click **Export**. In the Wavelength Routing export dialog box, type the name of the file and navigate to the desired folder. Click **Save**.

**Step 6** To close the Wavelength Routing report, click the **X** in the upper-right corner of the window.

## Viewing the Ethernet Aggregated Demand Report

Use the following procedure to view the Ethernet Aggregated Demand report:

### Procedure

**Step 1** Click the Mgmt Tree tab and right-click the analyzed network.

**Step 2** Choose Ethernet Aggregated Demand from the drop-down list. The Ethernet Aggregated Demand Report tab appears.



## Viewing the TDM Aggregated Demand Report

Use the following procedure to view the TDM Aggregated Demand report:

### Procedure

- 
- Step 1** Click the Mgmt Tree tab and right-click the analyzed network.
  - Step 2** Choose TDM Aggregated Demand from the drop-down list.  
The TDM Aggregated Demand Report tab appears.
- 

## Viewing Any-to-Any Finalized Circuits

To view the Any-to-Any (A2A) Finalized Circuits report:

### Procedure

- 
- Step 1** Click the Mgmt Tree tab and right-click the analyzed network.
  - Step 2** Choose A2A Finalized Circuits from the drop-down list.  
The A2A Finalized Circuits tab appears.

The A2A Finalized Circuits tab allows to edit or delete any Any-to-Any finalized ROADM demand (see [Creating a ROADM Demand, on page 76](#) task).

The following table describes the columns in the A2A Finalized Circuits tab.

**Table 35: A2A Finalized Circuits Tab Columns**

| Column Label | Description  |
|--------------|--|
| Name         | Displays the name of the site.   |
| Wavelength   | Displays the wavelength value of the optical channel. Also, displays the serial number of the wavelength in the wavelength band. The alphabet "e" besides the wavelength serial number represents that it is an "even" wavelength in the C-band. |
| From Loc     | Displays the site and side where the demand originates.  |
| To Loc       | Displays the site and side where the demand terminates.  |
| Signal Rate  | Displays the signal rate.  |

| Column Label | Description                                      |
|--------------|--|
| Equipment    | Displays the card type.                          |
| Notes        | Allows to add notes or comments.                 |
| Finalized On | Displays the date when the demand was finalized. |

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## Viewing Report Differences

You can compare the BoM, Internal Connections, and Installation Parameters reports for two networks. This is useful to see the differences between a baseline network and an Install or Upgrade network.

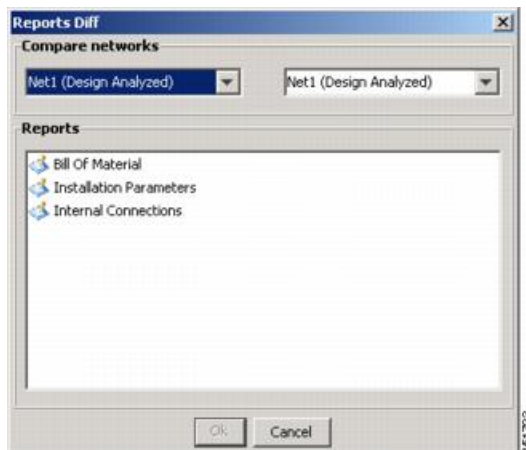
- The BoM Diff report lists the units that were added and/or removed from the BoM.
- The Internal Connection Diff report lists changed connections. If at least one of the two endpoints of an internal connection is different, Cisco Transport Planner reports that the internal connection has changed. The report shows all internal connections that were present in the baseline network but are not present in the final network, and all internal connections not present in the baseline network but present in the final network.
- The Installation Parameters Diff report lists changed parameters between the baseline network and the final network.

Use the following procedure to compare networks:

## Procedure

- Step 1** Click the Reports Diff icon. For more information about Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361. The Reports Diff dialog box appears. The below figure shows the Reports Diff dialog box as it appears when at least two analyzed networks exist in a project.

**Figure 26: Reports Diff Dialog Box**



- Step 2** In the Compare networks area, choose the baseline network from the drop-down list on the left. Choose the network to compare from the drop-down list on the right.
- Step 3** Click the report you would like to view. If you chose one non-analyzed network, you can view only the Bill of Material differences report.
- Bill of Material—(See BoM Diff Report figure) For a description of the columns, see BoM Diff Report Columns table.
  - Installation Parameters—For a description of the columns, see Installation Parameters Diff Report Columns table.
  - Internal Connections—For a description of the columns, see Internal Connections Tab Columns table.
- Step 4** Click **OK**.

The following figure shows the BoM Diff report.

**Figure 27: BoM Diff Report**

The screenshot shows the MetroPlanner interface with a 'BoM Diff Report Net1-Net6' window. The report compares two networks, Net1 and Net6. The summary for Net1 shows a BoM + Spare total discounted of 840,845.00, a BoM total discounted of 840,845.00, and a Spare total discounted of 0.00. The summary for Net6 shows a BoM + Spare total discounted of 823,100.00, a BoM total discounted of 823,100.00, and a Spare total discounted of 0.00. The Price List is MasterPriceDB and the Currency is Usd.

| Name  | PID                | Quantity | Unit Price | Total Price         | Disc    |
|---|--------------------|----------|------------|---------------------|---------|
| Oadm  | =                  |          |            |                     |         |
| ONS 15454 OADM - 1 Chn - 100GHz - 1558.17                 | = 15454-AD-1C-58.1 | 1        | 20,000.00  | 20,000.00           | 20,000  |
| ONS 15454 OADM - 2 Chs - 100GHz - 1554.13 - 1554.94       | = 15454-AD-2C-54.1 | 1        | 30,000.00  | 30,000.00           | 30,000  |
| ONS 15454 OADM - 4 Chs - 100GHz - 58.17-58.98-59.79-60.61 | = 15454-AD-4C-58.1 | 1        | 40,000.00  | 40,000.00           | 40,000  |
| Transponder   | =                  | 5        |            | 157,000.00          | 157,00  |
| PPM   | =                  | 5        |            | 15,695.00           | 15,695  |
| Mech Unit   | ≠                  | 22/18    |            | 11,715.00/7,845.00  | 11,715  |
| Common Unit   | ≠                  | 6/4      |            | 38,000.00/29,000.00 | 38,000  |
| SW License  | ≠                  | 6/3      |            | 7,980.00/3,990.00   | 7,980.0 |
| Opt Common Unit   | =                  | 2        |            | 18,000.00           | 18,000  |
| Amplifier   | =                  |          |            |                     |         |
| ONS 15454 Optical Pre-Amplifier Module                    | = 15454-OPT-PRE    | 1        | 22,000.00  | 22,000.00           | 22,000  |

The upper section of the BoM Diff Report tab displays the following information for each network:

- **BoM total discounted**—Displays the price for the overall network (without spare parts) for each item in the BoM. If Use global discount is checked, the total includes the discount from the Global discount percentage field.
- **Spare total discounted**—Displays the price for all of the recommended spare parts in all of the maintenance centers for the overall network. It is the sum of each spare item using the discounted price. The total appears after you check the Spare Part Report check box.
- **BoM + Spare total discounted**—Displays the sum of the BoM total discounted price and spare total discounted price.
- **Price List**—Displays the name of the price list database selected for the project.
- **Currency**—Displays the value of the currency used for each of the price values as specified within the selected price list database.

The following table describes the information in the BoM Diff report columns. Click a column to sort the table information by that column.

**Table 36: BoM Diff Report Columns**

| Column Label | Description                                  |
|--------------|--|
| Name         | Displays the name of the site and equipment. |

| Column Label                     | Description  |
|----------------------------------|--|
| Difference Summary (not labeled) | <p>Indicates a difference exists between the two network BoMs:</p> <p>= (equal sign)—Indicates that no difference exists between the two networks.</p> <p>(not equal sign)—Indicates that the item is present on both networks, but the number per network is different.</p> <p>1—Indicates that this item is present in the first network but not in the second network.</p> <p>2—Indicates that this item is present in the second network but not in the first network.</p> |
| PID                              | Displays the ID string of the product. To view a PID, click on the plus (+) sign by the equipment name to expand it.   |
| Quantity                         | Displays the number of specific products in the BoM. If the networks have a different quantity, Cisco Transport Planner displays both numbers in red in the following format: <i>first-network-quantity /second-network-quantity</i> .   |
| Unit Price                       | Displays the price for each unit. To view a unit price, click on the plus (+) sign by the equipment name to expand it.   |
| Total Price                      | Displays the total price of the products before applying the discount. If the networks have a different quantity, Cisco Transport Planner displays both numbers in red in the following format: <i>first-network-total price /second-network-total-price</i> .   |
| Discounted Total Price           | Displays the total price of the products after applying the discount. If the networks have a different quantity, Cisco Transport Planner displays both numbers in red in the following format: <i>first-network-discounted-total-price /second-network-discounted-total-price</i> .  |

The following table describes the columns in the Installation Parameters Diff report. Click a column to sort the table information by that column.

Differences between networks appear in red and in the following format: *baseline-network-value /final-network-value* .

**Table 37: Installation Parameters Diff Report Columns**

| Category              | Description  |
|-----------------------|--|
| Name                  | Displays the name of the site.   |
| <i>(Diff Summary)</i> | <p>Indicates a difference exists between the two network BoMs:</p> <p>= (equal sign)—Indicates that no difference exists between the two networks.</p> <p>(crossed-out equal sign)—Indicates that the item is present on both networks, but the number per network is different.</p> <p>1—Indicates that this item is present in the first network but not in the second network.</p> <p>2—Indicates that this item is present in the second network but not in the first network.</p> |
| Side                  | Displays the node interface: T (terminal), E (east), or W (west).  |
| Position              | Displays the rack, shelf, and slot position of the card from which the patchcord originates.   |
| Unit                  | Displays the name of the card.   |
| Port #                | Displays the port number from which the patchcord originates.  |
| Port ID               | Displays the port ID.  |
| Port Label            | Displays the name of the port.   |
| Parameter             | Displays the name of the parameter to be set, such as RX Power Low.  |
| Value                 | Displays the name of the value to be set.  |
| Measurement Unit      | Displays the measurement unit for the related installation parameter value, such as dBm.   |
| Manual Set            | Indicates with a Yes or No which parameters must be manually set using the CTC interface.  |

The following table lists the columns in the Internal Connections Diff report and their descriptions. Click a column to sort the table information by that column.

Differences between networks appear in red and in the following format: *baseline network value /final network value* .

**Table 38: Internal Connections Tab Columns**

| Column Name                      | Description   |
|----------------------------------|---|
| Name                             | Displays the name of the site. On the SW provisioning view subtab, this column indicates whether the connection should be manually set using the CTC interface or removed.  |
| Difference Summary (not labeled) | Indicates a difference exists between the two network BoMs:<br>= (equal sign)—Indicates that no difference exists between the two networks.<br>(not equal sign)—Indicates that the item is present on both networks, but the number per network is different.<br>1—Indicates that this item is present in the first network but not in the second network.<br>2—Indicates that this item is present in the second network but not in the first network. |
| Position                         | Displays the rack, shelf, and slot position of the card from which the patchcord originates.  |
| Unit                             | Displays the name of the card.  |
| Port label                       | Displays the name of the port.  |
| Attenuator                       | When indicated, this is the product ID of the bulk attenuator to be equipped on this connection. It also reports when an internal attenuator must be placed between the DC-TX and DC-RX ports on the preamplifier (when no DCU is equipped).  |
| Position                         | Displays the rack, shelf, and slot position of the card where the patchcord terminates.   |
| Unit                             | Displays the name of the card.  |
| Port Label                       | Displays the name of the port.  |
| P/F                              | Displays whether the connection relates to a present (P/F) or forecast (F) circuit.   |







## Editing a Project

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CTP allows you to edit the a project either before or after network analysis. Error messages that occur during network analysis often cannot be resolved until you edit one or more network components. To complete the procedures in this section, you must have a project open and the network(s) loaded. See the [Opening a Project](#), on page 18 and the [Loading and Unloading Networks](#), on page 19.

- [Editing Project Parameters](#), page 176
- [Editing Network Parameters](#), page 176
- [Editing Site Parameters](#), page 178
- [Editing Side Labels](#), page 233
- [Editing Service Demand Association and Traffic Subnet](#), page 234
- [Creating a Maintenance Center](#), page 236
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- [Editing an Ethernet Aggregated Demand](#), page 243
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- [Add or Remove Sites from P-Ring, Ethernet Aggregated, and TDM Aggregated Demands](#), page 249
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- [Editing Fiber Span, Pair, and Fiber Parameters](#), page 250
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- [Deleting a Network](#), page 353
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## Editing Project Parameters

Use the following procedure to edit project parameters:

### Procedure

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**Step 1** Click **Project** in the **Project Explorer** pane.

**Step 2** In the **Properties** pane, complete the following tasks as needed:

- **Customer**—Enter the name of the customer (128-character maximum) requiring this network design.
  - **Created by**—Enter the user name (128-character maximum).
  - **Units**—Displays the span measurement unit: Km (kilometers) or Miles.
  - **Price List**—Choose the price database from the drop-down list.
  - **Layout**—Displays ANSI (the North American standard) or ETSI (the international standard) to indicate the platform type. ANSI networks do not allow you to define SDH (ETSI) service demands. ETSI networks do not allow you to define SONET (ANSI) service demands.
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## Editing Network Parameters

Use the following procedure to edit network parameters:

## Procedure

**Step 1** Click a network in the **Project Explorer** pane or Mgmt Tree.

**Step 2** In the **Properties** pane, complete the following tasks as needed:

- Name—Enter the network name (128-character maximum).
- Position—Enter the object location in pixels.
- Created by—Enter the user name (128-character maximum).
- Status—Displays the state of the network (Design, Design-Analyzed, Install, and so on).
- Measurement Units—Choose Km or Miles from the drop-down list. Any change made to the measurement unit at the network level will change the measurement unit of all the ducts within that network. For additional information on changing the measurement units of an individual duct, see [Editing Fiber Span, Pair, and Fiber Parameters](#), on page 250.
- Node Split—Check this check box to enable Split ROADM feature.

**Note** To split or unsplit nodes in the network level, right-click on the network and choose the appropriate options.

- Enable Layout Movement Optimization Feature—Check this check box to enable the layout movement optimization feature.
- Encryption Always On—Check this check box to ensure that encryption is always enabled. This feature is supported only on a combination of MR-MXP and 200G-CK-LC cards.
  - When this check box is checked and the Encryption is selected as Yes in the Demand Editor, the NCS2K-MR-MXP-K9 PID is used instead of the NCS2K-MR-MXP-LIC PID.
  - When this check box is unchecked and the Encryption is selected as Yes in the Demand Editor for 100GE demands, CTP uses the L-NCS2K-MRE100GK9 PID along with the 200G-CK-LC and MR-MXP PIDs.
  - When this check box is unchecked and the Encryption value is selected as Yes in the Demand Editor for 10GE or 40GE demands, CTP uses the L-NCS2K-MRELRGK9 PID along with the 200G-CK-LC and MR-MXP PIDs.
- Use Bundles—Check this check box to use the Multishelf Management Integrated Kit bundle when generating the BoM instead of the single items.
- Use Spare Parts—Check this check box to determine the spare parts required by the network. If the network is in the Upgrade state, the parts required to support the implemented services and the newly added present services are included. To generate a spare parts report, you must associate the sites in a network with a maintenance center before network analysis.
- Use Global Discount—Check this check box to use the global discount for the entire network. The global discount is applied to all components in the BoM.
- Global Discount—Enter a new global discount in the form of a percentage.
- Use Client Payg—Check this check box to include license for client cards. This option is applicable to AR-MXP, AR-XP, 100G-LC-C, 100G-CK-LC-C, and 10X10G-LC cards. This check box is checked by default.

- **Enable NCS**—Check this check box to enable NCS to use the new NCS PIDs instead of the ONS 15454 M6, M2 and M12 PIDs.
- **Connection Verification**—Check this check box to enable the connection verification feature on the site. When you enable this feature on the network, it is automatically enabled on the associated sites of the network. The SMR-20 FS CV cards provide the connection verification feature along with the passive modules MF-DEG-5-CV, MF-UPG-4-CV, and MF-M16LC-CV. For more details, see [Connection Verification, on page 133](#).
- **Service Level**—Choose the service level (contract) identifier from the drop-down list.
- **Service Length**—Choose the maintenance service level length (in years) from the drop-down list.
- **Include SW Licenses**—Check this check box to include software licenses in the BoM.
- **Include Paper Documentation**—Check this check box to include paper documentation in the BoM.
- **Include CD Documentation**—Check this check box to include CD documentation in the BoM.
- **Hide Bom/price discount**—Check this check box to hide the global discount in the Unit Price column of the BoM.
- **WSON PID**—Check this check box to display the WSON PIDs in the BoM report.
- **Dimension**—Enter the network size in pixels.
- **Background color**—Click to choose a color for the network background.
- **Background image**—Displays the JPEG or GIF filename used as a background, if any. To choose a JPEG or GIF file as a background graphic for the network, click the down arrow and navigate to the desired directory.

## Editing Site Parameters

Editing the site parameters allows you to make changes to the current site configuration. A site folder in the Project Explorer pane displays the interface node information. Each site contains an NE folder in which network elements (NEs) are placed. The NEs are created after the network analysis.

The following configurations result in more than one NE creation:

- Individual shelf with OIC site functionality: One NE for each side.
- Individual shelf: One NE for each shelf.
- Multishelf with line card: One NE and one NE for each line card shelf.

Modifications in the site structure, functionality, and type also modify the number of NEs created.

A site folder for an analyzed network design also contains the following items, many of which you can edit:

- **A and B**—For a Line or Line+ site, two interface nodes appear in the Project Explorer pane under the Site folder, labeled A and B. For a Terminal or Terminal+ site, only one interface node (A) appears.
- **A(w) and A(p)**—For a PSM Terminal Optical Path site or a PSM Terminal Multiple Section site, two interface sides appear in the Project Explorer pane under the Site folder, labeled A(w) and A(p). A(w)

represents the working path and A(p) represents the protection path. For a PSM Terminal Optical Path site, the following options are available under the supported bands for the two interfaces.

- For A(w): Amplifiers, add/drop, and DWDM protection
- For A(p): DWDM protection
- For a PSM Terminal Multiple Section site, the following options are available under the supported bands for the two interfaces.
  - For A(w): Amplifiers, add/drop, and DWDM protection
  - For A(p): Amplifiers and DWDM protection
- C-Band or L-Band—Displays the supported band for the sides.
- Amplifiers—Lists the amplifiers and all related cards for each band and for each side.
- Add/Drop—Displays all of the add/drop and related cards for the band and side.
- Site Type Parameters—When selected, shows the site functionality and type in the Properties pane.
- Band Parameters—When selected, shows the output power in the Properties pane.
- Client—Lists the client cards.

CTP allows you to create property templates to design a set of property configurations for a site. When you have a network that has similar sites, you can use these property templates to quickly and accurately set up common properties. For more information, see [Property Template](#), on page 353.

Use the following procedure to edit site parameters. To delete a site, see [Deleting Sites](#), on page 350.

### Procedure

- 
- Step 1** In the **Project Explorer** pane, right-click the network folder and choose **Expand** from the shortcut menu.
- Step 2** Click the desired Site folder. The site parameters appear in the **Properties** pane.
- Step 3** Complete the following tasks to modify the site parameters in the **Properties** pane, as needed:
- Name—Enter the site name.
  - Position—Enter the site pixel position; for example, an entry of 0,0 positions the Site icon in the upper-left corner of the NtView Name tab.
  - MTTR (hours)—Enter the mean time to repair (MTTR) for all sites in the network. This value applies to every site in the network. If you change the MTTR value after creating sites, the new value will only apply to sites you create after the change.
  - Maintenance Center—Choose the name of the maintenance center from the drop-down list. To create a maintenance center, see the “4.6 Creating a Maintenance Center” section on page 4-59.
  - IP Address—Enter the IP address of the node.
  - Shelf Management—Choose one of the shelf configuration types from the drop-down list:
    - Auto—Sets the default option of the Multi Shelf Switch for all the nodes with more than one shelf. For M6/M15 chassis, the default option is Multi Shelf Integrated Switch.

- Multi Shelf Integrated Switch—All the MSTP optical cards (OADMs and amplifiers) reside in different shelves connected by a LAN. The LAN is implemented with switches connected to the MSTP shelves. These switches are used to connect to the external chassis. For this option, Multi-Shelf Integrated Switch Cards (MS-ISC) are used to support the multishelf configuration. M15 uses RJ 45 and optical ports to connect to an external chassis.
- Multi Shelf External Switch—All the MSTP optical cards (OADMs and amplifiers) reside in different shelves connected by a LAN. The LAN is implemented with switches external to the MSTP shelves (Cisco Catalyst 2950). For this option, two external Ethernet switch units (Cisco Catalyst 2950 and Cisco Catalyst 3650) are used to support the multishelf configuration. The Cisco Catalyst 2950 supports 12 subtending shelves and Cisco Catalyst 3650 supports 24 subtending shelves. CTP supports a maximum of 50 shelves, including the node controller shelf, in a multishelf configuration when the TNC, TNCE, TSC, TSCE, TNCS, TNCS-O, or TCC3 card is used as the node controller. CTP supports a maximum of 5 shelves, including the node controller shelf, in a multishelf configuration when TCC2P card is used as the node controller.
 

**Note** In Release 10.6.1, the TCC2P card can be used only on a standalone Network Element (NE) or as subtended shelf of an MSM having node controller with TCC3 card in M12 or TNCE/TNCS in NCS 2006 or NCS 2015. MS-ISC card is not supported in a shelf with a TCC2P card.
- Individual Shelf—All the MSTP optical cards (OADMs and amplifiers) reside in the same shelf. For this option, multishelf management is not supported; every shelf is managed as an independent shelf.
 

**Note** The ONS 15454 shelves must have TCC3 cards installed for the configurations.

For details on important notes on Shelf Management, see Important Notes for Shelf Management.

- Node Protection—Choose the node protection type from the drop-down list: Same Shelf or Separated Shelves.
 

**Note** Node protection is disabled for HYBRID 15454 ONS configuration.
- DCC Shelves Management—When checked, indicates that a TXP(P)\_MR\_2.5G card is in slot 12 on each shelf at each site.
- Installation w/o CTP—When checked indicates that the network is installed with the default parameters, so that the selected node can be installed without the Cisco Transport Planner configuration files (thresholds and setpoints).
- Node Type—(Release 9.1 and later releases) Enables you to choose the configuration type of the site.
- MSM External Switch—Enables you to choose the Multi Shelf External Switch type. The options are Auto, Cat 2950, and Cat 3650. The default option is Auto.
- Insulators—If checked, protects the Express Add/Drop (EAD) colorless ports of the 80-WXC-C cards configured as demux units.
 

**Note** The Cisco ONS 15216-FLD-2-ISO optical insulator is not supported in CTP Release 9.3 and later.

**Note** Optical insulator connections are displayed only in the Patchcord Installation tab in the Internal Connections report.
- Door—Choose the type of door from the drop-down list. The default option is Auto, which does not add any door type. Door and deep doors are two types of front doors that act as protective panels in the

ONS 15454 M2, ONS 15454 M6, and NCS 2015 M15 chassis. The deep door provides additional space in front of the shelf to accommodate cables that do not fit inside the standard door.

- **Node Type**—Choose the node type from the drop-down list. The options available are Legacy MSTP 15454 ONS and Flex NG-DWDM.
- **Node Split**—Check this check box to enable Split ROADM feature.
  - Note** To split or unsplit nodes in the network level, right-click on the network and choose the appropriate options.
- **IP Address**—Enter the IP address of the site.
- **MF Cover**—Choose the plastic transparent cover for the NCS2K-MF10-6RU and NCS2K-MF-6RU units from the drop-down list. This cover prevents direct access to the fibers connected with the faceplate. The options are Auto and MF-CVR (6/10).
- **MPO16 To MPO8**—Choose the MPO 16-2\*8 cable or the MF-2MPO-ADP adapter from the drop-down list. These units connect MPO16 connectors of 20-SMR-FS or 20-SMR-FS-CV WXC cards and the MPO8 connectors of MF-DEG-5, MF-UPG-4, MF-DEG-5-CV, and MF-UPG-4-CV patch panel cards. The MPO 16-2\*8 cable comes in three variants as follow:
  - MPO 16-2\*8-2 with cable length of 2m
  - MPO 16-2\*8-5 with cable length of 5m
  - MPO 16-2\*8-10 with cable length of 10m
- **Flex Spectrum**—Enables Flex Spectrum. You need the L-NCS2K-FS= license for this feature.
- **MPO16LC**—Choose from one of the following options:
  - **MF-MPO-16LC**—The MPO-16 to 16-LC fan-out module is a double slot module with one MPO-16 connector (COM) and eight LC duplex connectors. The MPO-16 connector is compatible with the SMR20 FS EXP and 16-AD-FS CH ports.
  - **MF-MPO-16LC Cable**—This cable also has ports similar to MF-MPO-16LC: one MPO-16 connector (COM) and eight LC duplex connectors. Use this cable for omnidirectional colorless configurations with SMR-20.
- **Evolved Mesh**—Check this check box to enable the evolved mesh feature on the network. When you enable this feature on the network, it is automatically enabled on the associated sites of the network. Evolved mesh is supported for sites with connectionless sides.
 

The MF-DEG-5-CV cards provide the evolved mesh feature. When you enable this feature, the MF-DEG-5-CV ports 1 to 5 are used for degree interconnections to support 5 line sides. If the evolved mesh check box is not checked, MF-DEG-5 card is used. The MF-DEG-5 ports 1 to 4 are used for degree interconnections to support 4 line sides and port 5 is used to create contentionless sides.
- **Use MR-MXP Breakout Cable** —Check this check box to use the ONS-MPO-MPOLC-10 breakout cable to interconnect the client ports of the MR-MXP card with the NCS2K-MF-MPO-20LC passive module when the MR-MXP card is configured as a 10x10GE fan-out.
- **Use 8X10G-FO**—Check this check box to use the NCS2K-MF-8X10G-FO passive module only for 10G on the client-side of the NCS2K-400G-XP card. By default this passive module is enabled.

- The NCS2K-MF-8X10G-FO unit uses a ONS-12MPO-MPO-8 cable to connect to the client ports of the NCS2K-400G-XP card. You can place this passive module either in a NCS2K-MF10-6RU or NCS2K-MF-1RU unit.
- Mpo16ToMpo16Cable—This is a new Multi-fiber patchcord with MPO24 connectors implemented in CTP Release 10.6.1 Software Update. The patchcord is used to replace 24MPO-MPO cable and has only 16 fibres connected from the 24 ribbon fibers. This is available in four variant lengths ((ONS-16MPO-MPO-2=, ONS-16MPO-MPO-4=, ONS-16MPO-MPO-6=, and ONS-16MPO-MPO-8=).

The patchcord is used for interconnections inside the ROADM with MPO24 standard:

- Between 20-SMR-FS and MF-MPO-16LC (CV)
- Between 20-SMR-FS and MF-2MPO-ADP
- Between 20-SMR-FS and PPMESH8-5AD
- Between 16-AD-CCOFS and MF-MPO-16LC (CV)
- Between 16-AD-CCOFS and 16-AD-CCOFS
- Terminal Configuration

A new property “Mpo16ToMpo16Cable” is added at Site level from CTP Release 10.6.1 and has values Auto, 16-MPO-MPO, and 24-MPO-MPO. If Auto is selected, 16-MPO-MPO cable is placed. 24-MPO-MPO cable is placed by forcible selection from the Mpo16ToMpo16Cable drop-down list.

- Service Level—Choose the service level from the drop-down list.
- Service Level Num of Years—Choose the maintenance service level (in years) from the drop-down list.
- Use Payg—Check this check box to enable the Pay As You Grow (PAYG) feature on the site. For more information about the Pay As You Grow feature, see the “1.8 Understanding the Pay As You Grow Feature” section on page 1-43.
- Enable NCS—Check this check box to use NCS PIDs for the selected site. The existing MSTP PIDs are replaced with new NCS PIDs. The NCS PIDs corresponding to the existing MSTP PIDs are given in the CTP Operations guide. For more information, see Table 2-3NCS PIDs, page 2-8.
- Connection Verification—Check this check box to enable the connection verification feature on the network. When you enable this feature on the network, it is automatically enabled on the associated sites of the network.
- The SMR-20 FS CV cards provide the connection verification feature along with the passive modules MF-DEG-5-CV, MF-UPG-4-CV, and MF-M16LC-CV. For more details, see 2.17 Connection Verification.
- Osmine Compliant—When checked, indicates that the transponder/muxponder cards are placed in the shelves according to OSMINE placement rules.
- Hybrid Node—When checked, indicates that all the nodes are configured as hybrid MSTP/MSPP nodes.
- Max Num of Shelves—Choose the maximum number (from 1 to 4) of ANSI or ETSI shelves (that equip optical cards or transponder/muxponder cards) that can be placed in each rack in the site when generating the site layout.
- AIC—Enables placement of AIC units. Choose Yes from the drop-down list to instruct CTP to insert the AIC card in slot 9 of the first shelf in each site.



- Fiber Storage—Enables placement of a fiber storage unit. Choose Yes from the drop-down list to instruct CTP to put the fiber storage within the rack below the optical shelf.
- Y-cable—Choose the Y-Cable unit to connect the client and add-drop unit.
  - Auto—Instructs CTP to set the default value for the Y-Cable option.
  - 1RU FlexLayer Shelf Assembly—Instructs CTP to use the ONS 15216 Splitter/Combiner Flex Layer modules to implement the required Y-cable protections.
  - 2RU Y-Cable Panel—Instructs CTP to use the new ADC Splitter/Combiner modules to implement the required Y-cable protections.
- Side/Side cabling—Choose the cabling used to connect different sides on different racks. Choose the loss value between the west and east side of the site, from” the drop-down list. It is useful in case of multi-shelf node protection when the racks are not located close to each other.
- Fan Tray—Select the type of fan tray to be placed within each node, from the drop-down list.
- TXP/MXP/XP in OTS—Enables you to choose whether to place client cards in OTS shelves.
- Chassis Type—Allows you to choose the chassis type. The options available are Auto, M15 Chassis, M12 Chassis, M6 Chassis, and M2 Chassis. The default option is Auto.
 

**Note** M2 chassis does not support MSM configuration.

The following section lists chassis selection rules for MSM with M2, M6, and M12 chassis (hybrid configuration):

- M2 chassis is not selected for MSM configuration.
- M6 chassis is forced when OSC Frame type is forced to GE.
- The layout is not built and an error message is displayed for the following conditions:
  - - When the chassis type is forced as M12 (for Site1), M2 (for Site 2), and M12 (for Site 3).
  - - When the chassis type is forced as M12 and when OSC pluggables are forced.
- M2 or M6 is not selected when the chassis type is selected as Auto. Table 4-2 summarizes the chassis selection rules when the chassis type is Auto. Table 4-3 summarizes the chassis selection rules when the FlexLayer modules are used.
- Power Supply—Allows you to choose the type of power supply. The options available are Auto, AC Power, AC2 Power, DC Power, DC20 Power, and DC40 Power. The default option is Auto (DC40). However, AC2 Power is not applicable to the M2 Shelf. M6 chassis supports both AC power and AC2 Power. M15 chassis supports AC power.
 

**Note** The AC2 power cables are present in the BoM only when AC2 Power and Auto or AC2 Power and Data Center options are selected in the Power Supply and UTS AC Power Cables sections respectively.
- Filler Card Type—Choose the type of card to be placed in the empty slots of a chassis. The options are:
  - Blank—CTP enables placement of only blank cards.
  - UTS Filler—CTP enables placement of blank cards in M12 chassis and Universal Transport System (UTS) filler cards in the M2, M6, M15, and M12 chassis. The two type of UTS filler cards placed

by CTP are 15454-M-T-FILLER (in TNC and TSC card slots) and 15454-M-FILLER (in other slots).

- **Populate Shelves From Bottom**—Check this check box to instruct Cisco Transport Planner to place the shelves in the rack from the bottom. This is useful in installing shelves in tall racks. For more information about the order in which CTP fills the rack, see the “4.18.1 General Placement Rules” section on page 4-106.
- **Redundant Power**—(M6 and M15 chassis only) Enables you to choose the redundant power supply to be added. The options available are Auto, Yes, and No. The Default option is Yes.
- **UTS AC Power Cables**—Enables you to choose the type of cables to be added for the AC power supply. The cables are listed based on the country type. The default option is EU.
- **Redundant Controller Card**—(M6 and M15 chassis only) Enables you to choose the redundant controller card. The options available are Auto, Yes, and No. The default option is Yes.
 

**Note** M6 chassis without a redundant controller card is not supported in the MSM configuration.
- **M6 Chassis in Use**—Enter an integer value for the number of M6 chassis to be used.
- **M12 Chassis in Use**—Enter an integer value for the number of M12 chassis to be used.
- **M6 Shelves**—(Release 9.2 and later releases) Enter an integer value for the number of empty shelves to be added to the node layout. CTP supports a maximum of 29 extra M6 shelves. The Auto option does not add any shelves.
- **M12 Shelves**—(Release 9.2 and later releases) Enter an integer value for the number of empty shelves to be added to the node layout. CTP supports a maximum of 29 extra M12 shelves. The Auto option does not add any shelves.
- **M15 Shelves**—(Release 10.5 and later releases) Enter an integer value for the number of empty shelves to be added to the node layout. The Auto option does not add any shelves.
- **Node Controller**—Enables you to choose a chassis as a node controller. The options available are Auto, M12 Chassis, M15 Chassis, and M6 Chassis. The default option is Auto.
- **TCC Type (Release 9.4 and later releases)**—Choose the type of TCC card, from the drop-down list. The options available are Auto, TCC2P, and TCC3. The default option is Auto, which selects the TCC3 card.
 

**Note** The M12 chassis with TCC2P cards, when used as the node controller cannot subtend M6 chassis.

In Release 10.6.1, the TCC2P card can be used only on a standalone Network Element (NE) or as subtended shelf of an MSM having node controller with TCC3 card in M12 or TNCE/TNCS in NCS 2006 or NCS 2015. MS-ISC card is not supported in a shelf with a TCC2P card.

- **M6/M2 Controller Type**—Choose the type of controller card from the drop-down list. The options available are Auto, TNC/TSC, TNCS-O, TNCS, and TNC-E/TSC-E. The default option is Auto, which selects the TNC-E/TSC-E card. When you choose TNCS-O, it is configured for the node controller and not the subtended shelf. TNCS-O cards support only Fast Ethernet (FE) and wavelength of 1518 nm in OSC transmissions.
 

**Note** From CTP 10.6.1 Software Update and Software Release 10.5.2, TNCS is enabled as a valid controller card for NCS 2006 Chassis. This is done by selecting TNCS as the Controller Type from the M6/M2 Controller Type drop-down list and Chassis Type as M6.

You can select a different M2/M6 controller type in a network in the release upgrade or upgrade state by unlocking the TSCE/TSC or TNCE/TNC card in the site layout.

- M15 Chassis in Use—Enter an integer value for the number of M15 chassis to be used.
- M15 Controller Type—Choose the type of M15 controller from the drop-down list. The options available are Auto, TNC-S, and TNCS-O. The default option is Auto, which selects the TNC-S card. When you choose TNCS-O, it is configured for the node controller and not the subtended shelf. TNCS-O cards support only Fast Ethernet (FE) and wavelength of 1518 nm in OSC transmissions.
  - Redundant power scheme—Choose the redundant power scheme from the drop-down list. The options available are 1+1, 2+1, 3+1, 2+2. You can choose the redundant power scheme to configure the number of working and protected power units for the chassis.
    - 3+1 is the default redundancy power scheme for M15 DC chassis and 2+2 is the default redundancy power scheme for M15 AC chassis. For example, if you choose 2+2 redundant power scheme, there will be 2 working power units and 2 protected power unit.
- The AC M15 chassis supports only 1+1, 2+2 modes. 2+2 is the default redundancy power scheme for M15 AC chassis
- RAMAN Adapter share—From CTP 10.6.1 Software Update, the MF-2LC-ADP Unit is configured to be shared only with EDRA amplifiers and not to be shared with RAMAN-CTP and RAMAN-CTP-COP amplifiers as in earlier releases. To apply this limitation, a new GUI option “RAMAN Adapter share” is introduced at Site level and a checkbox is provided, which is checked by default. This indicates that MF-2LC-ADP can be shared with EDRA amplifiers and not with RAMAN amplifiers irrespective of the default selection. For older networks with RAMAN-CTP and RAMAN-CTP-COP amplifiers, which wrongly share the MF-2LC-ADP, an error message is thrown during the analysis, asking the user to unlock the Site Layout before proceeding with the analysis.
- SFPs for multi-chassis—Specify the number of small form-factor pluggables (SFPs) that you want to use for Multi Shelf Management configuration. The number of SFPs you specify here will appear in the BOM.
- ECU Type—Choose the M6 External Connection Unit (ECU) type from the drop-down list. The options available are Auto, ECU, ECU-S, and ECU60-S. The default option is Auto, which selects the ECU-S unit.
  - ECU—Has 12 USB 2.0 ports and supports IEEE1588v2 PTP, time-of-day (ToD), and pulse-per-second (PPS) inputs.
  - ECU-S—Similar to ECU except that it has eight USB 2.0 ports and two USB 3.0 ports.
  - ECU60-S—Variant of ECU-S introduced for the NCS 2006 when the shelf is powered at –60 VDC nominal input voltage.
- MF Unit—Choose the mechanical frame for the passive optical modules from the drop-down list. The options available are Auto, MF-6RU/MF-10RU, and MF-1RU.
  - The NCS2K-MF-1RU has four slots for the passive optical modules.
  - The NCS2K-MF-6RU supports up to 14 single-slot passive optical modules such as any combination of NCS2K-MF-DEG-5, NCS2K-MF-UPG-4, NCS2K-MF-MPO-8LC, NCS2K-MF-4X4-COFS, and NCS2K-MF-2MPO-ADP units, or Connection Verification (CV) units such as NCS2K-MF-DEG-5-CV and NCS2K-MF-UPG-4-CV in the NCS2K-MF-6RU.
  - The NCS2K-MF10-6RU supports up to 10 double-slot passive optical modules such as NCS2K-MF-16AD-CFS=, NCS2K-MF-MPO-16LC=, NCS2K-MF-16AE-CFS=, NCS2K-MF-10AD-CFS=, and NCS2K-MF-MPO-20LC cards, or CV units such as NCS2K-MF-M16LC-CV.

- **Input Voltage**—Choose the input voltage for the ANSI mode. The voltage range that you choose determines the value of the AC2 power. The default option is Auto, which selects 100-120V. The power value for ETSI nodes is 1500W and the field is disabled for these nodes.
  - For 100-120V, the power value is 1200W.
  - For 200-250V, the power value is 1500W.
- **Scalable upto Degree**—Choose the degree to which the NG-DWDM node is scalable. Options available are 4, 8, and 12.
- **Degree Mesh Type**—Mesh type for Flex NG-DWDM site.
- **Functionality**—Displays the site functionality. To edit this field, double-click the site in the network view. The Edit dialog box appears. Choose the site functionality from the drop-down list. Table 4-2, Table 4-3, and Table 4-5 summarize the site design rules. The site icon changes depending on the functionality. For a description of the site icons, see Appendix A, “GUI Information and Shortcuts.”
 

**Note** You can choose only the following options for the functionality parameter of intermediate sites (on both the working and protected sides) in a PSM Line or PSM Section network topology: PSM Section: Pass Through or Line amplifier PSM Line: Pass Through

  - **Auto**—Allows the highest degree of flexibility in creating the network. Cisco Transport Planner generates a design for the site with the lowest possible cost given the other constraints.
  - **Pass Through**—Indicates that no equipment will be located at this site.
  - **Line amplifier**—Prevents any add/drop traffic at this site.
  - **OPT-AMP-C amplifier** is supported on FLEX NG-DWDM Line Amplifier nodes only if you select the “Line amplifier” option from the Functionality drop-down list.
  - **OSC site**—Indicates that site is designated for network communication, providing the possibility to access the OSC for management of the MSTP network. By default, no amplifiers are included in this site. However, if Cisco Transport Planner determines that an amplifier is required in the network, it can automatically place it at this location. Cisco Transport Planner allows you to set (force) preamplifier and booster amplifiers for each direction on a OSC site node.
  - **Add/Drop**—Indicates that this site has add/drop capability. Only point-to-point and P-ring circuits can be added/dropped at this site.
  - **Hub**—Indicates that this site is equipped with filters for adding and dropping all the channels (on both West and East sides). All express paths are open in hub configurations.
  - In HYBRID 15454 ONS configuration at least one node must be of the HUB functionality for the ring topology.
  - **Gain equalizer**—Indicates that this site uses WSS cards to control the generated tilt and extend unregenerated distances. The site is realized as an ROADM site without demultiplexer cards.
  - **R-OADM**—Indicates that this site supports Any-to-Any and also Fixed (point-to-point and P-ring) traffic types.
  - **OXC**—Indicates that this site uses OXC (optical cross connect) cards to control the generated tilt and extend unregenerated distances. This site is realized as an ROADM site without demultiplexer cards.

- OIC—Indicates that this site uses OIC (optical inter connect) cards to control the generated tilt and extend unregenerated distances. This site is realized as an ROADM site without demultiplexer cards.
- This functionality is available only for multidegree sites. Also, if you choose the structure of a site as multidegree and functionality as OXC, the Shelf Management option that you select should either be Integrated or External. Otherwise, the application displays an error message when analyzed.
- Type—Displays the site type. To edit this field, double-click the site in the network view. The Edit dialog box appears. Choose the site type from the drop-down list (see Table 4-2):
  - Auto—Allows the highest degree of flexibility in creating the network. Cisco Transport Planner generates a design for the site with the lowest possible cost given the other set of constraints.
  - Glass Through—Indicates a low-priority amplification site.
  - Line—Indicates a high-priority amplification site.
  - OADM—Indicates that it is a site with add/drop channels using discrete channel filters.
  - The OADM units available for the MSTP 15454 ONS configuration are 1Ch, 2Ch, 4Ch, 1-band, 4-band, and FLD-4.
  - The OADM units available for the Hybrid 15454 ONS configuration are FLB-2, FLA-8, and FLD-4.
    - **Note**
      - Avoid using all FLA-2 or FLA-8 units because it can lead to a total loss of signal in the system. If there is an overlap of selected wavelengths between FLA-2 and FLA-8 units, CTP displays an error message. If you use more than six 6 FLA 2 units, then the insertion loss is about 18 dB.
      - - FLA-8 and FLB-2 modules cannot be forced in a site having FLD-4 modules.
        - OADM units cannot be forced along with the FLD-4 units in MSTP 15454 ONS configuration.
  - WSS—Indicates that it is a site equipped with 32DMX or 32DMX-O. This option allows you to force the use of specific ROADM units.
  - Mux/Demux—Indicates that this is a full multiplexer/demultiplexer (FMD) site that adds and drops all channels on both sides using the 32MUX-O and 32DMX-O cards. Optical bypass is allowed.
  - SMR20 FS w/PPMESH8-5AD—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with SMR20 FS card. If this type is selected, the site can support up to 8 degrees, independent of the number of fibers connected to the site.
  - 80-WXC-C—Indicates that the site supports mesh and multi-ring topologies for 50 GHz networks.
  - 80-WXC-C Mux/Dmx—Indicates that this is a full multiplexer/demultiplexer (FMD) site that adds and drops all channels on both sides using the 80-WXC-C card in mux/demux mode.
  - 40-WXC-C w/PP-MESH-4—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with 80-WXC-C cards. If this type is selected, the site can support up to 4 degrees, independent of the number of fibers connected to the site.
  - 40-WXC-C w/PP-MESH-8—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with 80-WXC-C cards units. If this type is selected, the site can support up to 8 degrees, independent of the number of fibers connected to the site

- 80-WXC-C w/PP-MESH-4—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with 80-WXC-C cards. A site with this type can support up to 4 degrees, independent of the number of fibers connected to the site.
- 80-WXC-C w/PP-MESH-8—(Multidegree OXC sites only) Indicates the mesh type that is provided for sites with 80-WXC-C cards. A site with this type can support up to 8 degrees, independent of the number of fibers connected to the site.
- WSS/DMX—Multidegree OIC sites only.
- Flexible—Indicates that the site can support different equipment on each side. Valid for multi-degree OXC sites equipping 40-WXC-C or 80-WXC-C units at the different sides.
- SMR-1—Single module ROADM-1 (SMR-1) for line and terminal sites. It integrates preamplifier, OSC splitter/combiner, and a 2x1 wavelength cross connect. SMR-1 will be the default configuration for design rules with 40, 32, 20, 16 channels and for Line ROADM, Line Hub, and Terminal ROADM sites. SMR-1 configuration is selected only if the forced amplifier is compatible with it. For the same design rule, if SMR-1 is restricted, then SMR-2 will be the default configuration.
- SMR-2—Single module ROADM-2 for line, terminal, and multidegree sites. It integrates preamplifier, booster, OSC splitter/combiner, and a 4x1 wavelength cross-connect. SMR-2 will be the default configuration for multidegree sites with less than 5 sides. SMR-2 uses a new 15454 PP-4-SMR Patch Panel that is different from the one that the earlier WXC card used. SMR-2 is not selected for multidegree sites with omnidirectional entry point.
- SMR-9—Single module ROADM-9 for line, terminal, and multidegree sites. It integrates preamplifier, booster, OSC splitter/combiner, and a 9x1 wavelength cross-connect.
- SMR-20—Single module ROADM-20 for line, terminal, and multidegree sites. It integrates preamplifier, booster, OSC splitter/combiner, and a 20x1 wavelength cross-connect.
- **For the SMR cards:**
  - Cisco ONS 15216-EF-40-ODD units are automatically picked up as add/drop units for the SMR configuration. You can also force other mux/demux units like 32-WSS/32-DMX, or 40-WSS/40-DMX, or 40-MUX/40-DMX. To force these units, you should select the required site type and functionality.
  - You can place the SMR units in the Restricted Equipment list.
  - If 15216-EF-40-ODD/15216-MD-40-ODD is restricted, SMR with 40 mux/demux configuration will be the default site type.
- Scalable upto Degree—(For NG-DWDM only) Choose from the three degrees (4, 8, or 12) to which the node is scalable.
- Anti ASE—Choose **Yes** to configure the site so that all the express channels on the site are optically dropped and reinserted. In addition, all the patch cords between the West and East sections are removed. Choose **Auto** to allow Cisco Transport Planner to decide if the site should be configured as anti-amplified spontaneous emissions (anti-ASE). See Table 4-2 and Table 4-3 for a summary of the site design rules. Anti-ASE is disabled for HYBRID 15454 ONS configuration.

**Step 4** Click any side under a site to check the Omnidir Entry Point option. Check this option to mark the side as omnidirectional. This option is available only for multi-degree sides using OXC functionality and equipped with 40-SMR2-C or 40-WXC-C. Traffic cannot be added or dropped at the marked side and OSC units are not allowed. A side with Omnidir Entry Point option enabled can be connected only to a terminal site. Traffic

from the terminal site is directed towards a side not having the omnidirectional property. You cannot create a service demand between the terminal site connected to the OXC through the omnidirectional side. Traffic directed to the OXC site is terminated on the sides without the omnidirectional property.

**Step 5** To modify amplifier parameters, click **C-Band Amplifiers** or **L-Band Amplifiers** in the Project Explorer pane for the desired site interface. Choosing a value other than Auto will force a setting on the unit. For more information, see the “1.1.7 Auto, Forced, and Locked Parameters” section on page 1-15.

a) In From Fiber area of the Properties pane, complete the following as needed:

- **PRE**—Choose the preamplifier from the drop-down list (**Auto**, **None**, **OPT-EDFA-17** [C-band], **OPT-EDFA-24** [C-band], **OPT-AMP-C** [C-band], **OPT-AMP-17** [C-band], **OPT-BSTE** [C-band], **OPT-PRE** [C-band], **OPT-BST** [C-band], **OPT-AMP-L** [L-band]), EDRA1-26C-PRE [C-band], EDRA1-35C-PRE [C-band], EDRA2-26C-PRE [C-band], or EDRA2-35C-PRE [C-band].

**Note** From CTP 10.6.1 Software Update and System Release 10.6, OPT-AMP-C amplifier is supported on FLEX NG-DWDM Line Amplifier nodes by forcibly selecting the “OPT-AMP-C” option from PRE drop-down list.

**Note** EDRA amplifiers are applicable only for NGDWDM nodes. These amplifiers are not supported for the MSTP or HYBRID nodes.

**Note** BST and RAMAN amplifiers are automatically set if you choose EDRA amplifiers. See the following table for more information.

**Table 39: EDRA Amplifiers**

| <b>PRE (For Fiber Area)</b> | <b>BST</b>    | <b>RAMAN</b> |
|-----------------------------|---------------|--------------|
| EDRA1-26C-PRE               | None          | EDRA1-26C    |
| EDRA1-35C-PRE               | None          | EDRA1-35C    |
| EDRA2-26C-PRE               | EDRA2-26C-BST | EDRA2-26C    |
| EDRA2-35C-PRE               | EDRA2-35C-BST | EDRA2-35C    |

**Note** The OPT-EDFA-17 and OPT-EDFA-24 amplifiers do not support DCU modules.

**Note** The OPT-AMP-C and OPT-PRE amplifiers support FDCU modules.

**Note** If Raman amplification is enabled, the amplifier in the From Fiber area can be OPT-EDFA-17, OPT-EDFA-24, OPT-AMP-C, OPT-AMP-17, OPT-BST, OPT-BST-E, EDRA1-26C, EDRA1-35C, EDRA2-26C, or EDRA2-35C.

- **DCU 1/2**—Choose the DCU from the drop-down lists.
- **Output power**—Enter the output power.
- **Tilt**—Enter the desired tilt value.
- **TDCU**—Choose the TDCU type from the **TDCU units forcing** dialog box. You can force any of the following TDCU types:
  - **Auto**—CTP automatically places the fixed DCU units in the network.
  - **AUTO-Fixed**—CTP automatically places the fixed DCU units.
  - **AUTO-TDCU**—CTP automatically places the TDCU units

- T-DCU Fine— Choose the TDCU Type as T-DCU Fine and the compensation value from the Compensation drop-down list. CTP places the T-DCU Fine unit in the network. If you choose the compensation value as Auto, CTP chooses the optimum compensation value.

- T-DCU Coarse—Choose the TDCU Type as T-DCU Coarse and the compensation value from the Compensation drop-down list. CTP places the T-DCU Coarse unit in the network. If you choose the compensation value as Auto, CTP chooses the optimum compensation value.

**Note** Forcing the TDCU at the site-level overrides the design rules that is set at the network-level. The TDCU type that is set at the site-level overrides the placement rules set at the network-level, except for the **Auto** option. The **Auto** option places the TDCU based on the value that is set at the network-level.

**Note** The TDCU units forcing dialog box can be launched from the TDCU Forcing Property when you select C-Band Amplifiers in the Project Explorer pane.

**Note** You can edit the TDCU unit only when DCU 1 and DCU 2 is set to Auto, and you can edit DCU 1 and DCU 2 only when the TDCU unit is set to Auto.

- FDCU—Choose the FDCU unit from the drop-down list. The options are Auto, None, 15216-FBGDCU-165, 15216-FBGDCU-331, 15216-FBGDCU-496, 15216-FBGDCU-661, 15216-FBGDCU-826, 15216-FBGDCU-992, 15216-FBGDCU-1157, 15216-FBGDCU-1322, 15216-FBGDCU-1653, 15216-FBGDCU-1983. The Auto option places a FDCU unit only if the value of the FDCU field is set to “Always” at the network level.

**Note** From CTP release 10.1 onwards, FBGDCU is supported on all transponder cards for all System Releases above 9.4. However, the restrictions in running a System Release 9.4 network in any CTP release is still applicable.

**Note** The FDCU field is enabled only if the amplifier selected in the Pre field is OPT-AMP-C or OPT-PRE, in the From fiber area.

- Inline DCU—Choose from the drop-down list an inline DCU to provide the required chromatic dispersion compensation before a signal enters the node.
- Inline DCU2—Choose from the drop-down list a second inline DCU to provide higher chromatic dispersion compensation. In this case, both the DCUs will be cascaded.
- Attenuator In—Choose from the drop-down list the attenuator to be placed before the preamplifier position.
- Attenuator Out—Choose from the drop-down list the attenuator to be placed after the preamplifier position.  
While analyzing a network created in a CTP version earlier than Release 9.2.1, the Attenuator Out property inherits the value assigned to the Attenuator property in the Line/OADM area of the Add/Drop properties. Also, the lock applied to the Attenuator property is retained on the Attenuator Out property. The Attenuator property in the Line/OADM area of the Add/Drop properties is not available in CTP Release 10.1.

**Note** The Attenuator In and Attenuator Out drop-down lists are enabled only when a preamplifier is selected in the PRE drop-down list in the From Fiber area.

b) In the To Fiber area of the Properties pane, complete the following tasks as needed:

- BST—Choose the desired booster from the drop-down list (**Auto**, **None**, **OPT-EDFA-17** [C-band], **OPT-EDFA-24** [C-band], **OPT-AMP-C** [C-band], **OPT-AMP-17** [C-band], **OPT-BSTE** [C-band], **OPT-PRE** [C-band], **OPT-BST** [C-band], **OPT-AMP-L** [L-band], and **OPT-BST-L** [L-band]).

**Note** From CTP 10.6.1 Software Update and System Release 10.6, OPT-AMP-C amplifier is supported on FLEX NG-DWDM Line Amplifier nodes by forcibly selecting the “OPT-AMP-C” option from BST drop-down list.



**Note** The EDRA2-26C-BST [C-band], or EDRA2-35C-BST [C-band] amplifiers are automatically populated in the BST drop-down list when they are chosen in the PRE area.

**Note** The OPT-EDFA-17 and OPT-EDFA-24 amplifiers do not support DCU modules.

**Note** If Raman amplification is enabled, the amplifier in the To Fiber area can be OPT-EDFA-17, OPT-EDFA-24, OPT-AMP-C, OPT-BST, or OPT-BST-E.

- DCU 1/2—Choose the DCUs from the drop-down lists.
- Output power—Enter the output power.
- Tilt—Enter the tilt value.
- TDCU—Select the TDCU Type from the **TDCU units forcing** dialog box. You can force any of the following TDCU types:
  - Auto—CTP automatically places the fixed DCU units in the network.
  - AUTO-Fixed—CTP automatically places the fixed DCU units.
  - AUTO-TDCU—CTP automatically places the TDCU units.
  - T-DCU Fine— Select the TDCU Type as T-DCU Fine and choose the compensation value from the Compensation drop-down list. The CTP places the T-DCU Fine unit in the network. If you select the compensation value as Auto, CTP chooses the optimum compensation value.
  - T-DCU Coarse—Select the TDCU Type as T-DCU Coarse and choose the compensation value from the Compensation drop-down list. The CTP places the T-DCU Coarse unit in the network. If you select the compensation value as Auto, CTP chooses the optimum compensation value.

**Note** Forcing the TDCU at the site-level overrides the design rules that is set at the network level. The TDCU type that is set at the site-level overrides the placement rules set at the network level, except for the **Auto** option. The **Auto** option places the TDCU based on the value that is set at the network-level.

**Note** You can edit the TDCU unit only when DCU1 and DCU2 is set to Auto, and you can edit DCU1 and DCU2 only when the TDCU unit is set to Auto.

- FDCU—Choose the FDCU unit from the drop-down list. The options are Auto, None, 15216-FBGDCU-165, 15216-FBGDCU-331, 15216-FBGDCU-496, 15216-FBGDCU-661, 15216-FBGDCU-826, 15216-FBGDCU-992, 15216-FBGDCU-1157, 15216-FBGDCU-1322, 15216-FBGDCU-1653, 15216-FBGDCU-1983. The Auto option places a FDCU unit only if the value of the FDCU field is set to “Always” at the network level.

**Note** This field is enabled only if the amplifier selected in the Bst field is OPT-AMP-C in the To Fiber area.

- Attenuator In—Choose from the drop-down list the attenuator to be placed before the post amplifier position.
- Attenuator Out—Choose from the drop-down list the attenuator to be placed after the post amplifier position.

**Note** The Attenuator In and Attenuator Out properties are enabled only when a booster is selected in the BST drop-down list in the To Fiber area.

c) In the **Properties** pane, **General** area, complete the following tasks as needed:

- From the **OSC** drop-down list, choose **OSC-CSM**, **OSCM** or **FLD-OSC**.
- For C-Band Amplifiers, check the **Enable Inline DCU** check box in the **General** area of the **Properties** pane to use an inline DCU along with a Release 10.5 SMR-9 or SMR-20 card.

**Note** The FLD-OSC option is valid only for Line or Terminal sites with passive mux/demux (MD-40/EF-40) and Passive OADM (FLD4) Units. FLD-OSC is incompatible with Active OADM or ROADM cards.

d) In the **Properties** pane, **Raman Amplification** area, complete the following tasks as needed:

**Note** Options in the Raman Amplification area are enabled for a side only if the fiber span connected to it is Raman amplified. For information about enabling Raman amplification on a fiber span, see the “4.14 Editing Fiber Span, Pair, and Fiber Parameters” section on page 4-73.

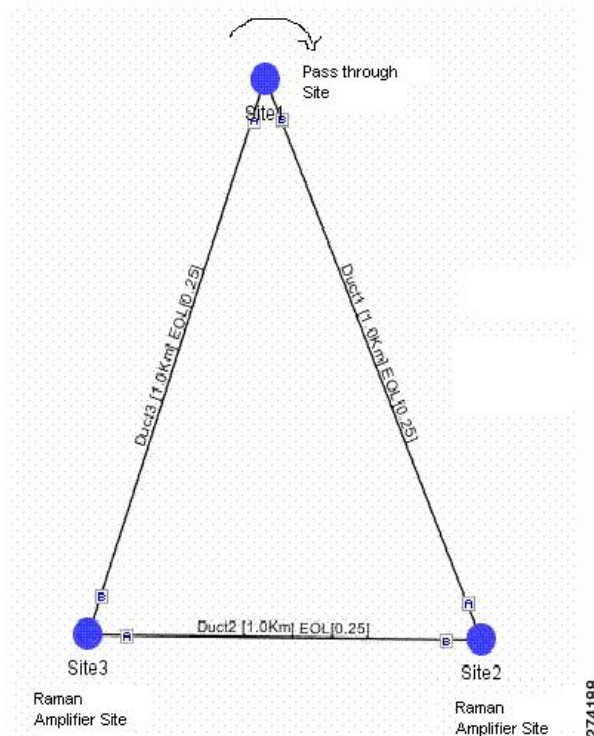
**RAMAN**—Choose the Raman amplifier from the drop-down list. The options available are Auto, RAMAN-CTP, RAMAN-CTP-COP, OPT-RAMP-CE, and OPT-RAMP-C. EDRA amplifiers are available here only if they are chosen in the PRE area. These rules are applicable to RAMAN-CTP and RAMAN-COP configurations:

- On selecting the RAMAN-CTP option, CTP places the 15454-M-RAMAN-CTP unit.
- On selecting the RAMAN-COP-CTP option, CTP places both the 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP units. The 15454-M-RAMAN-COP unit cannot be placed as standalone.
- The 15454-M-RAMAN-CTP and 15454-M-RAMAN-COP units are placed only in M2, M15, or M6 chassis and cannot be used without post-amplifiers.
- The DCN extension has to be enabled on the Raman amplified span.
- On selecting the RAMAN-CTP or RAMAN-CTP-COP option, the DCU1, DCU2, and TDCU parameters in the Raman Amplification area are disabled.
- The Raman amplified span must have the same configuration at both ends, that is, either RAMAN-CTP or RAMAN-COP-CTP.
- If the node on which RAMAN-CTP or RAMAN-CTP-COP has been configured is not a terminal or hub, then it should have the gain equalization capability. Therefore, such a node must be equipped with either 40-SMR1-C, 40-SMR2-C, 40-WXC-C, 80-WXC-C, 32MUX-O, 32DMX-O, or any WSS unit.
- The RAMAN-CTP link can traverse up to two consecutive Raman amplified spans; whereas, the RAMAN-CTP-COP link can traverse only one Raman amplified span. However, the Raman amplified span can have intermediate pass-through nodes.
- The traffic traversing the RAMAN-CTP-COP configured span must be dropped at the sides where the Raman amplified span terminates.
- If the RAMAN-CTP option is selected in the Restricted Equipment list, the RAMAN-COP option is selected implicitly.

**Note** A Raman amplifier must not be placed on a pass-through site. For example, in Figure 4-1, Site 1 is a pass-through site. The algorithm treats the span between Site 3 and Site 1 and the span between Site 1 and Site 2 as one span, and places the Raman amplifier on the external sites (Site2 and Site 3) on the ends of the span.

**Note** When EDRA amplifiers are chosen in the PRE area, the corresponding EDRA amplifiers are automatically set in the RAMAN section even when RAMAN amplification is disabled. When RAMAN amplification is enabled, the RAMAN-CTP and RAMAN-COP-CTP options are also available.

Figure 28: Sites with Raman Amplifier



- DCU1—Choose the DCU from the drop-down list.
- DCU2—Choose the DCU from the drop-down list.
- Gain—Enter the gain value.
- Tilt—Enter the tilt value.
- TDCU—Select the TDCU Type from the **TDCU units forcing** dialog box. You can force any of the following TDCU types:
  - Auto—CTP automatically places the fixed DCU units in the network.
  - AUTO-Fixed—CTP automatically places the fixed DCU units.
  - AUTO-TDCU—CTP automatically places the TDCU units
  - T-DCU Fine— Select the TDCU Type as T-DCU Fine and choose the compensation value from the Compensation drop-down list. The CTP places the T-DCU Fine unit in the network. If you select the compensation value as Auto, CTP chooses the optimum compensation value.
  - T-DCU Coarse—Select the TDCU Type as T-DCU Coarse and choose the compensation value from the Compensation drop-down list. The CTP places the T-DCU Coarse unit in the network. If you select the compensation value as Auto, CTP chooses the optimum compensation value.

**Note** Forcing the TDCU at the site-level overrides the design rules that is set at the network-level. The TDCU type that is set at the site-level overrides the placement rules set at the network-level, except for the **Auto** option. The **Auto** option places the TDCU based on the value that is set at the network-level.

**Note** You can edit the TDCU unit only when the Raman Amplified option is selected in the fiber couple.

**Note** You can edit the TDCU unit only when DCU1 and DCU2 is set to Auto, and you can edit DCU1 and DCU2 only when the TDCU unit is set to Auto.

- FDCU—Choose the FDCU unit from the drop-down list. The options are Auto, None, 15216-FBGDCU-165, 15216-FBGDCU-331, 15216-FBGDCU-496, 15216-FBGDCU-661, 15216-FBGDCU-826, 15216-FBGDCU-992, 15216-FBGDCU-1157, 15216-FBGDCU-1322, 15216-FBGDCU-1653, 15216-FBGDCU-1983. The Auto option places a FDCU unit only if the value of the FDCU field is set to “Always” at the network level.

**Note** The OPT-RAMP-C and OPT-RAMP-CE cards support FDCU units.

- No post-amplifier—Check this check box to configure the Raman amplifier without having a post amplifier on the other side of the site. This configuration is useful in networks with special fibers where the power of channels entering the fiber is very low.

The No post-amplifier check box is enabled only when the site structure is set to Line with the functionality as Line Amplifier and the type as Line.

When the No post-amplifier check box is checked, the DCU1, DCU2, and TDCU parameters in the Raman Amplification area are disabled.

- In fiber output power—Specify the value of the maximum power allowed to enter the fiber at the other side of the node.

You can edit the In fiber output power only when the No post-amplifier check box is checked.

**Note** In the Upgrade or Install mode, the No post-amplifier and the In fiber output properties are enabled only when the amplifier node is unlocked. For more information about unlocking site parameters, see the “2.10.5 Unlocking Parameters in the Network Design” section on page 2-53

**Step 6** To modify the add/drop parameters, click **Add/Drop** in the Project Explorer pane for the selected site interface. Choosing a value other than Auto will force a setting on the unit.

- In the OADM area, choose OADM or FLD units from the OADM Forcing drop-down list.
- In the Odd Grid Units area of the Properties pane, complete the following as needed:
  - Patch Panel—Choose the patch panel from the drop-down list. The available options are Auto, PP-80-LC, 2RU 64 ports LC Patch Panel, and 1RU 64 ports Patch Panel.
  - Demux—Choose the demultiplexer from the drop-down list. The available options are Auto, EF-40-ODD, MD-48-ODD, MD-40-ODD, FLA-8, 40-DMX-C, 32-DMX-O, and 32-DMX. The default option is Auto, which selects the EF-40-ODD unit.
  - Mux—Choose the multiplexer from the drop-down list. The available options are Auto, EF-40-ODD, MD-48-ODD, MD-40-ODD, FLA-8, 40-MUX-C, 40-WSS, 32-MUX-O, and 32-WSS. The default option is Auto, which selects the EF-40-ODD unit.
- In the **Even Grid Units** area of the **Properties** pane, complete the following as needed:
  - Patch Panel—Choose the patch panel from the drop-down list. The available options are Auto and PP-80-LC.
  - Demux—Choose the demultiplexer from the drop-down list. The available options are Auto, EF-40-EVEN, MD-48-EVEN, 40-DMX-CE, and MD-40-EVEN. The default option is Auto, which selects the EF-40-EVEN unit.

- Mux—Choose the multiplexer from the drop-down list. The available options are Auto, EF-40-EVEN, MD-48-EVEN, 40-WSS-CE, and MD-40-EVEN. The default option is Auto, which selects the EF-40-EVEN unit.

d) In the **Interleaver/Deinterleaver** area of the **Properties** pane, choose the interleaver/deinterleaver from the drop-down list. The available options are Auto, MD-48-CM, and MD-ID-50. The default option is Auto, which selects the MD-48-CM unit.

**Note** The FLD-4 units must be equipped as local add/drop units connected to the cross-connect card (SMR/WXC card) when they are forced on non-OADM site types.

- For the SMR, if the patch panel forced is different from an SMR PP MESH 4, then WSS is the site type instead of SMR.
- The EF-40-ODD/EVEN units and the MD-48-ODD/EVEN units support 48 and 96 channels respectively.
- If you select the MD-40-ODD, MD-40-EVEN, EF-40-ODD, or EF-40-EVEN unit as the mux, the same unit is automatically forced as the demux and vice-versa. The patch panel settings become uneditable if you choose the MD-40-ODD, MD-40-EVEN, EF-40-ODD, or EF-40-EVEN as the mux/demux unit.
- When FLA-8 is selected as the mux in a HYBRID 15454 ONS network, the same unit is automatically forced as the demux and vice-versa.
- When the MD-48-ODD and MD-48-EVEN units are selected as mux in a 96-channel HYBRID 15454 ONS network, the same units are automatically forced as the demux and vice-versa. The patch panel settings become uneditable.
- You can place the EF-40-ODD, EF-40-EVEN, MD-40-ODD, MD-40-EVEN, MD-48-ODD, MD-48-EVEN, MD-48-CM, and MD-ID-50 units in the Restricted Equipment list.

**Step 7** To add Alien Shelves to the network, choose the required site from the Project Explorer. In the properties pane, complete the following:

- Alien Shelf Name—Enter the name of the alien shelves to be added to the site. This name is displayed in the layout reports.
- Number of Alien Shelves—Enter the number of alien shelves to be added to the site.

Number of alien shelves can vary based on the alien shelf height. The maximum number of alien shelves that can be added is 645, if the alien shelf height is 1RU (rack height being 44 rack units) and there are no other shelves in the layout.

The maximum number of racks supported for a site is 15. If the addition of alien shelves require more than 15 racks, an error message is displayed in the summary report and the layout is not built for the site.

- Alien Shelf Height—Enter the height of the alien shelves in rack units (RU). If the alien shelf height is greater than the rack height, alien shelves are not added to the site. An error message is displayed for the same in the summary report.

Alien shelves are displayed only in the Layout report and are not listed in any other report. Alien shelves are not be added to the BoM.

Table 40: Site Design Rules for MSTP 15454 ONS Configuration - Line Structure

| Feature        | Type          | Card Options                              | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|----------------|---------------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|                |               |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M5  | M2  |
| Pass Through   | —             | —   | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | Yes           | —            | —   | —   |
| Line amplifier | Line          | Inline AT1                                | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | Yes           | Yes          | Yes | Yes |
|                | Glass Through | —   | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | Yes           | Yes          | Yes | Yes |
| OSC Site       | —             | —   | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | Yes           | Yes          | Yes | Yes |
| Add/Drop       | OADM          | List of AD-xC units<br>INLINE<br>ATT1     | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|                |               | FLD-4 Units                               | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|                | DMX           | Add:<br>32-MUX-O<br><br>Drop:<br>32-DMX-O | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |

| Entity | Type | Card Options                              | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|--------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|        |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
| Hub    | MDM  | Add:<br>32-MUX-O<br><br>Drop:<br>32-DMX-O | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|        |      | Add:<br>40-MUX-O<br><br>Drop:<br>40-DMX-O | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|        |      | 15216-<br>MD-40ODD<br>(MD-ID-50)          | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |      | 15216-<br>MD-40-<br>EVEN                  | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |      | 15216-EF40-<br>ODD<br>(MDXXYY)            | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |      | 15216-EF40-<br>EVEN                       | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        | WSS  | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-O | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|        |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C | Yes            | Yes   | No     | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|        |      |   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |

| Family | Type | Card Options                                | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|--------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|        |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6  | M2  |
|        |      | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE |                |       |        |        |              |        |        |               |              |     |     |
|        | 4BVR | 15216-MD40ODD                               | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | FLD-4 Units                                 | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | 15216-EF40-ODD                              | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|        |      | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C   | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|        |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C   | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|        | 4BVR | 15216-MD40ODD                               | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | 15216-EF40-ODD                              | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | FLD-4 Units                                 | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|        |      |   | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |



| Entry | Type | Card Options                              | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|-------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|       |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
|       |      | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C |                |       |        |        |              |        |        |               |              |     |     |
|       |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|       | 8WXC | 15216-<br>MD-40ODD<br>(MD-ID-50)          | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|       |      | FLD-4<br>Units                            | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|       |      | 15216-<br>MD-40-<br>EVEN                  | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|       |      | 15216-EF-40-<br>ODD<br>(MDXX-YY)          | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|       |      | 15216-EF-40-<br>EVEN                      | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|       |      | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|       |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C | Yes            | No    | No     | Yes    | Yes          | Yes    | No     | No            | Yes          | No  | No  |
|       |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |

| Family | Type                   | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|--------|------------------------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|        |                        |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6  | M2  |
|        |                        | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE<br>(15216-ID-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        | <del>8000</del><br>DMX | 15216-<br>MD-40<br>ODD                                       | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |                        | FLD-4<br>Units   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |                        | 15216-<br>MD-40-<br>EVEN                                     | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |                        | 15216-EF-40-<br>ODD<br>(MD-XX-YY)                            | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |                        | 15216-EF-40-<br>EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |                        | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|        |                        | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C                    | Yes            | No    | No     | Yes    | Yes          | Yes    | No     | No            | Yes          | No  | No  |
|        |                        | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |                        | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE                  | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |

| Entity      | Type             | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|-------------|------------------|----------------|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|             |                  |                | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
| Gain Equipt | WSS              | Add: 32-WSS-C  | Yes            | No    | No     | Yes    | Yes          | Yes    | No     | Yes           | Yes          | No  | No  |
|             |                  | 40-WSS-C       | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|             |                  | Add: 40-WSS-CE | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|             | <del>40WRC</del> | None           | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|             | <del>40WRC</del> | None           | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|             | <del>80WRC</del> | None           | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |

| Family | Type  | Card Options                                | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |      |     |     |
|--------|-------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|------|-----|-----|
|        |       |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6M5 | M2  |     |
| ROADM  | WSS   | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-O   | Yes            | No    | No     | Yes    | Yes          | No     | No     | No            | Yes          | No   | No  |     |
|        |       | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | No    | No     | Yes    | Yes          | Yes    | No     | Yes           | Yes          | No   | No  |     |
|        |       | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes  | No  |     |
|        |       | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No   | No  |     |
|        | 48MRC | 15216-MD40ODD                               |                | Yes   | Yes    | Yes    | Yes          | No     | No     | No            | No           | Yes  | Yes | Yes |
|        |       |   |                | Yes   | Yes    | Yes    | Yes          | No     | No     | No            | No           | Yes  | Yes | Yes |
|        |       | FLD-4 Units                                 | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes  | Yes |     |
|        |       | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No   | No  |     |
|        |       | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C   | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes  | No  |     |
|        |       |   | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No   | No  |     |

| Entry | Type             | Card Options                              | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |       |     |  |
|-------|------------------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-------|-----|--|
|       |                  |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M5 | M2  |  |
|       |                  | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C |                |       |        |        |              |        |        |               |              |       |     |  |
|       | <del>40WRC</del> | 15216-MD-40ODD                            | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |  |
|       |                  | 15216-EF-40-ODD                           | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |  |
|       |                  | FLD-4 Units                               | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |  |
|       |                  | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No    | No  |  |
|       |                  | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | No  |  |
|       |                  | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No    | No  |  |
|       | <del>80WRC</del> | 15216-MD-40ODD (MD-ID-50)                 | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes   | No  |  |
|       |                  | FLD-4 Units                               | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |  |
|       |                  | 15216-MD-40-EVEN                          | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes   | No  |  |
|       |                  |   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | No  |  |

| Family | Type                               | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|--------|------------------------------------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|        |                                    |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M5  | M2  |
|        |                                    | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C                    |                |       |        |        |              |        |        |               |              |     |     |
|        |                                    | 15216-EF-40-ODD<br>(MD-XX-YY)                                | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |                                    | 15216-EF-40-EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |                                    | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |                                    | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |                                    | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE<br>(15216-ID-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        | <del>8WXC</del><br><del>M12M</del> | 15216-MD-40-ODD  | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |                                    | FLD-4 Units  | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |                                    | 15216-MD-40-EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |                                    | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |

| Family       | Type | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|--------------|------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|              |      |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
|              |      | 15216-EF-40-ODD<br>(MDXXYY)                              | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|              |      | 15216-EF-40-EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|              |      | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|              |      | Add:<br>40-WSS-C<br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|              |      | Add:<br>40-WSS-CE<br>Drop:<br>40-DMX-CE<br>(15216-ID-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
| Includes MMU |      |  |                |       |        |        |              |        |        |               |              |     |     |
| Hub          | WSS  | Add:<br>32-WSS-C<br>Drop:<br>32DMX-O                     | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|              |      | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | Yes           | Yes          | No  | No  |

| Family | Type | Card Options                              | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |    |
|--------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|----|
|        |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2 |
| ROADM  | WSS  | Add:<br>32-WSS-C<br><br>Drop:<br>32DMX-O  | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No |
|        |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C | Yes            | No    | Yes    | Yes    | No           | No     | No     | Yes           | Yes          | No  | No |



Table 41: Site Design Rules for MSTP 15454 ONS Configuration - Terminal Structure

| Entry | Type | Card Options                          | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |      |     |
|-------|------|---------------------------------------|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|------|-----|
|       |      |                                       | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | MGM5 | M2  |
| Add   | AD-C | OADM cards                            | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No   | No  |
|       |      | FLD-4 Units                           | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes  | Yes |
|       | MD-C | Add:<br>32MUX-O<br>Drop:<br>32DMX-O   | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No   | No  |
|       |      | Add:<br>40-MUX-C<br>Drop:<br>40-DMX-C | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes  | No  |
|       |      | 15216-MD-40-ODD<br>(MD-ID-50)         | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | Yes           | Yes          | Yes  | Yes |
|       |      | 15216-MD-40-EVEN                      | No             | No    | No     | No     | Yes          | Yes    | Yes    | Yes           | Yes          | Yes  | Yes |
|       |      | 15216-EF-40-ODD<br>(MD-XX-YY)         | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes  | Yes |
|       |      | 15216-EF-40-EVEN                      | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes  | Yes |

| Entry | Type | Card Options                                | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|-------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|       |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
| RDM   | WSS  | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-O   | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|       |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | Yes   | No     | Yes    | Yes          | Yes    | No     | Yes           | Yes          | No  | No  |
|       |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C   | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|       |      | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
| RMC   |      | 15216-MD40-ODD                              | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|       |      | 15216-EF40-ODD                              | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|       |      | FLD-4 Units                                 | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|       |      | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C   | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|       |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C   | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|       |      |   | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |

| Empty | Type           | Card Options                          | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |       |     |
|-------|----------------|---------------------------------------|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-------|-----|
|       |                |                                       | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M5 | M2  |
|       |                | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C |                |       |        |        |              |        |        |               |              |       |     |
|       | <del>SMC</del> | 15216-MD-40-ODD                       | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |
|       |                | 15216-EF-40-ODD                       | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |
|       |                | FLD-4 Units                           | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |
|       |                | Add:<br>40-MUX-C<br>Drop:<br>40-DMX-C | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | No  |
|       |                | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C | Yes            | Yes   | No     | Yes    | No           | No     | No     | No            | Yes          | No    | No  |
|       |                | Add:<br>40-WSS-C<br>Drop:<br>40-DMX-C | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No    | No  |
|       | <del>SMC</del> | 15216-MD-40-ODD (MD-ID-50)            | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes   | No  |
|       |                | 15216-MD-40-EVEN                      | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes   | No  |
|       |                | 15216-EF-40-ODD (MD-XX-YY)            | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes   | Yes |
|       |                |                                       | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes   | Yes |

| Entry | Type                             | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |       |     |
|-------|----------------------------------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-------|-----|
|       |                                  |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M5 | M2  |
|       |                                  | 15216-EF-40-EVEN   |                |       |        |        |              |        |        |               |              |       |     |
|       |                                  | FLD-4 Units  | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |
|       |                                  | Add:<br>40-MUX-C<br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | No  |
|       |                                  | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No    | No  |
|       |                                  | Add:<br>40-WSS-C<br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No    | No  |
|       |                                  | Add:<br>40-WSS-CE<br>Drop:<br>40-DMX-CE<br>(15216-ID-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No    | No  |
|       | <del>MXC</del><br><del>MDX</del> | 15216-MD-40-ODD  | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes   | No  |
|       |                                  | 15216-MD-40-EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes   | No  |
|       |                                  | 15216-EF-40-ODD<br>(MD-XX-YY)                            | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes   | Yes |
|       |                                  | 15216-EF-40-EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes   | Yes |
|       |                                  | FLD-4 Units  | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | Yes |

| Empty        | Type | Card Options                                | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |       |    |
|--------------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-------|----|
|              |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M5 | M2 |
|              |      | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes   | No |
|              |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No    | No |
|              |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No    | No |
|              |      | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No    | No |
| Includes MMU |      |   |                |       |        |        |              |        |        |               |              |       |    |
| ODM          | WSS  | Add:<br>32-WSS-C<br><br>Drop:<br>32DMX-O    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No    | No |
|              |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | No    | Yes    | Yes    | No           | No     | No     | Yes           | Yes          | No    | No |

Table 42: Site Design Rules for MSTP 15454 ONS Configuration - Multi-Degree Structure

| Entry | Type                   | Card Options  | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |        |     |
|-------|------------------------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|--------|-----|
|       |                        |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M15 | M2  |
| OXC   | 40 WXC<br>RMSH<br>4    | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C               | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No     | No  |
|       |                        | Add:<br>40-MUX-C<br>Drop:<br>40-DMX-C               | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | No  |
|       |                        | Add:<br>40-WSS-C<br>Drop:<br>40-DMX-C               | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No     | No  |
|       |                        | Add:<br>80-WXC-C<br>MUX<br>Drop:<br>80-WXC-C<br>DMX | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No     | No  |
|       | <del>WXC</del><br>RMSH | 15216-<br>MD-40-ODD<br>(MD-ID-50)                   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes    | No  |
|       |                        | 15216-<br>MD-40-<br>EVEN                            | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes    | No  |
|       |                        | 15216-EF-40-<br>ODD<br>(MD-XX-YY)                   | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes    | Yes |
|       |                        | 15216-EF-40-<br>EVEN                                | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes    | Yes |
|       |                        | FLD-4<br>Units                                      | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | Yes |
|       |                        |   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | No  |

| Empty | Type          | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |    |
|-------|---------------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|----|
|       |               |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2 |
|       |               | Add:<br>40-MUX-C<br>Drop:<br>40-DMX-C                    |                |       |        |        |              |        |        |               |              |     |    |
|       |               | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No |
|       |               | Add:<br>40-WSS-C<br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No |
|       |               | Add:<br>40-WSS-CE<br>Drop:<br>40-DMX-CE<br>(15216-ID-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No |
|       |               | Add:<br>80-WXC-C<br>MUX<br>Drop:<br>80-WXC-C<br>DMX      | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No |
|       | 40 WXC/PP-M15 | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No |
|       |               | Add:<br>40-MUX-C<br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No |
|       |               |  | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No |

| Entry | Type                               | Card Options  | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |        |     |
|-------|------------------------------------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|--------|-----|
|       |                                    |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M15 | M2  |
|       |                                    | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C               |                |       |        |        |              |        |        |               |              |        |     |
|       |                                    | Add:<br>80-WXC-C<br>MUX<br><br>Drop:<br>80-WXC-C<br>DMX | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No     | No  |
|       | <del>80WXC</del><br><del>DMX</del> | 15216-<br>MD-40-ODD<br>(MD-ID-50)                       | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes    | No  |
|       |                                    | 15216-<br>MD-40-<br>EVEN                                | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes    | No  |
|       |                                    | 15216-EF-40-<br>ODD<br>(MD-XX-YY)                       | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes    | Yes |
|       |                                    | 15216-EF-40-<br>EVEN                                    | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes    | Yes |
|       |                                    | FLD-4<br>Units  | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | Yes |
|       |                                    | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C               | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | No  |
|       |                                    | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C               | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No     | No  |
|       | <del>80WXC</del><br><del>DMX</del> |   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No     | No  |



| Entry | Type            | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |        |     |
|-------|-----------------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|--------|-----|
|       |                 |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M5/M15 | M2  |
|       |                 | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C                    |                |       |        |        |              |        |        |               |              |        |     |
|       |                 | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE<br>(15216-ID-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No     | No  |
|       |                 | Add:<br>80-WXC-C<br>MUX<br><br>Drop:<br>80-WXC-C<br>DMX      | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No     | No  |
|       | <del>800R</del> | 15216-<br>MD-40-ODD  | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | No  |
|       |                 | 15216-EF-40-<br>ODD  | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | Yes |
|       |                 | FLD-4<br>Units   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | Yes |
|       |                 | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | No  |
|       |                 | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No     | No  |
|       |                 | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No     | No  |

| Entry | Type   | Card Options                                      | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |        |    |
|-------|--------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|--------|----|
|       |        |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M15 | M2 |
|       |        | Add:<br>80-WXC-C MUX<br><br>Drop:<br>80-WXC-C DMX | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No     | No |
|       | Flexic | —   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes    | No |

| Embry | Type                             | Card Options                                | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|-------|----------------------------------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|       |                                  |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
| OIC   | WSS                              | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | No    | No     | Yes    | Yes          | Yes    | No     | No            | Yes          | No  | No  |
|       |                                  | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-O   | Yes            | No    | No     | Yes    | Yes          | Yes    | No     | No            | Yes          | No  | No  |
|       |                                  | Add:<br>40-WSS-E<br><br>Drop:<br>40-DMX-E   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|       |                                  | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|       | <del>WSS</del><br><del>MDX</del> | 15216-<br>MD-40-ODD                         | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|       |                                  | 15216-<br>MD-40-<br>EVEN                    | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|       |                                  | 15216-EF40-<br>ODD<br>(MD-XX-YY)            | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|       |                                  | 15216-EF40-<br>EVEN                         | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|       |                                  | FLD-4<br>Units                              | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|       |                                  | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|       |                                  | Yes   | No             | Yes   | Yes    | Yes    | Yes          | Yes    | No     | Yes           | No           | No  |     |

| Entry | Type | Card Options                                | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |       |    |
|-------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-------|----|
|       |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M5 | M2 |
|       |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   |                |       |        |        |              |        |        |               |              |       |    |
|       |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No    | No |
|       |      | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No    | No |

**Table 43: Site Design Rules for MSTP 15454 ONS Configuration - PSM Terminal**

| Entry                       | Type | Card Options | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |       |    |
|-----------------------------|------|--------------|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-------|----|
|                             |      |              | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M6/M5 | M2 |
| Multiple Section Protection |      |              |                |       |        |        |              |        |        |               |              |       |    |

| Entry    | Type  | Card Options                    | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|----------|-------|---------------------------------|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|          |       |                                 | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
| Add/Drop | ADx-C | OADM cards                      | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|          |       | FLD-4 Units                     | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|          | MDx   | Add: 40-MUX-C<br>Drop: 40-DMX-C | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|          |       | 15216-MD40ODD (MD-ID-50)        | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | Yes           | Yes          | Yes | Yes |
|          |       | 15216-MD-40-EVEN                | No             | No    | No     | No     | Yes          | Yes    | Yes    | Yes           | Yes          | Yes | Yes |
|          |       | 15216-EF-40-ODD                 | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|          |       | 15216-EF-40-EVEN                | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |

| Family | Type | Card Options                                | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|--------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|        |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
| ROADM  | WSS  | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | Yes   | No     | Yes    | Yes          | Yes    | No     | No            | Yes          | No  | No  |
|        |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C   | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |      | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
| ROADM  | WXC  | 15216-MD40ODD<br>(MD-ID-50)                 | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |      | 15216-MD-40-EVEN                            | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |      | 15216-EF40-ODD<br>(MDXXYY)                  | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |      | 15216-EF40-EVEN                             | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |      | FLD-4 Units                                 | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |      | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C   | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |

| Entry | Type                               | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|-------|------------------------------------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|       |                                    |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
|       |                                    | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE<br>(15216-ID-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|       | <del>8WXC</del><br><del>MD4K</del> | 15216-<br>MD40ODD  | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|       |                                    | 15216-<br>MD-40-<br>EVEN                                     | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|       |                                    | 15216EF40-<br>ODD<br>(MD-XX-YY)                              | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|       |                                    | 15216EF40-<br>EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|       |                                    | FLD-4<br>Units   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|       |                                    | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|       |                                    | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|       |                                    | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|       |                                    |  | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |

| Family                  | Type  | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|-------------------------|-------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|                         |       |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
|                         |       | Add:<br>40-WSS-CE<br>Drop:<br>40-DMX-CE<br>(15216-ID-50) |                |       |        |        |              |        |        |               |              |     |     |
| Optical Path Protection |       |  |                |       |        |        |              |        |        |               |              |     |     |
| Add/Drop                | ADx3C | OADM cards   | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|                         |       | FLD-4 Units  | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|                         | MDx3x | Add:<br>40-MUX-C<br>Drop:<br>40-DMX-C                    | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|                         |       | 15216-MD40ODD (MD-ID-50)                                 | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | Yes           | Yes          | Yes | Yes |
|                         |       | 15216-MD-40-EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | Yes           | Yes          | Yes | Yes |
|                         |       | 15216-EF40-ODD (MDXXYY)                                  | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|                         |       | 15216-EF40-EVEN  | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |



| Entry                   | Type | Card Options                      | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|-------------------------|------|-----------------------------------|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|                         |      |                                   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
| ROADM                   | WSS  | Add: 32-WSS-C<br>Drop: 32-DMX-C   | Yes            | Yes   | No     | Yes    | Yes          | Yes    | No     | No            | Yes          | No  | No  |
|                         |      | Add: 40-WSS-C<br>Drop: 40-DMX-C   | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|                         |      | Add: 40-WSS-CE<br>Drop: 40-DMX-CE | No             | No    | No     | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
| <del>ROADM</del><br>MRC | MD40 | 15216-MD40ODD                     | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|                         |      | 15216EF40-ODD                     | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|                         |      | FLD-4 Units                       | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|                         |      | Add: 32-WSS-C<br>Drop: 32-DMX-C   | Yes            | No    | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|                         |      | Add: 40-MUX-C<br>Drop: 40-DMX-C   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|                         |      | Add: 40-WSS-C<br>Drop: 40-DMX-C   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
| <del>ROADM</del><br>MRC | MD40 | 15216-MD40ODD                     | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|                         |      | 15216EF40-ODD                     | Yes            | Yes   | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |

| Family | Type | Card Options                          | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|--------|------|---------------------------------------|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|        |      |                                       | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M12 | M2  |
|        |      | FLD-4 Units                           | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C | Yes            | No    | No     | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|        |      | Add:<br>40-MUX-C<br>Drop:<br>40-DMX-C | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|        |      | Add:<br>40-WSS-C<br>Drop:<br>40-DMX-C | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | No  | No  |
|        |      | 15216-MD40ODD<br>(MD-ID-50)           | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |      | 15216-MD-40-EVEN                      | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | No  |
|        |      | 15216EF40-ODD<br>(MDXXYY)             | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |      | 15216EF40-EVEN                        | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |      | FLD-4 Units                           | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |      | Add:<br>32-WSS-C<br>Drop:<br>32-DMX-C | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |      |                                       | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |

| Entity | Type                               | Card Options   | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |     |     |
|--------|------------------------------------|--|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|-----|-----|
|        |                                    |  | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | M15 | M2  |
|        |                                    | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C                    |                |       |        |        |              |        |        |               |              |     |     |
|        |                                    | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE<br>(15216-ID-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        | <del>8WXC</del><br><del>MD40</del> | 15216-<br>MD40ODD  | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |                                    | 15216-<br>MD-40-<br>EVEN                                     | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |                                    | 15216EF40-<br>ODD<br>(MD-XX-YY)                              | Yes            | Yes   | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |                                    | 15216EF40-<br>EVEN   | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | Yes | Yes |
|        |                                    | FLD-4<br>Units   | Yes            | No    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | Yes |
|        |                                    | Add:<br>40-MUX-C<br><br>Drop:<br>40-DMX-C                    | Yes            | NO    | Yes    | Yes    | No           | No     | No     | No            | Yes          | Yes | No  |
|        |                                    | Add:<br>32-WSS-C<br><br>Drop:<br>32-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |
|        |                                    | Add:<br>40-WSS-C<br><br>Drop:<br>40-DMX-C                    | Yes            | No    | Yes    | Yes    | Yes          | Yes    | Yes    | No            | Yes          | No  | No  |

| Family | Type | Card Options  | C-band 100 GHz |       |        |        | C-band 50GHz |        |        | L-band 100GHz | Shelf Option |                |    |
|--------|------|---|----------------|-------|--------|--------|--------------|--------|--------|---------------|--------------|----------------|----|
|        |      |   | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 64 Chs       | 72 Chs | 80 Chs | 32 Chs        | M12          | <del>M15</del> | M2 |
|        |      | Add:<br>40-WSS-CE<br><br>Drop:<br>40-DMX-CE<br>(152164D-50) | No             | No    | No     | No     | Yes          | Yes    | Yes    | No            | Yes          | No             | No |

Table 44: Site Design Rules for HYBRID 15454 ONS Configuration (with FlexLayer Modules)

| Structure | Entry        | Type                       | Card Options               | C-band 100 GHz |       |        |        |        | C-band 50GHz |        |        |        |     | Shelf Option |     |  |
|-----------|--------------|----------------------------|----------------------------|----------------|-------|--------|--------|--------|--------------|--------|--------|--------|-----|--------------|-----|--|
|           |              |                            |                            | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 48 Chs | 64 Chs       | 72 Chs | 80 Chs | 96 Chs | M12 | M15          | M2  |  |
| Line      | Pass Through | N/A                        | —                          | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes | Yes          | Yes |  |
|           | OLA          | Line amplifier             | FLA and FLB modules        | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes | Yes          | Yes |  |
|           |              | Pass Through               | —                          | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes | Yes          | Yes |  |
|           | OCSC         | —                          | —                          | Yes            | Yes   | Yes    | Yes    | No     | No           | No     | No     | No     | Yes | Yes          | Yes |  |
|           | AddP         | OADM                       | FLA, FLB, and FLD4 modules | Yes            | Yes   | Yes    | Yes    | No     | No           | No     | No     | No     | Yes | Yes          | Yes |  |
|           |              |                            | MCM                        | SC4B + FLA8    | Yes   | No     | No     | Yes    | No           | No     | No     | No     | Yes | Yes          | Yes |  |
|           |              | MDD                        |                            | Yes            | Yes   | Yes    | Yes    | No     | Yes          | Yes    | Yes    | No     | Yes | Yes          | Yes |  |
|           |              | MEN                        |                            | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | No     | Yes | Yes          | Yes |  |
|           |              | MDD                        |                            | Yes            | Yes   | Yes    | Yes    | No     | Yes          | Yes    | Yes    | No     | Yes | Yes          | Yes |  |
|           |              | MEN                        |                            | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | No     | Yes | Yes          | Yes |  |
| MDD       |              |                            | Yes                        | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes | Yes          |     |  |
| MEN       |              |                            | No                         | No             | No    | No     | No     | Yes    | Yes          | Yes    | Yes    | Yes    | Yes | Yes          |     |  |
| Hub       | OADM         | FLA, FLB, and FLD4 modules | Yes                        | Yes            | Yes   | Yes    | No     | No     | No           | No     | No     | Yes    | Yes | Yes          |     |  |

| Structure | Inventory | Type | Card Options       | C-band 100 GHz |       |        |        |        | C-band 50GHz |        |        |        | Shelf Option |     |     |     |     |
|-----------|-----------|------|--------------------|----------------|-------|--------|--------|--------|--------------|--------|--------|--------|--------------|-----|-----|-----|-----|
|           |           |      |                    | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 48 Chs | 64 Chs       | 72 Chs | 80 Chs | 96 Chs | M12          | M15 | M2  |     |     |
|           |           | M12  | SC4B + FLA8        | Yes            | No    | No     | Yes    | No     | No           | No     | No     | No     | Yes          | Yes | Yes |     |     |
|           |           |      | M12                | Yes            | Yes   | Yes    | Yes    | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |     |     |
|           |           |      | M15                | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |     |     |
|           |           |      | H12                | Yes            | Yes   | Yes    | Yes    | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |     |     |
|           |           |      | H15                | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |     |     |
|           |           |      | M12                | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes | Yes |     |
|           |           |      | M15                | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes | Yes |     |
| Terminal  | AdDp      | OADM | FLA and FLB models | Yes            | Yes   | Yes    | Yes    | No     | No           | No     | No     | No     | Yes          | Yes | Yes |     |     |
|           |           |      | M12                | SC4B + FLA8    | Yes   | No     | No     | Yes    | No           | No     | No     | No     | No           | Yes | Yes | Yes |     |
|           |           |      |                    | M12            | Yes   | Yes    | Yes    | Yes    | No           | Yes    | Yes    | Yes    | No           | Yes | Yes | Yes |     |
|           |           |      |                    | M15            | No    | No     | No     | No     | No           | Yes    | Yes    | Yes    | No           | Yes | Yes | Yes |     |
|           |           |      |                    | H12            | Yes   | Yes    | Yes    | Yes    | No           | Yes    | Yes    | Yes    | No           | Yes | Yes | Yes |     |
|           |           |      |                    | H15            | No    | No     | No     | No     | No           | Yes    | Yes    | Yes    | No           | Yes | Yes | Yes |     |
|           |           |      |                    | M12            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes | Yes | Yes |
|           |           |      |                    | M15            | No    | No     | No     | No     | No           | Yes    | Yes    | Yes    | Yes          | Yes | Yes | Yes | Yes |

Table 45: Site Design Rules for HYBRID 15454 ONS Configuration (with FlexLayer Modules)

| Structure | Entry        | Type                       | Card Options               | C-band 100 GHz |       |        |        |        | C-band 50GHz |        |        |        | Shelf Option |     |     |
|-----------|--------------|----------------------------|----------------------------|----------------|-------|--------|--------|--------|--------------|--------|--------|--------|--------------|-----|-----|
|           |              |                            |                            | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 48 Chs | 64 Chs       | 72 Chs | 80 Chs | 96 Chs | M12          | M15 | M2  |
| Line      | Pass Through | N/A                        | —                          | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes |
|           | OLA          | Line amplifier             | FLA and FLB modules        | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes |
|           |              | Pass Through               | —                          | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes |
|           | OCSC         | —                          | —                          | Yes            | Yes   | Yes    | Yes    | No     | No           | No     | No     | No     | Yes          | Yes | Yes |
|           | AddP         | OADM                       | FLA, FLB, and FLD4 modules | Yes            | Yes   | Yes    | Yes    | No     | No           | No     | No     | No     | Yes          | Yes | Yes |
|           |              | MCM                        | SC4B + FLA8                | Yes            | No    | No     | Yes    | No     | No           | No     | No     | No     | Yes          | Yes | Yes |
|           |              | MDD                        |                            | Yes            | Yes   | Yes    | Yes    | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |
|           |              | MEN                        |                            | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |
|           |              | MDD                        |                            | Yes            | Yes   | Yes    | Yes    | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |
|           |              | MEN                        |                            | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |
| MDD       |              |                            | Yes                        | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes |     |
| MEN       |              |                            | No                         | No             | No    | No     | No     | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes |     |
| Hub       | OADM         | FLA, FLB, and FLD4 modules | Yes                        | Yes            | Yes   | Yes    | No     | No     | No           | No     | No     | Yes    | Yes          | Yes |     |

| Structure | Kind | Type | Card Options       | C-band 100 GHz |       |        |        |        | C-band 50GHz |        |        |        | Shelf Option |     |     |     |     |
|-----------|------|------|--------------------|----------------|-------|--------|--------|--------|--------------|--------|--------|--------|--------------|-----|-----|-----|-----|
|           |      |      |                    | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 48 Chs | 64 Chs       | 72 Chs | 80 Chs | 96 Chs | M12          | M15 | M2  |     |     |
|           |      | M12  | SC4B + FLA8        | Yes            | No    | No     | Yes    | No     | No           | No     | No     | No     | Yes          | Yes | Yes |     |     |
|           |      |      | M12                | Yes            | Yes   | Yes    | Yes    | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |     |     |
|           |      |      | M15                | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |     |     |
|           |      |      | H12                | Yes            | Yes   | Yes    | Yes    | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |     |     |
|           |      |      | H15                | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | No     | Yes          | Yes | Yes |     |     |
|           |      |      | M12                | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes | Yes |     |
|           |      |      | M15                | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes | Yes |     |
| Terminal  | AdDp | OADM | FLA and FLB models | Yes            | Yes   | Yes    | Yes    | No     | No           | No     | No     | No     | Yes          | Yes | Yes |     |     |
|           |      |      | M12                | SC4B + FLA8    | Yes   | No     | No     | Yes    | No           | No     | No     | No     | No           | Yes | Yes | Yes |     |
|           |      |      |                    | M12            | Yes   | Yes    | Yes    | Yes    | No           | Yes    | Yes    | Yes    | No           | Yes | Yes | Yes |     |
|           |      |      |                    | M15            | No    | No     | No     | No     | No           | Yes    | Yes    | Yes    | No           | Yes | Yes | Yes |     |
|           |      |      |                    | H12            | Yes   | Yes    | Yes    | Yes    | No           | Yes    | Yes    | Yes    | No           | Yes | Yes | Yes |     |
|           |      |      |                    | H15            | No    | No     | No     | No     | No           | Yes    | Yes    | Yes    | No           | Yes | Yes | Yes |     |
|           |      |      |                    | M12            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | Yes | Yes | Yes |
|           |      |      |                    | M15            | No    | No     | No     | No     | No           | Yes    | Yes    | Yes    | Yes          | Yes | Yes | Yes | Yes |



**Table 46: Site Design Rules for NG-DWDM 15454 ONS Configuration (with FlexLayer Modules)**

| Site  | Embod     | Type          | Card Qtr | C-band 100 GHz |       |        |        |        | C-band 50GHz |        |        |        | Shelf Option |     |     |     |    |
|-------|-----------|---------------|----------|----------------|-------|--------|--------|--------|--------------|--------|--------|--------|--------------|-----|-----|-----|----|
|       |           |               |          | 32/16 Chs      | 8 Chs | 40 Chs | 20 Chs | 48 Chs | 64 Chs       | 72 Chs | 80 Chs | 96 Chs | M15          | M12 | M6  | M2  |    |
| Line  | Pass Thru | —             | —        | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | —            | —   | —   |     |    |
|       | OLA       | Pass Thru     | —        | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | —   | Yes | Yes |    |
|       | Hub       | M20x          | M20D     | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | —   | Yes | —  |
|       |           |               | M20N     | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | Yes    | —            | —   | —   | —   |    |
|       |           |               | 16AD     | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | —            | —   | —   | —   |    |
|       |           | SMR9<br>SMR20 | M20D     | Yes            | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | —   | —   | —   | —  |
|       |           |               | M20N     | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | Yes    | —            | —   | —   | —   |    |
|       |           | BWC           | None     | Yes            | No    | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | —   | Yes | No |
|       |           |               | M20D     | Yes            | No    | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | Yes | —   | Yes | No |
|       |           |               | M20N     | No             | No    | No     | No     | No     | Yes          | Yes    | Yes    | Yes    | Yes          | —   | Yes | No  |    |
|       | ACCES     |               | Yes      | No             | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | —   | Yes | No  |    |
|       | DGE       | BWC           | None     | Yes            | No    | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | —   | Yes | Yes |    |
|       |           | SMR9          | None     | Yes            | No    | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | —   | Yes | Yes |    |
|       |           | SMR20         | None     | Yes            | No    | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | —   | Yes | Yes |    |
|       | ROADM     | SMR9          | None     | Yes            | No    | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | Yes          | —   | Yes | No  |    |
| SMR20 |           | None          | Yes      | No             | Yes   | Yes    | Yes    | Yes    | Yes          | Yes    | Yes    | Yes    | —            | Yes | No  |     |    |

| Site        | Entry | Type          | Card<br>Opts  | C-band 100 GHz |          |           |           |           | C-band 50GHz |           |           |           | Shelf Option |     |     |     |    |
|-------------|-------|---------------|---------------|----------------|----------|-----------|-----------|-----------|--------------|-----------|-----------|-----------|--------------|-----|-----|-----|----|
|             |       |               |               | 32/16<br>Chs   | 8<br>Chs | 40<br>Chs | 20<br>Chs | 48<br>Chs | 64<br>Chs    | 72<br>Chs | 80<br>Chs | 96<br>Chs | M15          | M12 | M6  | M2  |    |
| Terrestrial | Add   | MDC           | 16AD          | Yes            | Yes      | Yes       | Yes       | Yes       | Yes          | Yes       | Yes       | Yes       | Yes          | —   | Yes | —   |    |
|             |       |               | MD8-<br>ODD   | Yes            | Yes      | Yes       | Yes       | Yes       | Yes          | Yes       | Yes       | Yes       | Yes          | —   | Yes | —   |    |
|             |       |               | MEN           | No             | No       | No        | No        | No        | Yes          | Yes       | Yes       | Yes       | Yes          | —   | Yes | —   |    |
|             |       | ROOM          | BWC           | 16AD           | Yes      | No        | Yes       | Yes       | Yes          | Yes       | Yes       | Yes       | Yes          | Yes | —   | Yes | No |
|             |       |               |               | MD8-<br>ODD    | Yes      | No        | Yes       | Yes       | Yes          | Yes       | Yes       | Yes       | Yes          | Yes | —   | Yes | No |
|             |       |               |               | MEN            | No       | No        | No        | No        | No           | Yes       | Yes       | Yes       | Yes          | Yes | —   | Yes | No |
|             |       | SMR9<br>SMR20 | 16AD          | Yes            | No       | Yes       | Yes       | Yes       | Yes          | Yes       | Yes       | Yes       | Yes          | —   | Yes | No  |    |
|             |       |               | MD8-<br>ODD   | Yes            | No       | Yes       | Yes       | Yes       | Yes          | Yes       | Yes       | Yes       | Yes          | —   | Yes | No  |    |
|             |       |               | MEN           | No             | No       | No        | No        | No        | Yes          | Yes       | Yes       | Yes       | Yes          | —   | Yes | No  |    |
|             | Misc  | OXC           | BWC           | MD8-<br>ODD    | Yes      | No        | Yes       | Yes       | Yes          | Yes       | Yes       | Yes       | Yes          | Yes | —   | Yes | No |
|             |       |               |               | MEN            | No       | No        | No        | No        | No           | Yes       | Yes       | Yes       | Yes          | Yes | —   | Yes | No |
|             |       |               | SMR9<br>SMR20 | MD8-<br>ODD    | Yes      | No        | Yes       | Yes       | Yes          | Yes       | Yes       | Yes       | Yes          | Yes | —   | Yes | No |
| MEN         |       |               |               | No             | No       | No        | No        | No        | Yes          | Yes       | Yes       | Yes       | Yes          | —   | Yes | No  |    |

## Important Notes for Shelf Management

- 1 When you choose Multi Shelf External Switch from the Shelf Management drop-down list, the multi-shelf external switch is placed in the layout irrespective of the node controller.
- 2 Shelf management is disabled for HYBRID 15454 ONS configurations.
- 3 If you select the Shelf Management Type as Multi Shelf Integrated Switch or Multi Shelf External Switch, you can modify the MSM Shelf ID for multishelf management configuration. To modify the MSM Shelf ID, see [Viewing the Layout of Single Site, on page 149](#).
- 4 The M6 chassis can support three subtended shelves, when used as node controller with an Integrated Switch. The subtended M6 chassis can subtend two more shelves.

- 5 If you chose Individual Shelf as the Shelf Management type, n Network Elements (NEs) will be created where n is the number of shelves. If you chose Multishelf as the Shelf Management type, all subtended shelves will belong to a single NE. The network elements are created after network analysis.
- 6 The Cisco NCS 2015 M15 chassis, controlled by two TNCS cards, can act as a node controller that manages other subtended M15 shelves. Up to three M15 shelves can be subtended directly to the Master shelf, and the number of subtended M15 shelves can be increased up to 10 in a daisy chain connection.
- 7 In a mixed Multi Shelf Management configuration, M15 shelves can be used as subtended shelves of an M6 node controller only if TNCE or TSCE control units are used.
- 8 Multi Shelf Management mixed configurations can extend up to 25 shelves for M6 and M15 chassis.
- 9 Multi Shelf Management configurations with M15 as node controller and M6 as subtended shelf are not supported in CTP 10.5.
- 10 Multi Shelf Management configurations with M15 and M12 in any combination (node controller or subtended shelf) are not supported in CTP 10.5.
- 11 Cisco NCS 2015 as the node controller with up to 10 NCS 2015 as subtended shelves.
- 12 Cisco NCS 2015 as the node controller with a mix of up to 15 NCS 2015, NCS 2006, and ONS 15454 as subtended shelves.
- 13 Cisco NCS 2006 as the node controller with a mix of up to 15 NCS 2015, NCS 2006, and ONS 15454 shelves as subtended shelves.
- 14 Cisco ONS 15454 as the node controller with a mix NCS 2015, NCS 2006, and ONS 15454 shelves as subtended shelves.

## Editing Side Labels

By default, CTP alphabetically names the sides with labels A through H. You can rename the sides as per requirement with any alphabet between A through H. Swapping of side labels is also possible. Use this procedure to edit side labels.




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**Note** In this guide, all references are to the default side labels A and B.

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**Note** Sides of a PSM Terminal site and the sides having remote add/drop ports cannot be renamed.

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You can also use the Multi-side editor to edit all side level properties in one step for all sites. For more information, see [Site Editor](#), on page 353.

### Procedure

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- Step 1** In the Project Explorer, right-click the side label and choose Edit from the shortcut menu. The Side Edit Dialog box is displayed. The left column, Side Name to be edited, displays the side names of all the sides present at the site. The right column, Names: Options, is used to enter a new name for the side.
  - Step 2** Click the cell in the Name: Options column and select a new name from the drop-down list.
  - Step 3** Repeat Step 2 for the other sides as required. Ensure that there is no duplication of side labels.
  - Step 4** Click OK to apply the new side labels. CTP will now display the new side labels at all interfaces where side names are displayed. For example, in the Project Explorer, various reports, and the network view.
- Note** Layout rules are applied to the sides as per the new labels, unless the layout of the side is locked.

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## Editing Service Demand Association and Traffic Subnet

Use this procedure to change the association of a service demand from one traffic subnet to another. You can change the association if the destination subnetwork satisfies all of the add/drop requirements of the service demand.

You can edit a traffic subnet only in the Design mode; in Install and Upgrade mode, this feature is not supported.

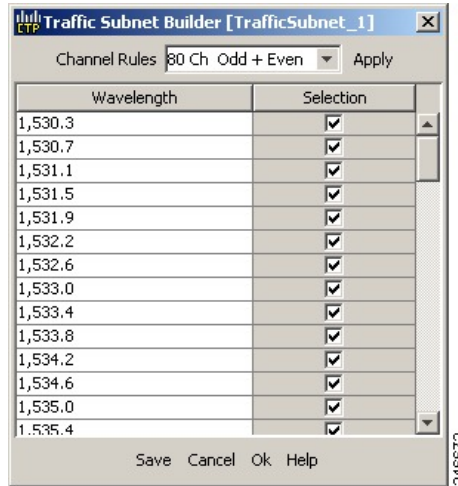
### Procedure

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- Step 1** In the Project Explorer pane, right-click **Traffic Subnets** and choose View Demand Relationship from the shortcut menu. The Select Subnet dialog box appears.
- a) Expand the Traffic Subnet folder to view the service demands associated with it.
  - b) Click the Move to Subnet row to see the list of destination traffic subnets where this service demand can be moved to. The list will only contain those Traffic Subnets that can satisfy the add/drop needs of this service demand.  
**Note** Cisco Transport Planner will check to see if each user-forced demand can be met at the destination traffic subnet. In case the check fails, a message shall be displayed asking the user to confirm if this operation should be continued. Click Yes to continue. All the unfeasible properties within each demands will be reset to the default value.
  - c) Select the desired destination traffic subnet and click OK.
- Step 2** (Optional) To edit the wavelength set associated to a traffic subnet, right-click Traffic Subnets in the Project Explorer pane and choose **Edit Channel Plan**. The Traffic Subnet Builder dialog box appears.
- a) Click the **Channel Rules** drop-down list to view the available channel rules.
  - b) Select the desired channel rule and click **Apply**.
  - c) Check the check box for the required wavelength in the Selection column to associate the wavelength to the traffic subnet. Uncheck the wavelength in the Selection column to remove the wavelength from the traffic subnet.
  - d) Click **Save** to save the wavelength association for the selected channel rule.

e) Click **OK** to apply the wavelength association to the traffic subnet.

**Figure 29: Edit Channel Plan—Traffic Subnet Builder**

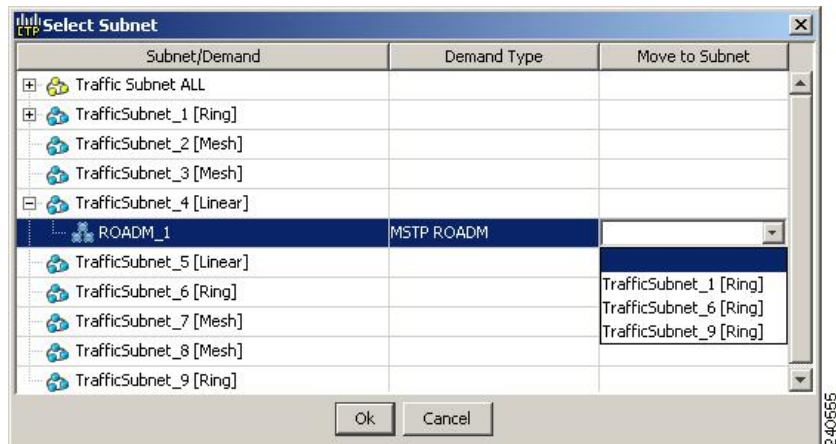


**Step 3** To edit a defined traffic subnet, right-click Traffic Subnets in the Project Explorer pane and choose **Edit**. The Traffic Subnet Builder dialog box appears.

- a) From the Selected Ducts area, click the ducts you want to include the new the new traffic subnet and click **OK**. The selected ducts are added in the Choose Ducts area.
- b) Click **OK**. The properties of the original traffic subnet are updated with the selected options.

**Note** Later, when analyzing the network, if the tool discovers that the order of the add/drop sites in the destination traffic subnet has been modified, the analyzer will mark these traffic demands as invalid and will not proceed with the analysis.

**Figure 30: Select Subnet Dialog Box**



## Creating a Maintenance Center

Use the following procedure to add maintenance centers that will supply your network with spare parts in the event of a failure. This feature helps your customer determine the quantity of spares that should be purchased, depending on the number of maintenance centers and their availability. Maintenance centers appear in the Maintenance Center folder under a site in the Project Explorer pane.

### Procedure

- 
- Step 1** In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.
- Step 2** Scroll down the Project Explorer pane, right-click the **Maintenance Center** folder, and choose **New Maintenance Center** from the shortcut menu.
- Step 3** Highlight the new maintenance center in the Project Explorer pane.
- Step 4** In the Properties pane, complete the following as needed:
- Confidence Level—Choose the percentage that represents the required confidence level for finding needed spare parts in the maintenance center: **50**, **75**, **95**, or **99** percent.
  - Restocking time (days)—Enter the time (including transportation) required to restock the part in the maintenance center.
- Step 5** To associate a maintenance center with a site, see the [Editing Site Parameters](#), on page 178.
- 

## Editing a Point-to-Point Demand

Use the following procedure to edit a point-to-point demand:

### Procedure

- 
- Step 1** In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu. In the Project Explorer pane, right-click the point-to-point demand and choose **Edit** from the shortcut menu. The appears. The table lists the details of the demand as Demand > Service > Trail > Section.
- Note** You can alternatively edit the point-to-point demand from the Network View. Right-click on the demand and click Edit to open the Demand Editor dialog box and edit the demand properties in the Properties pane. The service can contain more than one trail based on the protection type. For more information about the Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361.
- Step 2** At the demand level, you can edit the following properties in the Properties pane:
- Name—Edit the name of the demand.
  - Traffic Type—Choose the desired traffic type from the drop-down list. The possible values are 100GE, 10G-FICON, 8G-FICON, 10GE LAN PHY, 10GE WAN PHY, 15530 10 Gbps Aggregated, 15530 2.5 Gbps Aggregated, 15530 Data MXP, 15530 MR Transport, 1G-FICON, 2G-FICON, 2R-Any Rate,

3G-SDI, 40GE LAN PHY, D1 Video, DV-6000, DVB ASI, ESCON, Fast Ethernet 100 Mbps, Fiber Channel, Fiber Channel 10G, Fiber Channel 2G, Fiber Channel 4G, Fiber Channel 8G, Gigabit Ethernet, SD-HDI, HD-SDI, HDTV, ISC-Compat, ISC-Peer-1G, ISC-Peer-1G with STP, ISC-Peer-2G, ISC-Peer-2G with STP, ISC-Peer-2R, OTU1, OTU2, OTU2e, OTU3, OTU4, SDI, Sysplex CLO, Sysplex ETR. The OC-12, OC-192, OC-3, OC-48 and OC-768 traffic types are specific to ANSI networks. STM1, STM16, STM256, STM4 and STM64 traffic types are specific to ETSI networks.

- Protection—Choose the desired protection type from the drop-down list. The possible values are Client1+1, Fiber-Switched, Y-Cable, PSM-OCH, and Unprotected.

**Note** Y-Cable protection is not available for encrypted traffic types.

**Step 3** At the service level, you can edit the following properties in the Properties pane:

- Forecast—Changes a present section to a forecast section.
- Encryption—Choose Yes to enable encryption or No to disable encryption.
  - When the **Encryption Always ON** option is checked in the Network properties and the value of Encryption is Yes, the NCS2K-MR-MXP-K9 PID is used instead of the NCS2K-MR-MXP-LIC PID.
  - When the **Encryption Always ON** option is unchecked and the value of Encryption is Yes for 100GE demands, CTP uses the L-NCS2K-MRE100GK9 PID along with the 200G-CK-LC and MR-MXP PIDs.
  - When the **Encryption Always ON** option is unchecked and the value of Encryption is Yes for 10GE or 40GE demands, CTP uses the L-NCS2K-MRELRGK9 PID along with the 200G-CK-LC and MR-MXP PIDs.
- OCH Type—Choose the desired OCH type from the drop-down list. The possible values are OCH-CC, OCH-NC, and OCH-NCDCN. Default type is OCH-NC. OCH-CC and OCH-NCDCN have to be forced.
- Circuit ID—Enter a circuit ID (for example, 3:4).
- Wavelength—Forces a particular channel wavelength.
  - Auto—Allows the tool to assign a wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch.** Wavelengths are listed based on the selected band.

**Step 4** At the trail level, you can edit the following properties in the Properties pane:

- Wavelength—Forces a particular channel wavelength.
  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch.** Wavelengths are listed based on the selected band.

- You can edit the following properties for the source and destination sites:
  - Client Type
  - Card Type
  - Client Interface
  - Client Interface ITU
  - DWDM Trunk Type—Choose the trunk-side pluggable from the drop-down list. This drop-down list appears only for cards with trunk pluggables.
  - Colorless
  - OmniDirectional Side
  - Contentionless Side
  - Trunk Mode—Choose the trunk mode for the 400G-XP-LC card from the drop-down list. This drop-down list appears only for the 400G-XP-LC card. You can select either 100G or 200G trunk. 200G is the default value.

The options available are based on the service and card type selected.

**Note** You can force different card types for the source and destination sites.

**Step 5** At the section level, you can edit the following properties in the properties pane:

- Optical Bypass—Specifies the sites from the drop-down list where the channels for the current demand will be optically dropped. Sites present between the source and destination sites along the path of this section are available as options.
- Wavelength—Forces a particular channel wavelength.
  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch.** Wavelengths are listed based on the selected band.

- You can edit the following properties for the source and destination sites:
  - Client Type
  - Card Type
  - Client Interface
  - Client Interface ITU
  - DWDM Trunk Type
  - Colorless
  - OmniDirectional Side
  - Contentionless Side

The options available are based on the service and card type selected.



**Note** You can force different card types for the source and destination sites.

- Step 6** To add a new service, click the **Add new service** icon in the toolbar. A new row appears.
- Step 7** To delete an existing channel, select the row and click the **Delete service** icon in the toolbar.
- Step 8** To edit path constraints, click the **Path Constraints Editor** icon in the toolbar. For more information, see [Understanding Contentionless Functionality](#), on page 69.
- Step 9** To add a regeneration site, click the **Regeneration...** icon in the toolbar. The Regeneration editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site](#), on page 90.
- Note** When siblings of the same type (service, trail, or section) are chosen, the Properties pane displays the properties that are common. The properties that are different are marked with an asterisk.
- Step 10** Click **OK** to save the changes to the channels and close the Demand Editor dialog box, or **Cancel** to close the dialog box without saving the changes.

## Editing a P-Ring Demand

Use the following procedure to change the distribution of services in a P-ring service demand:

### Procedure

- Step 1** In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu. In the Project Explorer pane, right-click the P-ring demand and choose **Edit** from the shortcut menu. The Demand Editor appears. The table lists the details of the demand as Demand > Service > Trail > Section.
- For more information about the Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361.
- Step 2** At the demand level, you can edit the following properties in the properties pane:
- Name—Edit the name of the demand.
  - Traffic Type—Choose the desired traffic type from the drop-down list. The possible values are 100GE, 10G-FICON, 10GE LAN PHY, 10GE WAN PHY, 15530 10 Gbps Aggregated, 15530 2.5 Gbps Aggregated, 15530 Data MXP, 15530 MR Transport, 1G-FICON, 2G-FICON, 2R-Any Rate, 3G-SDI, 40GE LAN PHY, D1 Video, DV-6000, DVB ASI, ESCON, Fast Ethernet 100 Mbps, Fiber Channel, Fiber Channel 10G, Fiber Channel 2G, Fiber Channel 4G, Gigabit Ethernet, HDTV, ISC-Compat, ISC-Peer-1G, ISC-Peer-2G, ISC-Peer-2R, OC-12, OC-192, OC-3, OC-48, OC-768, OTU1, OTU2, OTU2e, OTU3, OTU4, SDI, Sysplex CLO, and Sysplex ETR.
  - Protection—Choose the desired protection type from the drop-down list. The possible values are Client1+1, Fiber-Switched, Y-Cable, PSM-OCH, and Unprotected.
- Note** Y-Cable protection is not available for encrypted traffic types.
- Step 3** At the service level, you can edit the following properties in the Properties pane:
- Forecast—Changes a present section to a forecast section.
  - Encryption—Choose Yes to enable encryption or No to disable encryption.

- OCH Type—Choose the desired OCH type from the drop-down list. The possible values are OCH-CC, OCH-NC, and OCH-NCDCN. Default type is OCH-NC. OCH-CC and OCH-NCDCN have to be forced.
- Circuit ID—Enter a circuit ID (for example, 3:4).
- Wavelength—Forces a particular channel wavelength.
  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - Allowed wavelength bands—C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch. Wavelengths are listed based on the selected band.

**Step 4** At the trail level, you can edit the following properties in the Properties pane:

- Wavelength—Forces a particular channel wavelength.
  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - Allowed wavelength bands—C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch. Wavelengths are listed based on the selected band.
- You can edit the following properties for the source and destination sites:
  - Client Type
  - Card Type
  - Client Interface
  - Client Interface ITU
  - DWDM Trunk Type
  - Colorless
  - OmniDirectional Side
  - Contentionless Side

The options available are based on the service and card type selected.

**Note** You can force different card types for the source and destination sites.

**Step 5** At the section level, you can edit the following properties in the Properties pane:

- Optical Bypass—Specifies the sites from the drop-down list where the channels for the current demand will be optically dropped. Sites present between the source and destination sites along the path of this section are available as options.
- Wavelength—Forces a particular channel wavelength.
  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.

- Allowed wavelength bands—C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch. Wavelengths are listed based on the selected band.
- You can edit the following properties for the source and destination sites:
  - Client Type
  - Card Type
  - Client Interface
  - Client Interface ITU
  - DWDM Trunk Type
  - Colorless
  - OmniDirectional Side
  - Contentionless Side

The options available are based on the service and card type selected.

**Note** You can force different card types for the source and destination sites.

- Step 6** To add a new service, click the **Add new service** icon in the toolbar. A new row appears.
- Step 7** To delete an existing service from the P-ring, choose the row and click the **Delete service** icon in the toolbar.
- Step 8** To add a regeneration site, click the **Regeneration...** icon in the toolbar. The Regeneration Editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site, on page 90](#).
- Note** When siblings of the same type (service, trail, or section) are chosen, the Properties pane displays the properties that are common. The properties that are different are marked with an asterisk.
- Step 9** Click **OK** to save the changes to the channels and close the Edit P-Ring Demand dialog box, or **Cancel** to close the dialog box without saving the changes.

## Editing a ROADM Demand

Use the following procedure to change the distribution of services in a ROADM service demand:

### Procedure

- Step 1** In the **Project Explorer** pane, right-click the network folder and choose **Expand** from the shortcut menu.
- Step 2** Right-click ROADM demand and choose **Edit** from the shortcut menu. The **Edit ROADM Demand** dialog box appears.
- Step 3** (Optional) If you copied properties of an existing ROADM demand, click Use Template to use the properties of the copied ROADM demand.
- Step 4** Select a traffic pattern type from the from the **Traffic Type** drop-down list:
- Hub — If selected, the First Site drop-down list becomes available.

- Meshed—If selected, go to Step 6.
- Ring—If selected, choose the Connectivity type as either Unprotected Minimum Hop, Unprotected Optimum Path, or Unprotected Subnet, and proceed to Step 7.

**Note** Refer to the [ROADM Traffic Demands, on page 15](#) for more information about the connectivity type choices.

**Step 5** For Hub traffic types, select the originating site from the **First Site** drop-down list.

**Step 6** Select a connectivity type from the **Connectivity type** drop-down list. The choices are Protected, Unprotected Minimum Hop, Unprotected Optimum Path, and Unprotected Subnet.

**Step 7** In the Service types pane, check the check boxes for one or more client service types for the ROADM demand. The client interfaces that support each service type appear in the right pane.

**Step 8** Check the **OmniDirection** check box to enable the omnidirectional property for the ROADM demand.

**Note** The omnidirectional property is applied to the unprotected ROADM demand only when all the sites in the ROADM group have a minimum of one omnidirectional side with two colorless ports on each side.

- The omnidirectional property is applied to the protected ROADM demand only when all the sites in the ROADM group has minimum two omnidirectional sides with two colorless ports on each side.
- When the ROADM demand is finalized, CTP shows the omnidirectional property as Yes irrespective of the source or destination.

**Step 9** Check the **Colorless** check box to enable the colorless property for the ROADM demand.

**Note** The colorless property is applied to the unprotected ROADM demand only when one line side with one colorless port is available in each site.

- The colorless property is applied to the protected ROADM demand only when two line sides with one colorless port are available in each site.
- If there are no colorless ports on the line side but available on the omnidirectional side, CTP displays an error message.
- When the ROADM demand is finalized, CTP shows the colorless property as Yes irrespective of the source or destination.

**Step 10** Check the **Contentionless** check box to enable the contentionless functionality for the ROADM demand. Contentionless functionality on a site refers to the contentionless add/drop ability of an N-degree ROADM node to accommodate N wavelengths of the same frequency from a single add/drop device. For a ROADM to be contentionless, the number of drop units should be equal to ROADM degrees.

**Step 11** To further refine the client interfaces, complete the following options for each row in the right pane. Check boxes in gray are not available for the client interface selection.

- Yes/No—Check to select this card to implement the service type.
- Client Interface—Displays the card type for the selected service type.
- Y-Cable—Check to select Y-cable protection if the connectivity type is Protected.
  - Note** Y-cable protection is not available for encrypted traffic types.
- 1+1 Protected—Check to select 1+1 protection if the connectivity type is Protected.
- Fiber Switched—Check to select fiber-switching protection if the connectivity type is Protected.

- Supported Service—Displays the service types supported for the card.

You can select more than one client interface to support the same service type. By default, Cisco Transport Planner checks the best client interface to support each service.

**Step 12** Click **OK** to save the changes to the demand.

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## Editing an Ethernet Aggregated Demand

Use the following procedure to edit Ethernet aggregated demands.

### Procedure

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- Step 1** In the **Project Explorer** pane, right-click the network folder and choose **Expand** from the shortcut menu.
- Step 2** In the **Project Explorer** pane, right-click the Ethernet aggregated demand and choose **Edit demand** from the shortcut menu. The **Ethernet Aggregated Demand** dialog box appears.
- Step 3** If a circuit already exists, to make a copy of it, right-click the circuit and click Copy Circuit. A new circuit appears as a WDM traffic channel with the same parameters as the original circuit.
- Step 4** To delete a circuit, right-click the circuit and click Delete Circuit.
- Step 5** To modify the parameters of an existing circuit, double-click the circuit. The **Edit Request** dialog box appears.
- Step 6** The **Edit Request** dialog box contains three areas of information: General, Src, and Dest.

#### General Area

- Label—Enter the label for the circuit. By default, VLAN\_Circuit\_x is used.
- Trunk Protection—Select the trunk protection type. Allowed values are:
  - Unprotected
  - Protected
- P/F—Choose Forecast if this demand will be needed in the future. Choose Present if this demand is needed now. This parameter drives the list of pluggable port modules to be equipped on the card and affects BoM reports.
- Path Forcing—Allows you to force the circuit routing on the traffic subnet associated with this demand. Allowed values are:
  - Auto—(Default) Causes the tool to automatically define the trunk path.
  - Side x—Represents the label of the side on the Src site where the circuit is routed.
- Client Protection—Choose the client protection type. Allowed values are:
  - Unprotected
  - Client 1+1
- Circuit Rate—Choose the circuit rates.

**Src Area**

- Site—Select the source site. Allowed values include the list of sites added in the WDM traffic channel.
- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.
- Card—Select the card. Allowed values are Auto, 10GE-XP, 10GE-EXP, GE-XP, and GE-EXP. Auto allows the tool to select an appropriate card type based on other constraints.

The Src area contains Working and Protected sub areas.

**Working sub area**

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.
- Port Num—Select the port number. Allowed values are Auto, 1, and 2. Auto allows the tool to select an appropriate port number based on other constraints.

**Protected sub area**

These fields are enabled only if client protection is enabled in the Client Protection field.

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.
- Port Num—Select the port number. Allowed values are Auto, 1, and 2. Auto allows the tool to select an appropriate port number based on other constraints.

**Dest Area**

- Site—Select the destination site. Allowed values include the list of sites added in the WDM traffic channel.
- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.
- Card—Select the card. Allowed values are Auto, 10GE-XP, 10GE-EXP, GE-XP, and GE-EXP. Auto allows the tool to select an appropriate card type based on other constraints.

The Dest area contains Working and Protected sub areas.

**Working sub area**

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.
- Port Num—Select the port number. Allowed values are Auto, 1 to 20. Auto allows the tool to select an appropriate port number based on other constraints.

**Protected sub area**

These fields are enabled only if client protection is enabled in the Client Protection field.

- Port CIR—Select the CIR, with 1 being the highest and 0.1 being the lowest.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.
- Port Num—Select the port number. Allowed values are Auto, and 1 to 20. Auto allows the tool to select an appropriate port number based on other constraints.

**Step 7** Click **OK**.

**Step 8** Click **Check** on the left corner of the window to generate a report showing the circuit path in the WDM traffic channel and to check any over-allocation of bandwidth. The report shows, in a row, each of the sites on the subnet, and each span in between.

**Step 9** To edit the demand, click the **DWDM channel** tab.

The table lists the details of the demand as Demand > Service > Trail > Section.

For more information about the Cisco Transport Planner icons, see [GUI Information and Shortcuts](#), on page 361.

**Step 10** At the service level, you can edit the following properties in the Properties pane:

- Forecast—Changes a present section to a forecast section.
- Wavelength—Forces a particular channel wavelength.
  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch.** Wavelengths are listed based on the selected band.

**Step 11** At the trail level, you can edit the following properties in the Properties pane:

- Wavelength—Forces a particular channel wavelength.
- You can edit the following property for the source and destination sites:
  - DWDM Trunk Type
  - Colorless
  - OmniDirectional Side

**Step 12** At the section level, you can edit the following properties in the Properties pane:

- Optical Bypass—Specifies the sites from the drop-down list where the channels for the current demand will be optically dropped. Sites present between the source and destination sites along the path of this section are available as options.
- Wavelength—Forces a particular channel wavelength.
- You can edit the following property for the source and destination sites:
  - DWDM Trunk Type

- Colorless
- OmniDirectional Side

**Step 13** To add a regeneration site, click the **Regeneration...** icon in the toolbar of the DWDM channel tab. The Regeneration Editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site](#), on page 90.

**Note** When siblings of the same type (service, trail, or section) are chosen, the Properties pane displays the properties that are common. The properties that are different are marked with an asterisk.

**Step 14** Click **Apply** to save the changes to the channels and click Close.

## Editing a TDM Aggregated Demand

Use the following procedure to edit a TDM aggregated demand:

### Procedure

- Step 1** In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.
- Step 2** In the Project Explorer pane, right-click the TDM aggregated demand and choose **Edit demand** from the shortcut menu. The TDM Aggregated Demand dialog box appears.
- Step 3** To make a copy of the circuit, right-click the circuit and click Copy Circuit. A new circuit appears under WDM Traffic channel with the same parameters as the original circuit.
- Step 4** To delete a circuit, right-click the circuit and click Delete Circuit.
- Step 5** To modify the parameters of an existing circuit, double-click the circuit. The Edit request dialog box appears.
- Step 6** The **Edit request** window contains three area of information: General, Src, and Dest.

#### General Area

- Label—Enter the label for the circuit. By default, VLAN\_Circuit\_x is used.
- Trunk Protection—Enter the trunk protection type. Allowed values are:
  - Unprotected
  - UPSR
- P/F—Select Forecast if this demand will be needed in the future. Select Present if this demand is needed now. This option drives the list of pluggable port modules to be equipped on the card and affects BoM reports.
- Path Forcing—This option allows you to force the circuit routing on the traffic subnet associated with this demand. The following values are supported:
  - Auto—(Default) Causes the tool to automatically define the trunk path.
  - Side x—Represents the label of the side on the Src site where the circuit is routed.
- Client Protection—Allowed values are:



- Unprotected
- 1+1 APS
- Circuit rate—Displays the allowed circuit rates.

### Src Area

- Site—Select the source site. Allowed values include the list of sites added in the WDM traffic channel.
- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.
- Card—Select the card. Allowed values are Auto and ADM-x. Auto allows the tool to select an appropriate card type based on other constraints.

The Src area contains Working and Protected sub areas.

#### Working sub area

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

#### Protected sub area

These fields are enabled only if client protection is enabled in the Client Protection field.

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

### Dest Area

- Site—Select the destination site. Allowed values include the list of sites added in the WDM traffic channel.
- SFP lambda—Select the desired SFP/XFP for this port or set it to Auto to allow the tool to select an appropriate value.
- Card—Select the card. Allowed values are Auto and ADM-x. Auto allows the tool to select an appropriate card type based on other constraints.

The Dest area contains Working and Protected sub areas.

#### Working sub area

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

#### Protected sub area

- Port Num—Select the port number. Allowed values are Auto and 1 to 16. Auto allows the tool to select an appropriate port number based on other constraints.
- Port Rate-Reach—Select the desired PPM for this port, or set it to Auto to allow the tool to select an appropriate value.

**Step 7** Click **OK**.

**Step 8** Click the **Check** tab in the left corner of the window to generate a report showing the circuit path in the WDM traffic channel and to check any over allocation of bandwidth. The report shows, in a row, each of the sites on the subnet, and each span in between.

**Step 9** To edit the demand, click the **DWDM channel** tab.

The table lists the details of the demand as Demand > Service > Trail > Section.

For more information about the CTP icons, see [GUI Information and Shortcuts](#), on page 361.

**Step 10** At the service level, you can edit the following properties in the Properties pane:

- Forecast—Changes a present section to a forecast section.
- Wavelength—Forces a particular channel wavelength.
  - Auto—Allows the tool to assign wavelength to the channel with the lowest possible cost, given the other set of constraints.
  - Allowed wavelength bands—**C band-32 ch.odd, L band- 32 ch.odd, C band- 40 ch.odd, C band - 64 ch., C band - 40 ch.even, C band - 72 ch., C band- 80 ch, C band - 48 ch.odd, C band - 48 ch.even, or C band - 96 ch.** Wavelengths are listed based on the selected band.

**Step 11** At the trail level, you can edit the following properties in the Properties pane:

- Wavelength—Forces a particular channel wavelength.
- You can edit the following property for the source and destination sites:
  - DWDM Trunk Type
  - Colorless
  - OmniDirectional Side

**Step 12** At the section level, you can edit the following properties in the Properties pane:

- Optical Bypass—Specifies the sites from the drop-down list where the channels for the current demand will be optically dropped. Sites present between the source and destination sites along the path of this section are available as options.
- Wavelength—Forces a particular channel wavelength.
- You can edit the following property for the source and destination sites:
  - DWDM Trunk Type
  - Colorless
  - OmniDirectional Side

**Step 13** To add a regeneration site, click the **Regeneration...** icon in the toolbar of the DWDM channel tab. The Regeneration Editor appears. The regeneration site can be created only at the trail level. For more information, see the [Creating a Regeneration Site](#), on page 90.

**Note** When siblings of the same type (service, trail, or section) are chosen, the Properties pane displays the properties that are common. The properties that are different are marked with an asterisk.

**Step 14** Click **Apply** to save the changes to the channels and click Close.

---

## Add or Remove Sites from P-Ring, Ethernet Aggregated, and TDM Aggregated Demands

To add or remove sites from P-Ring, Ethernet Aggregated, and TDM Aggregated demands:

### Procedure

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- Step 1** In the Project Explorer pane, right-click the network folder, and choose **Expand** from the shortcut menu. Perform the following.
- For P-Ring demand—In the Project Explorer pane, right-click the P-Ring demand and choose **Add/Remove Site** from the shortcut menu. The Add/Remove Sites dialog box listing all the sites in the network appears.
  - For Ethernet Aggregated and TDM Aggregated demands—In the Project Explorer pane, right-click the Ethernet Aggregated or TDM Aggregated demand and choose **Add/Remove Site** from the shortcut menu. The Add/Remove Sites dialog box listing all the sites in the network appears.
- Step 2** To add sites to the demand, select the sites in the Site Inclusion/Exclusion Panel and click the right arrow. Sites can be added only when the demand is in **Unlock<sup>1</sup>** state. When a site is added to the demand, new trails are created to accommodate the new sites. The existing circuits in the demand are not affected.
- Step 3** To remove sites from the demand, select the sites in the Site Inclusion/Exclusion Panel and click the left arrow. Sites can be removed only when the demand is in **Unlock 1** state. When a site is removed, all the associated circuits originating or terminating from that site are also removed.
- Step 4** Click **OK** to confirm adding or removing sites from P-Ring, Ethernet Aggregated, and TDM Aggregated demands. The updated site details are displayed in the Demand Editor window.
- 

## Add or Remove Multiple Optical Bypass Sites

The Optical Bypass Editor allows to specify multiple sites where the channels for the current demand are optically dropped. To add or remove multiple optical bypass sites:

## Procedure

- 
- Step 1** Create a Point-to-Point, P-Ring, Ethernet Aggregated, or TDM Aggregated demand. To create a Point-to-Point, P-Ring, Ethernet Aggregated, or TDM Aggregated demand, see [Creating a Demand](#), on page 66.
- Step 2** Right-click the network folder and choose **Expand** from the shortcut menu.  
In the Project Explorer pane, right-click the demand and choose **Edit** from the shortcut menu. The Demand Editor window appears. The Demand Editor window lists the details of the demand as Demand > Service > Trail > Section.
- Note** You can alternatively edit the demand from the network view. Right-click on the demand and click **Edit** to open the Demand Editor window.
- Step 3** Select the section in the demand. Click **Optical Bypass** in the toolbar. The Optical Bypass Editor window appears.
- Step 4** To add a site as optical bypass site, go to Step 5. To delete an optical bypass site, go to Step 6.
- Step 5** To add an optical bypass site, select, a site in the Available Sites pane in the Optical Bypass Editor. Click the down arrow to move the selected site to the Optical Bypass Sites pane. Sites present between the source and destination sites along the path of this section can be added as optical bypass sites. To add optical bypass site to the network in Upgrade or Release Upgrade state, unlock the demand and site to be added.
- Step 6** To delete an optical bypass site, select a site in the Optical Bypass Sites pane in the Optical Bypass Editor. Click the up arrow to move the selected site to Available Sites pane. When an optical bypass site is removed from the network, all the associated add/drop card are removed only when the site is in unlocked state.
- Step 7** Click **OK** to confirm adding or deleting optical bypass site.
- Step 8** Click **OK** to save the changes to the channels and close the Demand Editor dialog box.
- 

## Editing Fiber Span, Pair, and Fiber Parameters

Using the Properties pane you can manage a fiber span, a fiber pair, and individual fibers. A fiber pair consists of two different fibers (clockwise and counter-clockwise). The below table lists the properties that you can modify for a fiber span, fiber pair, or fiber.

**Table 47: Editable Fiber Properties**

| Property          | Fiber Span | Fiber Pair | Fiber |
|-------------------|------------|------------|-------|
| Name              | Yes        | Yes        | No    |
| Connection Type   | No         | No         | No    |
| EOL Ageing Loss   | Yes        | No         | No    |
| EOL Ageing Factor | Yes        | No         | No    |
| Measurement Units | Yes        | No         | No    |
| Fiber Type        | Yes        | Yes        | No    |

| Property                    | Fiber Span | Fiber Pair | Fiber |
|-----------------------------|------------|------------|-------|
| Span Length                 | Yes        | Yes        | Yes   |
| FDP In and FDP Out          | No         | No         | Yes   |
| Length Based Loss           | Yes        | Yes        | No    |
| Connector Loss (per site)   | Yes        | Yes        | Yes   |
| Tot SOL Loss w/o Connectors | Yes        | Yes        | No    |
| CD C-Band and CD L-Band     | Yes        | Yes        | No    |
| Loss                        | Yes        | Yes        | Yes   |
| PMD at Fiber                | Yes        | Yes        | Yes   |
| Raman Amplified             | Yes        | Yes        | No    |
| Attenuation at Lambda One   | Yes        | Yes        | No    |
| Attenuation at Lambda Two   | Yes        | Yes        | No    |

Use the following procedure to edit a fiber span, fiber pair, and fiber parameters:

### Procedure

- 
- Step 1** In the Project Explorer pane, right-click the **Fiber** folder and choose **Expand** from the shortcut menu.
- Step 2** In the Project Explorer pane, click one of the following. The options available for editing in the Properties pane change depending on your selection.
- To edit a fiber span, click the duct identifier.
  - To edit a fiber pair, click the fiber pair identifier.
  - To edit an individual fiber, click the fiber identifier.
- Step 3** In the Properties pane, edit the following parameters, as necessary. See Editable Fiber Properties table for the properties that you can change for a fiber span, fiber pair, or individual fiber.
- Name—Enter the desired name for the fiber span, pair, or fiber.
  - Connection Type—Displays the type of connection between the sites that the fiber span connects.

- EOL Ageing Loss—Enter the EOL aging loss value. The EOL loss per span value is added at the end of life to each discrete fiber in the network (for example, to add an EOL margin for splicing). If you set the ageing factor, you do not need to set the ageing loss.
- EOL Ageing Factor—Enter the number to factor fiber aging. This factor is multiplied by the SOL total span loss without connectors. If you set the ageing loss, you do not need to set the ageing factor.
- Measurement Units—Choose the measurement unit (Km or Miles) for a fiber span (duct) from the drop-down list. You can set the measurement unit only for the duct, but not for the fiber pair (couple) or fiber.
- Fiber Type—Choose the type of fiber for each span in the network.
- Span Length—Enter the span length. The displayed unit of measurement is retrieved from the Span Length field.
- FDP In—Enter the fiber distribution panel (FDP) connector information where the fiber is connected at the receiving end.
- FDP Out—Enter the fiber distribution panel (FDP) connector information where the fiber is connected at the transmitting end.
- Length Based Loss—If this check box is checked, the fiber loss is determined by multiplying the Span Length with the Loss Factor. If this check box is unchecked, enter the total span loss value in the Tot SOL Loss w/o Connectors property.
- Connector loss [x]—Enter the concentrated connector loss at the end of the span terminating at the source site.
- Connector loss [y]—Enter the concentrated connector loss at the end of the span terminating at the destination site.  
**Note** By default, the Connector Loss property uses the value as specified in the DWDM Design Rules. You can override the default value by typing a new value. For more information about the DWDM Design Rules, see [Setting the Default Platform Values, on page 26](#).
- Tot SOL Loss w/o Connectors—Enter the start of life fiber loss value for each span, excluding the connector concentrated loss. This property is disabled if the Length Based Loss check box is checked.
- CD C-Band and CD L-Band—Enter the fiber CD factor. The default value is dependent on the selected fiber type. Any value that you enter is lost whenever you change the fiber type. Chromatic dispersion is always entered in ps/nm/km. Fiber chromatic dispersion is defined for the middle of the wavelength band. C-band is defined at 1545.3 nm and L-band is defined at 1590.4 nm.
- Loss—Enter the value of the SOL fiber loss per kilometer used to calculate the loss of each span in the network. The fiber loss factor is always entered in dB/km.
- PMD at Fiber—The default value is dependent on the selected fiber type. You can type a new PMD value. Any entered value is lost whenever you change the fiber type and its default value is applied. PMD is always entered in ps/nm/km. If the PMD values entered for the individual fibers in a fiber couple are different from each other, then no PMD value is displayed for the fiber span (Duct) and the fiber pair (Couple) properties.
- Raman Amplified—Check this option to enable Raman amplification. It allows placement of Raman amplifiers on both end-points of the span. When this option is checked, the Raman amplification properties of the C-band amplifier are enabled.

**Note** You can choose adjacent spans as Raman amplified and choose a site between these spans as a pass-through site. The algorithm treats the adjacent spans as one span and places the Raman amplifier on the external sites on the ends of the span. The Raman amplified span is indicated by two red dots.

- Attenuation at Lambda One—Enter the attenuation value for the first Raman signal. The default value is Auto, which allows the tool to select an appropriate value.
- Attenuation at Lambda Two—Enter the attenuation value for the second Raman signal. The default value is Auto, which allows the tool to select an appropriate value.

**Step 4** As needed, view the following totals for a fiber span, fiber pair, or individual fiber on the Properties pane:

- Loss BOL—(Display only) Displays the total loss beginning of life (BOL) calculation.

**Note** BOL is also referred to as SOL.

- Loss EOL—(Display only) Displays the total loss EOL calculation.
- CD—(Display only) Displays the total chromatic dispersion.
- PMD—(Display only) Displays the total polarization mode dispersion.

## Editing Fiber Spans, Fiber Pairs, and Fibers Using the Fibers Dialog Box

The Fibers Dialog lists all fiber spans, fiber pairs, and fibers in the network. Use the following procedure to view and edit fiber parameters in the Fibers Dialog box appears.

### Procedure

- Step 1** In the **Project Explorer** pane, right-click the **Fibers** folder in the desired network and choose **Fibers Dialog** from the shortcut menu. The **Fibers Dialog** appears. The below table describes the Fiber Dialog box columns.

**Table 48: Fibers Dialog Box Columns**

| Column | Description  |
|--------|--|
| Name   | Displays the name of the fiber span (Duct), pair (Couple), or fiber. Click the plus (+) sign by a Duct name to expand the list and show the Couple names. Click the plus (+) sign by a Couple name to expand the list and show the individual fiber names. |
| Src.   | Displays the name of the source site or interface for the fiber span, fiber pair, or fiber.  |

| Column              | Description   |
|---------------------|---|
| Dst.                | Displays the name of the destination site or interface for the fiber span, fiber pair, or fiber.                          |
| Type                | Displays the type of fiber for each span in the network.  |
| Length              | Displays the span length. The displayed unit of measurement is retrieved from the Span Length field.                      |
| SpanLossCoefficient | Displays the ratio of attenuation in dB to span length which was visible while hovering the mouse pointer over the fiber. |
| Loss SOL            | Displays the total loss SOL calculation.  |
| Loss EOL            | Displays the total loss EOL calculation.  |
| CD C-Band           | Displays the total chromatic dispersion for the C-band.   |
| CD L-Band           | Displays the total chromatic dispersion for the L-band.   |
| PMD                 | Displays the total polarization mode dispersion (PMD).  |
| QD C-Band           | Displays the secondary order dispersion for C-band.   |
| QD L-Band           | Displays the secondary order dispersion for L-band.   |
| RD                  | Displays the random dispersion value.   |

**Step 2** To edit a fiber span, fiber pair, or fiber, select it in the Fibers Dialog. The Properties pane in the right area of the Fibers Dialog displays the properties for the selected item.

**Step 3** In the Properties pane, edit the following parameters, as necessary. See Editable Fiber Properties table for the properties that you can change for a fiber span, fiber pair, or individual fiber.

- Name—Enter the desired name for the fiber span, pair, or fiber.
- EOL Ageing loss—Enter the EOL ageing loss value. The EOL loss per span value is added at the end of life to each discrete fiber in the network (for example, to add an EOL margin for splicing). If you set the ageing factor, you do not need to set the ageing loss.
- EOL Ageing factor—Enter the number to factor fiber aging. This factor is multiplied by the SOL total span loss without connectors. If you set the ageing loss, you do not need to set the ageing factor.
- Measurement Units— You can view the span length and the measurement unit of each fiber span (Duct), fiber pair (Couple), and fiber. You cannot change the measurement unit of the fiber span and pair



(Couple). To change the measurement unit of the fiber span and pair, edit the measurement unit of the corresponding duct.

- **Fiber Type**—Choose the type of fiber for each span in the network.
- **OSC Frame Type**—Choose the OSC frame type. The options available are Auto, OC3 Frame, GE Frame, and FE Frame. The default option is Auto. When set in Auto, CTP will use FE Frame as the preferred frame type.
- **Span Length**—Enter the span length. The displayed unit of measurement is retrieved from the Span Length field.
- **FDP In**—Enter the fiber distribution panel (FDP) connector information where the fiber is connected at the receiving end.
- **FDP Out**—Enter the fiber distribution panel (FDP) connector information where the fiber is connected at the transmitting end.
- **Length Based Loss**—If this check box is checked, the fiber loss is determined by multiplying the Span Length with the Loss Factor. If this check box is unchecked, enter the total span loss value in the Tot SOL Loss w/o Connectors property.
- **Connector loss [x]**—Enter the concentrated connector loss at the end of the span terminating at the source site.
- **Connector loss [y]**—Enter the concentrated connector loss at the end of the span terminating at the destination site.  
**Note** By default, the Connector Loss property takes the value as specified in the DWDM Design Rules. Any entered value will overwrite the default value. For more information about the DWDM Design Rules, see “1.6.3 Setting the Default Platform Values” section on page 1-25.
- **Tot SOL Loss w/o Connectors**—Enter the start of life link fiber loss for each span, without the connector concentrated loss. The total SOL loss without connectors is equal to the loss factor multiplied by the length. This property is disabled if the Length Based Loss check box is selected.
- **CD C-Band and CD L-Band**—Enter the fiber CD factor. The default value is dependent on the selected fiber type. Any value that you enter is lost whenever you change the fiber type. Chromatic dispersion is always entered in ps/nm/km. Fiber chromatic dispersion is defined for the middle of the wavelength band. C band is defined at 1545.3 nm. L band is defined at 1590.4 nm.
- **Loss**—Enter the value of the SOL fiber loss per kilometer used to calculate the loss of each span in the network. The fiber loss factor is always entered in dB/km.
- **PMD at Fiber**—The default value is dependent on the selected fiber type. You can type a new PMD value. Any entered value is lost whenever you change the fiber type and its default value is applied. PMD is always entered in ps/nm/km. If the PMD values entered for the individual fibers in a fiber couple are different from each other, then no PMD value is displayed for the fiber span (Duct) and the fiber pair (Couple) properties.
- **Raman Amplified**—Check this option to enable Raman amplification. It allows placement of Raman amplifiers on both end-points of the span. When this option is checked, the Raman amplification properties of the C-band amplifier are enabled.  
**Note** You can select adjacent spans as Raman Amplified and select a site between these spans as a pass-through site. The algorithm treats the adjacent spans as one span and places the Raman amplifier on the external sites on the ends of the span.
- **Attenuation at Lambda One**—Enter the attenuation value for the first Raman signal. The default value is Auto, which allows the tool to select an appropriate value.

- Attenuation at Lambda Two—Enter the attenuation value for the second Raman signal. The default value is Auto, which allows the tool to select an appropriate value.

CTP updates the Fibers Dialog box with the new values.

**Step 4** As needed, view the following totals for a fiber span, fiber pair, or individual fiber on the Properties pane:

- Loss BOL—(Display only) Displays the total loss BOL calculation.  
**Note** BOL is also referred to as SOL.
- Loss EOL—(Display only) Displays the total loss EOL calculation.
- CD—(Display only) Displays the total chromatic dispersion.
- PMD—(Display only) Displays the total polarization mode dispersion.

**Step 5** Click OK.

---

## Exporting the Fiber Spans, Fiber Pairs, and Fibers in a Network

Use the following procedure to export all fiber spans, fiber pairs, and single fibers in a network to a .xls format:

### Procedure

---

- Step 1** In the Project Explorer pane, right-click the **Fibers** folder in the desired network and choose **Fibers Dialog** from the shortcut menu. The **Fibers Dialog** box appears.
- Step 2** Click **Export**. The Fibers Export dialog box appears.
- Step 3** Navigate to the desired directory, type the XLS filename, and click **Save**.
- 

## Layout Movement

You can use the layout movement feature to move specific cards to specific slots according to the placement rules.

## Restrictions

- Only one movement is allowed at a time between different chassis when an OSC-associated card is used in a layout movement. You can perform any number of movements within a chassis or if there is no chassis involved (as source or destination) in more than one movement.

If you try to move multiple OSC-associated cards between different chassis, the movements are blocked and CTP displays the following error message:

```
Only one movement involving controller card is allowed at a time. Please confirm the current movements and proceed.
```

- Layout movements are allowed only if there is a free OSC slot available in the destination chassis. OSC reassociation happens with destination chassis controller card. If this rule is not followed, CTP displays the following error message:

```
Movement fail as OSC connection cannot be moved.
```

## Prerequisites

- Ensure that you follow the rack and card placement rules. For more details on the rack and card placement rules, see [Rack Rules](#), on page 285.
- Ensure you go through the restrictions listed in [Restrictions](#), on page 256.

## Performing Layout Movements

### Procedure

---

- Step 1** In the **Project Explorer** pane, click the **NetView Name** tab and click the desired site.  
Or  
Double-click the site in the network view.
- Step 2** In the **Tasks** pane, click **Layout**. The **Layout** tab appears.
- Step 3** Choose Locked & Unlocked from the filter drop-down list.
- Step 4** Select the source card to be moved.
- Step 5** Click the destination slot. The card moves to the destination slot if it is in accordance with the rack and placement rules. For more details on the rack and card placement rules, see [Rack Rules](#), on page 285.
- 

## Layout Templates

You can create reusable layout templates to design layout configurations for a network. When you have a network that has fixed layout rules applicable for a large number of nodes, you can use these layout templates to quickly and accurately set up the layout for those nodes. These templates save you time, effort and minimize errors compared to the Layout or Shelf Movement feature.

This section contains the following topics:

- [Components of a Layout Template](#)
- [Mandatory Attributes and Sample XML Snippets for Cards](#)
- [Using a Layout Template](#)

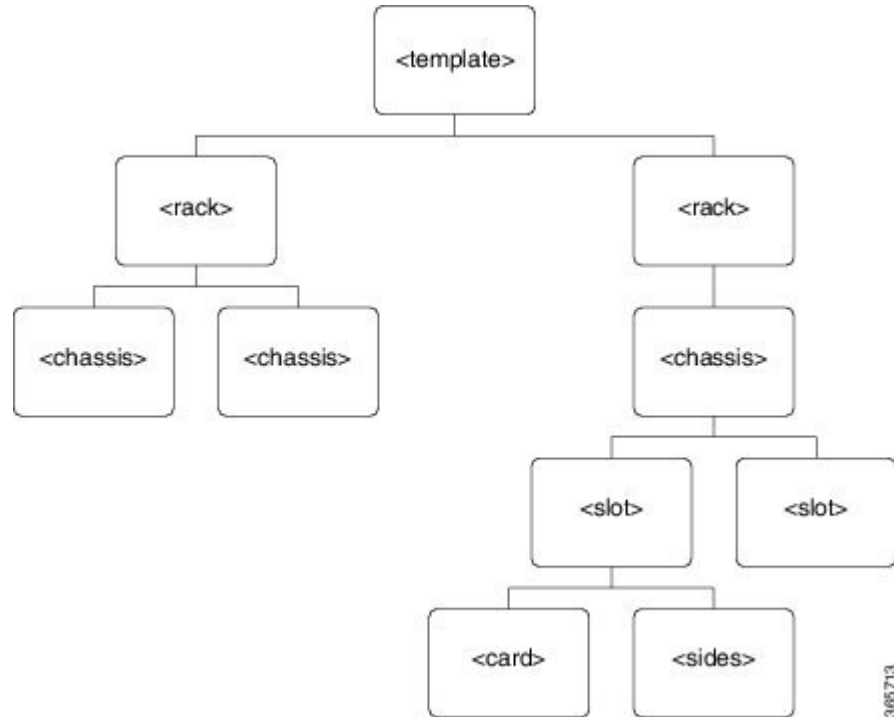
- [Port Details of Cards for Layout Template](#)
- [Supported Configurations for Layout Template](#)

## Components of a Layout Template

A layout template is an XML file that has the following main components:

- <template>
- <rack>
- <chassis>
- <slot>

**Figure 31: Sample Structure of a Layout Template**



The section below details on the layout template attributes, their tags, and attribute values.

### <template>

This attribute has the following tags:

| Tag  | Mandatory | Description                                | Attribute Values  |
|------|-----------|--|-------------------|
| <id> | No        | Unique identifier for the layout template. | Any string value. |

| Tag                  | Mandatory | Description  | Attribute Values  |
|----------------------|-----------|--|---|
| <comments>           | No        | User-specific comments for the template.   | Any string. For example, template1  |
| <clientInOTSShelves> | Yes       | Enables you to place client cards in the OTS shelves.  | <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul> |
| <isAnsi>             | Yes       | If the value of the attribute is set to true, it enables the Network Platform Layout to be ANSI-enabled. If the value is false, the Network Platform Layout is ETSI-enabled. | <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul> |
| <isNCSEnabled>       | Yes       | If the value of the attribute is set to true, it enables the NCS PIDs to be used. If the value is false, the ONS PIDs are used.  | <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul> |
| <sidesMap>           | No        | Maps the line, omnidirectional, or contentionless sides present in the CTP GUI with the side index used in the layout template.  | List of comma-separated sides:index pairs. For example, A:0,B:1,P:2,Q:3   |
| <rack>               | Yes       | Provides details about the racks present in layout.  | Attribute values are provided in the <rack> section below.                |

The following example shows sample values for the <template> attribute:

```

<template>
  <comments>template1</comments>
  <clientInOTSShelves>true</clientInOTSShelves>
  <isAnsi>true</isAnsi>
  <isNCSEnabled>true</isNCSEnabled>
  <sidesMap>E:0,F:1,G:2,H:3</sidesMap>
  <rack>
    RACK ATTRIBUTES
  </rack>
</template>

```

## <rack>

This attribute provides details about the racks present in the layout and has the following tags:

| Tag           | Mandatory | Description  | Attribute Values  |
|---------------|-----------|--|---|
| <id>          | Yes       | Rack identifier in the layout.   | Integer value from 1 to 25.   |
| <isMandatory> | No        | Specifies whether the rack is mandatory or not in the layout. If the value is true, the rack is placed even if it does not have any chassis or components. | <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul> |
| <chassis>     | No        | Specifies details about the chassis present in the rack.   | Attribute values are provided in the <chassis> section below.             |

The following example shows sample values for the <rack> attribute:

```
<rack>
  <id>1</id>
  <isMandatory>true</isMandatory>
  <chassis>
    CHASSIS ATTRIBUTES
  </chassis>
</rack>
```

## chassis

This attribute provides details about the chassis present in the rack and has the following tags:

| Tag        | Mandatory | Description  | Attribute Values   |
|------------|-----------|--|--|
| <type>     | Yes       | Specifies the chassis type.  | <ul style="list-style-type: none"> <li>• PDP</li> <li>• NCS2006-SA</li> <li>• MF10-6RU</li> <li>• MF1-RU</li> <li>• NCS2015-SA-DC</li> <li>• NCS2015-SA-AC</li> <li>• MF-6RU</li> <li>• FBR-STRG</li> <li>• AL-CH</li> <li>• 15216-DCU-SA</li> <li>• WS-C2950G-24-EL-DC</li> <li>• 15454-MS-EXT-24</li> <li>• NCS2K-PPMESH8-5AD</li> <li>• AIR-RAMP</li> </ul> |
| <position> | Yes       | Position of the chassis in the rack.   | The range of the value is from 1 to 44.  |
| <shelfId>  | No        | Chassis ID used in the CTP layout. This value must be the same as the shelf ID displayed in the layout.<br><br><b>Note</b> We recommend that you assign a shelf ID when designing a layout template. | Integer value from 1 to 50.  |
| <unitId>   | No        | Unit ID used in the CTP layout. This value must be the same as the unit ID displayed in the layout.<br><br><b>Note</b> We recommend that you assign a unit ID when designing a layout template.      | Integer value from 1 to 126.   |

| Tag                    | Mandatory | Description  | Attribute Values  |
|------------------------|-----------|--|---|
| <passiveshelfId>       | No        | Passive shelf ID of the MF10-6RU/MF-6RU units used in the CTP layout. This value must be the same as the passive shelf ID displayed in the layout. | Integer value from 1 to 126.  |
| <isMandatory>          | No        | Indicates whether the chassis is mandatory or not in the layout. If marked true, the chassis is placed even if it does not have any cards.         | <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul>   |
| <powersupply>          | No        | Type of power supply.  | <ul style="list-style-type: none"> <li>• AC Power</li> <li>• DC Power</li> <li>• DC20 Power</li> <li>• DC40 Power</li> <li>• AC2 Power</li> </ul> |
| <redundantPowersupply> | No        | Specify if you require a redundant power supply.   | <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul>   |
| <mfCover>              | No        | Specify if you require covers for MF10-6RU and MR-6RU fiber shuffle units.   | <ul style="list-style-type: none"> <li>• true</li> <li>• false</li> </ul>   |
| <fantray>              | No        | Type of fan tray.  | <ul style="list-style-type: none"> <li>• FTA-4-T</li> <li>• FTA-3-T</li> <li>• FTA-2-T</li> <li>• FTA</li> </ul>                                  |
| <ecutype>              | No        | Type of M6 External Connection Unit (ECU).   | <ul style="list-style-type: none"> <li>• ECU</li> <li>• ECU60-S</li> <li>• ECU-S</li> </ul>   |



| Tag                    | Mandatory | Description  | Attribute Values   |
|------------------------|-----------|--|--|
| <redundantpowerscheme> | No        | Type of redundant power scheme.                                      | <ul style="list-style-type: none"> <li>• 3+1</li> <li>• 2+2</li> <li>• 1+1</li> <li>• 2+1</li> </ul> |
| <door>                 | No        | Type of door.  | <ul style="list-style-type: none"> <li>• Door</li> <li>• DeepDoor</li> </ul>                         |
| <slot>                 | No        | Specifies details about the card present in the slot of the chassis. | Attribute values are provided in the <slot> section below.   |

The following example shows sample values for the <chassis> attribute for M15 chassis:

```
<chassis>
  <type>NCS2015-SA-DC</type>
  <position>14</position>
  <shelfId>1</shelfId>
  <isMandatory>true</isMandatory>
  <slot>
    <card>TNCS-O</card>
    <position>1</position>
  </slot>
</chassis>
```

## <slot>

| Tag      | Mandatory | Description  | Attribute Values   |
|----------|-----------|--|--|
| <card>   | Yes       | Name of the card.  | For details on the list of cards tested for the layout template feature, see <a href="#">Cards for the Supported Configurations, on page 284</a> . |
| <cardId> | No        | Unique ID of the card. You can define this attribute for cascaded or back to back connections. | Integer value such as 1, 2, and so on.   |

| Tag              | Mandatory | Description   | Attribute Values   |
|------------------|-----------|---|--|
| <position>       | Yes       | Position of the cards in the chassis.   | <ul style="list-style-type: none"> <li>The range is from 1 to 8 for M6.</li> <li>The range is from 1 to 17 for NCS 2015.</li> </ul>        |
| <unitId>         | No        | Unit ID of the card present in the slot.  | Integer value such as 1, 2, and so on.   |
| <ports>          | No        | Ports of TNC/TNCS/TNCS-O cards to which the SMR is connected.   | 0 or 1   |
| <mode>           | No        | Mode of amplifiers.<br>Choose one of the following: <ul style="list-style-type: none"> <li>PRE for preamplifier</li> <li>INLINE for an inline amplifier</li> <li>BST for Booster amplifier</li> </ul> | <ul style="list-style-type: none"> <li>PRE</li> <li>INLINE</li> <li>BST</li> </ul>   |
| <layer>          | No        | Layer to which the cards belong. This attribute is mainly used in multilayer or cascaded card structures.   | Integer value such as 1, 2, and so on.   |
| <sides>          | No        | Side association of the card.   | <sideIndex>  |
| <connectedSides> | No        | Sides connected to the card.  | List of <sideIndex>  |
| <pluggables>     | No        | Pluggable used for the TNC/TNCS cards.  | <ul style="list-style-type: none"> <li>ONS-SE-155-1510</li> <li>ONS-SC-OSC-18.0</li> <li>ONS-SC-OSC-ULH</li> <li>ONS-SC-Z3-1510</li> </ul> |

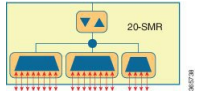
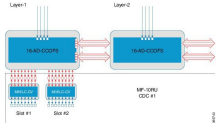
| Tag              | Mandatory | Description   | Attribute Values                          |
|------------------|-----------|---|---|
| <linkedCardIds>  | No        | Card IDs of the cards linked to the card present in the slot.   | List of <cardId>                          |
| <linkedCardPort> | No        | Physical port of the cards that are connected to the linked card. For details on the list of ports, see <a href="#">Port Details of Cards for Layout Template</a> . | Integer value such as 1, 2, and so on.    |
| <sideIndex>      | No        | Index of the side to which the card belongs.  | Integer value such as 0, 1, 2, and so on. |

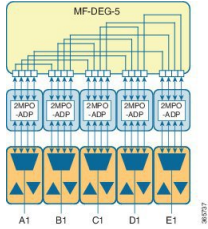
In the following example for the <slot> attribute, NCS2K-MF-MPO-16LC is connected to the NCS2K-16-AD-CCOFS card that has a card ID of 1 at port 73 (physical port of NCS2K-16-AD-CCOFS). Depending on these values the connections are made.

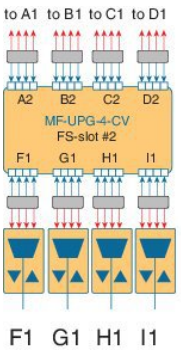
```
<slot>
<card>NCS2K-MF-MPO-16LC</card>
<position>1</position>
<unitId>5</unitId> <sides>
  <sideIndex>5</sideIndex>
</sides> <linkedCardIds>
  <cardId>1</cardId>
</linkedCardIds>
<linkedCardPort>73</linkedCardPort>
</slot>
```

## Mandatory Attributes and Sample XML Snippets for Cards

The table below provides a list of mandatory fields for the layout template and sample XML snippets for the following cards:

| Card              | Mandatory Tags  | Example   | Configuration  |
|-------------------|---|---|--|
| NCS2K-20-SMRFS    | <ul style="list-style-type: none"> <li>sides/sideIndex</li> <li>card</li> <li>position</li> </ul>   | <pre>&lt;slot&gt; &lt;card&gt;NCS2K-20-SMRFS &lt;/card&gt; &lt;position&gt;7 &lt;/position&gt; &lt;sides&gt; &lt;sideIndex&gt;2 &lt;/sideIndex&gt; &lt;/sides&gt; &lt;/slot&gt;</pre>   |   |
| NCS2K-9-SMR17FS   | <ul style="list-style-type: none"> <li>sides/sideIndex</li> <li>card</li> <li>position</li> </ul>   | <pre>&lt;slot&gt; &lt;card&gt;NCS2K-9-SMRFS &lt;/card&gt; &lt;position&gt;7 &lt;/position&gt; &lt;sides&gt; &lt;sideIndex&gt;2 &lt;/sideIndex&gt; &lt;/sides&gt; &lt;/slot&gt;</pre>  |  |
| NCS2K-16-AD-CCOFS | <ul style="list-style-type: none"> <li>cardId</li> <li>position</li> <li>sides/sideIndex</li> <li>connectedSides/sideIndex</li> </ul>                   | <pre>&lt;slot&gt; &lt;card&gt;NCS2K-16-AD-CCOFS &lt;/card&gt; &lt;cardId&gt;1 &lt;/cardId&gt; &lt;position&gt;6 &lt;/position&gt; &lt;sides&gt; &lt;sideIndex&gt;4 &lt;/sideIndex&gt; &lt;/sides&gt; &lt;connectedSides&gt; &lt;sideIndex&gt;0 &lt;/sideIndex&gt; &lt;sideIndex&gt;1 &lt;/sideIndex&gt; &lt;sideIndex&gt;2 &lt;/sideIndex&gt; &lt;sideIndex&gt;3 &lt;/sideIndex&gt; &lt;/connectedSides&gt; &lt;/slot&gt;</pre> |  |
| MF-6AD-CFS        | <ul style="list-style-type: none"> <li>card</li> <li>position</li> <li>sides/sideIndex</li> <li>linkedCardIDs/cardId</li> <li>linkedCardPort</li> </ul> |   |  |

| Card              | Mandatory Tags  | Example  | Configuration  |
|-------------------|---|--|--|
|                   |   | <pre data-bbox="963 285 1232 646">&lt;slot&gt; &lt;card&gt;MF-6AD-CFS &lt;/card&gt; &lt;position&gt;3 &lt;/position&gt; &lt;sides&gt; &lt;sideIndex&gt;4 &lt;/sideIndex&gt; &lt;/sides&gt; &lt;linkedCardIds&gt; &lt;cardId&gt;2 &lt;/cardId&gt; &lt;/linkedCardIds&gt; &lt;linkedCardPort&gt;20 &lt;/linkedCardPort&gt; &lt;/slot&gt;</pre>             |  |
| NCS2K-MF-MPO-16LC | <ul data-bbox="716 720 946 947" style="list-style-type: none"> <li>• card</li> <li>• position</li> <li>• sides/sideIndex</li> <li>• linkedCardIDs/cardId</li> <li>• linkedCardPort</li> </ul> | <pre data-bbox="963 699 1232 1108">&lt;slot&gt; &lt;card&gt;NCS2K-MF-MPO-16LC &lt;/card&gt; &lt;position&gt;1 &lt;/position&gt; &lt;sides&gt; &lt;sideIndex&gt;9 &lt;/sideIndex&gt; &lt;/sides&gt; &lt;linkedCardIds&gt; &lt;cardId&gt;6 &lt;/cardId&gt; &lt;/linkedCardIds&gt; &lt;linkedCardPort&gt;74 &lt;/linkedCardPort&gt; &lt;/slot&gt;</pre>     |  |
| NCS2K-MF-DEG-5    | <ul data-bbox="716 1161 946 1234" style="list-style-type: none"> <li>• position</li> <li>• connectedSides/sideIndex</li> </ul>  | <pre data-bbox="963 1140 1232 1528">&lt;slot&gt; &lt;card&gt;NCS2K-MF-DEG-5 &lt;/card&gt; &lt;position&gt;1 &lt;/position&gt; &lt;connectedSides&gt; &lt;sideIndex&gt;0 &lt;/sideIndex&gt; &lt;sideIndex&gt;1 &lt;/sideIndex&gt; &lt;sideIndex&gt;2 &lt;/sideIndex&gt; &lt;sideIndex&gt;3 &lt;/sideIndex&gt; &lt;/connectedSides&gt; &lt;/slot&gt;</pre> |  <p>The diagram shows an MF-DEG-5 card (yellow box) at the top with five output ports labeled A1, B1, C1, D1, and E1 (orange boxes) at the bottom. Each output port is connected to a corresponding input port on a card labeled 'SMPD ADP' (blue boxes) in the middle. The connections are shown as lines from the top of each SMPD ADP card to the bottom of the MF-DEG-5 card.</p> |
| NCS2K-MF-UPG-4    | <ul data-bbox="716 1602 946 1675" style="list-style-type: none"> <li>• position</li> <li>• connectedSides/sideIndex</li> </ul>  |  |  |

| Card                               | Mandatory Tags   | Example   | Configuration  |
|------------------------------------|--|---|--|
|                                    |  | <pre> &lt;slot&gt;   &lt;card&gt;NCS2K-MF-UPG-4    &lt;/card&gt;   &lt;position&gt;11 &lt;/position&gt;   &lt;connectedSides&gt;     &lt;sideIndex&gt;0   &lt;/sideIndex&gt;   &lt;sideIndex&gt;1   &lt;/sideIndex&gt;   &lt;sideIndex&gt;2   &lt;/sideIndex&gt;   &lt;sideIndex&gt;3   &lt;/sideIndex&gt;   &lt;sideIndex&gt;5   &lt;/sideIndex&gt;   &lt;sideIndex&gt;7   &lt;/sideIndex&gt;   &lt;sideIndex&gt;8   &lt;/sideIndex&gt;   &lt;sideIndex&gt;9   &lt;/sideIndex&gt;   &lt;/connectedSides&gt; &lt;/slot&gt;           </pre> |  <p>The diagram shows a card labeled 'MF-UPG-4-CV FS-slot #2'. On the top edge, there are four pairs of ports labeled A2, B2, C2, and D2. Above each pair, red arrows point upwards towards labels 'to A1', 'to B1', 'to C1', and 'to D1'. On the bottom edge, there are four pairs of ports labeled F1, G1, H1, and I1. Below each pair, there are blue arrows pointing downwards. A small vertical number '380728' is located on the right side of the diagram.</p> |
| <p>TNC / TNCS / TNCS-O / TNC-E</p> | <ul style="list-style-type: none"> <li>• card</li> <li>• position</li> <li>• ports (0,1)</li> <li>• connectedSides/sideIndex</li> <li>• pluggables</li> </ul> <p><b>Note</b> Pluggables are not required for TNCS-O.</p> |   |  |

| Card | Mandatory Tags | Example  | Configuration |
|------|----------------|--|---------------|
|      |                | <p>When the port is 0:</p> <pre> &lt;slot&gt;   &lt;card&gt;TNC-E&lt;/card&gt;   &lt;position&gt;1 &lt;/position&gt; &lt;ports&gt;0 &lt;/ports&gt;   &lt;connectedSides&gt;     &lt;sideIndex&gt;0   &lt;/sideIndex&gt;   &lt;/connectedSides&gt;   &lt;pluggables&gt; ONS-SE-155-1510   &lt;/pluggables&gt; &lt;/slot&gt; </pre> <p>When the port is 1:</p> <pre> &lt;slot&gt;   &lt;card&gt;TNC-E&lt;/card&gt;   &lt;position&gt;1 &lt;/position&gt; &lt;ports&gt;1 &lt;/ports&gt;   &lt;connectedSides&gt;     &lt;sideIndex&gt;0   &lt;/sideIndex&gt;   &lt;/connectedSides&gt;   &lt;pluggables&gt; :ONS-SE-155-1510   &lt;/pluggables&gt; &lt;/slot&gt; </pre> <p>When the port is 0:1:</p> <pre> &lt;slot&gt;   &lt;card&gt;TNC-E &lt;/card&gt;   &lt;position&gt;1 &lt;/position&gt; &lt;ports&gt;0 &lt;/ports&gt;   &lt;connectedSides&gt;     &lt;sideIndex&gt;0   &lt;/sideIndex&gt;   &lt;/connectedSides&gt;   &lt;pluggables&gt;ONS-SE-155-1510:ONS-SE-155-1510 &lt;/pluggables&gt; &lt;/slot&gt; </pre> |               |

| Card  | Mandatory Tags   | Example  | Configuration |
|---|--|--|---------------|
| Stand alone transponder with 200G-CK-LC                 | <ul style="list-style-type: none"> <li>• card</li> <li>• position</li> </ul>                                 | <pre>&lt;slot&gt; &lt;card&gt;200G-CK-LC &lt;/card&gt; &lt;position&gt;3 &lt;/position&gt; &lt;/slot&gt;</pre>   |               |
| Peer-Skip Transponder with 200G-CK-LC+MR-MXP            | <ul style="list-style-type: none"> <li>• card</li> <li>• position</li> <li>• linkedCardIDs/cardId</li> </ul> | <pre>&lt;slot&gt; &lt;card&gt;200G-CK-LC &lt;/card&gt; &lt;cardId&gt;2 &lt;/cardId&gt; &lt;position&gt;2 &lt;/position&gt; &lt;linkedCardIds&gt; &lt;cardId&gt;3 &lt;/cardId&gt; &lt;/linkedCardIds&gt; &lt;/slot&gt; &lt;slot&gt; &lt;card&gt;MR-MXP &lt;/card&gt; &lt;cardId&gt;3 &lt;/cardId&gt; &lt;position&gt;3 &lt;/position&gt; &lt;linkedCardIds&gt; &lt;cardId&gt;2 &lt;/cardId&gt; &lt;/linkedCardIds&gt; &lt;/slot&gt;</pre> |               |
| Peer-Skip-Skip Transponder with 200GCKLC+10X10GLC+MRMXP | <ul style="list-style-type: none"> <li>• card</li> <li>• position</li> <li>• linkedCardIDs/cardId</li> </ul> |  |               |



| Card | Mandatory Tags | Example   | Configuration |
|------|----------------|---|---------------|
|      |                | <pre> &lt;slot&gt;   &lt;card&gt;200G-CK-LC   &lt;/card&gt;   &lt;cardId&gt;8   &lt;/cardId&gt;   &lt;position&gt;2   &lt;/position&gt;   &lt;linkedCardIds&gt;     &lt;cardId&gt;9     &lt;/cardId&gt;     &lt;cardId&gt;10     &lt;/cardId&gt;   &lt;/linkedCardIds&gt; &lt;/slot&gt; &lt;slot&gt;   &lt;card&gt;10X10G-LC   &lt;/card&gt;   &lt;cardId&gt;9   &lt;/cardId&gt;   &lt;position&gt;3   &lt;/position&gt;   &lt;linkedCardIds&gt;     &lt;cardId&gt;8     &lt;/cardId&gt;     &lt;cardId&gt;10     &lt;/cardId&gt;   &lt;/linkedCardIds&gt; &lt;/slot&gt; &lt;slot&gt;   &lt;card&gt;MR-MXP   &lt;/card&gt;   &lt;cardId&gt;10   &lt;/cardId&gt;   &lt;position&gt;4   &lt;/position&gt;   &lt;linkedCardIds&gt;     &lt;cardId&gt;8     &lt;/cardId&gt;     &lt;cardId&gt;9     &lt;/cardId&gt;   &lt;/linkedCardIds&gt; &lt;/slot&gt; </pre> |               |

## Using a Layout Template



### Note

This feature is supported only for Flex nodes in the Design state and for an unlocked network.

## Procedure

- 
- Step 1** Create a layout template in XML to match the required layout.
- Step 2** Right-click the site and choose **Upload Layout Template**. The **Apply Site Template** dialog box appears.
- Step 3** Click **Browse** and choose the template.
- Step 4** Click **Apply**. You are notified of errors in the template, if any. If there are no errors the template is applied to the site.
- Step 5** After the layout template is applied to one or many sites of the network, analyze the network to get the racks/shelves/cards auto-placed as per the defined layout template.

### Important Notes:

- You cannot perform the layout movement of slots and shelves if a layout template is applied. You must ensure that the layout properties of parameters such as Shelf Type, Extra chassis are set to Auto when you apply a layout template.
  - You cannot apply a layout template when you upgrade the network. After upgrading the network, if there are changes in the network such as addition, deletion, or modification of the existing demands or sides, you must redefine and reapply the template in the design mode.
- 

## Port Details of Cards for Layout Template

The table below lists the port numbers that can be used for the <linkedCardPort> attribute in the Layout Template.

| Card Name                 | Label | Label | Label         |
|---------------------------|-------|-------|---------------|
| NCS2K-20-SMRFS            | 47    | MPO16 | EXP RX TX - 1 |
|                           | 48    | MPO16 | EXP RX TX - 2 |
|                           | 49    | MPO16 | EXP RX TX - 3 |
| <del>NCS1K-10-SMRFS</del> | 23    | LC    | EXP-TX 9      |
|                           | 24    | LC    | EXP-RX 9      |
|                           | 25    | LC    | EXP-TX 10     |
|                           | 26    | MPO   | EXP RX TX - 1 |
|                           | 27    | MPO   | EXP RX TX - 2 |

| Card Name                              | Label | Label     | Label         |           |
|--|-------|-----------|---------------|-----------|
| NCSK-16ADCCOFS                         | 73    | MPO       | DEG 1-4 RX TX |           |
|  | 74    | MPO16     | CH RX TX-4    |           |
|  | 75    | MPO16     | CH RX TX-5    |           |
|  | 76    | MPO16     | UPG RX TX-2   |           |
|  | 77    | MPO16     | UPG RX TX-3   |           |
| NCSK-16ADCCOFS<br>Cable<br>(First set) | 17    |           | LC            | PORT-1-TX |
|  | 18    | LC        | PORT-1-RX     |           |
|  | 19    | LC        | PORT-2-TX     |           |
|  | 20    | LC        | PORT-2-RX     |           |
|  | 21    | LC        | PORT-3-TX     |           |
|  | 22    | LC        | PORT-3-RX     |           |
|  | 23    | LC        | PORT-1-TX     |           |
|  | 24    | LC        | PORT-1-RX     |           |
|  | 25    | LC        | PORT-2-TX     |           |
|  | 26    | LC        | PORT-2-RX     |           |
|  | 27    | LC        | PORT-3-TX     |           |
|  | 28    | LC        | PORT-3-RX     |           |
|  | 29    | LC        | PORT-4-TX     |           |
|  | 30    | LC        | PORT-7-RX     |           |
|  | 31    | LC        | PORT-8-TX     |           |
| 32                                     | LC    | PORT-8-RX |               |           |

| Card Name                               | Label | Label | Label     |
|---|-------|-------|-----------|
| NCS2K-MF-MPO-16LC Cable<br>(Second set) | 170   | LC    | PORT-1-TX |
|   | 180   | LC    | PORT-1-RX |
|   | 190   | LC    | PORT-2-TX |
|   | 200   | LC    | PORT-2-RX |
|   | 210   | LC    | PORT-3-TX |
|   | 220   | LC    | PORT-3-RX |
|   | 230   | LC    | PORT-4-TX |
|   | 240   | LC    | PORT-4-RX |
|   | 250   | LC    | PORT-5-TX |
|   | 260   | LC    | PORT-5-RX |
|   | 270   | LC    | PORT-6-TX |
|   | 280   | LC    | PORT-6-RX |
|   | 290   | LC    | PORT-7-TX |
|   | 300   | LC    | PORT-7-RX |
|   | 310   | LC    | PORT-8-TX |
|   | 320   | LC    | PORT-8-RX |

The figure below shows how the omnidirectional side NCS2K-20-SMRFS is connected to NCS2K-MF-6AD-CFS using NCS2K-MF-MPO-16LC or NCS2K-MF-MPO-16LC cable.

# Supported Configurations for Layout Template

## ROADM Upto 16 Degrees with Contentionless A/D

This contentionless configuration uses NCS2K-20-SMRFS along with NCS2K-MF-DEG-5/NCS2K-MF-UPG-4 and NCS2K-16-AD-CCOFS. Here, NCS2K-16-AD-CCOFS is used as the Add/Drop card.

Figure 32: ROADM upto 16 Degrees with Contentionless A/D

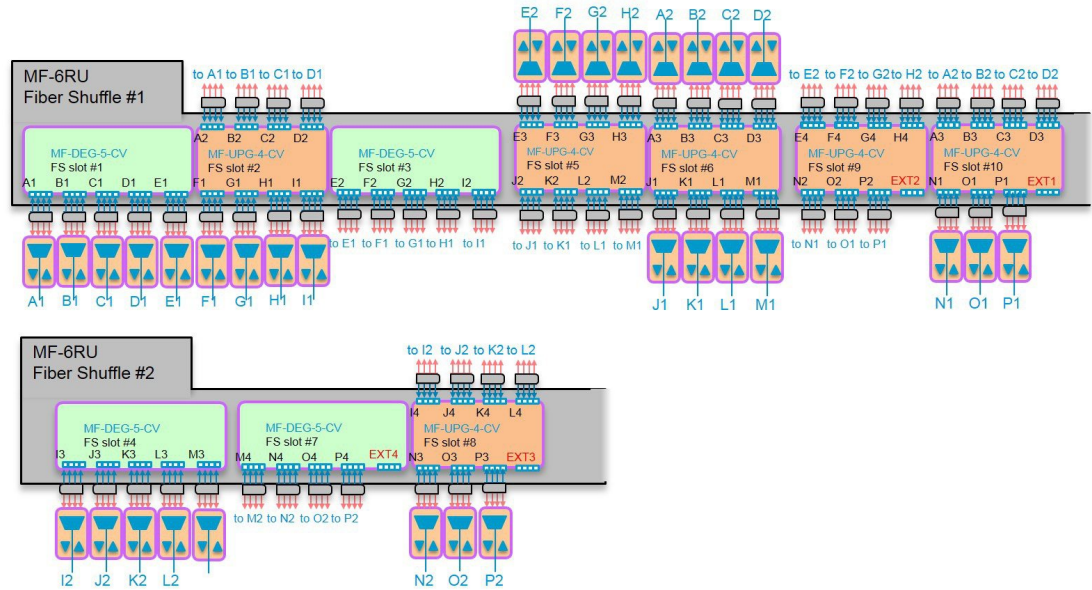
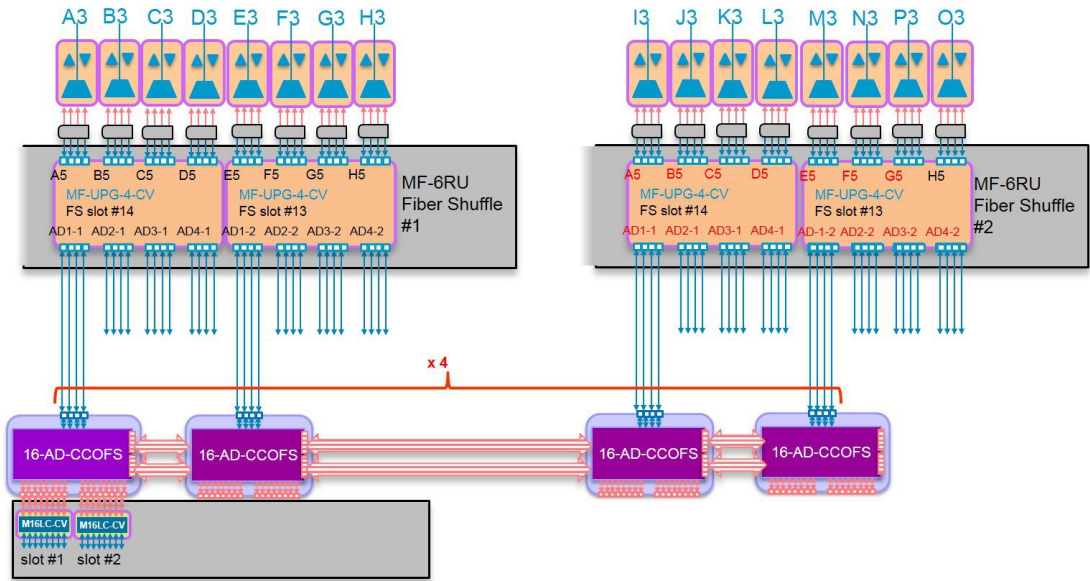


Figure 33: Add/Drop Stage

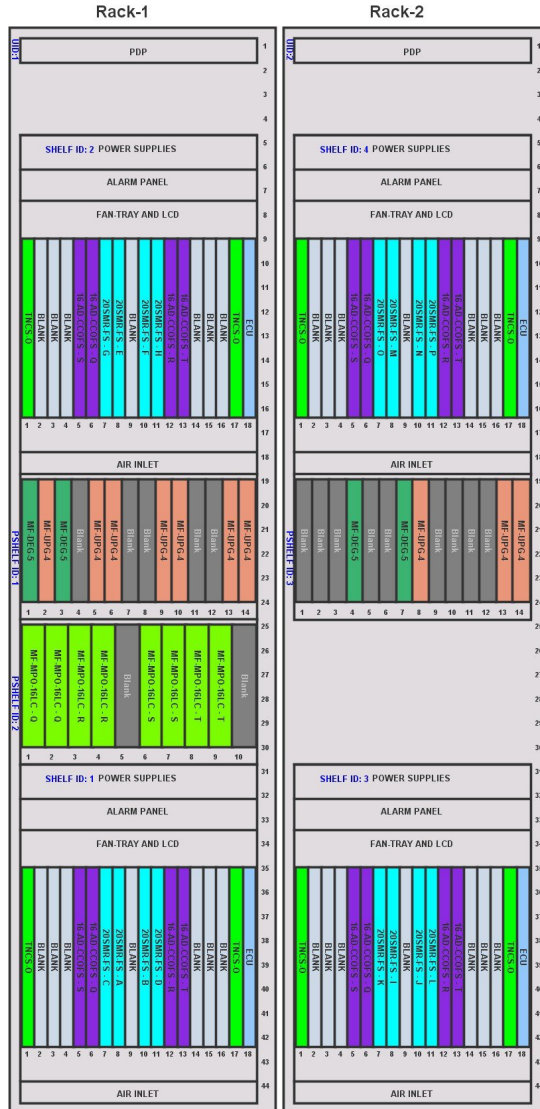
365765



365766

CTP layout for the above configuration is shown in the following figure:

Deg-16



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## ROADM upto 12 Degrees

This omnidirectional and colorless configuration uses NCS2K-20-SMRFS along with NCS2K-MF-DEG-5/ NCS2K-MF-UPG-4 and MF-6AD-CFS. Here, MF-6AD-CFS is used as the Add/Drop card.

Figure 34: ROADM upto 12 Degrees Omnidirectional and Colorless Configuration

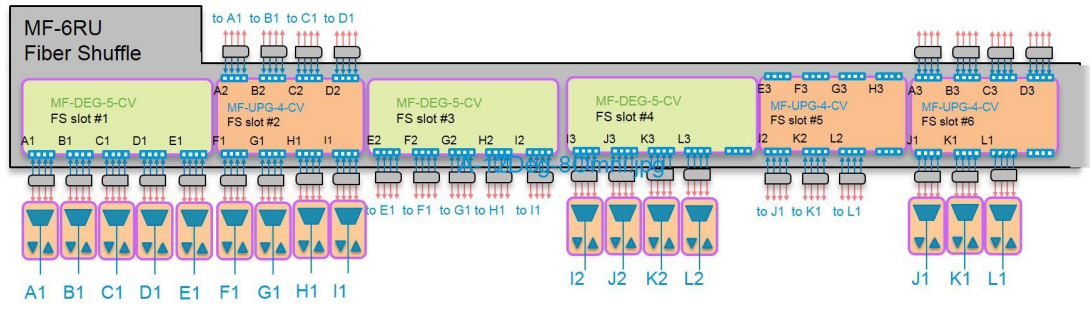


Figure 35: Add/Drop Stage

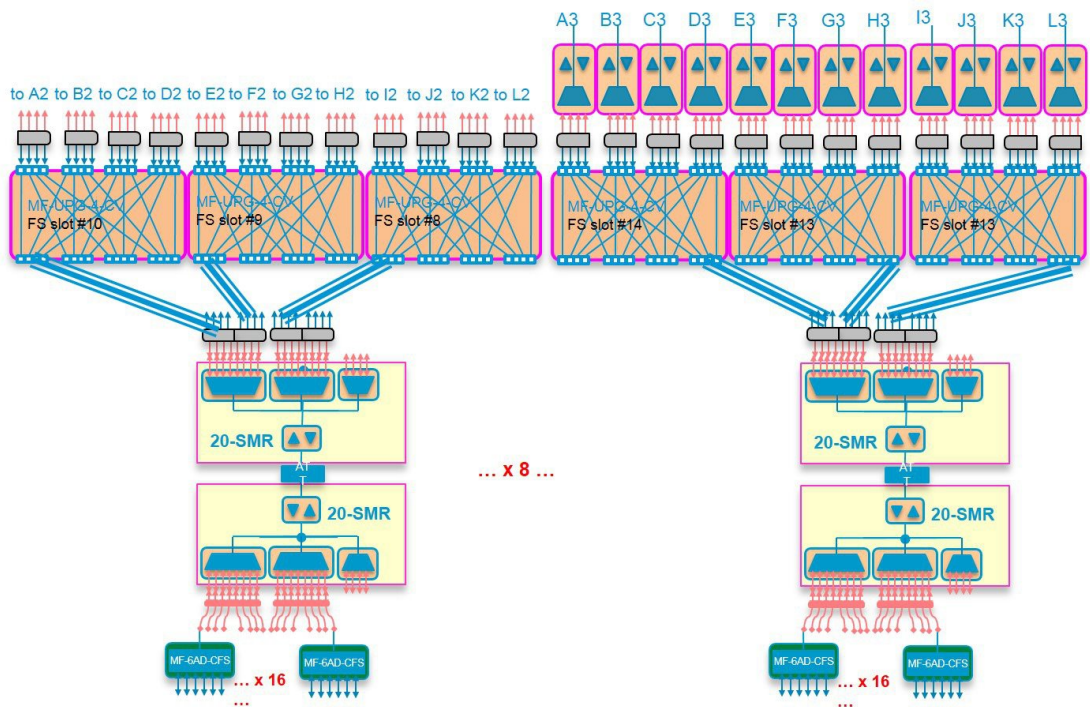
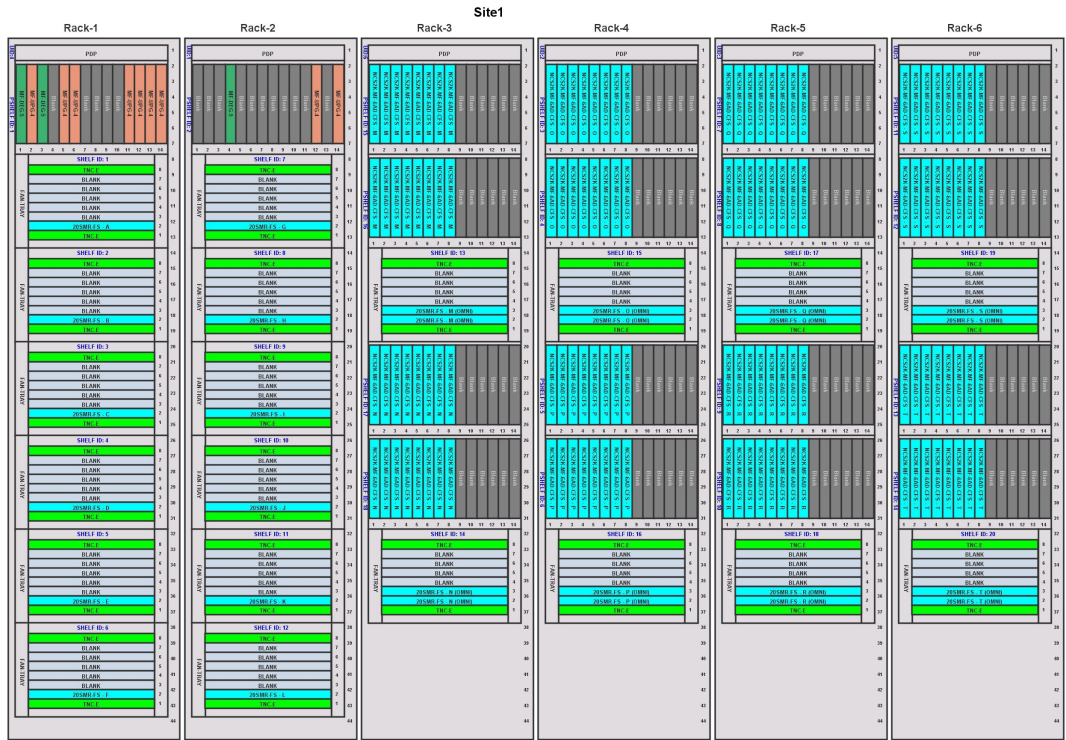


Figure 36: CTP Layout Using the Layout Template



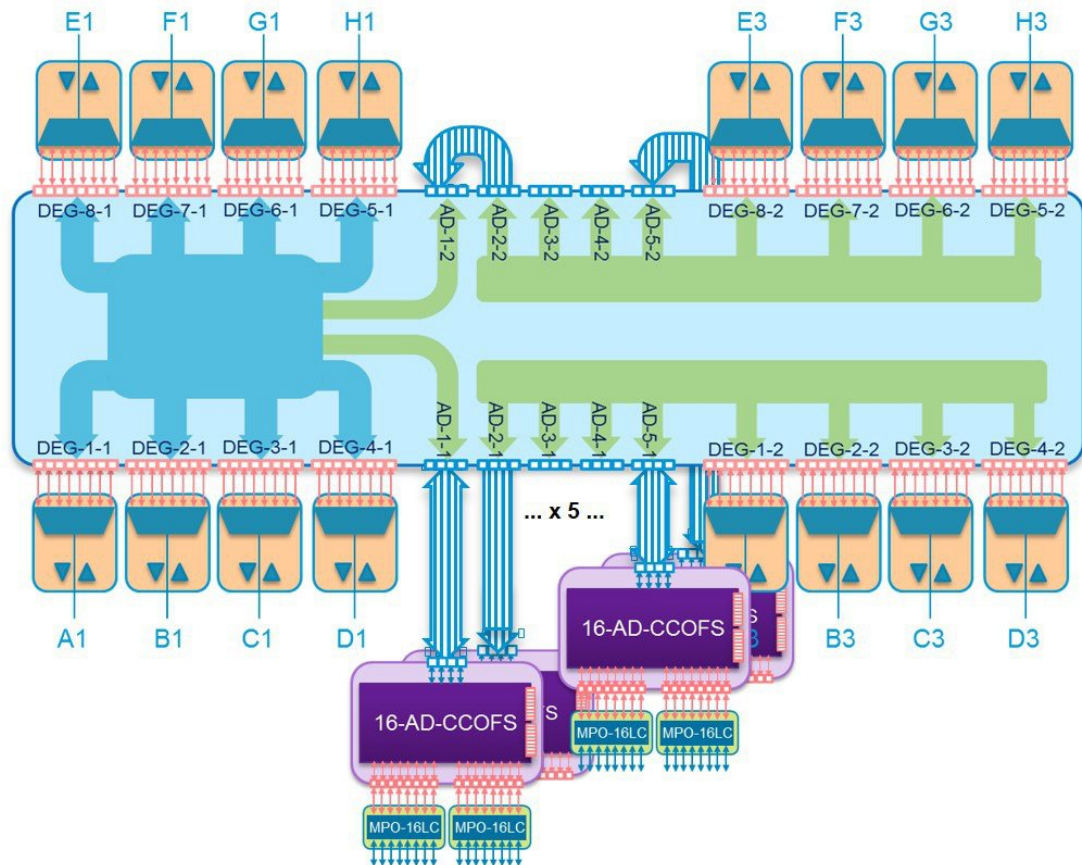


36517

## ROADM upto 8 Degrees

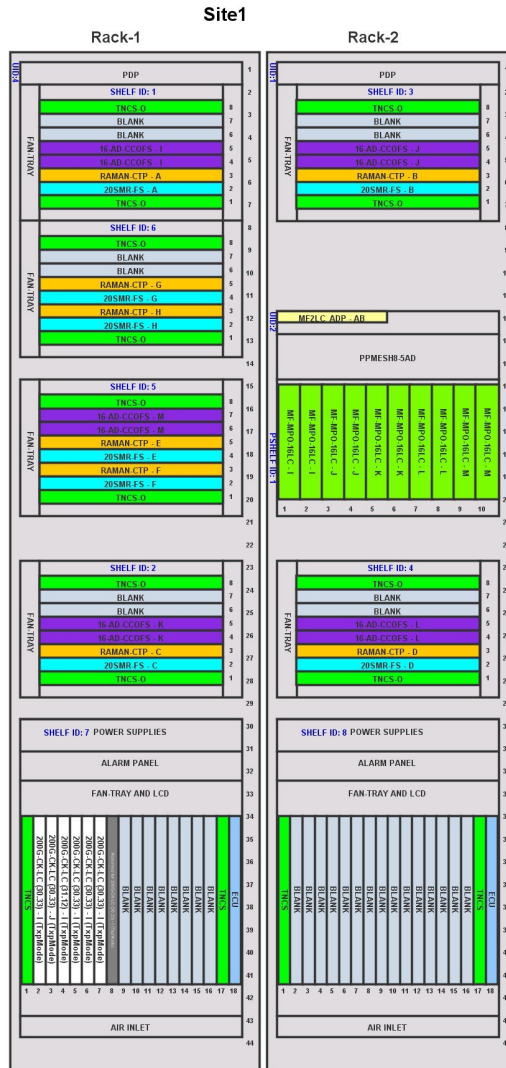
This contentionless configuration uses NCS2K-20-SMRFs along with NCS2K-PPMESH8-5AD and NCS2K-16-AD-CCOFS. Here, NCS2K-16-AD-CCOFS is used as the Add/Drop card.

**Figure 37: ROADM up to 8 Degrees Contentionless Configuration**



365762

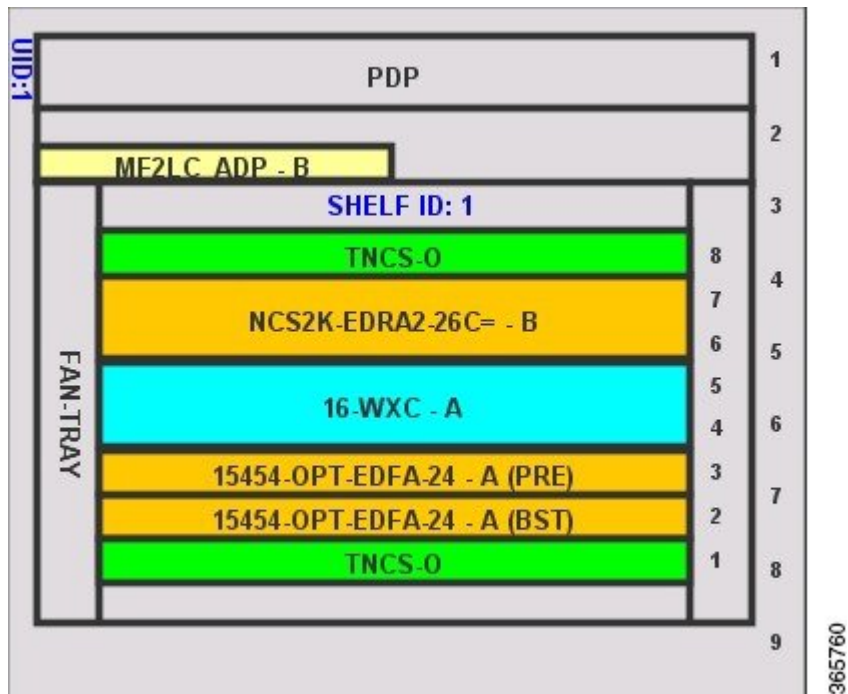
CTP layout for the above configuration is shown in the following figure:



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## Gain Equalizer

For a gain equalizer site, use NCS2K-16-WXC-FS with NCS2K-EDRA, 15454-OPT-EDFA24 (PRE and BST). CTP layout for the above configuration is shown in the figure below:

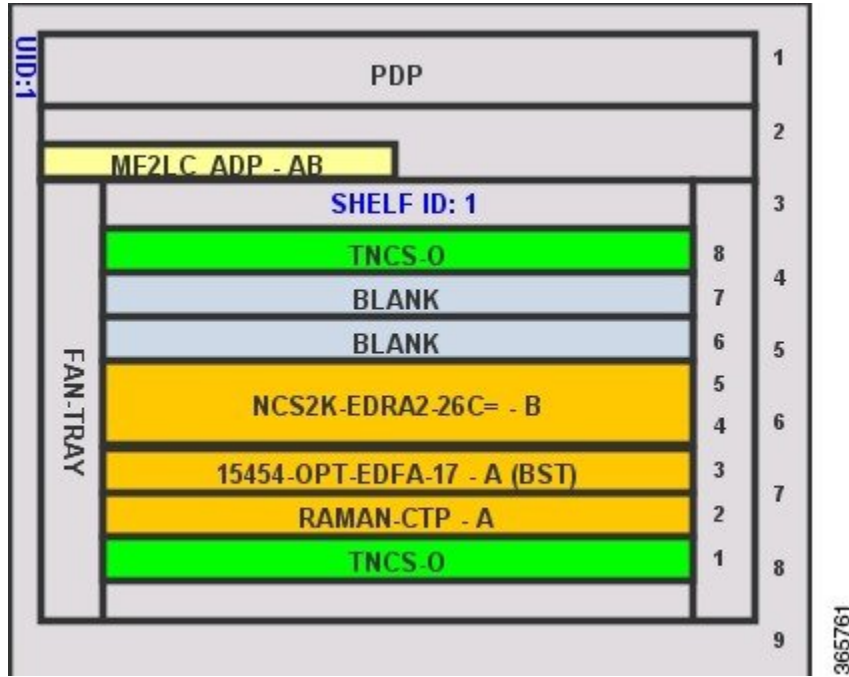


## Line Amplifier

For a line amplifier site, use any of the following configurations:

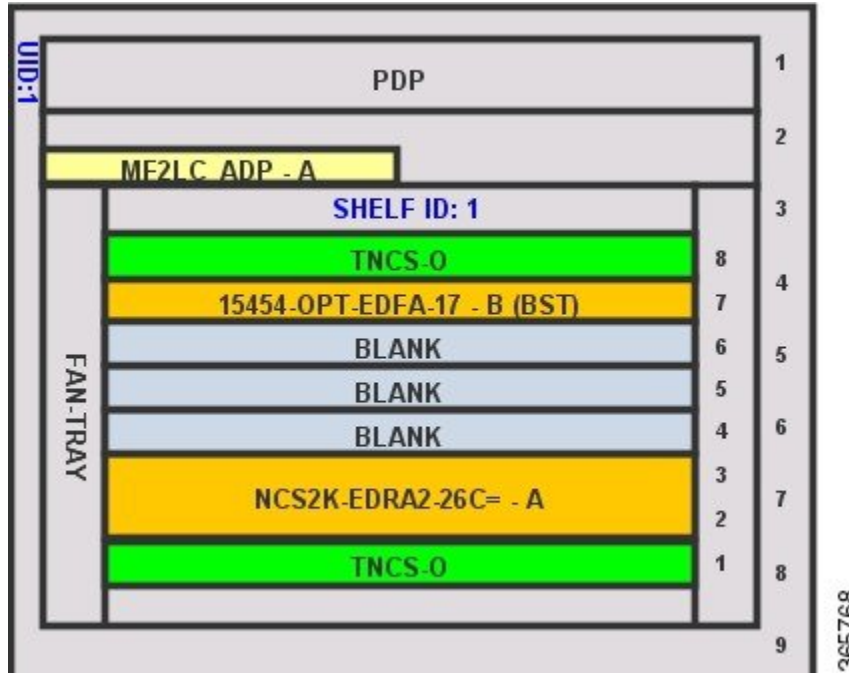
- NCS2K-EDRA1-26C, 15454-OPT-EDFA-17 With RAMAN-CTP

CTP layout for the above configuration is shown in the figure below:



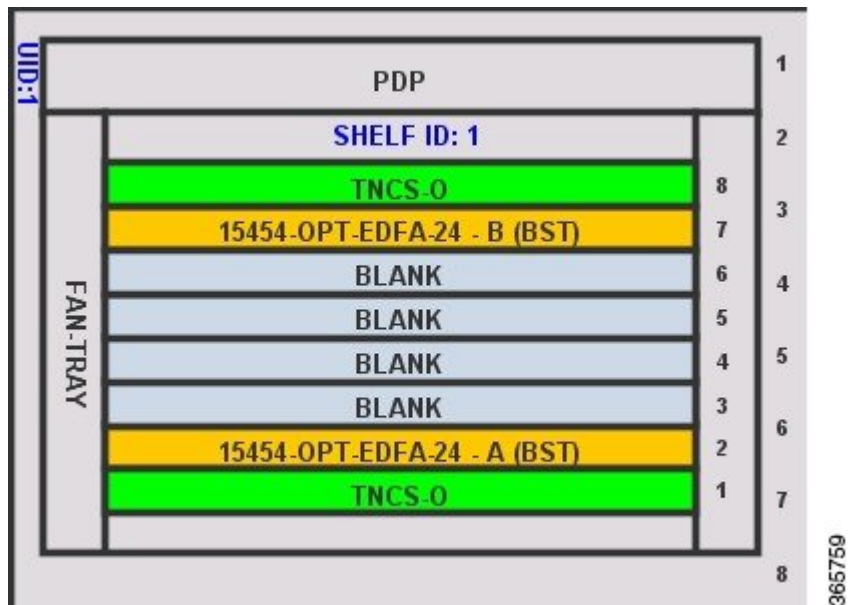
- NCS2K-EDRA1-26C, 15454-OPT-EDFA-17 Without RAMAN-CTP

CTP layout for the above configuration is shown in the figure below:



- 15454-OPT-EDFA-24 with or without RAMAN-CTP

CTP layout for the above configuration is shown in the figure below:



## Cards for the Supported Configurations

- NCS2K-16-AD-CCOFS
- MF-6AD-CFS
- NCS2K-PPMESH8-5AD
- NCS2K-MF-2LC-ADP
- TNCS-O
- TNCS
- TNC-E
- RAMAN-CTP
- NCS2K-MF-UPG-4
- NCS2K-MF-DEG-5
- NCS2K-MF-MPO-16LC
- NCS2K-20-SMRFS
- NCS2K-16-WXC-FS
- 15454-OPT-EDFA-17
- 15454-OPT-EDFA-24
- NCS2K-EDRA1-26C
- NCS2K-EDRA1-35C
- NCS2K-EDRA2-35C

- NCS2K-EDRA2-26C
- BLANK
- 200G-CK-LC
- MR-MXP
- 10X10G-LC

## Rack Rules

This section describes the following rules:

- [General Placement Rules](#)
- [M2 and M6 Placement Rules](#)
- [DCU Placement Rules](#)
- [Fiber Storage Placement Rules](#)
- [Air Ramp Placement Rules](#)
- [Patch Panel Placement Rules](#)
- [15216-MD-40-ODD/EVEN, 15216-EF-40-ODD/EVEN, and 15216-MD-48-ODD/EVEN Unit Placement Rules](#)
- [SMR Placement Rules](#)
- [Client Shelf Placement Rules](#)
- [Y-Cable Placement Rules](#)

## General Placement Rules

The following general rules apply to rack filling:

- CTP provisions the shelves in the rack from the top in the following order:
  - 1 PDP
  - 2 Ethernet switch shelf
  - 3 EAP shelf (fan out)
  - 4 Y-cable shelves (FlexLayer or Y-cable FMT)
  - 5 Band Combiner/Interleaver-deinterleaver FlexLayer shelf
  - 6 DCU shelves
  - 7 Patch-panel L shelves (PP-64-LC and FMT-32-Ch)
  - 8 15216 40-Channel Mux/Demux unit
  - 9 Air ramp (only for ETSI M12 shelves)
  - 10 MSTP optical shelves
  - 11 Air ramp (only for ANSI and ETSI M12 shelves)
  - 12 Fiber storage shelf
  - 13 Patch-panel shelves (for ETSI)

- 14 PP-MESH-4/PP-MESH-8
- 15 Transponder shelves (Present)
- 16 Line card shelves (Present)
- 17 Transponder shelves (Forecast)
- 18 Line card shelves (Forecast)

- If the Populate Shelves From Bottom check box is checked in the Layout area of Site properties, CTP provisions the shelves of the rack from the bottom. The shelves are arranged in the rack from top to bottom in the following order:

- 1 PDP
- 2 Line card shelves (Forecast)
- 3 Transponder shelves (Forecast)
- 4 Line card shelves (Present)
- 5 Transponder shelves (Present)
- 6 PP-MESH-4/PP-MESH-8
- 7 Patch-panel shelves (for ETSI)
- 8 Air ramp (only for ETSI M12 shelves)
- 9 MSTP optical shelves
- 10 Air ramp (only for ANSI/ETSI M12 shelves)
- 11 Fiber storage shelf
- 12 15216 40-Channel Mux/Demux unit
- 13 DCU shelves
- 14 Patch-panel L shelves (PP-64-LC and FMT-32-Ch)
- 15 Band Combiner/Interleaver-deinterleaver FlexLayer shelf
- 16 Y-cable shelves (FlexLayer or Y-cable FMT)
- 17 EAP shelf (fan out)
- 18 Ethernet switch shelf

- External switch shelf can be placed anywhere in any rack.
- The shelves from the DCU to the fiber storage unit are related to the optical shelf and must be used for every optical shelf.
- You cannot force the TDCU units in both Raman and post amplifier positions.
- The Power Distribution Panel (PDP) is always at the top of each rack and it is assumed to be a part of the rack.
- CTP places the MSTP optical shelf in the first available (layout unlocked) shelf position, starting from the first rack of the site or from the first rack of each side (for sites with site protection).
- CTP places as many shelves as possible within a rack, taking into account the height of the racks and the height of each shelf as shown in the following table:

| Height  | Rack/Shelf   |
|---------|--|
| 2000 mm | <ul style="list-style-type: none"> <li>• ANSI rack</li> <li>• ETSI rack</li> </ul> |



| Height                   | Rack/Shelf  |
|--------------------------|---|
| 44.75 mm (1 RU for ANSI) | <ul style="list-style-type: none"> <li>• DCU (ANSI) shelf</li> <li>• 15454-PP-64-LC PATCH-PANEL (ANSI) shelf (4.7/5.0 patch panel)</li> <li>• 15216-MD-40-ODD</li> <li>• Fiber storage (ANSI) shelf</li> <li>• PDP (ANSI) shelf</li> <li>• Air ramp (ANSI) shelf</li> <li>• FlexLayer shelf</li> <li>• Ethernet switch</li> <li>• Ethernet Adapter Panel (EAP) shelf (fan out)</li> </ul> |
| 89.50 mm (2 RU for ANSI) | <ul style="list-style-type: none"> <li>• 15454-PP2-64-LC PATCH-PANEL (ANSI) shelf</li> <li>• 15454-YCBL-LC (ANSI) shelf</li> <li>• 15454-80 LC-PC-II (PATCH-PANEL ANSI)</li> <li>• PP-MESH-4 (MESH PATCH-PANEL ANSI)</li> <li>• PP-MESH-8 (MESH PATCH-PANEL ANSI)</li> </ul>  |
| 50 mm (1 RU for ETSI)    | <ul style="list-style-type: none"> <li>• DCU (ETSI) shelf</li> <li>• 15454-PP-64-LC PATCH-PANEL (ETSI) shelf (4.7/5.0 patch panel)</li> <li>• 15216-MD-40-ODD</li> <li>• Fiber storage (ETSI) shelf</li> <li>• PDP (ETSI) shelf</li> <li>• Air ramp (ETSI) shelf</li> <li>• FlexLayer shelf</li> <li>• Ethernet switch</li> <li>• Ethernet Adapter Panel (EAP) shelf (fan out)</li> </ul> |

| Height                 | Rack/Shelf   |
|------------------------|--|
| 100 mm (2 RU for ETSI) | <ul style="list-style-type: none"> <li>• 15454-PP2-64-LC PATCH-PANEL (ETSI) shelf</li> <li>• 15454-YCBL-LC (ETSI) shelf</li> <li>• 15454-80 LC-PC-II (PATCH-PANEL ETSI)</li> <li>• PP-MESH-4 (MESH PATCH-PANEL ETSI)</li> <li>• PP-MESH-8 (MESH PATCH-PANEL ETSI)</li> </ul> |
| 407 mm                 | Card chassis ANSI (MSTP and transponder) shelf   |
| 617 mm                 | Card chassis ETSI (MSTP and transponder) shelf   |
| 254 mm (6 RU)          | M6 shelf   |
| 89.50 mm (2 RU)        | M2 shelf   |
| 622 mm (14RU)          | M15 shelf  |

## M2 and M6 Placement Rules

The following rules apply to M2 and M6 chassis placement:

- CTP places one M6 chassis on top of another M6 chassis without any air ramp.
- CTP does not allow an M2 chassis in an MSM configuration. If you force an M2 chassis in an MSM configuration, an error message is displayed.

## DCU Placement Rules

The following rules apply to DCU placement:

- CTP places the DCU shelves and DCU units on top of each MSTP optical shelf connected to the entering fiber of the span (or spans) to be compensated.
- If no room is available within the recommended space (for example, during an upgrade), then CTP places the DCU shelves and units in any of the other racks, starting preferably in the same rack as the MSTP optical shelf.
- CTP computes the DCU patchcord length with respect to the preamplifier position, using the same rules as the ones defined for TXP/MXP units.

## Fiber Storage Placement Rules

The following rules apply to fiber storage placement:

- If the fiber storage option is flagged as ON/AUTO, CTP places one fiber storage shelf below each MSTP optical shelf.
- If MSTP optical shelves are in different racks, CTP places a fiber storage shelf in each rack with an MSTP optical shelf.

## Air Ramp Placement Rules

The following rules apply to air ramp placement:

- An ANSI shelf must always have another ANSI shelf, an air ramp, or an empty space at the bottom of it.
- An ETSI shelf must always have one air ramp on top of it and one air ramp or an empty space at the bottom of it.
- Air ramp is not required on top of the ETSI shelf if the ETSI shelf is placed directly below the PDP in the rack.

CTP automatically adjusts the air ramp placement when changes occur in the layout options.

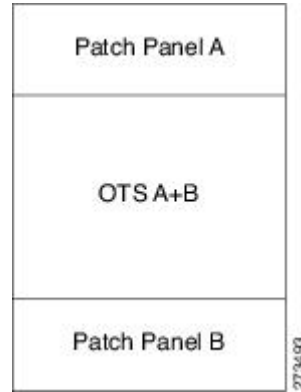
## Patch Panel Placement Rules

The following rules apply to patch panel placement:

- If you choose 15454-PP-64-LC, 15454-PP2-64-LC, or 15454-80-LC-PP-II patch panel, CTP deploys one patch panel for each side in the site.  
For example:
  - For a C-band /Odd channel terminal equipped with 32-Mux/Demux units: one patch panel shelf
  - For a C-band /Odd channel full-OADM: two patch-panel shelves.  
CTP places the two patch panel shelves together in the same rack when site protection is disabled and places them in two separate racks when site protection is enabled.
  - CTP places the patch panel shelves together on top of the OTS main shelf (under the DCU).
  - If the length of the MPO does not allow the patch panels to be together on top of the OTS main shelf (under the DCU shelves), then CTP places the patch panel shelves according to the following rules:
    - ETSI (without node protection)

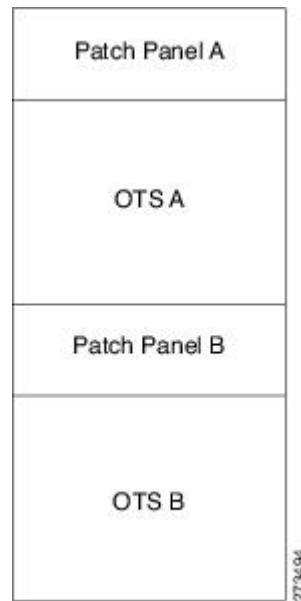
If the OTS units in both sides can be hosted within one shelf, then the layout is as shown in the following figure.

**Figure 38: Patch-Panel Placement for ETSI Without Node Protection**



- ANSI and ETSI (without node protection)  
If the OTS units on both sides cannot be hosted within one shelf, then the layout is as shown in the following figure.

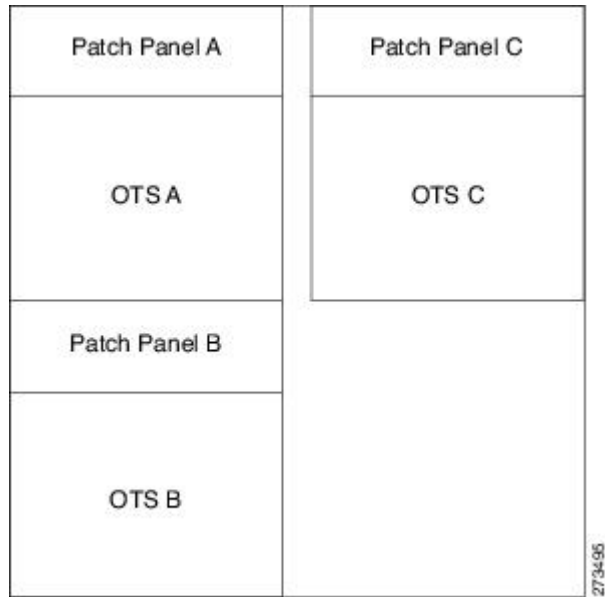
**Figure 39: Patch-Panel Placement for ANSI and ETSI Without Node Protection**



- ANSI and ETSI 3-N degree

For ANSI and ETSI 3-N degree, the layout is as shown in the following figure.

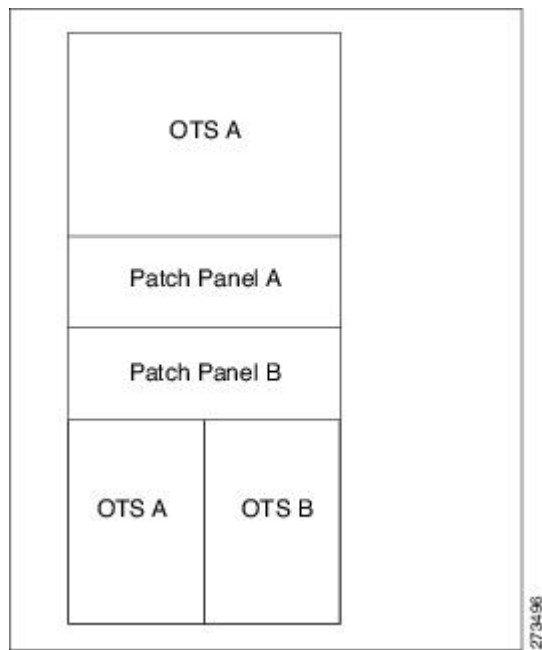
**Figure 40: Patch-Panel Placement for ANSI and ETSI 3-N Degree**



◦ Side occupying more than one shelf—ANSI

For a side occupying more than one shelf (ANSI), the layout is as shown in the following figure.

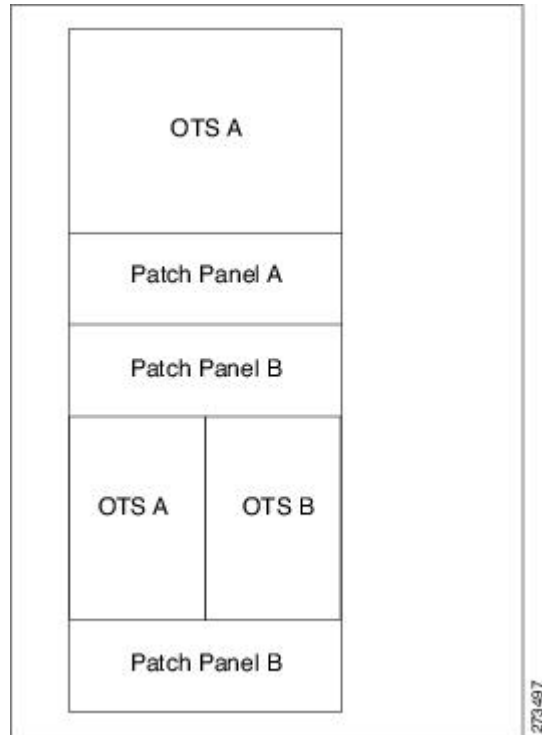
**Figure 41: Patch-Panel Placement—Side Occupying More than One Shelf (ANSI)**



◦ Side occupying more than one shelf—ETSI

For a side occupying more than one shelf (ETSI), the layout is as shown in the following figure.

**Figure 42: Patch-Panel Placement—Side Occupying More than One Shelf (ETSI)**



- If the OTS optical units cannot fit in one MSTP optical shelf, then CTP hosts the cards that are connected to the patch panel through MPO cables in the same shelf and places the patch-panel shelf on top of it.

## 15216-MD-40-ODD/EVEN, 15216-EF-40-ODD/EVEN, and 15216-MD-48-ODD/EVEN Unit Placement Rules

The following rules apply to ONS 15216 40-channel and 48-channel mux/demux units:

- CTP occupies the shelves in the rack from the top, adding the 15216-EF-40-ODD/15216-MD-40-ODD unit as close as possible to the shelf that contains the SMR cards.



**Note**

The SMR card refers to both the 40-SMR1-C and 40-SMR2-C cards.

- CTP automatically selects the 15216-EF-40-ODD as the add/drop units for SMR card configurations.

- You can move the 15216-EF-40-ODD/15216-MD-40-ODD unit to other shelves. However, a warning message is displayed suggesting that you place the 15216-MD-40-ODD unit as close as possible to the shelf that contains the SMR cards.
- You can manually force the 15216-EF-40-ODD/15216-MD-40-ODD unit with the 15216 FlexLayer modules (15216 FLB-2, FLA-8, FLD-4, FLD-9, CS-4).
- If you try to manually force the 15216-EF-40-ODD/15216-MD-40-ODD unit into the WSS site types, an error message is displayed.
- The 15216-MD-ID-50 units are replaced by the 15216-MD-48-CM units when the network is unlocked after an upgrade.
- To achieve network optimization, CTP applies the following placement rules based on the maximum channel requirements as defined by the optical subnet design rule. For more information about optical subnet design, see the [Creating an Optical Subnet](#), on page 64.
  - If the maximum channel count is less than or equal to 40, a 15216-EF-40-ODD or 15216-MD-40-ODD unit is placed.
  - If the maximum channel count is greater than 40 and the traffic has:

Only odd wavelengths, then the 15216-EF-40-ODD/15216-MD-40-ODD and MD-48-CM units are placed.

Only even wavelengths, then the 15216-EF-40-EVEN or 15216-MD-40-EVEN and MD-48-CM units are placed.

Both odd and even wavelengths, then the 15216-EF-40-ODD/15216-MD-40-ODD, 15216-EF-40-EVEN/15216-MD-40-EVEN, and MD-48-CM units are placed.

These placement rules are also applicable to the traffic being dropped at omnidirectional sides. For more information about the omnidirectional functionality, see the [Understanding Omnidirectional Functionality](#), on page 67.

**Note**

By default, the 15216-EF-40-ODD/15216-MD-40-ODD and 15216-EF-40-EVEN/15216-MD-40-EVEN units are used when colored omnidirectional sides are configured with the 80-WXC-C card; whereas the 40-MUX-C and 40-DMX-C cards are used by default to configure colored omnidirectional sides with the 40-WXC-C card.

- The 15216-MD-48-ODD and 15216-MD-48-EVEN units are allowed only in 48 or 96 channel hybrid networks.
- OPT-EDFA-17 or OPT-EDFA-24 units are automatically placed when the 15216-MD-48-ODD and 15216-MD-48-EVEN units are selected. If you manually force any other type of amplifier, an error message is displayed.
- The default interleaver-deinterleaver used is the MD-48-CM unit.

## SMR Placement Rules



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**Note** SMR cards are incompatible with EDRA cards. Raman-CTP/COP cards are compatible with SMR-9, and SMR-20 cards.

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Following are the placement rules for SMR:



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**Note** In this section, SMR refers to SMR-1 and SMR-2 cards. The rules below are not valid for SMR-9, and SMR-20 cards.

---

- If 15216 40-channel mux/demux units are associated with SMR, they must be placed in the same rack.
- The patch panel used for SMR-2 (SMR PP MESH 4) must be placed above the shelf where the SMR is placed.
- Forced OTS cards (like AMP, BST) are placed first, followed by SMR.
- For a line site, SMR of the first side must be placed left in the shelf and that of the next side must be placed right.
- In the upgrade scenario, if 15216 40-channel mux/demux units are associated with SMR, they must be placed in the same rack, even if there are free slots in the existing shelves. Movement of SMR card to another shelf or rack displays a warning message.

## Client Shelf Placement Rules

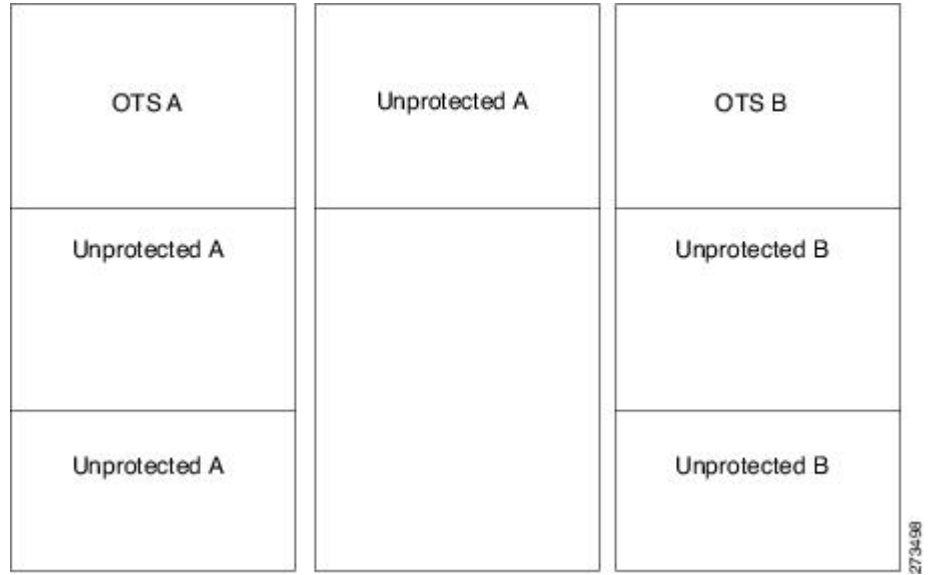
The following rules apply to client shelf placement:

- Node protection as same shelf:  
CTP places the client shelves from the first rack in an optimized manner.
- Node protection as separated shelves:



CTP places the client shelves, with unprotected or 1+1 protected cards, with their respective OTS racks. See the below figure.

**Figure 43: Client Shelf Placement-Node protection as Separated Shelves**



- CTP places the client shelves, filled with protection and aggregated demands, from the first rack in an optimized manner. CTP places these shelves after placing the unprotected or 1+1 protected shelves. CTP places the remaining client shelves, after filling the last OTS side rack, in new racks placed after the last OTS side rack. See the below figure.

**Figure 44: Client Shelf Placement-Protection and Aggregated Demand**



## Y-Cable Placement Rules

The following rules apply to Y-cable placement:

- CTP numbers each Y-cable protection module within the Y-cable protection shelf with progressive numbers (1 to n).
- The required number of Y-cable protection modules depends on the number of client ports (on transponders and muxponders) implementing the Y-cable protection within the racks in the site.
- Each Y-cable protection module can only connect transponders within the same rack.
- The shelf containing the Y-cable protection modules can be partially full.
- CTP uses single-mode or multimode Y-cable protection modules depending on the client interface on the transponder implementing the Y-cable protection.
- If a rack cannot physically hold all the Y-cable protection modules required to manage the Y-cable protected transponders, then CTP moves one client shelf (for example, the bottom shelf) to the next rack. If the moved shelf contains Y-cable protected transponders, then CTP moves the related Y-cable protection modules together.
- CTP shifts the shelf if (as mentioned in the previous item) no space is available within the rack to hold the shelves and the Y-cable protection modules required to support both present and future traffic demands.
- A Y-cable protection FlexLayer module (supporting two different Y-cable protection groups) in a rack could be partially unused even if additional shelves equipped with transponders are deployed in a rack that follows in the site.

## Shelf Rules

This section includes the following rules:

- [General Shelf Placement Rules](#)
- [Multishelf Placement Rules](#)
- [M2 and M6 Shelf Placement Rules](#)
- [Alien Shelf Placement Rules](#)
- [OTS Unit Placement Rules](#)
- [Cisco ONS 15216 FlexLayer Unit Placement Rules](#)
- [Controller Cards Placement Rules](#)
- [Client Cards Placement Rules](#)
- [Hybrid Site Layout Constraints](#)
- [DCU - Layout Constraints](#)
- [Multidegree Layout Rules](#)

## General Shelf Placement Rules

The following subsections list the general rules for and constraints on card slot placement.

### Card Slots

Each unit represented in the layout includes the slot occupancy provided in the following lists for one-slot and two-slot units.

- One-slot units:
  - Blank
  - AIC
  - TCC3 or TCC2P
  - T-DCU Fine
  - T-DCU Coarse
  - OSCM, OSC-CSM
  - AD-1C, AD-2C, AD-4C
  - AD-1B, AD-4B
  - 4MD
  - OPT-PRE, OPT-BST, OPT-BST-L, OPT-BST-E
  - AMP-17-C
  - AMP-C
  - 32-DMX
  - 40-DMX-C
  - 40-DMX-E
  - 40-MUX-C
  - MMU
  - PSM
  - All the line cards
  - All TXP and MXP units
  - 10GE-XP
  - OTU2-XP
  - MS-ISC-100T
  - TSC
  - TNC
  - OPT-EDFA-17

- OPT-EDFA-24
- AR-MXP
- AR-XP
- 100G-ME-C
- 100G-LC-C
- 100G-CK-LC-C
- 100GS-CK-LC
- 10X10G-LC
- WSE
- 9 SMR
- 12-AD-CCOFS
- 16-AD-CCOFS
- SMR20 FS
- Two-slot units:
  - 32MUX-O
  - 32DMX-O
  - 32-WSS
  - 40-WXC
  - 80-WXC-C
  - 40-WSS-C
  - 40-WSS-E
  - OPT-AMP-L
  - OPT-RAMP-C
  - OPT-RAMP-CE
  - ADM-10G, GE-XP
  - 40G CP-DQPSK MXP
  - 40G CP-DQPSK ME MXP
  - 40G CP-DQPSK TXP
  - 40G CP-DQPSK ME TXP
  - CFP-LC
  - 400G-XP-LC
- FlexLayer module
  - C/L Band Combiner

- 15216 modules
  - FLB-2
  - FLA-8
  - FLD-4
  - FLD-9
  - SC-4B
  - MD-40-ODD
  - MD-40-EVEN
  - EF-40-ODD
  - EF-40-EVEN
  - MD-48-ODD
  - MD-48-EVEN
- DCU module
  - A DCU module takes half of the DCU shelf space.

## Card Slot Constraints

- CTP allows a double slot card movement when the destination has a blank faceplate followed with a single slot card or the destination is a single slot card followed by a blank card.
- TCC units are placed in slots 7 or 11 of the M12 chassis. The Generated layout always places both working and standby TCC unit on each shelf.
- AIC units are placed in slot 9 of the M12 chassis.
- OSCM units are placed only in slots 8 or 10 of the M12 chassis.
- MS-ISC-100T units are placed in slots 6 and 12 of the M12 chassis.
- 2.5G and 10G line cards only are placed in slots 5, 6, 12, and 13 of the M12 chassis.
- TSC or TNC cards are placed in slots 1 and 8 of the M6 chassis.
- TSC or TNC card is placed in slot 1 of the M2 chassis.
- OSCM card is replaced with a TNC card when an OSCM card is selected and the chassis type is forced as M2 or M6 (if M2 or M6 chassis placement will not optimize the layout unless it is forced).
- TSC cards are placed as controller cards for the additional M2 or M6 chassis.
- For OSMINE compliance, the CTP does not place any card (if there is no booster placed by algorithm for that side) in slot 2 or in slot 16. CTP places a blank faceplate in slot 2 and 16. If the OTS side contains booster card, it is placed in slot 2 or slot 16.
- T-DCU units are placed in slots 1 to 6 and 12 to 17 of the M12 chassis.

- RAMAN-CTP and RAMAN-COP units as a pair are placed in either of the adjacent slots such as 2 and 3, 4 and 5, or 6 and 7 of the M6 and M15 chassis.
- Standalone 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 100G-ME-C, and 10X10G-LC cards are placed in slots 2 and 3 of the M2 chassis, or in slots 2, 3, 4, 5, 6, and 7 of the M6 chassis, or in either of the adjacent slots of the M15 chassis.
- WSE cards are placed in slots 2 and 3 of the M2 chassis or in slots 2, 3, 4, 5, 6, and 7 of the M6 chassis.
- CFP-LC cards are placed in slots 3 and 5 of the M6 chassis.
- 10X10G-LC and 100G-LC-C or 100G-ME-C units are placed as a pair in either of the adjacent slots 2 and 3, 4 and 5, or 6 and 7 of the M6 chassis.
- CFP-LC and 100G-LC-C or 100G-ME-C units are placed as a pair in either of the adjacent slots 3 and 2, 5 and 4, or 7 and 6 of the M6 chassis.
- 10X10G-LC and 100G-CK-LC-C or 100G-ME-C or 10X10G-LC and 100GS-CK-LC, units are placed as a pair in either of the adjacent slots 2 and 3, 4 and 5, or 6 and 7 of the M6 chassis.
- CFP-LC and 100G-CK-LC-C or 100G-ME-C units are placed as a pair in either of the adjacent slots 3 and 2, 5 and 4, or 7 and 6 of the M6 chassis.
- OLA nodes with 2 EDRA1-XX cards are placed only in the following slots of the M15 chassis: 2 and 4, 5 and 7, 8 and 10, 11 and 13.
- Flex ROADM nodes with EDRA2-XX and 16-WXC-FS cards are placed only in the following slots of the M15 chassis: 2 and 4, 5 and 7, 8 and 10, 11 and 13.
- 16-WXC and EDRA cards must be placed in adjacent slots of M15 chassis: 2 and 4, 5 and 7, 8 and 10, 11 and 13.
- TNCS-O cards are placed in slot 1 and 8 for M6, and slots 1 and 17 for M15 chassis.
- 400G-XP-LC cards are placed in any slot from 2 to 7 for M6 and 2 to 14 for M15 chassis.

The following table lists the M15 high speed configurations layout constraints.

**Table 49: M15 High Speed Configurations Layout Constraints**

| Card Combinations             | Operating Modes | Slots   |
|-------------------------------|-----------------|---|
| 2 x NCS2K-100G-CK-C=          | RGN-100G        | [2, 3] [4, 5] [6, 7] [8, 9] [10, 11] [12, 13] [14,15] |
| 2 x NCS2K-100ME-CK-C=         |                 |   |
| 2 x NCS2K-100GS-CK-C=         |                 |   |
| NCS2K-200G-CK-C= + 10X10G-LC  |                 |   |
| NCS2K-100G-CK-C= + 10X10G-LC  | MXP-10x10G      | [2, 3] [4, 5] [6, 7] [8, 9] [10, 11] [12, 13] [14,15] |
| NCS2K-100ME-CK-C= + 10X10G-LC |                 |   |
| NCS2K-100GS-CK-C= + 10X10G-LC |                 |   |
| NCS2K-200G-CK-C= + 10X10G-LC  |                 |   |

| Card Combinations                                   | Operating Modes | Slots   |
|---|-----------------|---|
| NCS2K-100GS-CK-C= + 2 x<br>NCS2K-MR-MXP-LIC=        | MXP-200G        | [2, 3, 4] [5, 6, 7] [8, 9,10] [11,12,13]<br>[14,15,16]  |
| NCS2K-200G-CK-C= + 2 x<br>NCS2K-MR-MXP-LIC=         |                 | <b>Note</b> Slots 2, 7, 8, 13, and 14 are for NCS2K-100GS-CK-C= or NCS2K-200G-CK-C= cards.  |
| NCS2K-100GS-CK-C= + 10X10G-LC +<br>NCS2K-MR-MXP-LIC | MXP-10x10G-100G | [2, 3, 4] [5, 6, 7] [8, 9, 10] [11, 12, 13] [14, 15,16]   |
| NCS2K-200G-CK-C= + 10X10G-LC +<br>NCS2K-MR-MXP-LIC  |                 | <b>Note</b> Slots 2, 7, 8, 13, and 14 are for NCS2K-100GS-CK-C= or NCS2K-200G-CK-C= cards. Slots 3, 6, 9, 12, and 15 are for 10X10G-LC cards. |
| NCS2K-100GS-CK-C= + +<br>NCS2K-MR-MXP-LIC           | MXP-CK-100G     | [2, 3] [4, 5] [6, 7] [8, 9] [10, 11] [12, 13]<br>[14,15]  |
| NCS2K-200G-CK-C= +<br>NCS2K-MR-MXP-LIC              |                 |   |

## Multishelf Placement Rules

- Multishelf site aggregate some of shelves that do not hold XC units.
- CTP creates the layout even if the MSTP equipment (for example, OTS and TXP/MXP units, but not ITU line cards) in a site is to be deployed on more than the available number of MSTP shelves. In this case CTP generates the error message, “Generated layout exceeded the maximum number of shelves in a multishelf site”.
- The MSTP and MSPP (line card) shelves can be placed on the same rack even if MSPP shelves cannot be part of the multishelf management.
- By default, CTP designates the OTS optical shelf in rack number 1 as the Node Controller (NC).
- The software running on the node assigns a shelf number when a subtended shelf is registered to the NC. You can assign any of the available numbers in the allowed range [1 to 8]. The numbers do not have to be consecutive.
- The maximum number of shelves in a multishelf configuration are:
  - 8 when using a multishelf integrated switch
  - 12 when using a multishelf external switch



### Note

CTP supports only daisy chain MSM connection configurations, it does not support ring MSM configurations.

The following subsections list the placement rules for different types of multishelf configurations.

## Auto

When the Shelf Management parameter is set to Auto:

- If the node controller is an M6, external switch is placed when:  
Total number of shelves  $> (2 * M6) + 1$   
where  
 $M6 =$  Number of Cisco ONS 15454 M6 shelves  
The number of external switches placed depend on the number of shelves exceeding the value  $(2 * M6) + 1$ .
- If the node controller is an M12, external switch is placed by default.  
CTP adds additional external switches when:  
Total number of shelves  $> (\text{total number of shelves subtended by the first switch}) + (M6 * 2)$
- For M6/M15 chassis, the default option is Multi Shelf Integrated Switch.

## Multishelf Integrated Switch

When the Shelf Management parameter is set to Multi Shelf Integrated:

- The LAN architecture of different MSTP shelves is implemented using the Cisco ONS 15454 MS-ISC-100T cards.
- To cope with TCC redundancy and to guarantee multishelf LAN reliability, the Cisco ONS 15454 MS-ISC-100T cards are redundant (connected to both the active and standby TCC units).
- CTP places both the Cisco ONS 15454 MS-ISC-100T cards in the node controller shelf.
- CTP places the Cisco ONS 15454 MS-ISC-100T cards in slots 6 and 12.
- If the node controller is an M6:
  - CTP does not place an external switch.
  - Total shelves that can be subtended  $= (M6 * 2) + 1$ .
- If the node controller is an M12:
  - CTP does not place an external switch.
  - CTP places Cisco ONS 15454 MS-ISC-100T card on the node controller chassis.
  - Total shelves that can be subtended  $= (M6 * 2) + 8$ .
- M15 uses Ethernet ports and optical ports to connect to an external chassis.
- For M15, the Multi Shelf Management configuration can have only 2 shelves per level when only optical ports are used. The Multi Shelf Management configuration is limited to 2 shelves (node controller and one subtended shelf) when only Ethernet ports are used.



## Multishelf External Switch

When the Shelf Management parameter is set to Multi Shelf External:

- The LAN architecture of different MSTP shelves is implemented using Catalyst 2950G-24-EI-DC units.
- To cope with TCC redundancy and to guarantee multishelf LAN reliability, Catalyst 2950G-24-EI-DC units are redundant (connected to both the active and standby TCC units).
- CTP places both Catalyst 2950G-24-EI-DC units on the same rack of the Node Controller (NC) shelf.
- If the node controller is an M6:
  - The Multi Shelf External Switch is placed in the layout irrespective of the node controller.
  - Additional external switches are placed when Total number of shelves > (total number of shelves subtended by the first switch) + (M6 \* 2)
  - M6 as the node controller with a mix of up to 15 NCS 2015, NCS 2006, and ONS 15454 shelves as subtended shelves.
- If the node controller is an M12:
  - External switch is placed by default.
  - Additional external switches are placed when Total number of shelves > (total number of shelves subtended by the first switch) + (M6 \* 2)
  - M12 as the node controller with a mix NCS 2015, NCS 2006, and ONS 15454 shelves as subtended shelves.



### Note

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The ONS 15454 shelves must have TCC3 cards installed for the configurations.

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- For M15:
  - Only Ethernet ports can be used to configure an external switch for a Multi Shelf Management (MSM) topology.
  - Pure configuration (only M15) and mixed (M6/M12/M15 as NC and M15, M6, M12 as subtended shelves) configuration are supported.



### Note

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CTP provides a warning message if the number of shelves exceeds 10 for pure MSM and exceeds 15 for mixed MSM configuration that include NCS2015 shelf.

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- - MSM configurations with M15 as a node controller and M6 as a subtended shelf are not supported in CTP 10.5.
  - MSM configurations with M15 and M12 in any combination (node controller or subtended shelf) are not supported in CTP 10.5.

- Cisco NCS 2006 as the node controller with a mix of NCS 2015, NCS 2006, and ONS 15454 shelves as subtended shelves.
- Cisco ONS 15454 as the node controller with a mix NCS 2015, NCS 2006, and ONS 15454 shelves as subtended shelves.

## Shelf Management in Upgraded or Release-Upgraded Network

The following rules apply for Shelf Management on upgraded or release-upgraded network with layout in locked state:

- When the Shelf Management configuration type is Auto:
  - If the M12 chassis is the node controller and the MS-ISC card is placed in the layout—On upgrading the network if the layout cannot accommodate all the subtended shelves added, then the Multi Shelf External Switch (Cisco Catalyst 3650) is placed in the layout.
  - If M6 chassis is the node controller and there is no Multi Shelf External Switch placed—On upgrading the network if the number of the M6 chassis cannot support all the shelves, then the Multi Shelf External Switch is placed in the layout.
- When the Shelf Management configuration type is Multi Shelf Integrated:
  - If M12 chassis is the node controller and the MS-ISC cards are placed in the layout—On upgrading the network if the layout cannot accommodate all the subtended shelves, then CTP displays an error message.
  - If M6 chassis is the node controller—On upgrading the network if the M6 chassis cannot support all the subtended shelves, then CTP displays an error message.
- When the Shelf Management configuration type is Multi Shelf External Switch:
  - If the Cisco Catalyst 2950 is placed in the base network—On upgrading the network if the Cisco Catalyst 2950 cannot subtend all the shelves, then the Cisco Catalyst 3650 is placed in addition to the Cisco Catalyst 2950 in the layout.

## Multishelf Separate Shelves

CTP orders the racks by first placing all the units facing one side and then all the other units facing the other side.

## Multishelf Separate Nodes

- If the site functionality is not ROADM or OADM, CTP displays the following warning message at the end of the network analysis:

“Separate nodes are allowed on ROADM/OADM sites only and cannot be applied to Site 'x'”

- If the site functionality is ROADM or OADM, CTP orders the rack by first placing all the units facing one side and then all the other units facing the other side.

- For OIC nodes with multishelf configuration, all the sides are placed in the layout in an optimized manner (like OXC). The entire site is considered as one Network Element. Two MSISC cards or two CAT switches are used in this configuration.
- For OIC node with individual shelf configuration, each degree is considered as one Network Element and each side is placed in separate racks and shelves. MSISC cards or CAT switches are not used in this configuration.

## M2 and M6 Shelf Placement Rules

- CTP places OSC-CSM card in an M6 shelf when the M6 shelf is used as an OSC regenerator site.
- CTP chooses the following:
  - TNC/TNCS-O card as the node controller for an M6 shelf
  - TNC-S/TNCS-O card as the node controller for an M15 shelf
  - TNC card for OTS shelves
  - TSC card if OSC card is not required
  - TSC card for all the client shelves
  - TSC card for sites with DCN extension
  - TSC card as the node controller if OSC-CSM card is required
- CTP does not support a combination of TSC and TNC cards in an M6 shelf
- CTP does not support the following cards on an M6 shelf:
  - AIC
  - AIC-I
  - OSCM
  - ISC



### Note

CTP does not allow the use of M2 chassis in an MSM configuration.

- CTP does not place the cards if power consumption of the existing cards, ECU, LCD and FAN exceeds the power generated by the Power Supply.
- CTP places a normal layout when the Bay Layout option is forced with a 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, WSE, or CFP-LC card.

## Alien Shelf Placement Rules

Following are the placement rules for alien shelves:

- Alien shelves are added to the rack after all the other shelves are added.

They are added to the first available rack with free space equal to or greater than the alien shelf height.

- All the alien shelves in a site must have the same height and name.
- Different sites can have different alien shelf height and name.
- Height of the alien shelf should be less than that of the rack height.
- Number of alien shelves can vary based on the alien shelf height. Maximum number of alien shelves that can be added is 600, if the alien shelf height is 1 Rack Unit (RU) and there are no other shelves.
- Product-IDs are not assigned to the alien shelves.
- Alien shelves are not be added to the BoM.

## OTS Unit Placement Rules

This section includes the following topics:

- [Shelf Placement Rules](#)
- [PSM Card Placement Rules](#)

### Shelf Placement Rules

The following subsections provide the placement rules for the different types of shelf configurations.

- CTP places the sides in alphabetical order in the shelves. This order is broken only for the purpose of optimisation.

For example, if sides A and C takes exactly half the shelf and B takes more than half, then the A and B sides do not go in the same shelf. CTP places A and C in the same shelf for the purpose of optimization and places B in the next shelf.

- CTP places the optical units within the OTS optical shelves by following the optical signal flow. However, for OSMINE designs, CTP places the MMU unit last to keep 32-WSS/Mux units adjacent to 32-Demux units.

For example: Booster or OSC-CSM->Preamplifier->WXC->WSS or Mux ->Demux or A/D filters

To optimize slot occupancy, this order can be changed (for example, Demux before WSS when a single slot is free in the left side).

- If the OPT-RAMP-C or the OPT-RAMP-CE unit is present, it must fill the outer slots (1 to 2 or 16 to 17).
- CTP places the TDC units (TDCU- FC and TDCU-CC) in slots 1 to 6 and 12 to 17.

#### Individual Shelf

- All OTS optical units (except for TXP/MXP or line card) reside in one shelf.
- CTP places TXP/MXP (or ITU line card depending on the hybrid parameter setting) units in the free slots in the OTS optical shelf.

- If all the OTS units cannot be placed within the OTS shelf, then CTP generates the following error message:

“Layout not feasible for {0} Individual Shelf configuration - No room in the optical shelf to host all the OTS units”.

#### **Individual Shelf and Multishelf (Same Shelf)**

- CTP places the optical units facing side A on the left side of the shelf and the optical units facing side B on the right side of the shelf.
- If one side of the shelf is full but more units (for example, add/drop filters) need to be placed within the shelf, then CTP uses the empty slots on the other side.

#### **Individual Shelf and Multishelf (Both Same Shelf and Separate Shelves)**

- For line sites, CTP places the OSC unit, the preamplifier, and the booster units facing side A on the left side of the shelf and places the OSC unit, the preamplifier, and the booster units facing side B on the right side of the shelf. The same placement applies for multidegree sites if both A and B units fit into one shelf (a half shelf for A and a half shelf for B).
- If a side requires more than a half shelf, CTP places the units from left to right.

#### **Multishelf Same Shelf**

- CTP places all the OTS optical units apart from a 4MD unit in a single OTS optical shelf.
- CTP places the additional 4MD unit that could not be placed within the first shelf in the second shelf.

#### **Multishelf Separate Shelves**

- CTP places all MSTP units facing one side and all MSTP units facing other side in separate racks.
- CTP places all optical units facing one side in a single OTS optical shelf.
- For terminal and line sites, CTP places units facing one side from left to right and the units facing the other side from right to left
- Shelf numbers are assigned in the following order:
  - Increasing number to all OTS shelves, from the first side to the last side.
  - Increasing number to all client shelves, from the first side to the last side.

## **PSM Card Placement Rules**

- With OCH protection, CTP places PSM cards anywhere in the service slots but preferably next to the related TXP/MXP unit.
- With line protection, CTP places PSM cards before any other card in the slots 1 or 17.
- With section protection, CTP places PSM card next to the PRE.

## Cisco ONS 15216 FlexLayer Unit Placement Rules

These are the Cisco ONS 15216 FlexLayer unit placement rules:

- CTP places the FLB-2, FLA-8, FLD-4, FLD-9, and Cisco ONS 15216-MD-40-ODD units in FlexLayer shelves.
- The FLD-4 units are placed on the rack along with the other units specific to that side.
- The FLA-2 and FLA-8 add/drop units are placed next to each other.
- The Cisco ONS 15216 shelf accommodates four cards. The cards cannot be moved within the shelf or across the shelves.
- CTP places the FLD-4 units in all the four slots in the sequence—Top-Left, Bottom-Left, Top-Right, and Bottom-Right.
- CTP does not place the FLD-4 units automatically. The FLD-4 units have to be forced by configuring the OADM Forcing property on each side of the node.
- CTP places FLD-9 optical insulators in the two 1 RU slots, starting first with the left slots and then the right slots.
- If the Cisco ONS 15216-MD-40-ODD unit is used, CTP places the Cisco ONS 15216 shelf near the Cisco ONS 15216-MD-40-ODD shelf.
- If the EAD colorless ports of the 80-WXC-C cards are configured as demux units and protected by optical insulators, CTP places the FlexLayer shelf as close to the 80-WXC-C demux units, immediately after any required air ramp.

## Controller Cards Placement Rules

These are the controller card placement rules for an M12 shelf.

- By default, CTP places TCC3 controller cards when an unlocked network is analyzed.
- If a locked network is analyzed, any existing TCC2P card is not replaced with a TCC3 card.

**Note**

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In Release 10.6.1, the TCC2P card can be used only on a standalone Network Element (NE) or as subtended shelf of an MSM having node controller with TCC3 card in M12 or TNCE/TNCS in NCS 2006 or NCS 2015. MS-ISC card is not supported in a shelf with a TCC2P card.

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- TCC3 cards are placed in any new M12 chassis being added in a locked network. No changes are made to the existing M12 chassis with TCC2P controller card.

## Client Cards Placement Rules

This section consists of the following topics:

- [Node Placement Rules](#)

- [Manual Regeneration Rules](#)
- [OTU2\\_XP Card Placement Rules](#)
- [AR-MXP and AR-XP Card Placement Rules](#)
- [100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, and CFP-LC Cards Card Placement Rules](#)
- [TXP/MXP and ITU Line Card Placement Rules](#)
- [Transponder and Muxponder Card Placement Rules](#)

## Node Placement Rules

The following subsections provide the placement rules for different types of node configurations.

### Non-Multidegree Node

CTP places the side A card in the left half of the shelf and the side B card in the right half of the shelf.

### Multidegree Node

CTP places the client cards from the available space in the left half of the shelf and then in the right half of the shelf.

### Node Protection as Same Shelf

CTP places the client cards from the first available shelf in an optimized manner.

### Node Protection as Separate Shelves

CTP places the unprotected and 1+1 protected client cards in respective OTS racks. CTP places all the unprotected and 1+1 protected client cards before placing the next OTS side cards.

CTP places the protection and aggregated cards after placing all the OTS, unprotected, and 1+1 protection cards. The protection and aggregated cards do not follow any specific placement rule. So CTP places them in the available space in the OTS shelf, then in existing client shelves (unprotected and 1+1 shelves), and then in new client shelves.

## Manual Regeneration Rules

The following subsection provide the placement rules for manual regeneration.

- CTP places a pair of back-to-back transponders in the same shelf whenever possible. However, CTP does not add an additional shelf so that the transponder/muxponder pair of units can be in the same shelf.
- With node protection as separate shelves, the two cards can be placed in their respective OTS side racks, but if free space is available in the other side of the OTS rack, the cards are placed there first before a new shelf is created.

## OTU2\_XP Card Placement Rules

The following subsection provide the placement rules for OTU2\_XP card.

### Transponder Mode

- If the card is used in transponder mode and if both trunk have the same side, then CTP places the card in the same side of the OTS rack.
- If the trunks have two different sides, then CTP places the card in any available space in an optimized manner.

### Regen Mode

With separate shelves, the trunks are connected to two different sides, so they will always be placed in available space in an optimized manner.

### Mixed Mode

For cards that have TXP and Regen mode in two different trunks, CTP follows the rules for the mode with the more-specific rules and places the cards in an optimized manner.

### Splitter

Because this feature is the same as fiber switched, CTP follows the rules for fiber-switched cards placed in any available space in an optimized manner.

### Y-cable

The existing Y-cable client card placement rules are followed. The pair is placed in the same shelf.

## AR-MXP and AR-XP Card Placement Rules

The following subsections provide the placement rules for AR-MXP and AR-XP cards.

### TXP\_MR, TXPP\_MR, MXP\_MR, MXPP\_MR, MXP\_DME, MXPP\_DME, MXP-4x2.5-10G, and MXPP-4x2.5-10G Card Modes

- If the card is used in transponder mode and if both trunks have the same side, then CTP places the card in the same side of the OTS rack.
- If the trunks have two different sides, then CTP places the card in any available space in an optimized manner.
- If the trunks have only one side, CTP places the card where the side is assigned.

### RGN\_10G Mode

With separate shelves, the trunks are connected to two different sides, so they are placed in any available space in an optimized manner.

### Splitter

Because this feature is the same as fiber-switched, CTP follows the rules for fiber-switched cards placed in any available space in an optimized manner.



**Y-cable**

The existing Y-cable client card placement rules are followed. The pair is placed in the same shelf.

## 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, and CFP-LC Cards Card Placement Rules

The below table summarizes the card placement rules for 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, and CFP-LC cards.

**Table 50: Card Placement Rules for 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, and CFP-LC Cards**

| Card         | Operational Mode                        | Peer Card                 | Valid Card Slot  | Valid Peer Card Slot   |
|--------------|---|---------------------------|--|--|
| 100G-LC-C    | TXP-100G (Standalone 100GE Transponder) | —                         | M2—Slots 2 and 3<br>M6—Slots 2 to 7  | —  |
|              | RGN-100G (100G Regenerator)             | 100G-LC-C                 | M2—Slot-2<br>M2—Slot-3<br>M6—Slot-2<br>M6—Slot-3<br>M6—Slot-4<br>M6—Slot-5<br>M6—Slot-6<br>M6—Slot-7 | M2—Slot-3<br>M2—Slot-2<br>M6—Slot-3<br>M6—Slot-2<br>M6—Slot-5<br>M6—Slot-4<br>M6—Slot-7<br>M6—Slot-6 |
| 100G-CK-LC-C | TXP-100G (Standalone 100GE Transponder) | —                         | M2—Slots 2 and 3<br>M6—Slots 2 to 7  | —  |
|              | RGN-100G (100G Regenerator)             | 100G-LC-C or 100G-CK-LC-C | M2—Slot-2<br>M2—Slot-3<br>M6—Slot-2<br>M6—Slot-3<br>M6—Slot-4<br>M6—Slot-5<br>M6—Slot-6<br>M6—Slot-7 | M2—Slot-3<br>M2—Slot-2<br>M6—Slot-3<br>M6—Slot-2<br>M6—Slot-5<br>M6—Slot-4<br>M6—Slot-7<br>M6—Slot-6 |

| Card        | Operational Mode                        | Peer Card                                | Valid Card Slot  | Valid Peer Card Slot   |
|-------------|---|--|--|--|
| 100GS-CK-LC | TXP-100G (Standalone 100GE Transponder) | —  | M2—Slots 2 and 3<br>M6—Slots 2 to 7  | —  |
|             | RGN-100G (100G Regenerator)             | 100GS-CK-LC                              | M2—Slot-2<br>M2—Slot-3<br>M6—Slot-2<br>M6—Slot-3<br>M6—Slot-4<br>M6—Slot-5<br>M6—Slot-6<br>M6—Slot-7 | M2—Slot-3<br>M2—Slot-2<br>M6—Slot-3<br>M6—Slot-2<br>M6—Slot-5<br>M6—Slot-4<br>M6—Slot-7<br>M6—Slot-6 |
| 10x10G-LC   | MXP-10x10G (10x10G Muxponder)           | 100G-LC-C or 100G-CK-LC-C or 100GS-CK-LC | M6—Slot-2<br>M6—Slot-3<br>M6—Slot-4<br>M6—Slot-5<br>M6—Slot-6<br>M6—Slot-7                           | M6—Slot-3<br>M6—Slot-2<br>M6—Slot-5<br>M6—Slot-4<br>M6—Slot-7<br>M6—Slot-6                           |
|             | RGN-10G (5x10G Transponder)             | —  | M2—Slots 2 and 3<br>M6—Slots 2 to 7  | —  |
|             | TXP-10G (5x10G Regenerator)             | —  | M2—Slots 2 and 3<br>M6—Slots 2 to 7  | —  |
| CFP-LC      | 2x40G Muxponder                         | 100G-LC-C                                | M6—Slot-3<br>M6—Slot-5   | M6—Slot 2 or 5<br>M6—Slot 4 or 7   |
|             | CFP-TXP (100G Transponder)—One port     | 100G-LC-C                                | M6—Slot-3<br>M6—Slot-5   | M6—Slot 2 or 5<br>M6—Slot 4 or 7   |
|             | CFP-TXP (100G Transponder)—Two ports    | Two 100G-LC-C                            | M6—Slot-3<br>M6—Slot-5   | M6—Slot 2 and 5<br>M6—Slot 4 and 7   |

## TXP/MXP and ITU Line Card Placement Rules

The following subsection provide the placement rules for TXP/MXP and ITU line cards.

- CTP places the TXP/MXP unit (or ITU line card for a hybrid site) by first filling the empty slots in the OTS optical shelves and then the slots in the following shelves.
- The site-protection option affects placement rules for both MSTP and MSPP units (line cards) even if MSPP shelves are not managed by the system in the multi-shelf site.
- If an MXP unit supports both protected and unprotected channels, CTP applies the rules for protected MXP channel.
- CTP places TXP/MXP units that implement fiber-switched protection in any rack in order to minimize the number of shelves.
- CTP places each of the transponders included in a fiber-switched protection site on either the left or right shelf side in order to fill the empty slots.
- By default, CTP uses side A to place Y-cable client interfaces within shelves in the racks. If the rack using side B is filled but can host n additional shelves, and an additional side A rack hosting only Y-cable client units has been added, then if the number of these client unit shelves is  $\leq n$  these shelves are moved to the side B rack.
- CTP places the MSPP line cards in M12 chassis irrespective of the chassis type selected.
- With multishelf node protection, all the units facing a different side are placed in different racks (even with multidegree nodes) with the exception of units (TXP/MXP) that need to be placed in the same shelf to support required functionality (for example, Y-cable protection units or 1+1 line cards).

### TXP/Line Card Placement (OSMINE Noncompliant)

- Y-cable Protection

TXP/MXP units that are part of a Y-cable protection sites are placed within the same shelf, but the unit facing side A is preferably placed on the left side of the shelf (slots 1 to 6) the unit facing side B is preferably placed on the right side of the shelf (slots 12 to 17).

- Individual Shelf and Multishelf Side A and B Same Shelf
  - 1+1 Client Protection:  
CTP places TXP/MXP units or line cards that are part of a 1+1 client protection within the same shelf, but the unit facing side A is placed on the left side of the shelf (slots 1 to 6) and the unit facing side B is placed on the right side of the shelf (slots 12 to 17).
  - Unprotected Transponder or Line Card.  
CTP places TXP/MXP units and line cards related to side A traffic in the left side of the shelf (slots 1 to 6) and the transponders and line cards related to side B traffic in the right side of the shelf (slots 12 to 17). If side A and side B have a different number of added or dropped channels, then CTP places the remaining client boards (transponder or line card) to fill remaining available slots even if they are not on the preferred side of the shelf.
- Multishelf Side A and Side B Separate Shelves
  - 1+1 Client Protection:  
-TXP/MXP

For TXP/MXP units that are part of a 1+1 client protection site, CTP places the client unit facing side A in the shelf of the unit facing side A and the client unit facing side B in the shelf of the units facing side B.

- Line Card

For line cards that are part of a 1+1 client protection site, CTP places both units in the same shelf (the switch is done by XC). The unit facing side A is on the left side of the shelf (slots 1 to 6) the unit facing side B is on the right side of the shelf (slots 12 to 17).

-Unprotected Transponder or Line Cards

CTP places TXP/MXP units and line cards facing side A in the shelf of the appropriate rack as defined in the previous bullet item, but fills all the slots of the shelf.

### TXP/Line Card Placement (OSMINE Compliant)

- ◦ 1+1, Y-cable Protected Transponder or Line Card

CTP places each transponder or line card that is involved in a Client 1+1 or Y-cable protection group in adjacent slots. In a protection group, CTP places the TXP/MXP facing side A in the left slot and the TXP/MXP facing side B in the right slot.

- ◦ Unprotected Transponder or Line Card

CTP places TXP/MXP units or line card facing side A in the shelf of the appropriate rack as defined in the previous bullet item, but fills all the slots of the shelf.

## Transponder and Muxponder Card Placement Rules

- In an ADM single-card configuration with node protection as same shelf, CTP places the card in an optimized manner. CTP looks for space in all OTS shelves, then in the existing client shelves, and then creates a new shelf if needed.
- In an ADM single-card configuration with node protection as separate shelves, if the trunks use same side (for example, A,A), then CTP places the card in the respective OTS side rack. If the trunks use different sides (A,B), CTP places the card in any shelf or rack in an optimized manner.

## Hybrid Site Layout Constraints

- For a site flagged as a Hybrid node configuration, CTP does not place either the XC or SONET/SDH units and displays the following message:  
“The generated BOM does not include SONET/SDH units.”
- For a site with an individual shelf and flagged as a Hybrid Node configuration, when the resulting site type does not allow placing all the (OTS optical) units within the OTS shelf, then CTP displays the following error message:  
“Hybrid layout not feasible for <SiteX> - Resulting NE Site Type configuration xxxx (e.g. AUTO [A/D])”
- CTP does not place an ADM-10G card in a shelf with a line card even when Hybrid Site configuration is enabled.

## DCU - Layout Constraints

- For multishelf site protection configurations, each DCU shelf containing DCU modules that compensates for the chromatic dispersion of fiber entering in one side is placed in the same rack of the MSTP optical shelf as the one holding units facing on that side.

For example, CTP places the side A DCU shelf and side A DCU units in the same rack as the one holding the MSTP optical shelf with units facing side A.

- For configurations with an individual shelf or no site protection, the CTP places the DCU shelves in the same rack as the one holding the MSTP optical shelf.
- CTP places the DCU units within the shelf as follows:
  - In general, the DCU faces side A on the left side of the DCU shelf and the DCU faces side B on the right side of the DCU shelf.

- If two DCU units are required on one side and no DCU units are required on the other side, then CTP places both units within the same DCU shelf.

The following examples are for various DCU shelf configuration:

Example 1: DCU side A | DCU side B

Example 2: DCU side A | DCU side A

Example 3:

Upper shelf: DCU side A | Empty

Lower shelf: DCU side A | DCU side B

- DCUs for side A are placed from top to bottom, from left to right.
- DCUs for side B are placed from top to bottom, from left to right.

## Multidegree Layout Rules

This section consists of the following topics:

- [General OTS Units Placement Rules](#)
- [OXC Multidegree Layout Rules](#)
- [OIC Multidegree Layout Rules](#)

### General OTS Units Placement Rules

The following subsections provide placement rules for different types of unit configurations.

- Each “half shelf” gets a different default side ID if side B holds a card that can be part of the side object (a card connected to the span).
- The software running on the node (the patch-cord manager) moves shelf by shelf from shelf ID = 1 to shelf ID = 8 and from slots 1 to 6 to slots 12 to 17 (even on the right side of the shelf the order is always left to right). For each half shelf, each time the software finds a unit that is part of a side object, it

automatically assigns a side ID to all the units within that half shelf (starting from side A and incrementing each ID).

- The side ID is not incremented if the patch-cord manager finds an empty half shelf or an half shelf that does not hold a card that can be part of the side object.
- The side ID is not maintained when moving cards from one shelf to another.
- If the patch-cord manager finds a user-defined (or NE update-defined) side ID, it uses the assigned label for that side. The next side encountered is labeled as user side ID +1.
- For multidegree nodes without node protection, the layout algorithm fills each half shelf with units starting from the outside to the inside of the shelf.

### **OTS unit placement (without node protection)**

- For each side, the layout algorithm starts placing all the OTS units of one side within the first free half-shelf. If no free half shelf is found, then a new shelf is added to the layout.
- If the OTS unit of one side cannot be hosted within a half shelf, then the following cases are possible:
  - If the second half of the same shelf is empty, then the remaining units of current side are placed within the second half shelf.
  - If the second half of the shelf is not available, then this half shelf is unused for holding OTS units of this side, and all the OTS units of this side are moved to a new empty shelf. Empty half shelves can be filled with remaining OTS units of first side that can be placed within an half shelf.
- OTS units of different sides cannot be placed within the same half shelf. If half shelf is only partially filled with OTS cards, then the remaining slots are filled with client cards (transponders).

### **OTS unit placement (with node protection)**

With node protection, a different shelf or rack must be used for each side of the unit.

### **Client unit placement**

- If an OTS shelf or half shelf has empty slots, the layout algorithm starts filling the empty slots with client cards of that side.
- For a multishelf site without node protection, if no other client card of the OTS side is placed (due to some additional constraint such as OSMINE) within this shelf, then any other client card of any other side is placed in the empty slot.

### **Y-cable protected unit placement (same shelf and separated shelves):**

Client pairs are deployed (both in the same shelf) using the following criteria:

- ◦ A and B sides (A left, B right)
- ◦ A and C sides (A left, C right)
- ◦ B and C sides (B left, C right)
- ◦ B and D sides (B left, D right)

The goal is to optimize shelf occupancy, so available slots in existing shelves are used first, then new shelves are created if needed.

### 1+1 protected unit placement

- Same shelf:  
Client pairs are deployed (both in the same shelf) using the following criteria:
  - A and B sides (A left, B right)
  - A and C sides (A left, C right)
  - B and C sides (B left, C right)
  - B and D sides (B left, D right)

The goal is to optimize shelf occupancy, so available slots in existing shelves are used first, then new shelves are created if needed.

- Separate shelves:

Each client is deployed in a rack related to its own side.

The goal is to optimize shelf occupancy, so available slots in existing shelves are used first, then new shelves are created if needed.

### DCU unit placement

- In a multidegree node site, CTP places the DCU units for a side within the same rack that contains the OTS unit shelf for that side.
- In an unlocked rack layout, CTP places the DCU shelves in a rack with each one above the related OTS shelf.
- In an unlocked rack layout, CTP places the DCU units to use the optimal number of DCU shelves.
- CTP places the DCU units for each side starting from the first free slot in the existing DCU shelf, and then adding a new DCU shelf when no space is available.

## OXC Multidegree Layout Rules

- OXC multidegree sites are supported with multishelf only.
- The following message appears if an OXC multidegree site with single shelf is selected: "Multi Shelf management is required for OXC MultiDegree Site site name"

## OIC Multidegree Layout Rules

From Release 9.1 onwards, for OIC nodes with multishelf configuration, all the sides are placed in the layout in an optimized manner (like OXC). The entire site is considered as one Network Element. Two MSISC cards or two CAT switches are used in this configuration.

For OIC node with individual shelf configuration, each degree is considered as one Network Element and each side is placed in separate racks and shelves. MSISC cards or CAT switches are not used in this configuration.

## Card Rules

This section includes the following rules:

- [AR-MXP and AR-XP Card Constraints](#), on page 318
- [AR-MXP and AR-XP Card Operational Modes](#), on page 319
- [AR-MXP and AR-XP Card Client-Payloads](#), on page 320
- [AR-MXP and AR-XP Card Mode–Port Restrictions](#), on page 321
- [100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, and CFP-LC Card Constraints](#), on page 324
- [100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, 100GS-CK-LC + 10X10G-LC, 200G-CK-LC, 200G-CK-LC + 10X10G-LC, 200G-CK-LC + MR-MXP + 10X10G-LC, 200G-CK-LC + MR-MXP, 200G-CK-LC + MR-MXP + MR-MXP, and CFP-LC Cards Operation Modes](#), on page 324
- [Supported Source and Destination Card Types for 200G-CK-LC as Regeneration Card](#), on page 326
- [100GS-CK-LC and 10X10G-LC Cards Regeneration Configurations](#), on page 326
- [WSE Card Constraints](#), on page 327
- [WSE Card Operation Modes](#), on page 327
- [WSE Card Regeneration Configurations](#), on page 327

## AR-MXP and AR-XP Card Constraints

This section lists AR-MXP and AR-XP card constraints.

- AR-MXP and AR-XP cards are supported only in Point-to-Point, P-Ring, and ROADM demands.
- AR-MXP and AR-XP cards do not interoperate with the following cards:
  - MXP-MR-10DME
  - MXPP-MR-10DME
  - MXP\_MR\_2.5G
  - MXPP\_MR\_2.5G
  - TXPP\_MR\_2.5G
  - GE\_XP card
  - 10GE\_XP card
  - ADM-10G card



- AR-XP card supports a maximum bandwidth of 20 Gbps.
- AR-MXP card supports a maximum bandwidth of 10 Gbps.
- In the AR-MXP card, if any of the SFP ports are aggregated to any of the XFP port, the other XFP port cannot be used.
- AR-MXP card supports a maximum of four OTU1 trunk ports or one OTU2 trunk port.
- AR-MXP card does not support MXP-VAD-10G (High Rate) operation mode.

## AR-MXP and AR-XP Card Operational Modes

The following table provides a list of operational modes supported by AR-MXP and AR-XP cards.

**Table 51: Operational modes supported by AR-MXP and AR-XP cards**

| Card Mode                                       | Rate      | AR-XP | AR-MXP |
|---|-----------|-------|--------|
| TXP_MR (Unprotected Transponder)                | High Rate | Yes   | Yes    |
|   | Low Rate  | Yes   | Yes    |
| TXPP_MR (Protected Transponder)                 | Low Rate  | Yes   | Yes    |
| MXP_DME (Unprotected Data Muxponder)            | High Rate | Yes   | Yes    |
| MXPP_DME (Protected Data Muxponder)             | High Rate | No    | Yes    |
|   | Low Rate  | No    | No     |
| MXP_MR (Unprotected Multi-Rate Muxponder)       | High Rate | Yes   | Yes    |
|   | Low Rate  | Yes   | Yes    |
| MXPP_MR (Protected Multi-Rate Muxponder)        | High Rate | No    | Yes    |
|   | Low Rate  | Yes   | Yes    |
| MXP-4x2.5-10G (OC48/OTU1 Unprotected Muxponder) | High Rate | Yes   | Yes    |
| MXPP-4x2.5-10G (OC48/OTU1 Protected Muxponder)  | High Rate | No    | Yes    |
| RGN_10G (OTU2 Regenerator)                      | High Rate | Yes   | Yes    |

| Card Mode                     | Rate      | AR-XP | AR-MXP |
|-------------------------------|-----------|-------|--------|
| RGN_2.5G (OTU1 Regenerator)   | Low Rate  | Yes   | Yes    |
| MXP-VDC-10G (Video Muxponder) | High Rate | No    | Yes    |

## AR-MXP and AR-XP Card Client-Payloads

The following table provides client-payload mapping supported by AR-MXP and AR-XP cards.

**Table 52: AR-MXP and AR-XP Card Supported Client-Payload Mapping—SONET/SDH, Ethernet, OTU1, and FC**

| Card Mode | Rate | SONET/SDH |          |          | Ethernet |     |           | OTUI | FC    |       |       |
|-----------|------|-----------|----------|----------|----------|-----|-----------|------|-------|-------|-------|
|           |      | OC3/SIM1  | OC3/SIM4 | OC3/SIM6 | FE       | GE  | 10GE/OTU2 | OTU1 | FC03G | FC06G | FC12G |
| TXPMR     | LOW  | YES       | YES      | YES      | YES      | YES | NO        | NO   | YES   | YES   | YES   |
|           | HIGH | NO        | NO       | NO       | NO       | NO  | NO        | NO   | NO    | NO    | NO    |
| TXPMR     | LOW  | YES       | YES      | YES      | YES      | YES | NO        | NO   | YES   | YES   | YES   |
|           | HIGH | NO        | NO       | NO       | NO       | NO  | NO        | NO   | NO    | NO    | NO    |
| MP10G     | HIGH | NO        | NO       | NO       | NO       | YES | NO        | NO   | YES   | YES   | YES   |
| MP10G     | HIGH | NO        | NO       | NO       | NO       | YES | NO        | NO   | YES   | YES   | YES   |
| MP40G     | LOW  | YES       | YES      | NO       | YES      | YES | NO        | NO   | YES   | NO    | NO    |
|           | HIGH | YES       | YES      | YES      | YES      | YES | NO        | YES  | YES   | YES   | YES   |
| MP40G     | LOW  | YES       | YES      | NO       | YES      | YES | NO        | NO   | YES   | NO    | NO    |
|           | HIGH | YES       | YES      | YES      | YES      | YES | NO        | YES  | YES   | YES   | YES   |
| MP10G     | HIGH | NO        | NO       | YES      | NO       | NO  | NO        | YES  | NO    | NO    | NO    |
| MP10G     | HIGH | NO        | NO       | YES      | NO       | NO  | NO        | YES  | NO    | NO    | NO    |
| MP10G     | HIGH | NO        | NO       | NO       | NO       | NO  | NO        | NO   | NO    | NO    | NO    |
| RGN10G    | HIGH | NO        | NO       | NO       | NO       | NO  | YES       | NO   | NO    | NO    | NO    |
| RGN25G    | LOW  | NO        | NO       | NO       | NO       | NO  | NO        | YES  | NO    | NO    | NO    |

**Table 53: AR-MXP and AR-XP Card Supported Client-Payload Mapping—ISC and Video**

| Card Mode    | Rate | ISC   |             |             | Video  |        |        |
|--------------|------|-------|-------------|-------------|--------|--------|--------|
|              |      | 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  | NO    | YES         | YES         | NO     | NO     | NO     |
|              | HIGH | NO    | NO          | NO          | NO     | NO     | NO     |
| MPX_DME      | HIGH | NO    | NO          | NO          | NO     | NO     | NO     |
| MPXP_DME     | HIGH | NO    | NO          | NO          | NO     | NO     | NO     |
| MPX_MR       | LOW  | NO    | NO          | NO          | NO     | NO     | NO     |
|              | HIGH | NO    | NO          | NO          | YES    | YES    | NO     |
| MPXP_MR      | LOW  | NO    | NO          | NO          | NO     | NO     | NO     |
|              | HIGH | NO    | NO          | NO          | YES    | YES    | NO     |
| MPX4#25-10G  | HIGH | NO    | NO          | NO          | NO     | NO     | NO     |
| MPXP4#25-10G | HIGH | NO    | NO          | NO          | NO     | NO     | NO     |
| MPXVD-10G    | HIGH | NO    | NO          | NO          | NO     | NO     | NO     |
| RGN_10G      | HIGH | NO    | NO          | NO          | NO     | NO     | NO     |
| RGN_2.5G     | LOW  | NO    | NO          | NO          | NO     | NO     | NO     |

## AR-MXP and AR-XP Card Mode-Port Restrictions

The following table lists card mode-port restrictions for the AR-MXP card.

| AR-MXP Configurations |       |                             | Operational Mode Instance – 1 |               | Operational Mode Instance – 2 |                  | Operational Mode Instance – 3 |                 | Operational Mode Instance – 4 |                 |
|-----------------------|-------|-----------------------------|-------------------------------|---------------|-------------------------------|------------------|-------------------------------|-----------------|-------------------------------|-----------------|
| Operational Mode      | Rate  | Client: Trunk Mapping       | Client Port(s)                | Trunk Port(s) | Client Port(s)                | Trunk Port(s)    | Client Port(s)                | Trunk Port(s)   | Client Port(s)                | Trunk Port(s)   |
| TXP-MR                | LOW   | 1 : 1                       | 4                             | 8             | 3                             | 7                | 2 <sup>2</sup>                | 6 <sup>3</sup>  | 1 <sup>4</sup>                | 5 <sup>5</sup>  |
|                       | HIGH  | 1 : 1                       | 9                             | 10            | —                             | —                | —                             | —               | —                             | —               |
| TXP-MR                | LOW   | 1 : 2                       | 1                             | 5,6           | 2 <sup>6</sup>                | 7,8 <sup>7</sup> | —                             | —               | —                             | —               |
|                       | HIGH  | NIL                         | —                             | —             | —                             | —                | —                             | —               | —                             | —               |
| MXP-ME                | HIGH  | 4 : 1                       | 1 to 4                        | 9             | 5 to 8                        | 10               | —                             | —               | —                             | —               |
|                       | 8 : 1 | 1 to 8                      | 9                             | —             | —                             | —                | —                             | —               | —                             | —               |
| MXP-MR                | LOW   | N : 2<br>(N=2,3,5,6,7)      | D <sup>8</sup>                | 5 or 6        | D <sup>9</sup>                | 7 or 8           | —                             | —               | —                             | —               |
|                       | HIGH  | N : 1<br>(N=2,3,5,6,7 or 8) | D <sup>10</sup>               | 9             | —                             | —                | —                             | —               | —                             | —               |
| MXP-MR                | LOW   | N : 2<br>(N=2,3,5,6)        | D <sup>11</sup>               | 5,6           | D <sup>12</sup>               | 7,8              | —                             | —               | —                             | —               |
|                       | HIGH  | N : 2<br>(N=2,3,5,6,7)      | D <sup>13</sup>               | 9,10          | —                             | —                | —                             | —               | —                             | —               |
| MXP-10G               | HIGH  | 4 : 1                       | 1 to 4<br>-> or 5 to 8->      | 9 or 10       | —                             | —                | —                             | —               | —                             | —               |
| MXP-10G               | HIGH  | 4 : 2                       | 1 to 4<br>-> or 5 to 8->      | 9,10          | —                             | —                | —                             | —               | —                             | —               |
| MXP-10G               | HIGH  | 3 : 1                       | 1 to 3                        | 9             | —                             | —                | —                             | —               | —                             | —               |
| RGN-10G               | HIGH  | 1 : 1                       | 9                             | 10            | —                             | —                | —                             | —               | —                             | —               |
| RGN-25G               | LOW   | 1 : 1                       | 4                             | 8             | 3                             | 7                | 2 1 <sup>14</sup>             | 6 <sup>15</sup> | 1 <sup>16</sup>               | 5 <sup>17</sup> |

<sup>2</sup> Not supported if the adjacent AR-MXP cards use OTU1 as client ports.

<sup>3</sup> Not supported if the adjacent AR-MXP cards use OTU1 as client ports.

<sup>4</sup> Not supported if the adjacent AR-MXP cards use OTU1 as client ports.

<sup>5</sup> Not supported if the adjacent AR-MXP cards use OTU1 as client ports.

- 6 Not supported if the adjacent AR-MXP cards use OTU1 as client ports.  
 7 Not supported if the adjacent AR-MXP cards use OTU1 as client ports.  
 8 D = dynamic mapping of client ports.  
 9 D = dynamic mapping of client ports.  
 10 D = dynamic mapping of client ports.  
 11 D = dynamic mapping of client ports.  
 12 D = dynamic mapping of client ports.  
 13 D = dynamic mapping of client ports.  
 14 Not supported if the adjacent AR-MXP cards use OTU1 as client ports.  
 15 Not supported if the adjacent AR-MXP cards use OTU1 as client ports.  
 16 Not supported if the adjacent AR-MXP cards use OTU1 as client ports.  
 17 Not supported if the adjacent AR-MXP cards use OTU1 as client ports.

The following table lists card mode–port restrictions for the AR-XP card.

| AR-XP Configurations |      |                       | Operational Mode Instance – 1 |               | Operational Mode Instance – 2 |               | Operational Mode Instance – 3 |               | Operational Mode Instance – 4 |               |
|----------------------|------|-----------------------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|
| Operational Mode     | Rate | Client: Trunk Mapping | Client Port(s)                | Trunk Port(s) | Client Port(s)                | Trunk Port(s) | Client Port(s)                | Trunk Port(s) | Client Port(s)                | Trunk Port(s) |
| TXP-MR               | LOW  | 1 : 1                 | 4                             | 8             | 3                             | 7             | 2                             | 6             | 1                             | 5             |
|                      | HIGH | 1 : 1                 | 9                             | 10            | —                             | —             | —                             | —             | —                             | —             |
| TXPMR                | LOW  | 1 : 2                 | 1                             | 5,6           | 2                             | 7,8           | —                             | —             | —                             | —             |
|                      | HIGH | NIL                   | —                             | —             | —                             | —             | —                             | —             | —                             | —             |
| MXPMR                | HIGH | 4 : 1                 | 1 to 4                        | 9             | 5 to 8                        | 10            | —                             | —             | —                             | —             |
|                      | HIGH | 8 : 1                 | 1 to 8                        | 9             | —                             | —             | —                             | —             | —                             | —             |
| MXPMR                | HIGH | 8 : 2                 | 1 to 8                        | 9,10          | —                             | —             | —                             | —             | —                             | —             |
| MXPMR                | LOW  | N : 2 (N=2 to 7)      | D <sup>18</sup>               | 5 or 6        | D <sup>19</sup>               | 7 or 8        | —                             | —             | —                             | —             |
|                      | HIGH | N : 1 (N=2 to 8)      | D <sup>20</sup>               | 9             | D <sup>21</sup>               | 10            | —                             | —             | —                             | —             |
| MXPMR                | LOW  | N : 2 (N=2 to 6)      | D <sup>22</sup>               | 5,6           | D <sup>23</sup>               | 7,8           | —                             | —             | —                             | —             |
|                      | HIGH | N : 2 (N=2 to 8)      | D <sup>24</sup>               | 9,10          | —                             | —             | —                             | —             | —                             | —             |

| AR-XP Configurations |      |                       | Operational Mode Instance – 1 |               | Operational Mode Instance – 2 |               | Operational Mode Instance – 3 |               | Operational Mode Instance – 4 |               |
|----------------------|------|-----------------------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|-------------------------------|---------------|
| Operational Mode     | Rate | Client: Trunk Mapping | Client Port(s)                | Trunk Port(s) | Client Port(s)                | Trunk Port(s) | Client Port(s)                | Trunk Port(s) | Client Port(s)                | Trunk Port(s) |
| MP43G                | HIGH | 4 : 1                 | 1 to 4                        | 9             | 5 to 8                        | 10            | —                             | —             | —                             | —             |
| MP43G                | HIGH | 4 : 2                 | 1 to 4 or 5 to 8              | 9,10          | —                             | —             | —                             | —             | —                             | —             |
| MP43G                | HIGH | 3 : 1                 | 1 to 3                        | 9             | —                             | —             | —                             | —             | —                             | —             |
| RGN10G               | HIGH | 1 : 1                 | 9                             | 10            | —                             | —             | —                             | —             | —                             | —             |
| RGN25G               | LOW  | 1 : 1                 | 4                             | 8             | 3                             | 7             | 2                             | 6             | 1                             | 5             |

18 D = dynamic mapping of client ports.

19 D = dynamic mapping of client ports.

20 D = dynamic mapping of client ports.

21 D = dynamic mapping of client ports.

22 D = dynamic mapping of client ports.

23 D = dynamic mapping of client ports.

24 D = dynamic mapping of client ports.

## 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, and CFP-LC Card Constraints

This section lists 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, and CFP-LC card constraints.

- The 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, and CFP-LC cards are supported only in Point-to-Point and ROADM demands.
- The 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, and CFP-LC cards are supported only in unprotected service demands.

## 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, 10X10G-LC, 100GS-CK-LC + 10X10G-LC, 200G-CK-LC, 200G-CK-LC + 10X10G-LC, 200G-CK-LC + MR-MXP + 10X10G-LC, 200G-CK-LC + MR-MXP, 200G-CK-LC + MR-MXP + MR-MXP, and CFP-LC Cards Operation Modes

The following table provides a list of operational modes supported by the 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, 100GS-CK-LC + 10X10G-LC, 200G-CK-LC, 200G-CK-LC + 10X10G-LC,

200G-CK-LC + MR-MXP + 10X10G-LC, 200G-CK-LC + MR-MXP + MR-MXP, 200G-CK-LC + MR-MXP, and CFP-LC cards.

**Table 54: Operating Modes and Supported Payloads for 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 10X10G-LC, 100GS-CK-LC + 10X10G-LC, 200G-CK-LC, 200G-CK-LC + 10X10G-LC, 200G-CK-LC + MR-MXP + 10X10G-LC, 200G-CK-LC + MR-MXP, 200G-CK-LC + MR-MXP + MR-MXP, and CFP-LC Cards**

| Card  | Operational Mode   | Supported Client Payloads   |
|---|--|---|
| 100G-LC-C or 100G-ME-C                      | TXP-100G (Standalone 100GE Transponder)  | OTU4, 100GE   |
| 100G-CK-LC-C                                | TXP-100G (Standalone 100GE Transponder)  | OTU4, 100GE, 40GE LAN PHY   |
| 100GS-CK-LC                                 | TXP-100G (Standalone 100GE Transponder)  | 100GE   |
|   | RGN-100G (100G Regenerator)  | —Regeneration of any 100 G configuration  |
| 100GS-CK-LC + 10X10G-LC                     | MXP-10x10G   | 10GE LAN PHY, OC-192, STM64   |
| 10x10G-LC                                   | <ul style="list-style-type: none"> <li>MXP-10x10G (10x10G Muxponder + 100G-LC-C or 100G-ME-C)</li> <li>10x10G-LC+100G-CK-LC-C</li> </ul> | OC192/STM-64, 10GE-LAN PHY, 10GE-WAN PHY (using OC192), OTU2, OTU2e, 8G FC, 8G FICON, 10G FC, 10G FICON |
|   | <ul style="list-style-type: none"> <li>10x10G-LC+100GS-CK-LC</li> </ul>  | 10GE LAN PHY, OC192/STM64   |
|   | RGN-10G (5x10G Regenerator)  | OC192/STM-64, 10GE-LAN Phy, 10GE-WAN Phy (using OC192), OTU2, OTU2e, 10G FC, 10G FICON                  |
|   | TXP-10G (5x10G Transponder)  | OC192/STM-64, 10GE-LAN Phy, 10GE-WAN Phy (using OC192), OTU2, OTU2e, 8G FC, 8G FICON, 10G FC, 10G FICON |
| 200G-CK-LC                                  | TXP-100G   | 100GE, OTU4   |
| 200G-CK-LC + 10X10G-LC                      | MXP-10x10G   | 10GE LAN PHY, OC-192, STM64, OTU2, OTU2e  |
| 200G-CK-LC + MR-MXP + 10X10G-LC with SD-FEC | MXP-10X10G-100G  | 10GE LAN PHY  |

| Card                                     | Operational Mode  | Supported Client Payloads |
|--|---|---------------------------|
| 200G-CK-LC + MR-MXP + MR-MXP with SD-FEC | MXP-200G  | 10GE LAN PHY              |
| 200G-CK-LC + MR-MXP with FEC/EFEC/SD-FEC | MXP-100G  | 10GE LAN PHY              |
| 200G-CK-LC + MR-MXP with FEC/EFEC/SD-FEC | TXP-100G  | 100GE                     |
|  | MXP-CK-100G (only SD-FEC)   | 100G                      |
| CFP-LC                                   | 2x40G Muxponder + 100G-LC-C or 100G-ME-C                          | OTU3/40GE-LAN Phy         |
|  | CFP-TXP (100G Transponder + 100G-LC-C or 100G-ME-C)—One port      | OTU4, 100GE               |
|  | CFP-TXP (100G Transponder + 2x100G-LC-C or 2x100G-ME-C)—Two ports | OTU4, 100GE               |

## Supported Source and Destination Card Types for 200G-CK-LC as Regeneration Card

200G-CK-LC is the only regeneration card that can have different source and destination card types across all FEC Types. These card combinations include:

- 200G-CK-LC
- 200G-CK-LC + 10x10G
- 200G-CK-LC +MR-MXP
- 200G-CK-LC + MR-MXP + MR-MXP
- 200G-CK-LC + MR-MXP + 10x10G

## 100GS-CK-LC and 10X10G-LC Cards Regeneration Configurations

The 100G-ME-C, 100G-LC-C, 100G-CK-LC-C, 100GS-CK-LC, and 10X10G-LC cards support the following regeneration configurations:

- Two 100G-ME-C or 100G-LC-C cards placed in adjacent slots connected through the chassis backplane.
- Two 100G-CK-LC-C cards or one 100G-LC-C card and one 100G-CK-LC-C card can be used for regeneration.
- Two 100GS-CK-LC cards coupled on backplane can be used for regeneration.



- One 10X10G-LC card placed in any slot with five ports used as regeneration ports. The port pairs used for regeneration are 1-2, 3-4, 5-6, 7-8, and 9-10.

## WSE Card Constraints

This section lists the WSE card constraints.

- The WSE card is supported only in Point-to-Point, P-ring and ROADM demands.
- The WSE card does not have Y-cable protection.

## WSE Card Operation Modes

The following table provides a list of operational modes supported by the WSE card.

**Table 55: Operating Modes and Supported Payloads for WSE Cards**

| Card | Operational Mode            | Supported Client Payloads |
|------|-----------------------------|---------------------------|
| WSE  | RGN-10G (5x10G Regenerator) | OTU2e                     |
|      | TXP-10G (5x10G Transponder) | 10GE LAN PHY and OTU2     |

## WSE Card Regeneration Configurations

The WSE card supports the following regeneration configuration:

- One WSE card placed in any slot with five ports used as regeneration ports. The port pairs used for regeneration are 1-2, 3-4, 5-6, 7-8, and 9-10.

## OSMINE Layout Rules

For OSMINE layout rules, see [OSMINE Layout Rules](#) , on page 431.

## Adjusting Site Layout

Site layout adjustment is a feature that allows you to move a selected card from its current slot to another slot in the chassis. This feature helps you customize the site layout based on your requirements. You can move both present and forecast cards. Cisco Transport Planner will automatically change the card position values and cable lengths in the Traffic Matrix report, Aggregated TDM /Ethernet report, Internal Connection report, and BoM report. You can view the modified reports by reopening the report. Shelf movement is possible for the following:

- All PP-Mesh, Patch Panel, Alien shelf, and DCU shelves.

- DCU cards
- EAP, Air Ramp, Fan Tray, Flex Shelf, and External Switch.

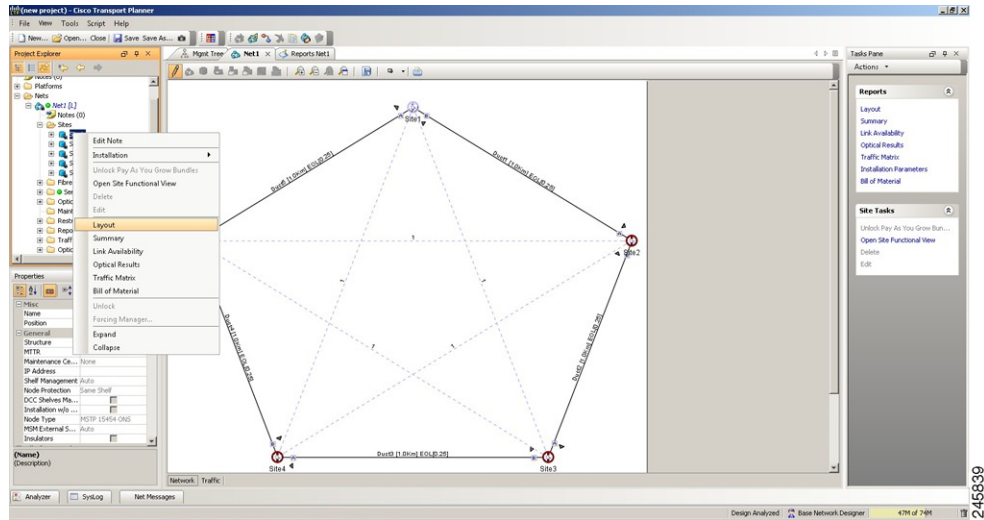
Site layout adjustments can only be done on a network that has been analyzed and is in any administrative state (Design, Upgrade, or Installation). Site layout adjustment can also be done on a release-upgraded network that has been analyzed.

Use the following procedure to move a card to a new position:

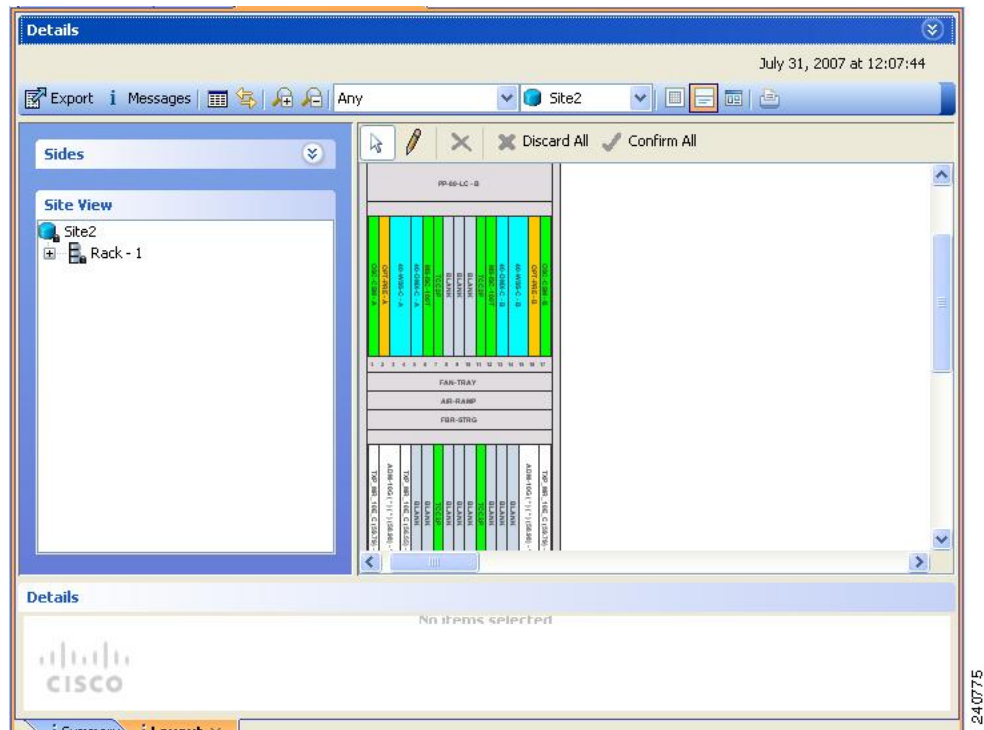
**Procedure**

- Step 1** Right-click the site for which you want to move the cards in the rack and choose Layout, see in the following figure. The Details dialog box appears, see in the below figure.

**Figure 45: Selecting the Layout View**

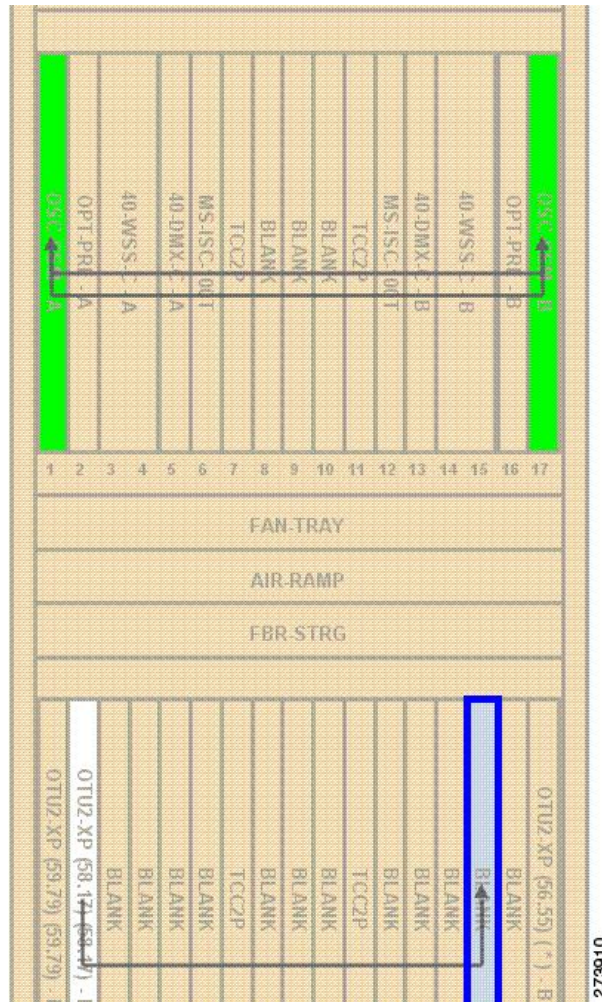


**Figure 46: Details Dialog Box**



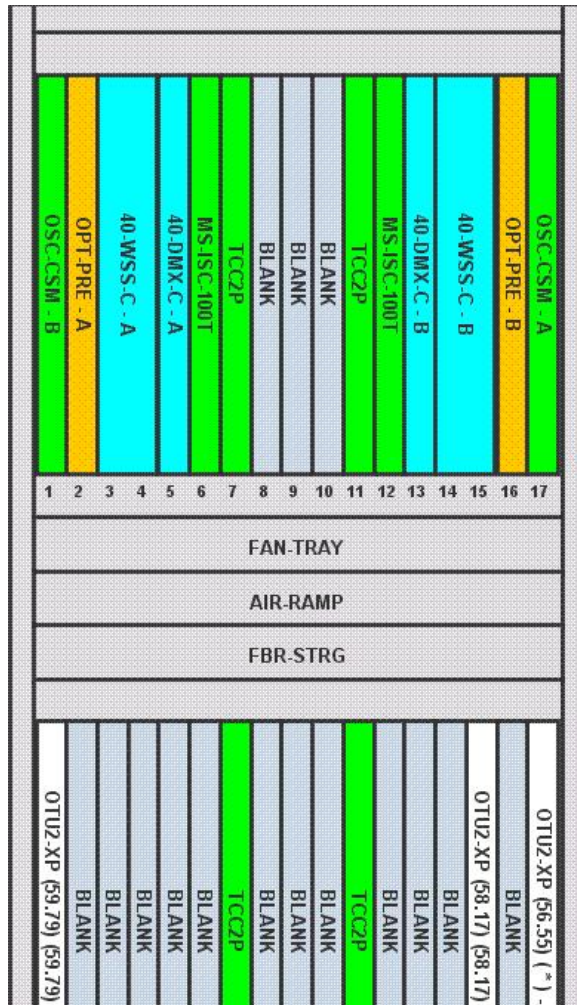
- Step 2** Choose the **Locked & Unlocked** mode from the drop-down list for the layout.
- Step 3** Choose Draw Mode and then click the card and move it to the desired slot in the shelf, see in the following figure.

*Figure 47: Site Layout Before Adjustment*



**Step 4** Click **Confirm All** to confirm the changes made. When you confirm all site adjustments, Cisco Transport Planner automatically unlocks both the source and destination slot positions, see in the following figure.

**Figure 48: Site Layout After Adjustment**



**Note** The destination slot position must be within an existing shelf on the existing rack. A destination slot can be any empty slot or any other slot containing a client/OTS card. It cannot be a slot you have already defined as the destination for another position change (in the current layout adjustment session).

**Note** A double slot card can be moved if the destination has one slot card and blank card.

The following table lists the allowed site layout adjustments.

The following constraints are applicable to card layout adjustment:

- When the network is moved to design mode, all the reports are deleted. When you analyze the network again, the reports are regenerated with the cards placed in their default positions. To avoid this default placement upgrade the network, add the services, and then analyze the network so that the cards are retained in the same position. In some cases, you may need to unlock the site.

- Only OSCM cards can be moved to slots 8 or 10.
- MS-ISC, Blank, TCC, and AIC cards cannot be moved. Cards cannot be moved to slots 6 or 12 if MS-ISC cards are present in those slots.
- DCU cards can move only to empty locations in another DCU shelf. You can also swap a DCU card with another DCU card in the same shelf, between shelves in the same rack, or between shelves in different racks in analyzed or upgrade analyzed networks. You cannot create new shelves to accommodate a DCU card.
- In DCC shelf management, TXP-MR-2.5G or TXPP-MR-2.5G cards in slot 12 cannot be moved.

The other constraints are included in the following table.

**Table 56: Allowed Site Layout Movements**

| From/To                                      | OTS               | Upgrade/<br>Protected<br>switched<br>TXP-MXP | Upgrade/<br>Protected<br>switched<br>LC | 1+1<br>Protected<br>TXP-<br>MXP                                     | 1+1<br>Protected<br>LC                       | Y-cable<br>Protected<br>TXP | Y-cable<br>Protected<br>MXP/<br>Multi-<br>trunk | Y-cable<br>and 1+1<br>Protection<br>in Same<br>Card | 1+1<br>Protected<br>Multi-trunk                                     | PSM<br>Line /<br>Section | PSM-OCH   |
|--|-------------------|--|---|---|--|-----------------------------|---|---|---|--------------------------|---|
| OTS  | Yes <sup>25</sup> | Yes  | No                                      | Yes   | No   | No                          | No  | No  | Yes   | Yes                      | Yes   |
| Upgrade/<br>Protected<br>switched<br>TXP-MXP | Yes               | Yes  | No                                      | Yes for same-shelf protection; Yes for separated-shelves protection | No   | No                          | No  | No  | Yes for same-shelf protection; Yes for separated-shelves protection | Yes                      | Yes   |
| Upgrade/<br>Protected<br>switched<br>LC      | No                | No   | Yes                                     | No  | No for different shelves; Yes for same shelf | No                          | No  | No  | No  | No                       | No  |
| 1+1<br>Protected<br>TXP-MXP                  | Yes               | Yes  | No                                      | Yes for same-shelf protection; Yes for separated-shelves protection | No   | No                          | No  | No  | Yes for same-shelf protection; Yes for separated-shelves protection | No                       | Yes for same-shelf protection; Yes for separated-shelves protection |
| 1+1<br>Protected<br>LC                       | No                | No   | Yes                                     | No  | Yes  | No                          | No  | No  | No  | No                       | No  |

| From/To  | OTS        | <del>Update</del><br>After<br>switched<br>TXP-MXP | <del>Update</del><br>After<br>switched<br>LC | 1+1<br>Protected<br>TXP-<br>MXP   | 1+1<br>Protected<br>LC | Y-cable<br>Protected<br>TXP | Y-cable<br>Protected<br>MXP/<br>Multi-<br>trunk | Y-cable<br>and 1+1<br>Protection<br>in Same<br>Card | 1+1<br>Protected<br>Multi-trunk   | PSM<br>Line /<br>Section | PSM-OCH  |
|--|------------|---|--|---|------------------------|-----------------------------|---|---|---|--------------------------|--|
| Y- cable<br>Protected<br>TXP                         | <b>Yes</b> | Yes   | No   | Yes for same-<br>shelf<br>protection;<br><b>Yes</b> for<br>separated<br>shelves<br>protection     | No                     | <b>Yes</b>                  | <b>Yes</b>                                      | No  | Yes for<br>same-<br>shelf<br>protection;<br><b>Yes</b><br>for<br>separated-<br>shelves<br>protection        | No                       | <b>Yes</b>   |
| Y- cable<br>Protected<br>MXP/<br>Multi-trunk         | <b>Yes</b> | Yes   | No   | Yes for same-<br>shelf<br>protection;<br><b>Yes</b> for<br>separated<br>shelves<br>protection     | No                     | No                          | No  | No  | Yes for<br>same-<br>shelf<br>protection;<br><b>Yes</b> for<br>separated<br>shelves<br>protection            | No                       | <b>Yes</b>   |
| Y- Cable<br>and 1+1<br>Protection<br>on Same<br>Card | <b>Yes</b> | Yes   | No   | Yes for same-<br>shelf<br>protection;<br><b>Yes</b><br>for<br>separated-<br>shelves<br>protection | No                     | No                          | No  | No  | No  | No                       | No   |
| 1+1<br>Protected<br>Multi-trunk                      | <b>Yes</b> | Yes   | No   | Yes for same-<br>shelf<br>protection;<br><b>Yes</b><br>for<br>separated-<br>shelves<br>protection | No                     | No                          | No  | No  | <b>Yes</b> for<br>same-<br>shelf<br>protection;<br><b>Yes</b><br>for<br>separated-<br>shelves<br>protection | No                       | Yes for<br>same-<br>shelf<br>protection;<br><b>Yes</b><br>for<br>separated-<br>shelves<br>protection |
| PSM<br>Line/Section                                  | <b>Yes</b> | Yes   | No   | No  | No                     | No                          | No  | No  | No  | No                       | No   |

| From/To | OTS | Updatable<br>switched<br>TXP-MXP | Updatable<br>switched<br>LC | 1+1<br>Protected<br>TXP-<br>MXP  | 1+1<br>Protected<br>LC | Y-cable<br>Protected<br>TXP | Y-cable<br>Protected<br>MXP/<br>Multi-<br>trunk | Y-cable<br>and 1+1<br>Protection<br>in Same<br>Card | 1+1<br>Protected<br>Multi-trunk  | PSM<br>Line /<br>Section | PSM-OCH |
|---------|-----|----------------------------------|-----------------------------|--|------------------------|-----------------------------|---|---|--|--------------------------|---------|
| PSM-OCH | Yes | Yes                              | No                          | Yes for<br>same-<br>shelf<br>protection, Yes<br>for<br>separated-<br>shelves<br>protection | No                     | No                          | No  | No  | Yes for<br>same-<br>shelf<br>protection, Yes<br>for<br>separated-<br>shelves<br>protection | No                       | No      |

<sup>25</sup> For all site movements marked as Yes, Cisco Transport Planner creates a reverse link. For example, when a Y-cable protected TXP is moved to an OTS card, a reverse link (that is, a link between the OTS card and the Y-cable protected TXP) is created automatically.

## Constraints in Layout Adjustments in M2 and M6 Shelves

The following constraints are applicable to card layout adjustment in an M2 or M6 shelf:

- Card movement is allowed between the following chassis:
  - 15454 ONS chassis to M6 and vice-versa
  - M6 chassis to M2 chassis and vice-versa
  - M6 chassis to M6 chassis
  - M2 chassis to M2 chassis
- TNC or TSC card movements are not allowed.
- The movement for the following cards from ONS 15454 chassis to M2 or M6 chassis is not allowed:
  - OSCM
  - AIC
  - ISC

## Constraints in Layout Adjustments

For any other kind of forced position, Cisco Transport Planner will not prevent you from forcing any destination position even if it does not match some of the layout recommended constraints (for example, OSMINE or TXP/MXP 1+1 Client protection).



You need to ensure that the following conditions are met when doing layout adjustments:

- Site layout adjustments can only be done on a network that has been analyzed and is in any administrative state (Design, Upgrade, or Installation).
- A pair of TXP/MXP cards that are part of a Y-cable protection group must stay within the same shelf.
- A pair of ADM-10G cards that are part of the same ADM peer group must stay within the same shelf.
- A pair of line cards that are part of a protection group must stay within the same shelf.
- A pair of line cards in a site that are part of a P-ring circuit must stay within the same shelf.
- You should not perform more than five movements before clicking the **ConfirmAll** button.
- Manual layout adjustment is not supported for FLD-4 units.

## Adjusting the Shelf Layout

You can adjust the shelf layout using the “Move” option. To adjust the shelf layout do the following:

### Procedure

- 
- Step 1** Right-click the site for which you want to move the shelves in the rack and choose **Layout**.
- Step 2** Right-click on the shelf and select **Move**. The **Shelf Movement** dialog box opens.
- Step 3** In the Shelf Movement dialog box select the following:
- **Source Rack**— Specifies the selected shelf rack. You cannot edit this field.
  - **Destination Rack**— Select the destination rack ID to move the shelf to the selected rack.
  - **From RU**— Displays the shelf number of the selected shelf. You cannot edit this field.
  - **To RU**—Select the exact rack unit position to move the shelf.
  - **Swap**— Check the check box to swap the source and destination shelves that are of the same rack unit size.
- Note** If you do not select the Swap option, then you can move any shelf to any rack or within the rack, if an empty slot is available.
- Step 4** Click **OK**. Cisco Transport Planner will automatically change the shelf position values and cable lengths in the Traffic Matrix report, Aggregated TDM /Ethernet report, Internal Connection report, and BoM report.
- Note** To move a passive shelf, right-click on the passive shelf and follow Step 2 to Step 4 of the shelf movement.
- 

## Shelf Movement Rules

The following constraints are applicable to shelf movement adjustments:

- You can move any shelf to any rack or a shelf within a rack if the slot position is blank.
- You can do site adjustments in only one site before confirming the changes.

- Only one shelf movement can be performed at a time.
- The maximum number of 15 racks can be created.
- Shelf movement is not possible for PDP shelf.
- You can move the Y-cable protection module shelf within the rack in the available space.
- Passive shelves can be moved within the same rack or across the racks.
- After every shelf movement, the Layout is analyzed to modify the BOM, based on the cables that are connected.
- Cisco Transport Planner will automatically update the layout with the new shelf position values and cable lengths in the Traffic Matrix report, Aggregated TDM /Ethernet report, Internal Connection report, and BoM report.
- Air ramp and fiber storage associated with the ANSI/ETSI shelf will be automatically moved with the 15454 ONS shelf movement.
- The shelf movement is not allowed if there is no space to accommodate the air ramp and fiber storage associated with the shelf.
- M6 and 15454 ONS shelves can be moved in the same rack or across racks.
- When the source and destination chassis are of different RUs, move the source chassis below the destination chassis if the space is available. Interchanging the chassis are not allowed.

## Modifying Shelf Management Properties

CTP enables you to modify the Shelf Management configuration type when the layout is in Locked state.

- When the Shelf Management configuration type is changed from Multi Shelf Integrated Switch to Multi Shelf External Switch, CTP:
  - Places the Multi Shelf External Switch at the end of the rack. If space is not available, a new rack is created.
  - Adds the Multi Shelf External Switch to the BoM, and the MS-ISC card is removed from the BoM if the node controller is M12 chassis.
  - Network analysis is not blocked.
- When the Shelf Management configuration type is changed from Multi Shelf External Switch to Multi Shelf Integrated Switch, CTP prompts to unlock the layout.
- When the Shelf Management configuration type is changed from Auto to Multi Shelf External Switch, Multi Shelf Integrated Switch, or Individual Shelf, CTP prompts to unlock the layout.

## Card Movement Rules

The following constraints are applicable to card movements:

- AR-MXP card follows the existing MXP card movement rules.
- AR-XP card follows the existing TXP card movement rules.

- AR-MXP and AR-XP cards are allowed to move to the Cisco ONS 15454 shelf only when the Cisco ONS 15454 shelf has a FTA4 fan tray assembly.
- AR-MXP and AR-XP cards are allowed to move to an M2 or M6 shelf from the Cisco ONS 15454 shelf and vice-versa. If any protection is configured, then the existing protection rules are applied.
- AR-MXP and AR-XP cards are allowed to move to an M2 shelf from an M6 shelf and vice-versa. If any protection is configured, then the existing protection rules are applied.

## Arranging Sites

Sites can be arranged into four different configurations. Use the following procedure to arrange the sites into a configuration or to move all of the sites so that they appear in the Cisco Transport Planner window:

### Procedure

---

**Step 1** Click the **NtView Name** tab.

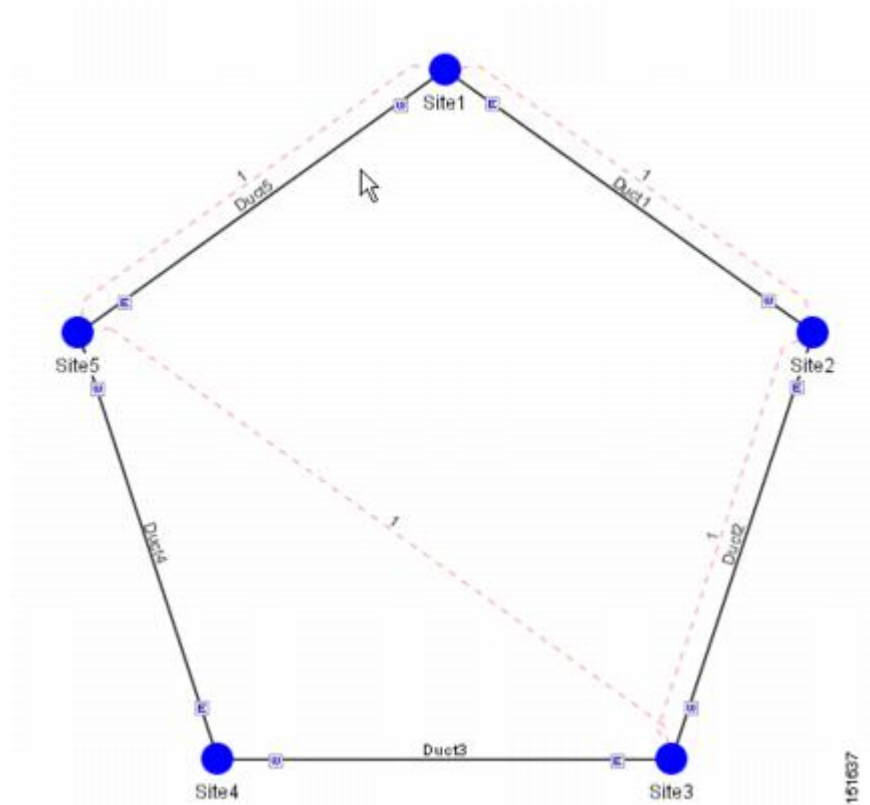
**Step 2** Click the Arrange Sites drop-down list, and choose one of the following:

**Note** All shapes are approximations.

- Fit to visible rectangle view—Zooms to display all sites in the NtView Name tab.

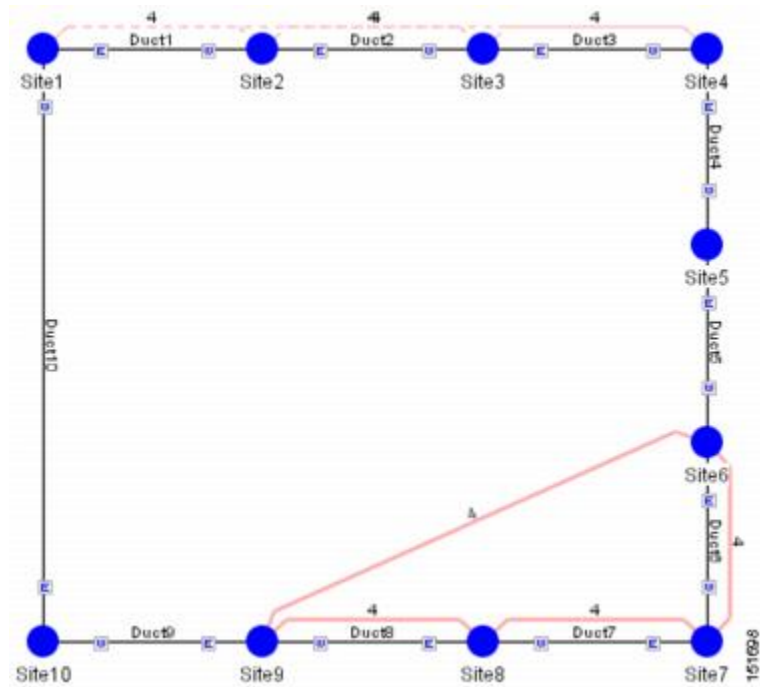
- Arrange to an ellipse—Rearranges all sites in an ellipse form, as shown in the following figure.

**Figure 49: Ellipse Shape**



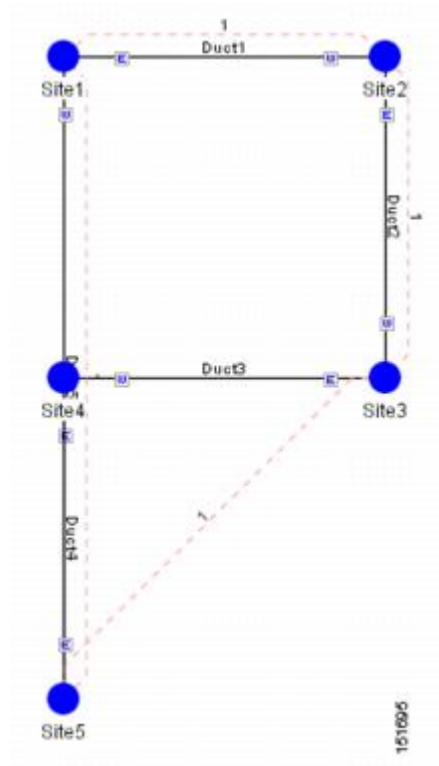
- Arrange to a square—Rearranges all sites in a square form so that the sites appear clockwise around the square, as shown in the following figure. To complete a full square, this arrangement requires at least four sites.

**Figure 50: Square Shape**



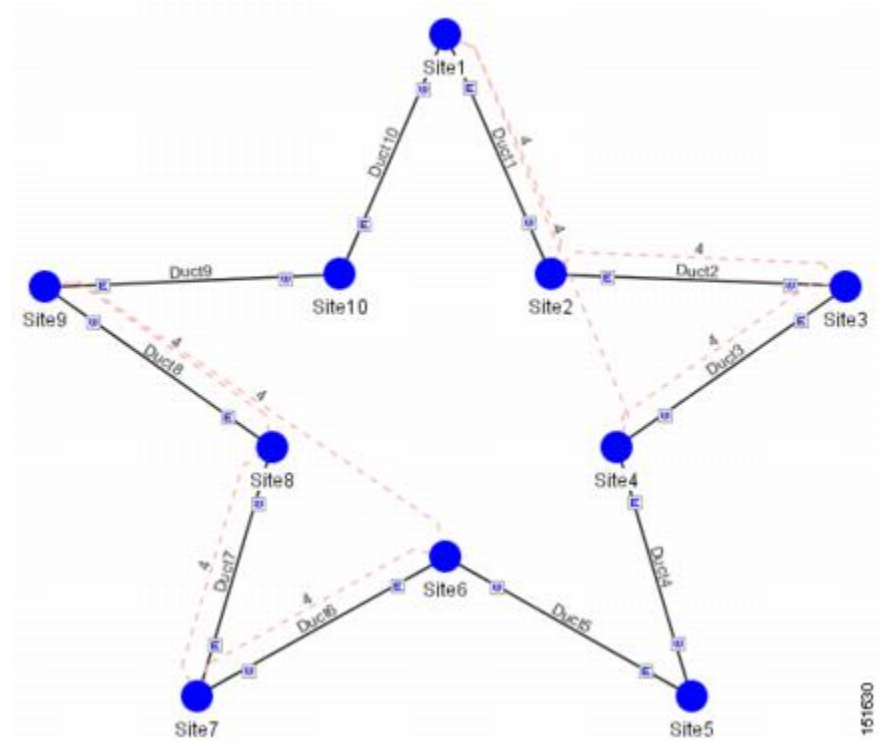
- Arrange to a snake—Rearranges all sites so that they cross the NtView Name tab from right to left and then left to right in a serpentine, linear format, as shown in the following figure.

**Figure 51: Snake Shape**



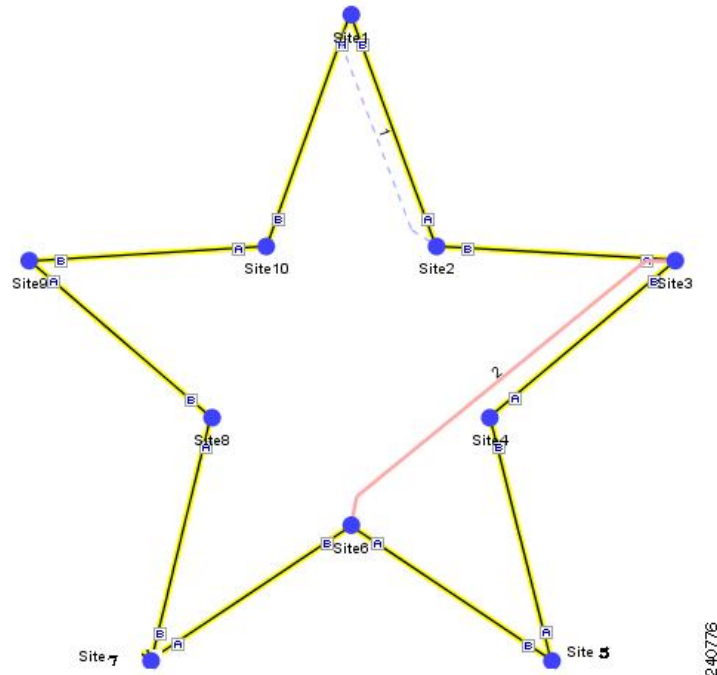
- Arrange to a double ring—Rearranges the sites into a dual ring format, as shown in the following figure.

**Figure 52: Double Ring Shape**



- Arrange to Fit to Maximum Rectangle View—Arranges sites in proportion, using all network map area, as shown in the following figure.

**Figure 53: Fit to Maximum Rectangle View Shape**



## Modifying Site Properties

You can edit a site after you have created it using the Network Creation Wizard. To create a site, see the [Creating a Project](#), on page 47. The following properties of a site can be modified:

- Site Structure
- Site Functionality
- Site Type
- Number of Sides

You can also use the Multi-side editor to edit all side level properties in one step for all sites. For more information, see [Site Editor](#), on page 353.

To edit the properties of a site:



## Procedure

**Step 1** In the Project Explorer pane, click the Sites folder. The list of sites included in the network appears.

**Step 2** Complete any one of the following:

- In Project Explorer pane, right-click the site you want to modify and select Edit.
- In NtView, double-click the site icon.
- In NtView, right-click the site icon and select Edit.  
The **Site Edit** dialog box appears.
- Choose the **Structure** type from the drop-down list in the **Site Properties** pane:

| Structure | Supported Configurations  | Description   | Possible Structure Edits   |
|-----------|---|---|--|
| Line      | <ul style="list-style-type: none"> <li>• MSTP 15454 ONS</li> <li>• HYBRID 15454 ONS</li> <li>• NG-DWDM</li> </ul> | Two pairs of fibers are terminated at the node.   | Can be changed to Line+ site.<br><br><b>Note</b> Line+site structure edit is applicable only on MSTP 15454 ONS |
| Terminal  | <ul style="list-style-type: none"> <li>• MSTP 15454 ONS</li> <li>• HYBRID 15454 ONS</li> <li>• NG-DWDM</li> </ul> | A single pair of fiber is terminated at the node.   | Can be changed to a Terminal+ site.  |
| Line+     | <ul style="list-style-type: none"> <li>• MSTP 15454 ONS</li> </ul>  | Two pairs of fibers are terminated at the node, but the number of fibers can be increased when an MMU card (topology upgrade) is installed. This node is ready to scale to become a multidegree node after MMUs are installed in this node. | Can be changed to a Line site.   |

| Structure    | Supported Configurations  | Description   | Possible Structure Edits           |
|--------------|---|---|------------------------------------|
| Terminal+    | MSTP 15454 ONS  | A single pair of fiber is terminated at the node, but the number of fibers can be increased if an MMU card (topology upgrade) is installed. This node is ready to scale to become a multidegree node after MMUs are installed in this node. | Can be changed to a Terminal site. |
| Multi-degree | <ul style="list-style-type: none"> <li>• MSTP 15454 ONS</li> <li>• NG-DWDM</li> </ul> | Nodes have more than two sides and face more than two fiber spans.  |                                    |

**Note** You cannot edit the site structure parameter of PSM sites. For PSM sites with add/drop functionality, mux/demux is the supported site type. For PSM Line sites ROADM functionality, 40-SMR1-C, 40-SMR2-C, and WSS are the supported site types. For PSM section sites with ROADM functionality, WSS is the only supported site type..  
To change any other structure (such as changing Line to Terminal), you must delete and reinsert the site.

- Choose the **C-Band** and **L-Band** parameters from the drop-down list. See Site Design Rules for MSTP 15454 ONS Configuration Table and Site Design Rules for HYBRID 15454 ONS Configuration (with FlexLayer Modules)Table for additional details on Site Design rules.

**Note** L-band is not applicable to HYBRID 15454 ONS configuration.

**Note** To enable the Split ROADM feature, the Functionality and Type must be forced. For multi-degree site, select OXC and 80-WXC. For line site, select ROADM and 80-WXC in the C-Band parameters.

- Right-click the site, click **Add Side**, and choose **Line** or **Omni-Directional** or **Multiple Omni-Directional** or **Contention-Less** or **Multiple Contention-Less** to add a line or omni-directional or multiple omni-directional **contention-less** or **multiple contention-less** sides to a site. The new side gets listed under the site in the Site Explorer pane. If the site added is omni-directional, the Omni-directional Side property of the side is set to **Yes**. You can add a side to a site only if the site does not already have the maximum number of allowed sides provisioned for it. Click **Apply** after adding each side for the change to take effect.

**Note** Line side is not applicable to NG-DWDM configuration.

**Step 3** Click a side to view and modify properties associated with it in the Side Properties pane:

- Label—Displays the label of the side.
- OmniDir Entry Point—Displays the value of the OmniDir Entry Point option.
- Colorless Ports (Non 100G for NG-DWDM)—Displays the number of colorless ports on the side.
- Colorless 100G Ports—Displays the number of colorless 100G ports on the side.
- Remote Spur—Displays the number of remote spurs associated with the side.

- **Omnidirectional Side**—Displays the value of the omnidirectional property for the side.
- **Contentionless Side**—Displays the value of the contentionless property for the side.
- **Side Type**—Displays the type of the side. This property can be edited for multi-degree sites with OXC functionality and type as flexible.
- **Omni Side Type**—(NG-DWDM configuration only) The options available are Auto, 4X4 COFS (default), 16-WXC, SMR-9, and SMR-20. For an 8-degree node, 16-WXC, SMR-9, and SMR-20 are available.
- **Contentionless Side Type**—(NG-DWDM configuration only) The options available are Auto, 12-AD-CCOFS, and 16-AD-CCOFS (default).
- **Interlever Type**—Interlever type for multidegree sites. The interleaver provides signal interleaving and deinterleaving in the channel spacing DWDM systems. The options are MPO cable, and MD-48-CM.

**Step 4** Right-click a side and select any of the following options to modify the properties of a side. Click **Apply** after selecting each option for the change to take effect.

- **Set Omni-Directional**—Allows you to set the omnidirectional property of the side. The available values are Auto, Yes, and No. The default option is Auto. The Auto option allows CTP to dynamically enable omnidirectional functionality on a side in the following ways:

- If there are no free sides (free sides are those sides not connected by ducts) available on a site, and the site has less than eight provisioned sides, CTP automatically creates an omnidirectional side.
- If one or more free sides are available, CTP automatically makes one of the free sides omnidirectional.

The Yes option indicates that omnidirectional demands can be dropped on the side and the No option indicates that omnidirectional demands cannot be dropped on the side. For information on supported site structure and functionality for omnidirectional sides, see [Understanding Omnidirectional Functionality, on page 67](#).

- **Edit Colorless Ports**—Allows you to add or edit colorless ports in the **Colorless Ports** dialog box.

From CTP Release 10.6, you can add colourless ports in the range of 0 to 96 for an omnidirectional side for OXC4/8/12/16. This configuration is applicable only when Structure is Multi-degree, Functionality is OXC, and Type is SMR-20. Multiple NCS2K-MF-6AD-CFS cards can be used as the Add/Drop cards in this configuration.

The maximum number of colorless ports allowed per side, varies according to the site functionality and type as defined in the following table:

| Functionality             | Type                    | Colorless ports (50 GHz) | Colorless ports (100 GHz) |
|---------------------------|-------------------------|--------------------------|---------------------------|
| ROADM                     | 80-WXC-C<br>(mux/demux) | 72                       | 72                        |
| ROADM / Hub /<br>Terminal | 40-SMR1-C               | 9                        | 9                         |
|                           | 40-SMR2-C               | 9                        | 9                         |
| Hub / Terminal            | 80-WXC-C<br>(mux/demux) | 80                       | 80                        |

| Functionality | Type                 | Colorless ports (50 GHz)  | Colorless ports (100 GHz)   |
|---------------|----------------------|---|---|
| OIC           | 80-WXC-C (mux/demux) | 72 if 2 sides are connected to ducts.63 if 3 sides are connected to ducts.54 if 4 sides are connected to ducts.45 if 5 sides are connected to ducts.36 if 6 sides are connected to ducts.<br><br>27 if 7 sides are connected to ducts.<br><br>18 if 8 sides are connected to ducts. | 72 if 2 sides are connected to ducts.63 if 3 sides are connected to ducts.54 if 4 sides are connected to ducts.45 if 5 sides are connected to ducts.36 if 6 sides are connected to ducts.<br><br>27 if 7 sides are connected to ducts.<br><br>18 if 8 sides are connected to ducts. |
| OXC           | 80-WXC-C             | 9   | 9   |
|               | 40-SMR2-C            | 9   | 9   |
|               | Flexible             | 9   | 9   |

**Note** For OXC nodes with 80-WXC-C, 40-SMRC-2 or Flexible configurations, the maximum number of colorless ports allowed also indicates the maximum number of demands (colored and colorless) that can be added to the side. Forcing the maximum number of colorless ports on a side prevents any colored demand from being added to the side. For example, if you force nine colorless ports on a side of an OXC node with 80-WXC-C card, then a colored demand cannot be dropped on the side. However, if you force only seven colorless ports, the remaining two ports can be utilized for dropping two colored demands.

For NG-DWDM nodes:

| Side                           | No. of Ports for Non 100G Colorless | No. of Ports for 100G Colorless |
|--------------------------------|-------------------------------------|---------------------------------|
| Terminal                       | 0-17                                | 0-96                            |
| Hub                            | 0-17                                | 0-96                            |
| Omnidirectional                | 0-17                                | 0-96                            |
| Line side of multi-degree node | 0-13                                | 0-13                            |

- **Add Remote Spur**—Allows you to add a remote add/drop port to the side and increments the Remote Add/Drop Port property of the side by one. You can add only one remote add/drop port to a side. For sites with 80-WXC-C card (mux/demux mode), the number of remote add/drop ports allowed varies depending on the number of available Express Add/Drop (EAD) ports on the side.

**Note** Remote Spur is not applicable to NG-DWDM configuration.

To add or remove remote add/drop ports, the network must be in Design or Upgrade mode, and the sites must have a defined structure, functionality, and type as described in the following table.

| Structure   | Functionality | Type                          | Equipment                                  |
|---|---------------|-------------------------------|--|
| Line  | ROADM / Hub   | 40-SMR1-C                     | 40-SMR1-C                                  |
|   |               | 40-SMR2-C                     | 40-SMR2-C                                  |
|   |               | 80-WXC-C                      | 80-WXC-C<br>(bidirectional)                |
|   |               | 80-WXC-C<br>(mux/demux)       | 80-WXC-C<br>(mux/demux)                    |
| Terminal<br><br><b>Note</b> Terminal sites must not have amplifiers or DCUs connected to them while connecting to a remote add/drop port. A terminal site with a remote add/drop port cannot be upgraded to any other site structure. | ROADM         | 40-SMR1-C                     | 40-SMR1-C                                  |
|   |               | 40-SMR2-C                     | 40-SMR2-C                                  |
|   |               | 80-WXC-C<br>(mux/demux)       | 80-WXC-C<br>(mux/demux)                    |
| Multi-degree  | OXC           | 80-WXC-C w/<br>MESH-PP-4      | 80-WXC-C                                   |
|   |               | 80-WXC w/<br>MESH-PP-8        | 80-WXC-C                                   |
|   |               | Flexible                      | 80-WXC-C<br>(bidirectional) or<br>40-WXC-C |
|   |               | 40-SMR2-C +<br>15454-PP-4-SMR | 40-SMR2-C                                  |
|   | OIC           | 80-WXC-C<br>(mux/demux)       | 80-WXC-C<br>(mux/demux)                    |

**Note** You cannot add remote spurs to sites with functionality or type set to Auto, or to sites with protection type set to PSM Line or PSM Section.

- Amplifiers and DCUs are not supported on any sides of a remote spur.
- If a remote terminal has active units, DCN extension must be implemented on the spur link.
- Remote spurs are not supported for colorless sites with OXC functionality, or equipped with 40-SMR1-C or 40-SMR2-C.

You can define local add/drop units at a side where a remote add/drop port is present, only if the local add/drop units are connected to an 80-WXC-C card configured as mux/demux. To delete a remote spur, delete the side associated with it; this reduces the Remote Add/Drop Port property of the side by one. You cannot delete a side with a remote add/drop port if the port is connected to a remote network terminal.

- **Delete Side**—Allows you to delete the selected side. If you delete an omnidirectional side or a colorless side, any locked service referencing the side is unlocked.

**Step 5** Click **Apply**. The selected changes are applied to the site.

**Step 6** Click **OK** to save the changes and exit the Edit dialog box.

## What to Do Next



**Note** When you modify a site, Cisco Transport Planner does not allow you to decrease the number of node sites. For example, it would not be possible to change a Line site to a Line+ or Multi-Degree site but, a Multi-Degree site can be changed to a Line site.

The following table shows the structure modifications that you can make using Cisco Transport Planner.

**Table 57: Permitted Structure Modifications**

| Starting Structure    | Ending Structure          |
|-----------------------|---------------------------|
| Terminal or Terminal+ | Line, Line+, Multi-Degree |
| Line or Line+         | Multi-Degree              |

When you modify the properties of a site, Cisco Transport Planner checks the compatibility between the original site properties and the new configurations that you make on each site. It also checks for consistency in the add/drop section and/or in the amplifier/DCU section and displays a warning message in case of inconsistency. Cisco Transport Planner then unlocks the related instances and/or parameters for you to make modifications. If the units were forced, Cisco Transport Planner removes the forcing to perform the required modifications.

If the starting instances/parameters are consistent, even if not optimal for the ending configuration, Cisco Transport Planner will warn the user about possible sub-optimization, but the related unit/parameter will be kept Locked (with its Layout property).

While upgrading a site equipped with 80-WXC-C, 80-WXC-C Mux/Demux, or 80-WXC-C with MESH-PP-4/8, CTP unlocks the entire site. This is not applicable for flexible site types.

For Multi-Degree sites with OXC functionality, if you upgrade the type of the site to Flexible, CTP unlocks the entire site. For Multi-degree sites with OXC functionality and flexible type, if you change the configuration

of a side (from 40-WXC-C to 80-WXC-C, or vice versa), CTP unlocks only the parameters of the changed side.

Site modifications that require unlocking of some instances/parameters are provided in the following table.

**Table 58: Site Modification Unlock Instances/Parameters**

| Starting Configuration | Ending Configuration         | Mandatory Unlock                                 | Suggested Unlock   |
|------------------------|------------------------------|--|--|
| Line, PT               | Line, OLA                    | All amplifiers/DCU section                       | -  |
| Line, OSC-site         | Line, OLA                    | All amplifiers cards.                            | -  |
| Line, OLA              | Line, A/D                    | None.  | All amplifier cards                                      |
| Line, OLA              | Line, ROADM                  | None.  | All amplifier cards                                      |
| Line, A/D, OADM-xc     | Line, ROADM                  | All OADM-xc cards.                               | All amplifier cards                                      |
| Line, HUB, WSS         | Line, ROADM                  | None.  | All amplifier cards                                      |
| Term, ROADM, WSS       | Line, ROADM, WSS             | None.  | All amplifier cards                                      |
| Term, ROADM, WSS       | Multi-degree, WSS            | 32-DMX-O (if present)                            | All amplifier cards                                      |
| Line, ROADM, WSS       | Multi-degree, WXC, PP-MESH-4 | 32-DMX-O (if present)                            | WSS cards, 40-MUX-C is the default; all amplifier cards  |
| Line, ROADM, WSS       | Multi-degree, WXC, PP-MESH-8 | 32-DMX-O (if present), AMP-17 cards (if present) | WSS units (40-MUX-C is the default), all amplifier cards |

## Deleting Notes

Use the following procedure to delete a note from any item in the Project Explorer pane:

### Procedure

- 
- Step 1** Double-click the **Notes** folder.
  - Step 2** In the Notes window, click **Go** in the Action column for the note that you want to delete. The item is highlighted in the Project Explorer pane.
  - Step 3** Right-click the item in the Project Explorer pane and choose **Delete Note** from the shortcut menu.
-

## Deleting Sites

Use the following procedure to delete sites from a network. You can delete a site if the site is in the Unlocked state and does not have a traffic demand set up on it. You can delete sites from a network in the Design state only.

### Procedure

- 
- Step 1** Verify that the site is in the Unlocked state in the Project Explorer pane. For more information, see [Unlocking Parameters in the Network Design, on page 103](#).
  - Step 2** Delete traffic demands on the site. For more information, see the [Deleting a Traffic Demand, on page 352](#).
  - Step 3** In the NtView Name tab, click the Site icon and click **Delete** from the Tasks Pane. You can also right-click on the Site icon and click Delete from the shortcut menu. For more information about the Cisco Transport Planner icons, see [GUI Information and Shortcuts, on page 361](#).
  - Step 4** For a Line or Line+ site, a confirmation dialog box is displayed. Click No to delete the fiber spans along with the site. Click Yes to delete the site and replace the two fiber spans connected to it with a single fiber span that directly connects the adjacent sites. The new fiber span is created as per the rules in the [Fiber Joining Rules, on page 350](#).
- 

## Fiber Joining Rules

When deleting a Line or Line+ site, the sites adjacent to the deleted site can be directly connected with a new fiber span that inherits properties from the old fiber spans. The new fiber span can be created when these conditions are fulfilled.

- No traffic is added, dropped, or bypassed at the deleted site.
- No remote Add/Drop site is connected to the deleted site.
- The following fiber properties must be the same for both the fibers that are connected to the site to be deleted.
  - Fiber Type
  - Connection Type
  - Length Based Loss
  - DCN Extension
  - OSC Frame Type
  - Optical Subnet Design Rules (both for C-band and L-band)
  - Raman Amplification
  - Measurement Units



If the above conditions are not fulfilled, the fibers cannot be joined. You have to delete the site along with the fibers connected to it.

Following property values are inherited from the old fiber spans as per the specified rules.

- Properties acquired by the fiber span (Duct):
  - EOL Ageing Loss = The value that is greater in the two fibers
  - EOL Ageing Factor = The value that is greater in the two fibers
- Properties acquired by the fiber pair (Couple):
  - CD C-band and CD L-band =  $(CD1 * L1 + CD2 * L2) / (L1 + L2)$   
where  
CD1 = Chromatic dispersion of the first fiber  
CD2 = Chromatic dispersion of the second fiber  
L1 = Length of the first fiber  
L2 = Length of the second fiber
  - PMD =  $SQRT[(P1^2 * L1 + P2^2 * L2) / (L1 + L2)]$   
where  
SQRT = Square root  
P1 = PMD of the first fiber  
P2 = PMD of the second fiber  
L1 = Length of the first fiber  
L2 = Length of the second fiber
  - QD C-band and QD L-band = The value that is greater in the two fibers
  - RD Factor = The value that is greater in the two fibers
- Properties acquired by the fiber:
  - Span Length = Cumulative length of the old fiber spans
  - Loss factor =  $[(LF1 * L1) + (LF2 * L2)] / (L1 + L2)$   
where  
LF1 = Loss factor of the first fiber  
LF2 = Loss factor of the second fiber  
L1 = Length of the first fiber  
L2 = Length of the second fiber
  - Connector Loss = The value of the corresponding site

## Deleting a Traffic Demand

A traffic demand must be in the Unlocked state before you can delete it. Use the following procedure to delete a traffic demand:

### Procedure

---

- Step 1** In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.
  - Step 2** Verify that the demand is in the Unlocked state. For more information, see the [Unlocking Parameters in the Network Design, on page 103](#).
  - Step 3** Right-click the demand that you want to delete in the Project Explorer pane and choose **Delete** from the shortcut menu. As an alternative, you can click **Delete** in the Tasks Pane.
- 

## Deleting a Traffic Subnet

Use the following procedure to delete a created traffic subnet. The Traffic Subnet ALL cannot be deleted.

### Procedure

---

- Step 1** In the Project Explorer pane, click the **Net > Traffic Subnets** folder to expand it.
  - Step 2** Right-click the traffic subnet to be deleted and select **Delete** to delete the subnet.
  - Step 3** If the traffic subnet being deleted is associated with demands, a dialog box will appear listing all the demands associated with this subnet. These associations will be removed and the demands will be moved to the Traffic Subnet ALL demand. Upon confirmation, the traffic subnet will be deleted.  
**Note** Demands moved under Traffic Subnet All will be marked invalid and the network will not be analyzed, until the user associates the demands with either a Ring or Linear subnet.
- 

## Deleting a Fiber Span

Use the following procedure to delete a fiber span from the network design:

### Procedure

---

- Step 1** In the Project Explorer pane, right-click the network folder and choose **Expand** from the shortcut menu.
  - Step 2** In the Project Explorer pane, right-click the duct that you want to delete and choose **Delete** from the shortcut menu. As an alternative, you can click **Delete** in the Tasks Pane.
  - Step 3** Click **Yes** to confirm the fiber deletion.
-

## Deleting a Network

To delete a network from a project, in the Network Mgmt Tree tab click the network and choose **Delete** from the Tasks Pane. You cannot delete a network if it is the only network in a project.

## Property Template

From CTP Release 10.3, CTP allows you to create property templates to design a set of property configurations for a network, site, demand, duct, or an amplifier. When you have a network that has similar sites, you can use these property templates to quickly and accurately set up common properties. These templates save you time by applying the necessary properties and ensuring consistency across sites, demands, ducts, or amplifiers.

Use the following procedure to create and deploy a property template for a site, demand, duct, or an amplifier:

### Procedure

- 
- Step 1** Click the desired Site, Demand, Duct, or Amplifier. The respective parameters appear in the **Properties** pane.
  - Step 2** Update the parameters in the **Properties** pane, as needed.
  - Step 3** Right-click the Site, Demand, Duct, or Amplifier icon and choose **Save Property Template**. The **Template Properties dialog** box appears with the summary of the configured properties.
  - Step 4** Check or uncheck the check boxes of the required properties.
  - Step 5** Click **Select All** or **Unselect All**, as needed.
  - Step 6** Click **OK** to open the **Save Property Template** dialog box. Name the template and save it.
- 

### What to Do Next

To apply a property template on a site, demand, duct, or an amplifier, right-click the corresponding icon and choose **Apply Property Template**.

## Site Editor

CTP allows you to configure all side-level properties for all sites in the design phase from a single window using the Side Editor. You cannot edit the properties after the network is analyzed or the network is upgraded. For an upgraded network, you can edit only sites that are unlocked.



---

**Note** You can view only Flex add/drop sites in the Side Editor. You cannot view passthrough, gain equalizers, and line amplifiers in the Side Editor.

---

Use the following procedure to edit all side-level properties for all sites using the Side Editor:

## Procedure

---

- Step 1** Click the desired Network or Site.
  - Step 2** Right-click the Network or Site and click **Open Side Editor**.  
The Side Editor dialog box appears.
  - Step 3** Click **Add Sides** to add Omni-Directional, Contention-Less, Multi-Omni-Directional, or Multi-Contention-Less sides.
  - Step 4** You can select or unselect all sites or sides using the icons on the toolbar
  - Step 5** Click the **Select Similar** drop-down list and choose the required option to select the similar type of sides.
  - Step 6** Double-click any of the side properties to configure or edit the property.
  - Step 7** Click **OK** to save your changes.
-



## Modeled Network Examples

---

This chapter provides examples of typical optical networks you can model using the Cisco Transport Planner.

This chapter contains the following section:

- [Supported Cisco Transport Planner Topologies, page 355](#)

### Supported Cisco Transport Planner Topologies

The Cisco Transport Planner supports the following topologies:

- Linear ([Single Span Topology, on page 356](#) or [Multiple Span Topology, on page 356](#))
- Ring ([Hubbed Ring Topology, on page 358](#) or [Closed Ring Topology, on page 357](#))
- [Mesh Topology, on page 359](#)

An example of each topology is given in this chapter.

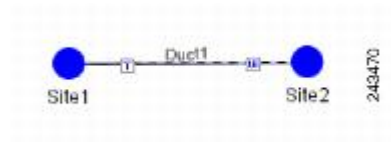
### Linear Topologies

In a linear topology, the nodes are arranged in a line and are connected to two other adjacent nodes. However, the first and last node are not connected. There are two types of linear topologies, single-span and multispan.

## Single Span Topology

The following figure shows an example of a single-span topology. This topology is characterized by a single span link. It can support only two terminal sites (full terminal or flexible channel-count terminal) without any intermediate line amplifier or optical add/drop multiplexing (OADM) sites.

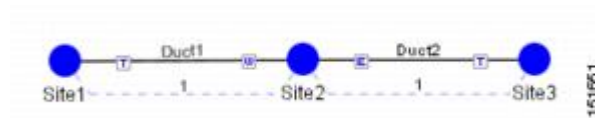
**Figure 54: Single-Span Topology Example**



## Multiple Span Topology

The following figure shows an example of a multispan topology. This configuration is characterized by the presence of two terminal sites (full terminal or flexible channel-count terminal) with intermediate OADM or line amplifier nodes. In a multispan configuration, specific wavelengths are terminated at different points in the span and only unprotected traffic can be provisioned.

**Figure 55: Multispan Topology Example**



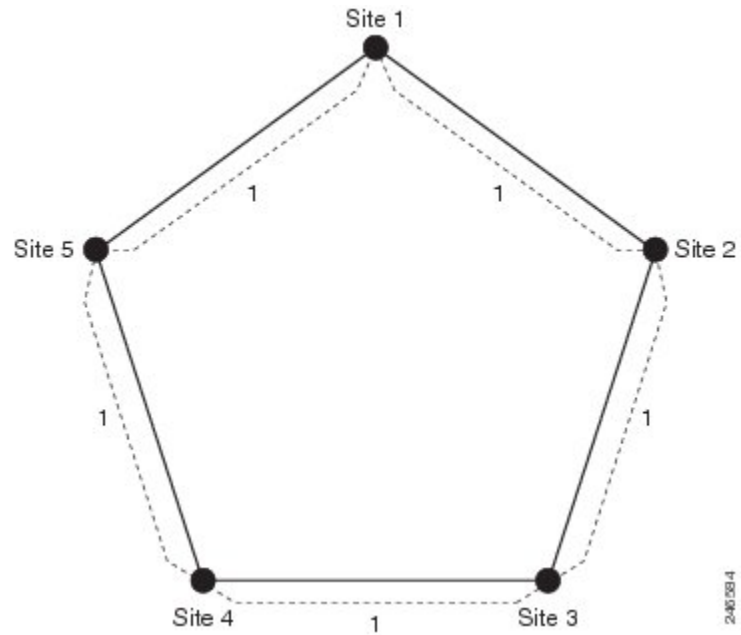
## Ring Topology

In a ring topology, each node is connected to exactly two other nodes, forming a circular configuration. It requires at least three nodes to form a ring. There are two types of ring topologies—closed ring and hubbed ring.

## Closed Ring Topology

The following figure shows an example of a closed ring configuration. Here the traffic flows in a circular manner across the network.

**Figure 56: Closed Ring Topology Example**

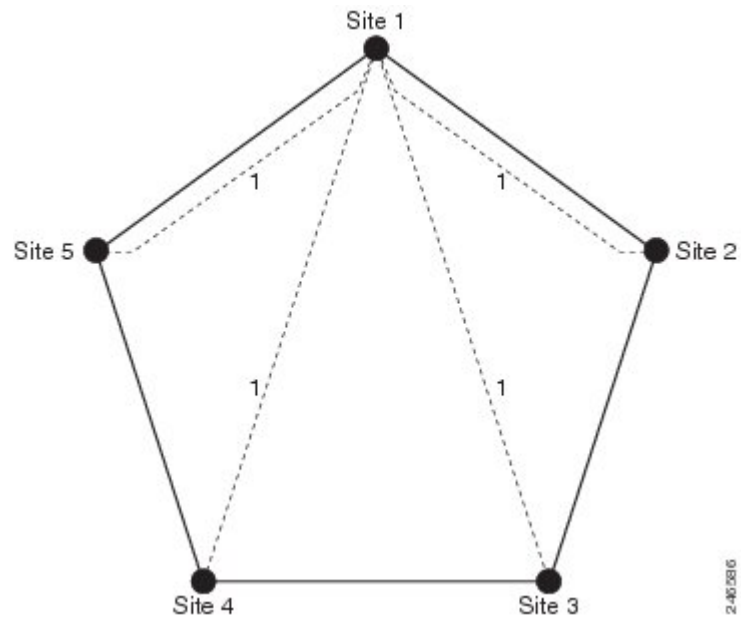


2-461381-4

## Hubbed Ring Topology

The following figure shows an example of a hubbed ring topology, also known as an open ring. In this configuration, at least one of the sites must be a hub site, where all channels are terminated. At the hub site, no traffic is expressed from one side to another, hence forming a break in the ring.

**Figure 57: Hubbed Ring Topology Example**

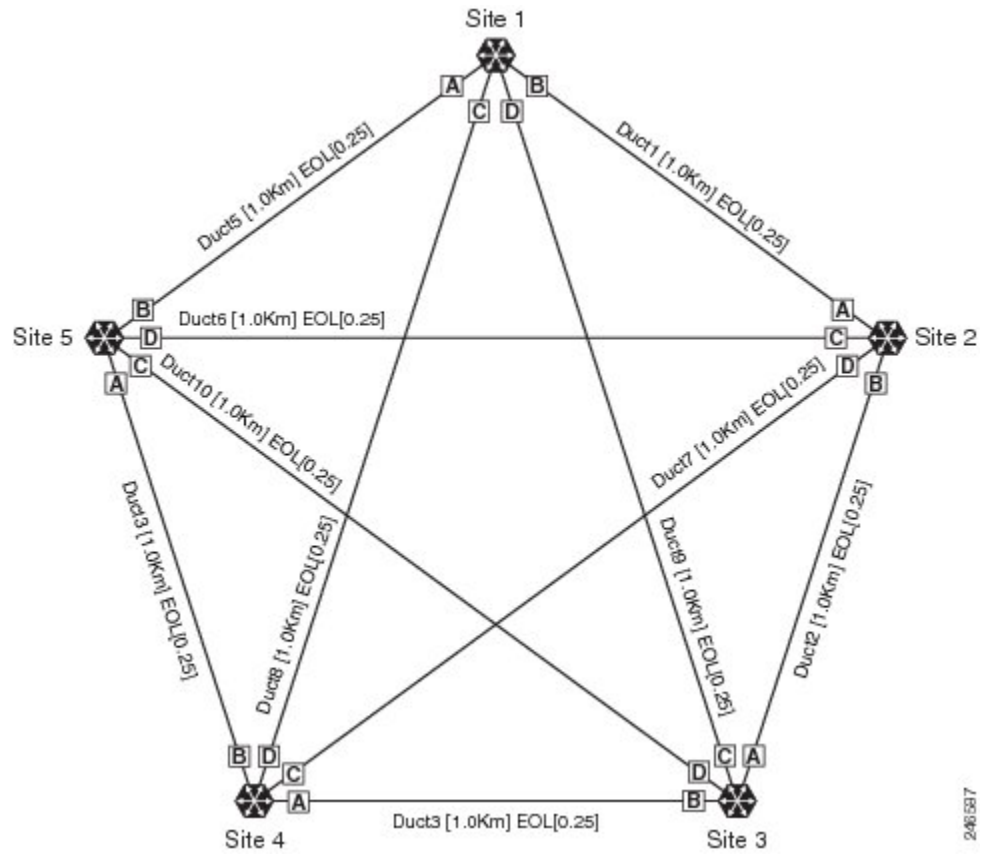




# Mesh Topology

The following figure shows an example of a mesh topology where each node is connected to one or more nodes. This configuration provides maximum redundancy to the network.

**Figure 58: Mesh Ring Topology Example**







## GUI Information and Shortcuts

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This appendix describes the Cisco Transport Planner views, menus, tools, and shortcuts options. For more information about Cisco Transport Planner, refer to [Introduction, on page 1](#).

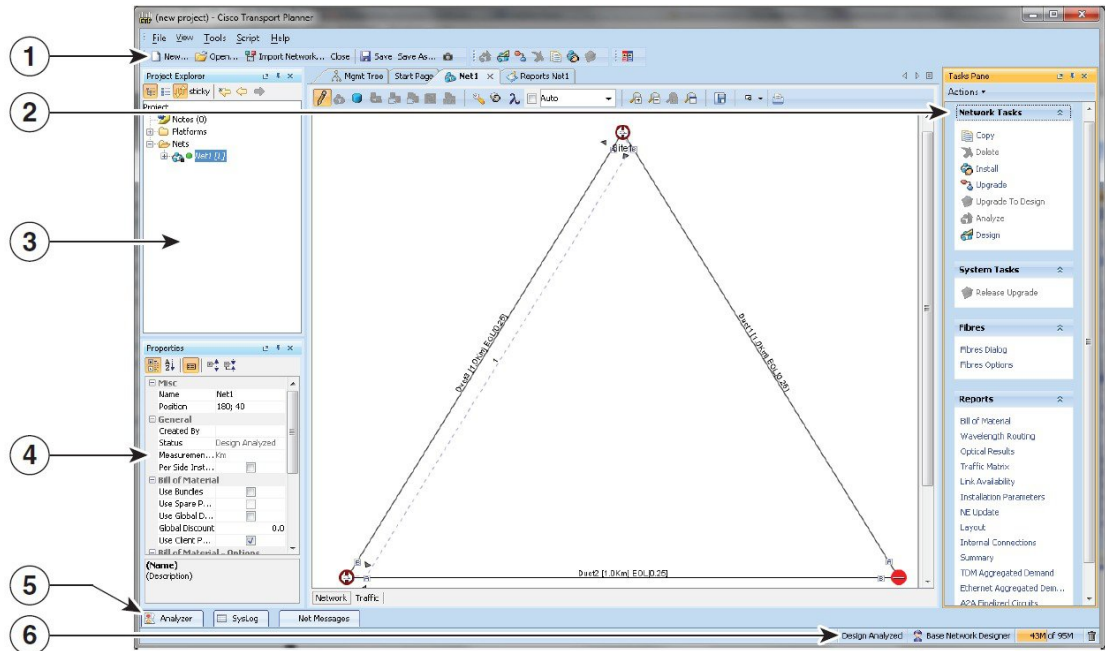
- [Manage the Cisco Transport Planner Window, page 361](#)
- [Site Icons, page 382](#)
- [Demand Editor Icons, page 383](#)

### Manage the Cisco Transport Planner Window

The Cisco Transport Planner window provides a menu bar, toolbar, a Project Explorer pane, a Properties pane, an Analyzer pane, and a Task Pane to allow you to manage a network design as shown in the following figure.

The Mgmt Tree tab displays the networks that you have created for a project. The NtVw Net# tab displays the sites for a network (identified by the Net# on the tab).

**Figure 59: Cisco Transport Planner Window with Network Tree**


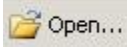


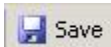



|   |                       |   |                 |
|---|-----------------------|---|-----------------|
| 1 | Tool Bar              | 4 | Properties Pane |
| 2 | Tasks Pane            | 5 | Analyzer Pane   |
| 3 | Project Explorer Pane | 6 | Status Bar      |

## Menu and Toolbar Options

The Cisco Transport Planner window menu bar and toolbar provide primary Cisco Transport Planner functions. The below table shows the actions that are available from the menu and toolbar.

**Table 59: Menu and Toolbar Options**



| Menu | Menu Option    | Toolbar   | Description  |
|------|----------------|---|--|
| File | New            |    | Creates a new Cisco Transport Planner project. See the <a href="#">Creating a Project</a> , on page 47.  |
|      | Open           |    | Opens an existing Cisco Transport Planner project. See the <a href="#">Opening a Project</a> , on page 18.   |
|      | Import Network |     | Imports node parameters from a network.  |
|      | Close          |    | Closes the current project without closing the Cisco Transport Planner session. If you have not saved the current project, Cisco Transport Planner will prompt you to save before closing. See the <a href="#">Closing a Project</a> , on page 20. |
|      | Save           |  | Saves the current project. See the <a href="#">Closing a Project</a> , on page 20.   |
|      | Save As        |  | Allows you to save the current project with a new file name. See the <a href="#">Saving a Project</a> , on page 19.  |
|      | Clear History  | —   | Clears the file history from Cisco Transport Planner. Cisco Transport Planner maintains a list of the last ten open projects in the File menu.   |
|      | Exit           | —   | Exits the Cisco Transport Planner software.  |

| Menu | Menu Option       | Toolbar | Description  |
|------|-------------------|---------|--|
| View | My Default Layout | —       | Changes the Cisco Transport Planner display to the user default layout. Cisco Transport Planner allows you to define the default value for Platform Options, Project Options, and General Options. The defined value are used as default for each new created project. See the <a href="#">Setting Cisco Transport Planner Options</a> , on page 22.   |
|      | Default Layout    | —       | Returns the Cisco Transport Planner display to the system default layout.  |
|      | Task Pane         | —       | Displays the commands available for the selected entity (network, site, duct, etc.).   |
|      | Project Explorer  | —       | Displays the Project Explorer pane, which includes folders for project notes, networks, sites, fibers, traffic demand groups, subnets, maintenance centers, restricted equipment list, and reports. Clicking the plus (+) sign by each folder expands the folder. Clicking the minus (–) sign by each folder hides the folder. contents. You can also right-click a folder and choose <i>Expand</i> from the shortcut menu to show folder contents. The default location of the Project Explorer pane is the upper left section of the Cisco Transport Planner window. |





| Menu | Menu Option            | Toolbar | Description  |
|------|------------------------|---------|--|
|      | Properties             | —       | Displays the Properties pane, which shows parameter settings for the selected entity in the Project Explorer pane, Mgmt Tree tab, or NtVw Net# tab. The default location of the Properties pane is the lower left section of the Cisco Transport Planner window. |
|      | Analyzer Messages      | —       | Displays the Analyzer Messages pane at the bottom of the Cisco Transport Planner window. The Analyzer Messages pane displays any error messages that occur during network analysis.  |
|      | A2A Finalized Circuits | —       | Displays Any-to-Any Finalization report at the bottom of the Cisco Transport Planner window. The Any-to-Any Finalization report pane displays the demands that are finalized in the network.   |

| Menu  | Menu Option        | Toolbar | Description  |
|-------|--------------------|---------|--|
| Tools | Options            | —       | Opens the Options Explorer dialog box, where you can change the user default settings. See the <a href="#">Setting Cisco Transport Planner Options</a> , on page 22.   |
|       | DB Parts Mgmt      |         | Opens the PartsTreePanel dialog box, where you can view the list of available parts for each release. See the <a href="#">Setting the Default Project Values</a> , on page 35.   |
|       | Price List Mgmt    | —       | Opens the Price Manager dialog box, where you can view maintenance contracts and add price databases. See the <a href="#">Managing the Price List</a> , on page 112.   |
|       | Export             | —       | Opens the Export dialog box, which allows you to export user options, price lists, maintenance contracts, and parts database files. See the <a href="#">Exporting User Options, Price Lists or Alien Definitions</a> , on page 41. |
|       | Import             | —       | Opens the Import dialog box, which allows you to import user options, price lists, maintenance contracts, and parts database files. See the <a href="#">Importing User Options, Price Lists or Alien Definitions</a> , on page 42. |
|       | Import from Sherpa | —       |  |







| Menu            | Menu Option         | Toolbar   | Description   |
|-----------------|---------------------|---|---|
|                 |                     |   | Opens the Import dialog box, which allows you to import Layer 2 network designs using the Cisco Carrier Packet Transport system.  |
|                 | Delete Cache        | —   | Deletes the CTP cache on restart.   |
| Help            | Manual              | —   | Opens the Cisco Transport Planner online help.  |
|                 | Tips of the Day     | —   | Opens the Tip of the Day dialog box, which provides helpful hints about using Cisco Transport Planner. Click the <i>Next</i> button to view the next tip and the <i>Back</i> button to view a previous tip. Check <i>Show Tips on Startup</i> to display the Tip of the Day dialog box when you launch Cisco Transport Planner. |
|                 | About               | —   | Displays Cisco Transport Planner version information.   |
| Network Toolbar |                     |   |   |
| —               | Create a new subnet |  | Opens the Network Creation wizard when you click this icon and then click in the Cisco Transport Planner window. See the <a href="#">Creating a Project</a> , on page 47.   |
| —               | Create a new site   |  | Opens the Site Creation wizard when you click this icon and then click in the Cisco Transport Planner window. See the <a href="#">Adding Sites</a> , on page 61.  |

| Menu | Menu Option  | Toolbar   | Description   |
|------|--|---|---|
| —    | Create a new duct                                  |    | Allows you to create a new duct between sites. See the <a href="#">Adding Fiber Spans</a> , on page 63.   |
| —    | Create a new P2P demand                            |    | Opens the Point to Point Demand Creation wizard when you click this icon and then click two sites. See the <a href="#">Understanding Contentionless Functionality</a> , on page 69. |
| —    | Create a new P-ring demand                         |    | Opens the P-Ring Creation wizard. See the <a href="#">Creating a Protected Ring Demand</a> , on page 73.  |
| —    | Finalize Any-to-Any traffic                        |    | Opens Finalize Any-to-Any Traffic window.   |
| —    | Toggle the filter for Any-to-Any finalized traffic |  | Displays the Any-to-Any demands that are finalized in the network   |
| —    | Create a new TDM Aggregated demand                 |  | Opens a TDM creation wizard. See the <a href="#">Creating TDM Aggregated Demands</a> , on page 86.  |
| —    | Connection Viewer                                  |  | A new tool that provides a Card View and Mesh View for analyzed networks.<br><br><b>Note</b> Connection Viewer lists only the Line sides in the drop-down list.                     |
| —    | Create a new Ethernet Aggregated demand            |  | Opens a Ethernet creation wizard. See the <a href="#">Creating Ethernet Aggregated Demands</a> , on page 81.  |

| Menu | Menu Option                  | Toolbar   | Description  |
|------|------------------------------|---|--|
| —    | Set various GUI options      |    | Displays the CTP GUI Options dialog box where the wavelength options can be set. The wavelength information can be displayed in nm, as a channel number or both.   |
| —    | Hide/show Network Details    |    | Hides or displays duct information (duct name, EOL), amplifier forcing, and circuits on the network map in the Network tab.  |
| —    | Wavelength usage information |    | Hides or displays wavelength usage percentage in color on the network map in the Network tab.<br><br>– To display the wavelength usage in color, click <i>Wavelength Usage Information</i> in the network view. This option is enabled only after network analysis is complete.<br><br>– To highlight ducts that have selected wavelengths, choose the required wavelength from the adjacent drop-down list and then click <i>Wavelength Usage Information</i> . The default option is Auto, where all the wavelengths in the duct are selected. |
| —    | Zoom in                      |  | Zooms in on the NtVw Net# tab.   |

| Menu | Menu Option                         | Toolbar   | Description  |
|------|-------------------------------------|---|--|
| —    | Zoom out                            |    | Zoom out from the NtVw Net# tab.   |
| —    | Normal viewing                      |    | Returns the NtVw Net# tab to normal viewing (1:1).   |
| —    | Fit to window                       |    | Resizes the view so that all sites fit inside the NtVw Net# tab window.  |
| —    | Save network view image             |    | Saves a JPEG of the network design. See the <a href="#">Creating a JPEG of the Network Design</a> , on page 104.                                     |
| —    | Analyze Network                     |   | Analyzes the selected network. See the <a href="#">Analyzing the Network</a> , on page 98.   |
| —    | Enter design mode                   |  | Puts the selected Design-Analyzed network back into the design mode for further changes. See the <a href="#">Analyzing the Network</a> , on page 98. |
| —    | Put current network in upgrade mode |  | Creates a copy of the selected Design-Analyzed network in the Upgrade state. See the <a href="#">Creating an Upgrade Network</a> , on page 101.      |
| —    | Delete current network              |  | Deletes the selected network. See the <a href="#">Deleting a Network</a> , on page 353.  |
| —    | Copy current network                |  | Copies the selected network. See the <a href="#">Creating a Copy of the Network</a> , on page 100.   |

| Menu | Menu Option                         | Toolbar  | Description   |
|------|-------------------------------------|--|---|
| —    | Put current network in install mode |   | Creates a copy of the selected Design-Analyzed network in the Install state. See the <a href="#">Creating a Network in the Install State</a> , on page 100. |
| —    | Copy & Go back to Design Mode       |   | Copies the selected network in the Design state. See the <a href="#">Creating a Copy of the Network in Design State</a> , on page 100.                      |
| —    | Reports Diff                        |   | Opens the Reports Diff dialog box, which allows you to create a report that shows the differences between networks.   |
| —    | Run the Garbage Collector           |  | Deletes unloaded networks from memory.  |

## Cisco Transport Planner Panes


Cisco Transport Planner provides four panes that help you manage a network design: Project Explorer, Properties, Analysis, and Tasks Pane.










### Project Explorer Pane

The Project Explorer pane provides a management tree for the entire project. Each network appears as a folder that contains the sites, fibers, traffic groups, subnets, maintenance centers, restricted equipment lists, and reports for that network. If you have made changes to a network design, that network folder and the changed item folder appear in blue italics in the pane.

By default, the Project Explorer pane is located in the upper-left section of the Cisco Transport Planner window. The below table shows the actions that are available from the Project Explorer toolbar.

**Table 60: Project Explorer Toolbar Options**

| Toolbar   | Description                                     |
|---|---|
|  | Displays the Project Explorer as a single pane. |









| Toolbar   | Description  |
|---|--|
|    | Displays the Project Explorer as split panes. The upper pane contains the main project tree; the lower pane shows only the folders for the network that is selected in the upper pane.   |
|    | Auto scrolls to the selected object in the Project Explorer tree. For example, if you click on a site in the NtView Net# tab but it is not in view in the Project Explorer tree, Cisco Transport Planner will automatically scroll the Project Explorer pane until the selected site is in view. |
| sticky  | Allows selection of multiple folders or icons (or both) in the Project Explorer pane.  |
|    | Moves backward through the list of previously selected items in the Project Explorer pane.   |
|  | Moves forward through the list of previously selected items in the Project Explorer pane.  |
|  | Moves (undocks) the Project Explorer pane from the default location in the upper left corner so that you can move it around your desktop area as an individual window.   |
|  | Moves the Project Explorer pane back to the default location.  |
|  | Hides the Project Explorer pane. To view again, move the mouse over the Prop tab that appears in the upper left corner of the Cisco Transport Planner window.  |
|  | When in hidden mode, reopens the Project Explorer pane in the default location.  |
|  | Closes the Project Explorer pane. To reopen, choose <b>Project Explorer</b> from the View menu.  |


## Properties Pane

The Properties pane shows all of the parameters set for a selected item (either in the Project Explorer pane, the Network Mgmt Tree tab, or the NtVw Net# tab). Many items are editable in the Properties pane. By default, the Properties pane is located in the lower-left section of the Cisco Transport Planner window.

The below table shows the actions that are available from the Properties Pane toolbar.

**Table 61: Properties Pane Toolbar Options**








| Toolbar   | Description  |
|---|--|
|    | Categorizes the properties by type.  |
|    | Organizes the properties in alphabetical order.  |
|    | Shows or hides the description area at the bottom of the Properties pane.  |
|  | Expands the property categories (if collapsed).  |
|  | Collapses the property categories (if expanded).   |
|  | Moves (undocks) the Properties pane from the default location in the lower left corner so that you can move it around your desktop area as an individual window. |
|  | Moves the Properties pane back to the default location.  |
|  | Hides the Property pane. To view again, move the mouse over the Prop tab that appears in the upper left corner of the Cisco Transport Planner window.            |
|  | When in hidden mode, reopens the Properties pane so that it appears in the default location.   |

| Toolbar   | Description   |
|---|---|
|  | Closes the Properties Pane. To reopen, choose <b>Properties</b> from the View menu. |




## Analyzer Pane

The Analyzer tab at the bottom of the Cisco Transport Planner window appears after you have analyzed a network design. Clicking the Analyzer tab opens the Analyzer pane. The below table shows the actions that are available from the Analyzer pane.

**Table 62: Analyzer Toolbar Options**

| Toolbar   | Description  |
|---|--|
|    | Moves down through the Analyzer messages.  |
|   | Moves up through the Analyzer messages.  |
|  | Opens the Apply Filters dialog box, which allows you to filter the messages to show or hide Exceptions, Errors, Warnings, and/or Info.                         |
|  | Expands the Analyzer message categories (if collapsed).  |
|  | Collapses the Analyzer message categories (if expanded).   |
|  | Moves (undocks) the Analyzer pane from the default location in the lower left corner so that you can move it around your desktop area as an individual window. |
|  | Moves the Analyzer pane back to the default location.  |








| Toolbar   | Description  |
|---|--|
|  | Hides the Analyzer pane. To view again, move the mouse over the Analyzer tab that appears in the bottom of the Cisco Transport Planner window. |
|  | Opens the Analyzer pane so that it remains open in the bottom section of the Cisco Transport Planner window.                                   |
|  | Closes the Analyzer pane. To reopen, choose <b>Analyzer messages</b> from the View menu.   |

## Tasks Pane

The Tasks Pane lists the available commands and reports for a selected item. The commands change based on the selected item. For example, a selected site will have different commands available than a selected fiber span. By default, the Tasks Pane is located in the upper right section of the Cisco Transport Planner window. The below table shows the actions that are available from the Tasks Pane toolbar.

**Table 63: Tasks Pane Toolbar Options**

| Toolbar   | Description   |
|---|---|
|  | Moves (undocks) the Tasks Pane from the default location in the lower left corner so that you can move it around your desktop area as an individual window. |
|  | Moves the Tasks Pane back to the default location.  |
|  | Hides the Tasks Pane. To view again, move the mouse over the Tasks tab that appears in the upper right corner of the Cisco Transport Planner window.        |
|  | When in hidden mode, reopens the Tasks Pane so that it appears in the default location.   |
|  | Closes the Tasks Pane. To reopen, choose <b>Tasks Pane</b> from the View menu.  |

## Shortcuts

Cisco Transport Planner provides the following mouse shortcuts:

- Double-clicking a network icon in the Network Mgmt Tree tab opens the NtVw Net# tab, which shows the sites for that network.
- Right-clicking a report table column displays a shortcut menu that allows you to view or hide the columns in a report.
- Right-clicking an item in the Network Mgmt Tree tab or NtVw Net# tabs opens a shortcut menu that allows you to choose actions to perform on the selected item. The shortcut menu options differ based on the item selected and the network state. (Many commands are not available until a network is analyzed.) The following table lists the shortcut menu actions that are available for each item.
- Right-clicking on multiple items in the Project Explorer pane opens a shortcut menu that allows you to choose actions to perform on multiple items. The shortcut menu options are Delete, Unlock, Unlock Pay As You Grow Bundles, and Insert Site. The Unlock Pay As You Grow Bundles option is available only for sites and the Insert Site option is available only for ducts.

**Table 64: Shortcut Menu Actions**

| Toolbar  | Description   |
|--|---|
| Networks in the following states: Design, Install, and Upgrade | <ul style="list-style-type: none"> <li>• Unload/Load—Unloads or loads the network. See the <a href="#">Loading and Unloading Networks</a>, on page 19.</li> <li>• Edit Note—Allows you to create a note for that item. See the <a href="#">Adding Notes to a Project</a>, on page 65.</li> </ul>  |
| Networks in the following states: Design, Install, and Upgrade | <ul style="list-style-type: none"> <li>• Delete—Removes the network from the project. See the <a href="#">Deleting a Network</a>, on page 353 .</li> <li>• Copy—Creates a copy of the network. See the <a href="#">Creating a Copy of the Network</a>, on page 100.</li> <li>• Upgrade to Design— Copies the selected network in the Design state. See the <a href="#">Creating a Copy of the Network in Design State</a>, on page 100 .</li> <li>• Arrange Sites—Allows you to rearrange sites in the Cisco TransportPlanner window. See the <a href="#">Arranging Sites</a>, on page 337.</li> <li>• Forcing Manager—Unlocks individual units in multiple sites/ducts. See the <a href="#">Forcing Manager</a>, on page 103.</li> </ul> |

| Toolbar           | Description  |
|-------------------|--|
| Analyzed networks | <ul style="list-style-type: none"> <li>• <b>Unload/Load</b>—Unloads or loads the network. See the <a href="#">Loading and Unloading Networks</a>, on page 19.</li> <li>• <b>Edit Note</b>—Allows you to create a note for that item. See the <a href="#">Adding Notes to a Project</a>, on page 65.</li> <li>• <b>Install</b>—Creates a copy of the network in the Install state. See the <a href="#">Creating a Network in the Install State</a>, on page 100.</li> <li>• <b>Open Site Functional View</b>—Opens the site functional view. See the <a href="#">Viewing the Site Functional View</a>, on page 98.</li> <li>• <b>UnSplit Node</b>—Unsplints the node on the site. To split again, right-click on the site and select Split Node.</li> <li>• <b>Delete</b>—Removes the network from the project. See the <a href="#">Deleting a Network</a>, on page 353.</li> <li>• <b>Upgrade</b>—Creates a copy of the network in the Upgrade state. See the <a href="#">Creating an Upgrade Network</a>, on page 101 .</li> <li>• <b>Copy</b>—Creates a copy of the network. See the <a href="#">Creating a Copy of the Network</a>, on page 100.</li> <li>• <b>Layout</b>—Opens the Layout tab. See the <a href="#">Viewing the Layout of Single Site</a>, on page 149.</li> <li>• <b>Internal Connections</b>—Opens the Internal Connections tab. See the <a href="#">Viewing Internal Connections</a>, on page 142.</li> <li>• <b>Optical Results</b>—Opens the Optical Results tab. See the <a href="#">Viewing Optical Results</a>, on page 157.</li> <li>• <b>Wavelength Routing</b>—Opens the Wavelength Routing tab. See the <a href="#">Viewing Wavelength Routing</a>, on page 162.</li> <li>• <b>Bill of Material</b>—Opens the Bill of Materials tab. See the <a href="#">Viewing a Network BoM</a>, on page 107.</li> </ul> |

| Toolbar           | Description  |
|-------------------|--|
| Analyzed networks | <ul style="list-style-type: none"><li>• Installation—Opens a submenu with the following options:<ul style="list-style-type: none"><li>◦ NE Update—Creates a configuration file for each site in the network. See the <a href="#">Saving the NE Update File, on page 138</a>.</li><li>◦ Installation Parameters—Opens the Installation Parameters tab. See the <a href="#">Viewing the Installation Parameters, on page 139</a>.</li></ul></li><li>• Arrange Sites—Allows you to rearrange sites in the Cisco Transport Planner window. See the <a href="#">Arranging Sites, on page 337</a>.</li></ul> |

| Toolbar | Description |
|---------|-------------|
| Sites   |             |






| Toolbar | Description  |
|---------|--|
|         | <ul style="list-style-type: none"> <li>• Edit—Allows you to edit the demand. See the <a href="#">Editing a Point-to-Point Demand, on page 236</a>, <a href="#">Editing a P-Ring Demand, on page 239</a>, or <a href="#">Editing a ROADM Demand, on page 241</a>.</li> <li>• Edit Note—Allows you to create a note for that item. See the <a href="#">Adding Notes to a Project, on page 65</a>.</li> <li>• Unlock—Unlocks the site. See the <a href="#">Unlocking Parameters in the Network Design, on page 103</a>.</li> <li>• Delete—Removes the site from the project. See the <a href="#">Deleting Sites, on page 350</a>.<br/>If the network is analyzed, the following actions are also available:</li> <li>• Layout—Opens the Layout tab. See the <a href="#">Viewing the Layout of Single Site, on page 149</a>.</li> <li>• Internal Connections—Opens the Internal Connections tab. See the <a href="#">Viewing Internal Connections, on page 142</a>.</li> <li>• Optical Results—Opens the Optical Results tab. See the <a href="#">Viewing Optical Results, on page 157</a>.</li> <li>• Wavelength Routing—Opens the Wavelength Routing tab. See the <a href="#">Viewing Wavelength Routing, on page 162</a>.</li> <li>• Bill of Material—Opens the Bill of Materials tab. See the <a href="#">Viewing a Network BoM, on page 107</a>.</li> <li>• Installation—Opens a submenu with the following options: <ul style="list-style-type: none"> <li>◦ NE Update—Creates a configuration file for each site in the network. See the <a href="#">Saving the NE Update File, on page 138</a>.</li> <li>◦ Installation Parameters—Opens the Installation Parameters tab. See the <a href="#">Viewing the Installation Parameters, on page 139</a>.</li> </ul> </li> <li>• Provision Node—Exports the NE Update Configuration file to the node. Opens the Node Login window. See the <a href="#">Bidirectional Communication with the Network Element, on</a></li> </ul> |

| Toolbar         | Description  |
|-----------------|--|
|                 | <p><a href="#">page 119</a>.</p> <ul style="list-style-type: none"> <li>• <b>Unlock Pay As You Grow Bundles</b>—Recalculates the PAYG bundles for the site when the network is analyzed. See the <a href="#">Unlock Pay As You Grow Bundles, on page 46</a>.</li> </ul>  |
| Sites           | <ul style="list-style-type: none"> <li>• <b>Open Site Functional View</b>—Opens the site functional view. See the <a href="#">Viewing the Site Functional View, on page 98</a>.</li> <li>• <b>Unlock</b>—Unlocks the site. See the <a href="#">Unlocking Parameters in the Network Design, on page 103</a>.</li> <li>• <b>Forcing Manager</b>—Unlocks individual units in multiple sites/ducts. See the <a href="#">Forcing Manager, on page 103</a>.</li> </ul>   |
| Fiber spans     | <ul style="list-style-type: none"> <li>• <b>Edit Note</b>—Allows you to create a note for that item. See the <a href="#">Adding Notes to a Project, on page 65</a>.<br/>If the network is analyzed, the <b>Unlock</b> command is also available. See the <a href="#">Unlocking Parameters in the Network Design, on page 103</a>.</li> </ul>   |
| Traffic demands | <ul style="list-style-type: none"> <li>• <b>Edit Note</b>—Allows you to create a note for that item. See the <a href="#">Adding Notes to a Project, on page 65</a>.</li> <li>• <b>Edit</b>—Allows you to edit the demand. See the <a href="#">Editing a Point-to-Point Demand, on page 236</a>, <a href="#">Editing a P-Ring Demand, on page 239</a>, or <a href="#">Editing a ROADM Demand, on page 241</a>.</li> <li>• <b>Delete</b>—Removes the demand from the project. See the <a href="#">Deleting a Traffic Demand, on page 352</a>.</li> <li>• <b>Add/Remove Site</b>—Allows to add or remove sites from P-Ring, Ethernet Aggregated, and TDM Aggregated demands.<br/>If the network is analyzed, the <b>Unlock</b> command is also available. See the <a href="#">Unlocking Parameters in the Network Design, on page 103</a>.</li> </ul> |







# Site Icons

A site icon indicates the functionality of site. The below table shows the site icons.

**Table 65: Site Icons**

| Site Name      | Site Icon   | Description   |
|----------------|---|---|
| Add/Drop       |    | Indicates that this site has add/drop capability. Only point-to-point and P-ring circuits can be added/dropped at this site.  |
| Gain equalizer |    | Indicates that this site uses wavelength selective switch cards to control the generated tilt and extend unregenerated distances. The site is realized as an ROADM site without demultiplexer cards.  |
| Hub            |   | Indicates that this site is equipped with filters for adding and dropping all the channels (on both West and East sides). All express paths are open in hub configurations.   |
| Line amplifier |  | Indicates that any add/drop traffic is prevented at this site.  |
| OSC site       |  | Indicates that site is designated for network communication, providing the possibility to access the optical service channel (OSC) for management of the MultiService Transport platform (MSTP) network. By default, no amplifiers are included in this site. However, if Cisco Transport Planner determines that an amplifier is required in the network, it can automatically place it at this location. Cisco Transport Planner allows you to set (force) preamplifier and booster amplifiers for each direction on a OSC Site node. |












| Site Name    | Site Icon   | Description  |
|--------------|---|--|
| Pass Through |    | Indicates that no equipment will be located at this site.  |
| R-OADM       |    | Indicates that this site supports Any-to-Any and also Fixed (point-to-point and P-ring) traffic types. |
| PSM          |    | Indicates a PSM site with Aw representing the working path and Ap representing the protected path.     |
| Terminal     |    | Indicates a terminal site.   |
| OXC          |   | Indicates a multi degree OXC site.   |
| OIC          |  | Indicates a multi degree OIC site  |

## Demand Editor Icons

The below table shows the demand editor icons.

**Table 66: Demand Editor Icons**

| Icons   | Description                                      |
|---|--|
|  | Expands the services of a demand (if collapsed). |

| Icons   | Description                                       |
|---|---|
|    | Collapses the services of a demand (if expanded). |
|    | Creates a new service.                            |
|    | Deletes an existing service.                      |
|    | Selects siblings at the same level.               |
|    | Selects all siblings of the same type.            |
|  | Opens the path constraints editor.                |
|  | Opens the regeneration editor.                    |
|  | Opens Optical Bypass editor.                      |



## Cards and Pluggables

This appendix provides a list of Supported Pluggables supported in CTP and the cards supported by NCS 2015.

**Table 67: Supported Pluggables**

| Card   | Supported Pluggables   | Default Pluggable |
|--------|--|-------------------|
| 10G-XR | <ul style="list-style-type: none"> <li>• ONS-XC-10G</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> </ul>   | ONS-XC-10G-C      |
| GE-XP  | <ul style="list-style-type: none"> <li>• ONS-XC-10G</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-10G-EP30.3 through ONS-XC-10G-EP61.4</li> </ul>  | ONS-XC-10G-C      |
| GE-XPE | <ul style="list-style-type: none"> <li>• ONS-XC-10G</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-SC-EOP1</li> <li>• ONS-XC-10G-EP30.3 through ONS-XC-10G-EP61.4</li> <li>• ONS-SI-GE-EX</li> </ul> | ONS-XC-10G-C      |

| Card     | Supported Pluggables  | Default Pluggable |
|----------|---|-------------------|
| 10GE-XP  | <ul style="list-style-type: none"> <li>• ONS-XC-10G</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-10G-EP30.3 through ONS-XC-10G-EP61.4</li> </ul>                         | ONS-XC-10G-C      |
| 10GE-XPE | <ul style="list-style-type: none"> <li>• ONS-XC-10G</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-10G-EP30.3 through ONS-XC-10G-EP61.4</li> </ul>                         | ONS-XC-10G-C      |
| ADM-10G  | <ul style="list-style-type: none"> <li>• ONS-XC-10G</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-10G-EP30.3 through ONS-XC-10G-EP61.4</li> <li>• ONS-SI-GE-EX</li> </ul> | ONS-XC-10G-C      |
| OTU-2_XP | <ul style="list-style-type: none"> <li>• ONS-XC-10G</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-10G-EP30.3 through ONS-XC-10G-EP61.4</li> </ul>                         | ONS-XC-10G-C      |

| Card             | Supported Pluggables  | Default Pluggable |
|------------------|---|-------------------|
| 40G DQPSK MXP    | <ul style="list-style-type: none"> <li>• ONS-XC-10G-1470 through ONS-XC-10G-1610</li> <li>• ONS-XC-10G-S1</li> <li>• ONS-XC-10G-I2</li> <li>• ONS-XC-10G-L2</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-8G-SM</li> <li>• ONS-XC-8G-MM</li> <li>• ONS-XC-10G-SR-MM</li> <li>• ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=</li> </ul> | ONS-XC-10G-C      |
| 40G CP-DQPSK MXP | <ul style="list-style-type: none"> <li>• ONS-XC-10G-1470 through ONS-XC-10G-1610</li> <li>• ONS-XC-10G-S1</li> <li>• ONS-XC-10G-I2</li> <li>• ONS-XC-10G-L2</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-8G-SM</li> <li>• ONS-XC-8G-MM</li> <li>• ONS-XC-10G-SR-MM</li> <li>• ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=</li> </ul> | ONS-XC-10G-C      |

| Card                | Supported Pluggables  | Default Pluggable |
|---------------------|---|-------------------|
| 40G CP-DQPSK ME MXP | <ul style="list-style-type: none"> <li>• ONS-XC-10G-1470 through ONS-XC-10G-1610</li> <li>• ONS-XC-10G-S1</li> <li>• ONS-XC-10G-I2</li> <li>• ONS-XC-10G-L2</li> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-8G-SM</li> <li>• ONS-XC-8G-MM</li> <li>• ONS-XC-10G-SR-MM</li> <li>• ONS-XC-10G-EP30.3= through ONS-XC-10G-EP61.4=</li> </ul> | ONS-XC-10G-C      |

| <b>Card</b>     | <b>Supported Pluggables</b> | <b>Default Pluggable</b> |
|-----------------|-----------------------------|--------------------------|
| AR-MXP<br>AR-XP |                             | ONS-XC-10G-C             |

| Card | Supported Pluggables  | Default Pluggable |
|------|---|-------------------|
|      | <ul style="list-style-type: none"> <li>• ONS-XC-10G-C</li> <li>• ONS-XC-10G-96C</li> <li>• ONS-XC-10G-S1</li> <li>• ONS-XC-10G-I2</li> <li>• ONS-XC-10G-L2</li> <li>• ONS-XC-8G-SM</li> <li>• ONS-XC-8G-MM</li> <li>• ONS-XC-10G-EP30.3 through ONS-XC-10G-EP61.4</li> <li>• ONS-SE-200-MM</li> <li>• ONS-SI-155-SR-MM</li> <li>• ONS-SI-622-SR-MM</li> <li>• ONS-SC-2G-xx.x</li> <li>• ONS-SC-2G-xxxx=</li> <li>• ONS-SE-4G-MM</li> <li>• ONS-SE-4G-SM</li> <li>• ONS-SE-100BX10U</li> <li>• ONS-SE-100BX10D</li> <li>• ONS-SE-GE-BXU</li> <li>• ONS-SE-GE-BXD</li> <li>• ONS-SE-ZE-EL</li> <li>• ONS-SI-100-FX</li> <li>• ONS-SI-100-LX10</li> <li>• ONS-SI-GE-LX</li> <li>• ONS-SI-GE-SX</li> <li>• ONS-SI-GE-ZX</li> <li>• ONS-SI-GE-EX (AR-XP only)</li> <li>• ONS-SI-155-I1</li> <li>• ONS-SI-155-L2</li> <li>• ONS-SI-622-I1</li> <li>• ONS-SI-622-L1</li> </ul> |                   |



| Card                                      | Supported Pluggables  | Default Pluggable |
|---|---|-------------------|
|   | <ul style="list-style-type: none"> <li>• ONS-SI-622-L2</li> <li>• ONS-SC-4G-xx.x</li> <li>• ONS-SI-2G-L1</li> <li>• ONS-SI-2G-L2</li> <li>• ONS-SI-2G-S1</li> <li>• ONS-SE-Z1</li> <li>• ONSSI-155-L1</li> <li>• ONS-SE-155-xxxx</li> <li>• ONS-SC-155-EL</li> <li>• ONS-SC-4G-xx.x</li> <li>• ONS-SC-HD3GV-TX</li> <li>• ONS-SC-HD3GV-RX</li> <li>• ONS-SI-155-L1</li> <li>• ONS-SE-100-BX10U</li> <li>• ONS-SE-100-BX10D</li> </ul> |                   |
| 100G-LC-C<br>100G-ME-C<br>100G-CK-ME-C    | ONS-CXP-100G-SR10   | ONS-CXP-100G-SR10 |
| 100G-CK-LC-C<br>100GS-CK-LC<br>200G-CK-LC | <ul style="list-style-type: none"> <li>• CPAK-100G-SR10</li> <li>• CPAK-100G-LR4</li> <li>• CPAK-100G-SR4</li> </ul>  | CPAK-100G-SR10    |

| Card  | Supported Pluggables   | Default Pluggable |
|---|--|-------------------|
| 100GS-CK-LC +<br>10X10G-LC<br>200G-CK-LC +<br>10X10G-LC | <ul style="list-style-type: none"> <li>• ONS-SC+-10G-SR</li> <li>• ONS-SC+-10G-ER</li> <li>• ONS-SC+-10G-LR</li> <li>• ONS-SC+-10G-ZR</li> <li>• ONS-SC+-10G-xx.x</li> <li>• ONS-SC+-10GEPxx.x</li> <li>• ONS-SC+-10G-C</li> <li>• ONS-SC+-10G-CU-1</li> <li>• ONS-SC+-10G-CU-3</li> <li>• ONS-SC+-10G-CU-5</li> <li>• ONS-SC+-10G-CU-7</li> <li>• ONS-SC+-10G-xxxx</li> </ul> | —                 |

| Card                                  | Supported Pluggables   | Default Pluggable |
|---------------------------------------|--|-------------------|
| 200G-CK-LC +<br>MR-MXP +<br>10X10G-LC | <p><b>MR-MXP (SFP+):</b></p> <ul style="list-style-type: none"> <li>• ONS-SC+-10G-SR=</li> <li>• ONS-SC+-10G-LR=</li> <li>• ONS-SC+-10G-C= (10G Tunable)</li> <li>• ONS-SC+-10G-EP30.3= through</li> <li>• ONS-SC+-10G-EP61.8= (10G DWDM)</li> </ul> <p><b>MR-MXP (QSFP):</b></p> <ul style="list-style-type: none"> <li>• ONS-QSFP-40G-SR4</li> <li>• ONS-QSFP-4x10G-LR</li> </ul> <p><b>10X10G-LC:</b></p> <ul style="list-style-type: none"> <li>• ONS-SC+-10G-SR</li> <li>• ONS-SC+-10G-ER</li> <li>• ONS-SC+-10G-LR</li> <li>• ONS-SC+-10G-ZR</li> <li>• ONS-SC+-10G-xx.x</li> <li>• ONS-SC+-10GEPxx.x</li> <li>• ONS-SC+-10G-C</li> <li>• ONS-SC+-10G-CU-1</li> <li>• ONS-SC+-10G-CU-3</li> <li>• ONS-SC+-10G-CU-5</li> <li>• ONS-SC+-10G-CU-7</li> <li>• ONS-SC+-10G-xxxx</li> <li>• ONS-QSFP-4x10G-LR</li> <li>• ONS-QSFP-40G-SR4</li> </ul> | —                 |

| Card  | Supported Pluggables  | Default Pluggable |
|---|---|-------------------|
| 200G-CK-LC +<br>MR-MXP with<br>FEC/EFEC/SD-FEC                          | <b>MXP-100G:</b> <ul style="list-style-type: none"> <li>• ONS-SC+-10G-SR=</li> <li>• ONS-SC+-10G-LR=</li> <li>• ONS-SC+-10G-C</li> <li>• ONS-SC+-10G-EPxx.x</li> <li>• ONS-QSFP-40G-SR4</li> <li>• ONS-QSFP-4x10G-LR</li> </ul> <b>TXP-100G:</b> <ul style="list-style-type: none"> <li>• CPAK-100G-SR10</li> <li>• CPAK-100G-LR4</li> </ul> <b>100GE</b> <ul style="list-style-type: none"> <li>• CPAK-100G-SR4</li> </ul>                                     | —                 |
| 200G-CK-LC +<br>MR-MXP + MR-MXP with<br>SD-FEC                          | <b>40GE</b><br>QSFP-40G-LR4   | —                 |
| 200G-CK-LC +<br>MR-MXP (200G Mxp<br>100G+10x10G Mode) with<br>SD-FEC_20 | <b>100GE</b> <ul style="list-style-type: none"> <li>• CPAK-100G-SR4</li> <li>• CPAK-100G-SR10</li> <li>• CPAK-100G-LR4</li> </ul> <b>10GE LAN PHY FOR MR-MXP (SFP+)</b> <ul style="list-style-type: none"> <li>• ONS-SC+-10G-LR</li> <li>• ONS-SC+-10G-SR</li> <li>• ONS-SC+-10G-C</li> <li>• ONS-SC+-10G-EP</li> </ul> <b>10GE LAN PHY for MR-MXP (QSFP)</b> <ul style="list-style-type: none"> <li>• ONS-QSFP-40G-SR4</li> <li>• ONS-QSFP-4x10G-LR</li> </ul> | —                 |

| Card      | Supported Pluggables  | Default Pluggable |
|-----------|---|-------------------|
| 10x10G-LC | <ul style="list-style-type: none"> <li>• ONS-SC+-10G-ER</li> <li>• ONS-SC+-10G-LR</li> <li>• ONS-SC+-10G-SR</li> <li>• ONS-SC+-10G-ZR</li> <li>• ONS-SC+-10G-30.3 through ONS-SC+-10G-61.4</li> <li>• ONS-SC+-10GEP-30.3 through ONS-SC+-10GEP-61.4</li> <li>• ONS-SC+-10G-CU-1</li> <li>• ONS-SC+-10G-CU-3</li> <li>• ONS-SC+-10G-CU-5</li> <li>• ONS-SC+-10G-CU-7</li> <li>• ONS-SC+-10G-C</li> <li>• ONS-SC+-10G-xxxx</li> </ul> | ONS-SC+-10G-SR    |
| WSE       | <ul style="list-style-type: none"> <li>• ONS-SC+-10G-ER</li> <li>• ONS-SC+-10G-LR</li> <li>• ONS-SC+-10G-SR</li> <li>• ONS-SC+-10G-ZR</li> <li>• ONS-SC+-10G-30.3 through ONS-SC+-10G-61.4</li> <li>• ONS-SC+-10GEP-30.3 through ONS-SC+-10GEP-61.4</li> <li>• ONS-SC+-10G-CU-1</li> <li>• ONS-SC+-10G-CU-3</li> <li>• ONS-SC+-10G-CU-5</li> <li>• ONS-SC+-10G-CU-7</li> <li>• ONS-SC+-10G-C</li> </ul>                             | ONS-SC+-10GEP-XX  |

| Card          | Supported Pluggables  | Default Pluggable   |
|---------------|---|---|
| CFP-LC        | <ul style="list-style-type: none"> <li>• ONS-CC-100G-LR4</li> <li>• ONS-CC-100GE-LR4</li> <li>• ONS-CC-40G-LR4</li> <li>• ONS-CC-40G-FR</li> <li>• CFP-40G-SR4</li> <li>• CFP-100G-SR10</li> </ul>  | <p>ONS-CC-100G-LR4 for OTU4</p> <p>ONS-CC-100GE-LR4 for 100GE LAN PHY</p> <p>ONS-CC-40G-LR4 for 40GE LAN PHY or OTU3</p>  |
| MXP_MR_10DMEX | <ul style="list-style-type: none"> <li>• ONS-SE-G2F-SX</li> <li>• ONS-SE-G2F-LX</li> <li>• ONS-SI-GE-ZX</li> <li>• ONS-SE-4G-MM</li> <li>• ONS-SE-4G-SM</li> <li>• ONS-SI-GE-EX</li> </ul>  | <p>ONS-SE-G2F-SX for Gigabit ethernet, Fiber Channel 2G, 2G-FICON, 1G-FICON, Fiber Channel.</p> <p>ONS-SE-4G-MM for 4G-FICON, Fiber Channel 4G.</p> <p>ONS-SE-G2F-LX for ISC-Compact, ISC-Peer-1G, ISC-Peer-2g.</p> |
| MXP_MR_10DME  | <ul style="list-style-type: none"> <li>• ONS-SE-G2F-LX</li> <li>• ONS-SE-G2F-SX</li> <li>• ONS-SE-ZE-EL</li> <li>• SFP-GE+-LX</li> <li>• SFP-GEFC-SX</li> <li>• ONS-SI-GE-ZX</li> <li>• ONS-SI-GE-EX</li> <li>• ONS-SE-4G-MM</li> <li>• ONS-SE-4G-SM</li> </ul> | <p>ONS-SE-G2F-LX for Gigabit ethernet, Fiber Channel 2G, 2G-FICON, 1G-FICON, Fiber Channel, ISC-Compact, ISC-Peer-1G, ISC-Peer-2g.</p> <p>ONS-SE-4G-MM for 4G-FICON, Fiber Channel 4G.</p>                          |
| 400G-XP-LC    | <ul style="list-style-type: none"> <li>• QSFP-100G-SR4-S</li> <li>• ONS-QSFP28-LR4</li> <li>• QSFP-100G-LR4-S</li> <li>• QSFP-4X10G-LR-S</li> <li>• ONS-CFP2-WDM</li> </ul>   | <p>QSFP-100G-SR4-S</p>  |

| Card          | Supported Pluggables  | Default Pluggable |
|---------------|---|-------------------|
| 40G DQPSK TXP | <ul style="list-style-type: none"> <li>• ONS-XC-10G</li> <li>• ONS-XC-10G-30.3 through ONS-XC-10G-61.4</li> </ul> | ONS-XC-10G        |

The following table lists the cards supported by Cisco NCS 2015.



**Note**

You must upgrade the cards supported in Cisco NCS 2015 M15 chassis to Release 10.5 or Release 10.5.2 before you use them on the M15 chassis.

| Interface Type                           | Card                       | Release |
|--|----------------------------|---------|
| <b>Wavelengths Management Line Cards</b> |                            |         |
|  | NCS2K-9-SMRxxFS            | R10.5   |
|  | NCS2K-20-SMR-FS            |         |
|  | NCS2K-12-AD-CCOFS          |         |
|  | NCS2K-16-AD-CCOFS          |         |
|  | NCS2K-16-WXC-FS            |         |
|  | 15454-80-WXC-C             | R10.5.2 |
|  | 15216-MD-40-ODD/EVEN/ID-50 |         |
|  | 15216-EF-40-ODD/EVEN       |         |
| <b>Optical Amplifier Line Cards</b>      |                            |         |

| Interface Type                               | Card                 | Release |
|--|----------------------|---------|
|  | NCS2K-EDRA1-26/35C   | R10.5   |
|  | NCS2K-EDRA2-26/35C   |         |
|  | 15454-OPT-EDFA-17/24 |         |
|  | 15454-M-RAMAN-CTP    |         |
|  | 15454-M-RAMAN-COP=   |         |
|  | 15454-OPT-PRE        | R10.5.2 |
|  | 15454-OPT-BST        |         |
|  | 15454-OPT-BST-E      |         |
|  | 15454-OPT-AMP-C      |         |
|  | 15454-OPT-AMP-17C    |         |
| <b>Transponder/Muxponder Ancillary Cards</b> |                      |         |



| Interface Type | Card              | Release |
|----------------|-------------------|---------|
|                | NCS2K-200G-CK-C   | R10.5   |
|                | NCS2K-100GS-CK-C  |         |
|                | NCS2K-MR-MXP-LIC  |         |
|                | NCS2K-100G-CK-C   |         |
|                | NCS2K-100ME-CKC   |         |
|                | 15454-M-100G-LC   |         |
|                | 15454-M-100-ME-LC |         |
|                | 15454-M-10X10G-LC |         |
|                | 15454-M-WSE-K9=   |         |
|                | 15454-AR-MXP      |         |
|                | 15454-AR-XPE      |         |
|                | 15454-CFP-LC      | R10.5.2 |
|                | 15454-AR-XP=      |         |
|                | 15454-OTU2-XP=    |         |
|                | 15454-40E-MXP-C=  |         |
|                | 15454-40E-TXP-C=  |         |
|                | 15454-10E-L1-C    |         |
|                | 15454-PSM         |         |
|                | 15454-OSC-CSM     | R10.6.1 |
|                | 400G-XP-LC        |         |





## Troubleshooting

This appendix lists some troubleshooting procedures for Cisco Transport Planner. They are classified as:

- [Traffic Mapping Troubleshooting](#), on page 401
- [Amplifier Troubleshooting](#), on page 406

**Note**

In the System Messages, Cisco Transport Planner will replace {n} with a Site name, an Unit name, an Optical design rule, or a Number as applicable.

- [Traffic Mapping Troubleshooting](#), page 401
- [Amplifier Troubleshooting](#), page 406

## Traffic Mapping Troubleshooting

The following procedures help you resolve traffic mapping problems with the network design.

### Wavelength Exceeded

**Symptom:** Cisco Transport Planner warns you that all network analysis solutions exceed the wavelengths. The following table describes the potential causes of the symptom and the solution.

**Table 68: Wavelength Exceeded**

| Possible Problem | Solution |
|------------------|----------|
|------------------|----------|

|   |   |
|---|---|
| <p>A span in the ring must carry more than 32 wavelengths to implement the traffic demands.</p> | <p>Remove the forced path routing on unprotected channels:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Service Demands folder, right-click the appropriate demand and choose <b>Edit</b> from the shortcut menu.</li> <li>2 In the Path column, choose <b>Auto</b> from the drop-down list.</li> <li>3 Re-analyze the network.</li> </ol>   |
| <p>A span in the ring must carry more than 16/8 wavelengths.</p>                                | <p>Change the traffic mapping design rules under the related subnet and choose an option that allows a greater number of channels:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Subnets folder, expand Traffic Mapping and click <b>System Release</b>.</li> <li>2 In the Properties pane, choose the new rules option from the C-Band Rules or L-Band Rules drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## Invalid Routing

**Symptom:** Cisco Transport Planner warns you of invalid routing (out of network boundary).

The following table describes the potential causes of the symptom and the solution.

**Table 69: Invalid Routing**

| Possible Problem   | Solution  |
|--|---|
| <p>In a linear network, the direction of each service demand is restricted by the topology but the user applied an unfeasible direction forcing.</p> | <p>Remove the forced path routing:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Service Demands folder, right-click the appropriate demand and choose <b>Edit</b> from the shortcut menu.</li> <li>2 In the Path column of the Edit &lt;demand&gt; dialog box, choose <b>Auto</b> from the drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## Cannot Find Alternate Route

**Symptom:** Cisco Transport Planner warns you that it cannot find an alternate route due to multiple hub nodes along the path.

The following table describes the potential causes of the symptom and the solution.

**Table 70: Cannot Find Alternate Route**

| Possible Problem  | Solution  |
|---|---|
| Because a hub node does not allow express channels, if multiple hub nodes are present, not all point-to-point connections are possible. | Remove the hub functionality constraints: <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band</b> or <b>L-Band</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Functionality drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## Cannot Route Service

**Symptom:** Cisco Transport Planner warns you that it cannot route service through a hub node.

The following table describes the potential causes of the symptom and the solution.

**Table 71: Cannot Route Service**

| Possible Problem   | Solution  |
|--|---|
| Since a hub node does not allow express channels, not all service routes are possible. | Remove the path routing forcing or the hub functionality constraints. <p>To remove the path routing forcing:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Service Demands folder, right-click the appropriate demand and choose <b>Edit</b> from the shortcut menu.</li> <li>2 In the Path column of the Edit &lt;demand&gt; dialog box, choose <b>Auto</b> from the drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> <p>To remove the hub functionality constraints:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band</b> or <b>L-Band</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Functionality drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## Overlapped Services Assigned to the Same Wavelength

**Symptom:** Cisco Transport Planner warns you that overlapped services are assigned to the same wavelength.

The following table describes the potential causes of the symptom and the solution.

**Table 72: Overlapped Services Assigned to the Same Wavelength**

| Possible Problem   | Solution  |
|--|---|
| Some unprotected channels with assigned wavelengths and directions overlap along the ring. | <p>Remove path routing forcing and/or wavelengths on the specific channels.</p> <p>To remove the path routing forcing:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Service Demands folder, right-click the appropriate demand and choose <b>Edit</b> from the shortcut menu.</li> <li>2 In the Path column of the Edit &lt;demand&gt; dialog box, choose <b>Auto</b> from the drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> <p>To remove the wavelength forcing:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Service Demands folder, right-click the appropriate demand and choose <b>Edit</b> from the shortcut menu.</li> <li>2 In the Wavelength column of the Edit &lt;demand&gt; dialog box, choose <b>Auto</b> from the drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## Protected Services Assigned to the Same Wavelength

**Symptom:** Cisco Transport Planner warns you that protected services are assigned to the same wavelength.

The following table describes the potential causes of the symptom and the solution.

**Table 73: Protected Services Assigned to the Same Wavelength**

| Possible Problem  | Solution  |
|---|---|
| In ring networks, each protected/P-ring request allocates one wavelength. If more than one protected service is forced on the same wavelength and aggregation is not possible, the network is not feasible. | <p>Remove forced wavelengths on the specific channels:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Service Demands folder, right-click the appropriate demand and choose <b>Edit</b> from the shortcut menu.</li> <li>2 In the Wavelength column of the Edit &lt;demand&gt; dialog box, choose <b>Auto</b> from the drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## Cannot Route Service Because of Add/Drop Constraints

**Symptom:** Cisco Transport Planner warns you that it cannot route service because of add/drop equipment constraints.

The following table describes the potential causes of the symptom and the solution.

**Table 74: Cannot Route Service Because of Add/Drop Constraints**

| Possible Problem   | Solution   |
|--|--|
| Add/drop equipment forcing might prevent express channels in a node, which makes unfeasible some channel routes. | Remove add/drop equipment constraints. <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band</b> or <b>L-Band</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Functionality drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## Design Requires a ROADM or Full Mux/Demux Site

**Symptom:** Cisco Transport Planner warns you that the design requires a ROADM or full multiplexer/demultiplexer site, but no valid site was found.

The following table describes the potential causes of the symptom and the solution.

**Table 75: Cannot Route Service Because of Add/Drop Constraints**

| Possible Problem | Solution |
|------------------|----------|
|------------------|----------|

|  |   |
|--|---|
| <p>The traffic mapping algorithm might not be able to find a valid solution that respects both the user forcing and the system specifications (in terms of maximum site losses and layout constraints). In such cases, the only possible countermeasure for the algorithm is to upgrade one node to a full capacity node (ROADM or full Mux/Demux). If no valid node is found due to user forcing or equipment locking, the process stops and the network is unfeasible.</p> | <p>Remove any forcing/locking that prevents at least one node from being upgraded to ROADM or full multiplexer/demultiplexer. Conditions that prevent upgrading a node to ROADM or full multiplexer/demultiplexer are:</p> <ul style="list-style-type: none"> <li>• Site functionality is forced to Add/Drop and site type is forced to OADM</li> <li>• During an upgrade procedure, OADM equipment is locked at the site</li> </ul> <p>To change site functionality and type forcing:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band</b> or <b>L-Band</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Functionality drop-down list.</li> <li>3 Choose <b>Auto</b> from the Type drop-down list.</li> <li>4 Re-analyze the network.</li> </ol> <p>To unlock OADM equipment:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>Add/Drop</b> under the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the OADM Forcing drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |
|--|---|

## Amplifier Troubleshooting

The following procedures help you resolve amplifier related problems with the network design.

### Incompatible DCUs (C-Band)

**Symptom:** Cisco Transport Planner warns you that DCUs are incompatible.

The following table describes the potential causes of the symptom and the solution.

**Table 76: Incompatible DCUs (C-Band)**

| Possible Problem | Solution |
|------------------|----------|
|------------------|----------|



|   |   |
|---|---|
| <p>If the DCUs in the same site are both SMF slope compensating, the cumulative negative dispersion should not be over 1600 ps/nm.</p>                            | <p>Remove or change one of the forced DCUs:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane, click <b>C-Band Amplifiers</b>.</li> <li>2 In the Properties pane, choose the desired DCU from the DCU1 and/or DCU2 drop-down lists.</li> <li>3 Re-analyze the network.</li> </ol> |
| <p>If the DCUs in the same site belong to different types, only the following DCU combinations are allowed: DCU-E-200 and DCU-100, or DCU-E-350, and DCU-100.</p> |   |
| <p>Two E-LEAF slope compensating DCUs are not allowed at the same site.</p>   |   |

## MMU Does Not Have Correct Amplifier (L-Band)

Cisco Transport Planner warns you that an L-band node with an MMU requires that the OPT-AMP-L card is forced as the preamplifier (PRE) and booster amplifier (BST).

The following table describes the potential causes of the symptom and the solution.

**Table 77: MMU Does Not Have the Correct Amplifier (L-Band)**

| Possible Problem  | Solution  |
|---|---|
| <p>In L-band, a node with an MMU installed has amplifier forcing other than two OPT-AMP-L amplifier units, one as PRE and one as BST.</p> | <p>Remove any amplifier forcing in the node:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the PRE and BST drop-down lists.</li> <li>3 Re-analyze the network.</li> </ol> |

## MMU Does Not Have Correct Amplifier (C-Band)

**Symptom:** Cisco Transport Planner warns you that a C-band node with an MMU requires both a preamplifier (OPT-PRE) and a booster (OPT-BST).

The following table describes the potential causes of the symptom and the solution.

**Table 78: MMU Does Not Have the Correct Amplifier (C-Band)**

| Possible Problem | Solution |
|------------------|----------|
|------------------|----------|

|   |   |
|---|---|
| <p>In C-band, a node with an MMU installed requires both OPT-PRE and OPT-BST.</p> | <p>Remove any amplifier forcing in the node:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the PRE and BST drop-down lists.</li> <li>3 Re-analyze the network.</li> </ol> |
|---|---|

## Output Power or Tilt are Out of Range

**Symptom:** Cisco Transport Planner warns you that the output power or tilt are out of range for the amplifier selected.

The following table describes the potential causes of the symptom and the solution.

**Table 79: Output Power or Tilt are Out of Range**

| Possible Problem   | Solution  |
|--|---|
| <p>The output power or tilt forced by the user is not within the allowed range based on the algorithm selected and the type of amplifier selected.</p> | <p>Remove or change the forced value:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> or <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Tilt drop-down list in the From Fiber and To Fiber areas. If you force a value, the tilt value limits are -3.0 to +3.0.</li> <li>3 Re-analyze the network.</li> </ol> |

## Invalid Fiber Values, Types, and Loss Values

**Symptom:** Cisco Transport Planner warns you of one of the following:

- Fiber pairs are of invalid types or values
- Fibers have a start of life (SOL) total loss greater than an end of life (EOL) total loss

The following table describes the potential causes of the symptom and the solution.

**Table 80: Invalid Fiber Values, Types, and Loss Values**

| Possible Problem | Solution |
|------------------|----------|
|------------------|----------|

|  |  |
|--|--|
| <p>An attenuator is forced in a site where there is no place to connect.</p> | <p>Remove the attenuator forcing or verify that the attenuator is inserted on the correct side and wavelength:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> or <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, complete one of the following:</li> <li>3 Choose <b>Auto</b> from the Attenuator drop-down list in the From Fiber area to remove the forcing.</li> <li>4 Verify that the attenuator is inserted on the correct side and wavelength. If not, revise accordingly.</li> <li>5 Re-analyze the network.</li> </ol> |
|--|--|

## Attenuator Forcing Not Allowed

**Symptom:** Cisco Transport Planner warns you that attenuator forcing on channels is not allowed; no add/drop ports are available.

The following table describes the potential causes of the symptom and the solution.

**Table 81: Attenuator Forcing Not Allowed**

| Possible Problem  | Solution  |
|---|---|
| <p>Cisco Transport Planner has an attenuator forced in a site where there is no place to connect.</p> | <p>Remove the attenuator forcing or verify that the attenuator is inserted on the correct side and wavelength:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> or <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, complete one of the following:</li> <li>3 Choose <b>Auto</b> from the Attenuator drop-down list for the appropriate amplifier.</li> <li>4 Verify that the attenuator is inserted on the correct side and wavelength. If not, revise accordingly.</li> <li>5 Re-analyze the network.</li> </ol> |

## Unavailable Add/Drop Channels

**Symptom:** Cisco Transport Planner warns you that an attenuator was present, but add/drop channels are no longer available.

The following table describes the potential causes of the symptom and the solution.

**Table 82: Unavailable Add/Drop Channels**

| Possible Problem   | Solution  |
|--|---|
| After a network upgrade, a client was removed but the add/drop attenuator is still forced. | Unlock the add/drop attenuator: <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>Client</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the drop-down list for the appropriate Rx and Tx attenuator.</li> <li>3 Re-analyze the network.</li> </ol> |

## Tilt Forced When No Tilt Design Is Selected

**Symptom:** Cisco Transport Planner warns you that tilt is forced for an amplifier although No Tilt Design was selected for the network.

The following table describes the potential causes of the symptom and the solution.

**Table 83: Tilt Forced When No Tilt Design is Selected**

| Possible Problem   | Solution   |
|--|--|
| The user forced one or more amplifier tilt setting, but the No Tilt Design option is also selected.<br><br><b>Note</b> To view that No Tilt Design is selected in the Project Explorer, click the appropriate system release under DWDM Design Rules settings in the Subnets folder. | Remove forced tilt for the amplifier: <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> or <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Tilt drop-down list for the appropriate amplifier.</li> <li>3 Re-analyze the network.</li> </ol> |

## Cannot Replace 32-DMX with 32DMX-0

**Symptom:** Cisco Transport Planner warns you that 32-DMX cannot be replaced with 32DMX-0 as needed because of user forcing.

The following table describes the potential causes of the symptom and the solution.

**Table 84: Cannot Replace 32-DMX with 32DMX-0**

| Possible Problem | Solution |
|------------------|----------|
|------------------|----------|

|   |   |
|---|---|
| <p>Cisco Transport Planner attempts to use the 32DMX-O card but the 32-DMX card is forced by the user. This could cause an overload of alarms or, if no channel is alarmed, problems during network installation.</p> | <p>If channels dropped at the site are alarmed, allow the use of add/drop attenuators:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Subnets folder, expand DWDM Design Rules and click <b>System Release</b>.</li> <li>2 In the Properties pane, uncheck <b>No TXT/Line-Card RX Bulk Attenuator Design</b>.</li> <li>3 Re-analyze the network.</li> </ol> <p>If no channel is alarmed, remove the 32-DMX forcing:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>Add/Drop</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Demux drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |
|---|---|

## Preamplifier Working in Invalid Mode

**Symptom:** Cisco Transport Planner warns you that a preamplifier is working in an invalid mode.

The following table describes the potential causes of the symptom and the solution.

**Table 85: Preamplifier Working in Invalid Mode**

| Possible Problem | Solution |
|------------------|----------|
|------------------|----------|

|  |   |
|--|---|
| <p>A preamplifier is working in power control mode. Based on the traffic matrix, channel survivability might not be guaranteed if the fiber is cut or the equipment fails.</p> | <p>If the booster amplifier preceding the preamplifier is forced as None by the user, remove the None forcing on the booster amplifier:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> or <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Tilt drop-down list for the From Fiber (BST) amplifier.</li> <li>3 Re-analyze the network.</li> </ol> <p>If the span preceding the preamplifier is within the 27 to 30 dB range, use a higher powered C- or L-band rules algorithm (such as, 32 Chs + 5 dBm/ch):</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Subnets folder, expand Traffic Mapping and click <b>System Release</b>.</li> <li>2 In the Properties pane, choose the new rules option from the C-Band Rules or L-Band Rules drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> <p>If span is greater than 30 dB, the error is unavoidable.</p> |
|--|---|

## Gain Too Low for an Amplifier

**Symptom:** Cisco Transport Planner warns you that an amplifier is working with a gain that is too low.

The following table describes the potential causes of the symptom and the solution.

**Table 86: Gain Too Low for an Amplifier**

| Possible Problem  | Solution   |
|---|--|
| <p>An amplifier is working with a gain lower than its minimum capabilities. This could be caused by a span that is too short or by compensation problems (L-band only) coupled with the “Use in-line attenuator” option not selected.</p> | <p>If attenuators are forced or inline attenuators were disabled, remove the forcing on the attenuators:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>Add/Drop</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Attenuator drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## Gain Too High for an Amplifier

**Symptom:** Cisco Transport Planner warns you that an amplifier is working with a gain that is too high.

The following table describes the potential causes of the symptom and the solution.

**Table 87: Gain Too High for an Amplifier**

| Possible Problem  | Solution   |
|---|--|
| An amplifier is working with a gain that is greater than its physical capabilities. | Remove the forcing on the attenuators: <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>Add/Drop</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the Attenuator drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> |

## User Forcing Overridden

**Symptom:** Cisco Transport Planner warns you that user forcing will not be allowed.



**Note**

This is a warning and does not prevent the network from being fully functional. The message is displayed in situations where a forcing configured by the user cannot be respected due to physical constraints since the problem may appear only after several calculation steps. The algorithm notifies the user and ignores the setting to avoid interrupting the analysis.

The following table describes the potential causes of the symptom and the solution.

**Table 88: User Forcing Overridden**

| Possible Problem   | Solution   |
|--|--|
| If the warning appears during a network upgrade, this means the installation parameters must be updated because the upgrade is traffic affecting. This warning could also appear after importing a Cisco MetroPlanner 2.5.x network with all output as forcings. | For a network upgrade, unlock the site with the warning.<br>For a 2.5.x import, if you cannot update the installation parameters, open the design in Cisco MetroPlanner 2.5.x. |



**Note**

In the upgrade mode, Cisco Transport Planner remembers all the parameters from last analysis and not from its parent network. A warning with respect to the installation parameters is displayed only when there is a difference between the new values and the values from previous analysis. For example: Create a network design and analyse it. Upgrade the network design and modify some spans. Analyse the upgraded network. A warning message is displayed since some of the installation parameters have changed. Re-analyse the network with making modifications. The warning is no longer displayed since none of the installation parameters have changed. You can create a diff report to identify all the modified installation parameters, see [Viewing Report Differences, on page 168](#).

## Unsupported Configuration

**Symptom:** Cisco Transport Planner warns you that the configuration is unsupported because of an excessive number of amplifiers or OSC regeneration sites.

The following table describes the potential causes of the symptom and the solution.

**Table 89: Unsupported Configuration**

| Possible Problem                               | Solution                          |
|--|-----------------------------------|
| The system is working over its specifications. | Revise the design and re-analyze. |

## Channel Power Near the Fail Threshold

**Symptom:** Cisco Transport Planner warns you that the channel power is near the fail threshold.

The following table describes the potential causes of the symptom and the solution.

**Table 90: Channel Power Near the Fail Threshold**

| Possible Problem  | Solution   |
|---|--|
| Some thresholds are set to the minimum value allowed; this could lead to some false alarms during network life. | Remove the forcing: <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> or <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the PRE and BST drop-down lists.</li> <li>3 Re-analyze the network.</li> </ol> |

## Channel Power Below the Fail Threshold

**Symptom:** Cisco Transport Planner warns you that the channel power is below the fail threshold.

The following table describes the potential causes of the symptom and the solution.

**Table 91: Channel Power Below the Fail Threshold**

| Possible Problem | Solution |
|------------------|----------|
|------------------|----------|



|   |   |
|---|---|
| <p>The channel power received by the site is too low, and the fail threshold cannot be set.</p> | <p>Remove the forcing:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> or <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the PRE and BST drop-down lists.</li> <li>3 Re-analyze the network.</li> </ol> |
|---|---|

## OSC Channel Power Below the Fail Threshold

**Symptom:** Cisco Transport Planner warns you that the OSC channel power is below the fail threshold and that the network is not feasible.

The following table describes the potential causes of the symptom and the solution.

**Table 92: OSC Channel Power Below the Fail Threshold**

| Possible Problem                       | Solution  |
|--|---|
| <p>The OSC channel is not working.</p> | <p>Remove the forcing:</p> <ol style="list-style-type: none"> <li>1 In the Project Explorer pane under the Sites folder, click <b>C-Band Amplifiers</b> or <b>L-Band Amplifiers</b> for the appropriate site.</li> <li>2 In the Properties pane, choose <b>Auto</b> from the OSC drop-down list.</li> <li>3 Re-analyze the network.</li> </ol> <p>If the span where the OSC fails is longer than 37 dB, the error is unavoidable.</p> |





## Third-Party DWDM Wavelength Interface Model

Cisco Transport Planner allows you to define a third-party dense wavelength division multiplexing interface to be used in project creation. After you define third-party DWDM interfaces, you can choose them when creating traffic demands. This appendix provides background information for calculating third-party client wavelength interfaces.

- [Interface Operative Area, page 417](#)
- [Scale Factors, page 420](#)
- [Single-Interfering Cross-Talk Penalty Measurement, page 421](#)
- [Gaussian Cross-Talk Penalty Measurement, page 422](#)

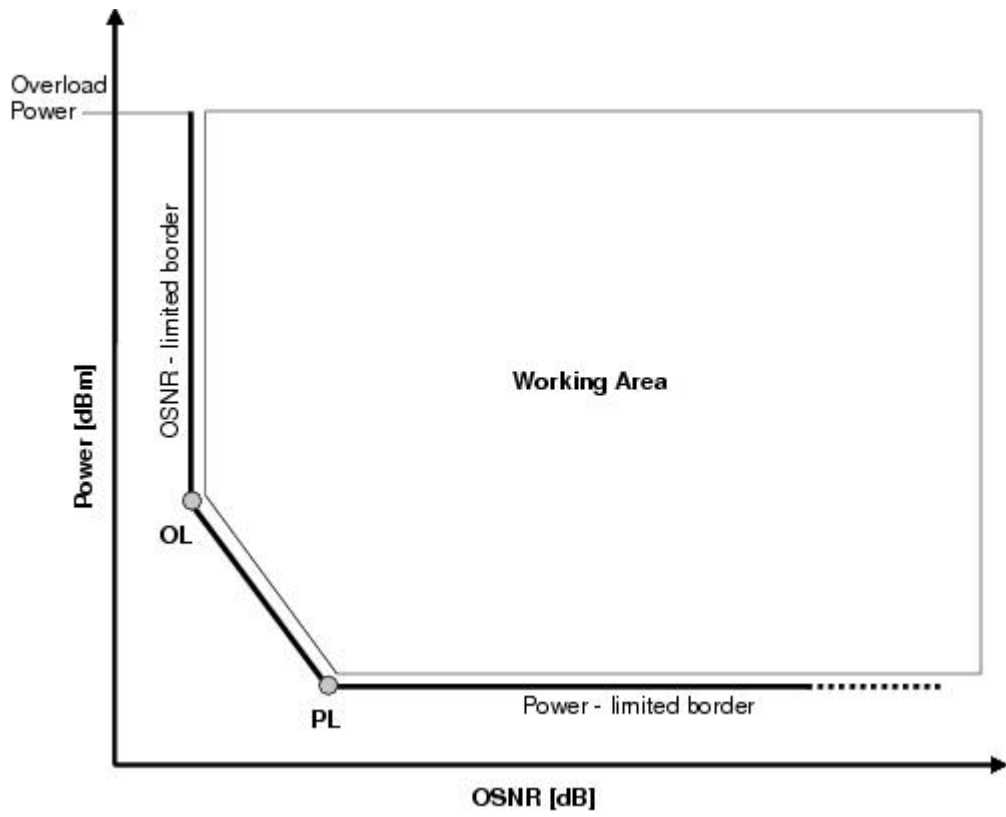
### Interface Operative Area

In the Cisco Transport Planner interface model, the operative area of an interface is defined on a two-dimensional Cartesian plane where the x-axis is the optical signal-to-noise ratio (OSNR) value (dB) and y-axis is the receiver (Rx) power value (dBm). Three lines border the operative area. These lines are an approximation of the ISO-Bit Error Rate (BER) curve corresponding to the maximum BER tolerable by the interface:

- On the original ISO-BER curve there are two points, OL and PL, that define the two main borders: OSNR limited (OL) and power limited (PL).
- The upper boundary of the OSNR-limited border is the interface power overload; this is also the upper limit to the working area. Physical constraints limit this value to 35 to 40 dB.

The following figure shows the working area in an interface.

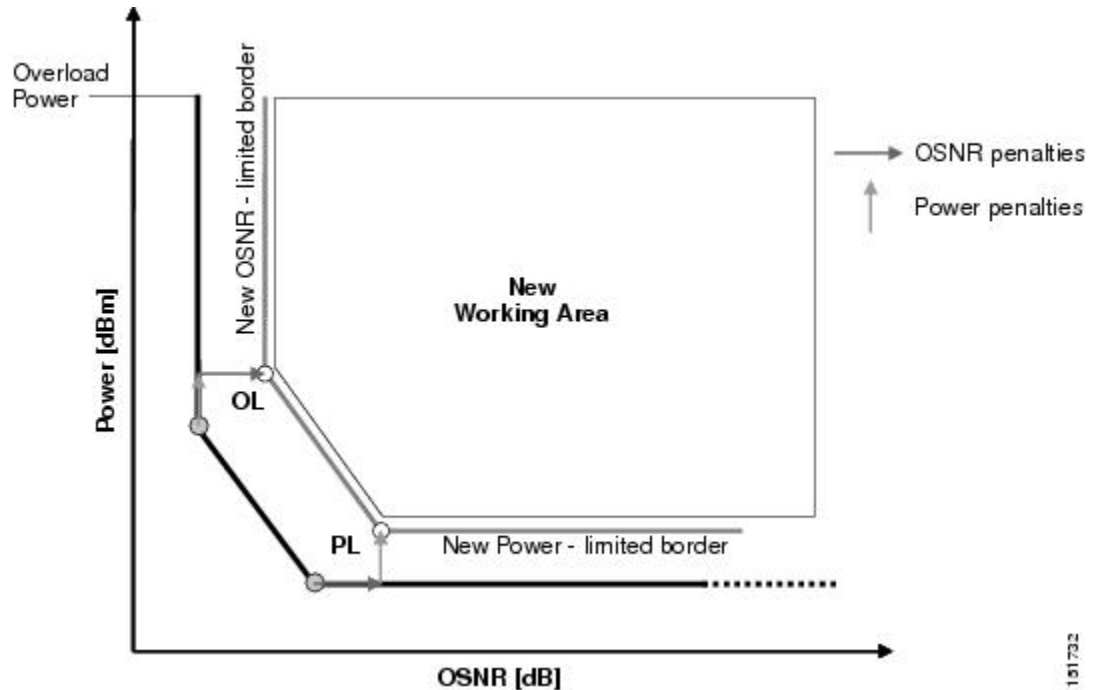
**Figure 60: Interface Operative Area**



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Signal impairments reduce the operative area of the interface. Because of signal distortion, higher OSNR and/or power on the Rx are required to get the same BER. When the power and OSNR margins are increased, OL and PL identify a new working area as shown in the following figure.

**Figure 61: Interface Margin Application**



To define a third-party client interface, you enter parameters in Cisco Transport Planner that build the working area and model its robustness to signal impairments such as dispersion, single interfering, Gaussian cross talk (Xt), etc. The input parameters follow:

- Transmitter characteristics:
  - Modulation format— Non Return to Zero (NRZ) or Duo Binary
  - Transmitter type—Mach Zehnder (MZ), Direct Modulated Laser (DML), or Electro-absorption Modulated Laser (EML)
  - Receiver threshold—Optimal (minimum BER) or Average (average received power)
  - Regeneration type—3R or 2R regeneration mode
  - Forward Error Correction (FEC) mode—FEC, Enhanced FEC (E-FEC), or none
  - Transmitter stability—The maximum wavelength error allowed (pm)
- Bit rate
- Power range—Transmit (Tx) maximum and minimum power output levels (dBm)
- Back-to-back receiver sensitivity—A configuration in which the receiver is placed in front of the transmitter with no other equipment between the two. Back to back is used to measure Tx and Rx pairs.
  - Overload power (dBm)

- OL\_power (dBm)—The minimum power level in the OSNR-limited range
  - OL\_OSNR (dB)—The minimum OSNR level in the OSNR-limited range (measured on 0.5 nm bandwidth)
  - PL\_power (dBm)—The minimum power level in the power-limited range
  - PL\_OSNR (dB)—The minimum power level in the OSNL-limited range (measured in .5 nm increments)
- Chromatic dispersion (CD)—The broadening of a light pulse after traveling a distance in the fiber. You can set the CD robustness [ps/nm], which is the maximum positive dispersion tolerable by the interface.
  - Scale value—Calculates how efficient a card is in recovering the signal distortion. For more information, see the [Scale Factors](#), on page 420.
  - Single-interfering cross-talk penalties—Calculates interference caused by a single signal. For more information, see the [Single-Interfering Cross-Talk Penalty Measurement](#), on page 421.
  - Gaussian cross-talk penalties—Calculates random power that interferes with a signal. For more information, see the [Gaussian Cross-Talk Penalty Measurement](#), on page 422.

Transmitter characteristics, bit rate, and back-to-back sensitivity parameters are required to create a third-party interface; the other parameters are optional. Cisco Transport Planner checks your input to determine if the third-party interface could be modeled on a card type already present in the software. If the interface is not supported, Transport Planner displays an error message. For the procedure to define third-party interfaces, see [Defining Third-Party DWDM Interfaces](#), on page 37.

## Scale Factors

The slope of the Q-factor (BER error function) curve versus OSNR or Rx power determines how a BER increase could be recovered with an increase of OSNR, power, or both depending in which OSNR/power working point the card is. In general, the scale factors are two values (one in OSNR and one in power) for each working point (OL and PL) of the interface model. If one is zero, it means that for that working point the BER is not sensitive to an increase. At least one factor must be different from zero.

The scale factors reflect the optical signal after it has passed through the maximum dispersion it can tolerate, because when the signal is more distorted the slope is higher and the factors are applied on impairments other than dispersion. As a result, the slope should be calculated at the OSNR and power of the OL and PL points with the dispersion margins added. Q-factor variation is 2 dB.

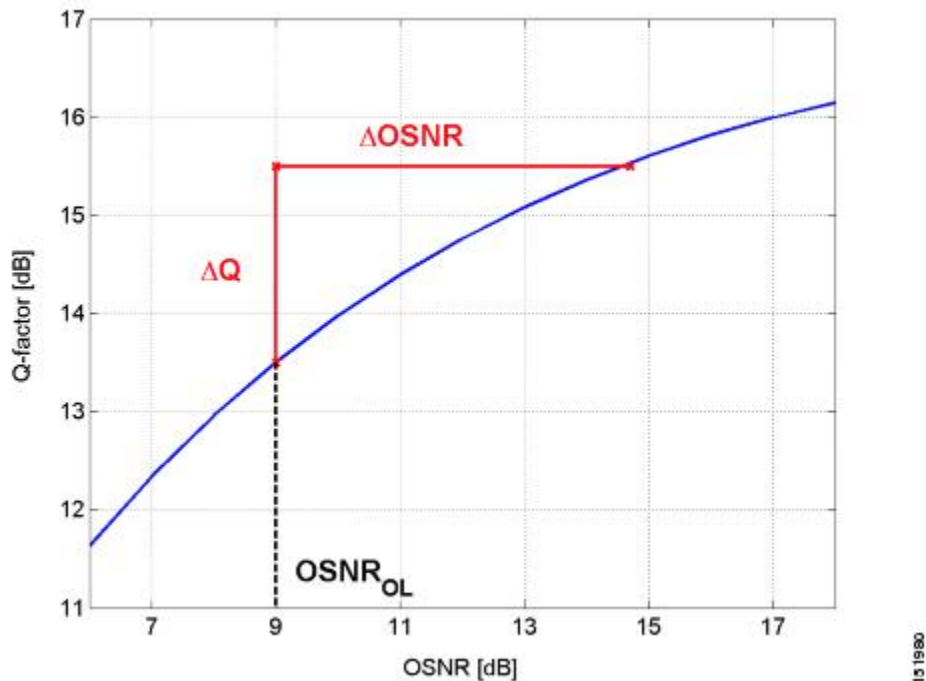
F-P(PL), F-P(OL), F-OSNR(PL), and F-OSNR(OL) values entered in Cisco Transport Planner translate a Q-penalty (that is, a BER increase) into power and OSNR penalties. F-P(PL) and F-OSNR(PL) are evaluated in the PL working region, while F-P(OL) and F-OSNR(OL) are evaluated in the OL working region of the curve with the dispersion margins added.

The formulas follow:

- $P\text{-penalty}(PL) = Q\text{-penalty} * F\text{-P}(PL)$
- $P\text{-penalty}(OL) = Q\text{-penalty} * F\text{-P}(OL)$
- $OSNR\text{-penalty}(PL) = Q\text{-penalty} * F\text{-OSNR}(PL)$
- $OSNR\text{-penalty}(OL) = Q\text{-penalty} * F\text{-OSNR}(OL)$

The following figure illustrates the increase in OSNR corresponding to a variation of the Q-factor equal to 2 dB.

**Figure 62: Q-Factor Curve**



## Single-Interfering Cross-Talk Penalty Measurement

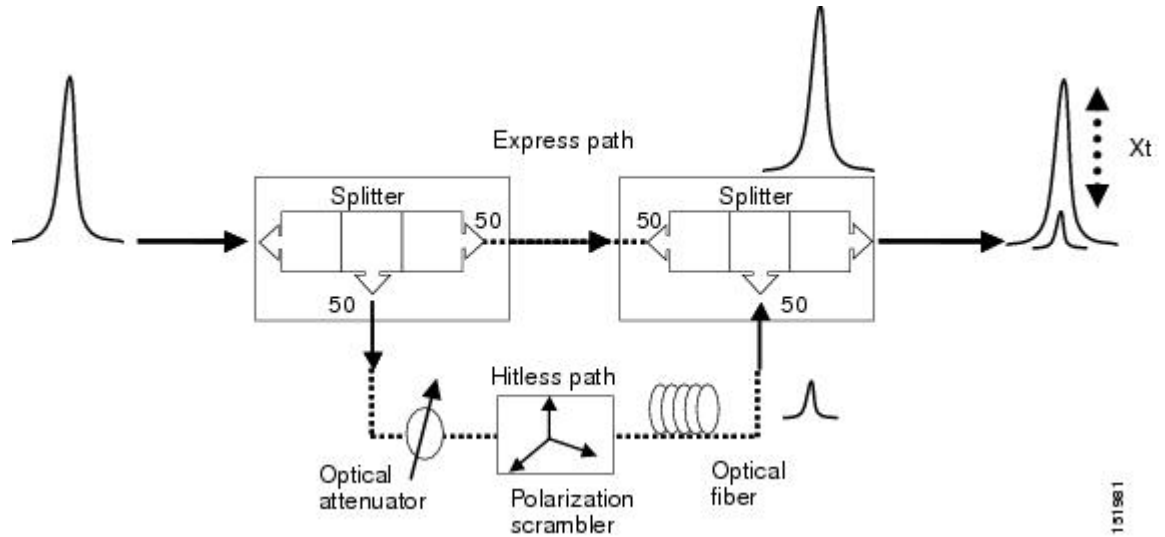
The single interfering cross-talk (Xt) measurement is shown in below figure. The signal is split into two parts and recombined after one part has passed through attenuation, polarization scrambling, and linear transmission. The cross-talk calculation is the ratio between the two recombined signals. The attenuation allows different levels of cross-talk. The polarization scrambling measures the worst case of reciprocal polarization between the signal and its attenuated replica and the fiber to avoid phase coherence between signal and replica.

Because the penalty depends on the OSNR and power level, the measurement is calculated in the two working points OL and PL with the dispersion margin added. Consequently, a fiber with the maximum dispersion the interface can tolerate is placed between the transmitter and the splitter, as shown in below figure. Transmission into the fiber should be linear (with channel power less than  $-10$  dBm).

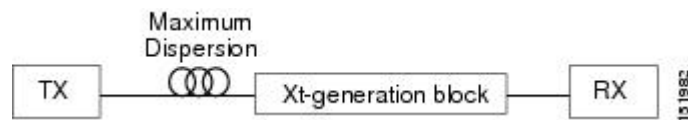
To calculate single-interfering cross-talk, you can input the coefficients for the exponential curves that estimate P-penalty(PL), P-penalty(OL), OSNR-penalty(PL), and OSNR-penalty(OL) for in the OL and PL regions of

the interface model with dispersion margins added. The formula is  $\text{Penalty}(\text{IXt}) = A_{\text{SIXt}} * \exp(B_{\text{SIXt}} * \text{IXt})$ .

**Figure 63: Generation Block for Single-Interfering Cross-Talk Measurement**



**Figure 64: Block Diagram for Crosstalk Measure**



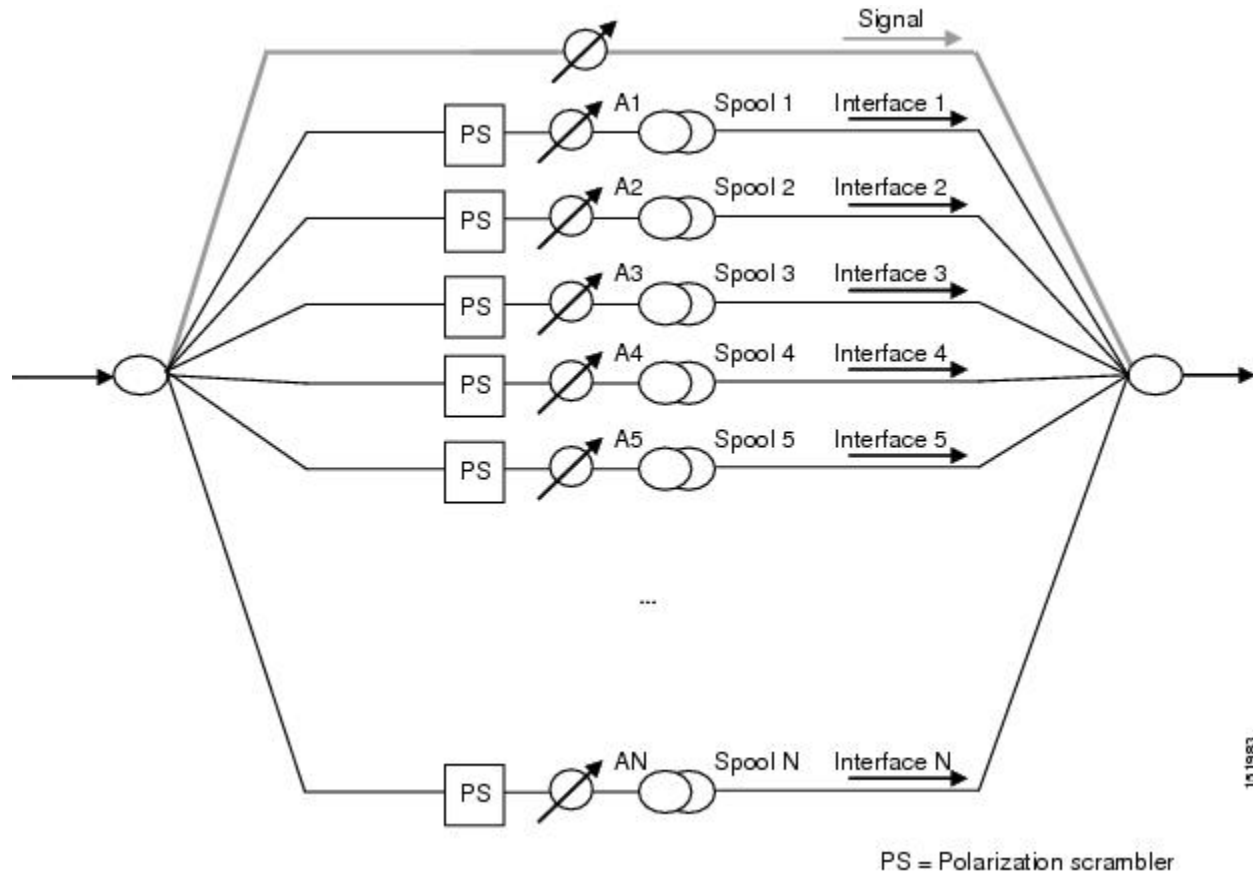
## Gaussian Cross-Talk Penalty Measurement

Cross-talk with Gaussian statistics can be simulated by recombining a high number of interfering signals. The interfering branch shown in the above figure set up has to be replicated in order to obtain more interfering signals, as shown in the below figure. The signal is split into N parts and each part but one passes through an attenuator (from A1 to AN in below figure), a polarization scrambler, and a spool of fiber. Ten interfering signals are enough to guarantee a good approximation of the Gaussian statistics. In case of the single interfering cross-talk, the penalty depends on the working point, OSNR/power, in which the card is working. The measurement should be done in the OL and PL with dispersion margin added with the maximum dispersion tolerable by the card, as shown in the above figure.



To calculate Gaussian cross-talk levels, you can enter the coefficients for the exponential curves that estimate P-penalty(PL), P-penalty(OL), OSNR-penalty(PL), and OSNR-penalty(OL) in the OL and PL regions of the interface model with dispersion margins added. The formula is  $Penalty(GXt) = A\_GXt * \exp(B\_GXt * GXt)$ .

**Figure 65: Generation Block for Gaussian Cross-Talk Measurement**



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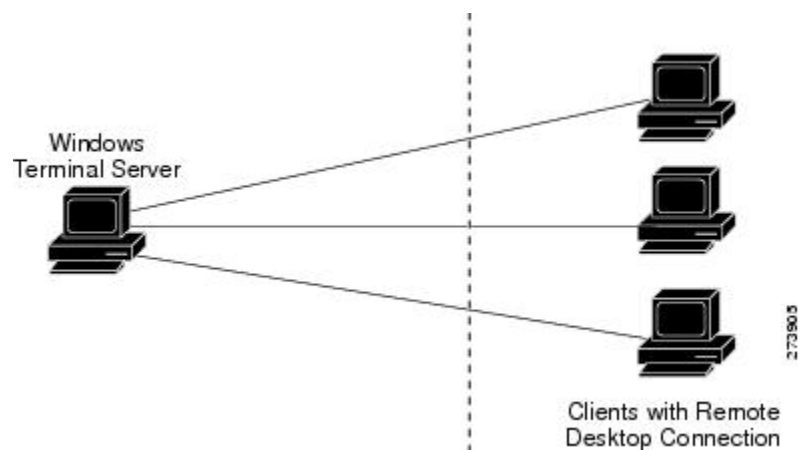
## Configuring CTP to Run on a Server

Analysis of complex networks are CPU intensive and often time consuming. Cisco Transport Planner can be deployed on a server so that network analysis is carried out on the server. CTP launch and operation are supported by the following remote application software:

- Windows Server with Terminal Services
- VNC

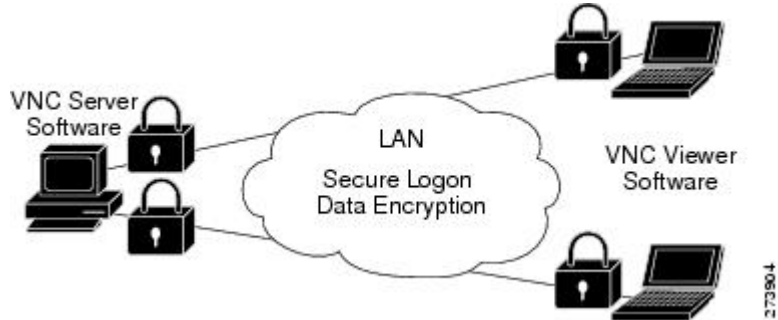
Terminal Services, available in Windows Server, makes it possible to run CTP on the terminal server but have it controlled from the user desktop, thus behaving like a local application, as shown in the following figure.

**Figure 66: Figure E-1 Remote Desktop Connection Using Terminal Services**



To use VNC, an instance of the VNC server must be installed on the server and the VNC viewer must be installed on the user desktop. To download VNC, go to <http://www.realvnc.com/>. See the following figure.

**Figure 67: Figure E-2 VNC Environment**



The server must be configured by the administrator so that all users have their own home directory on the server. The connection to the server is secure and can be established using a username and password. An instance of Cisco Transport Planner is installed in each user home directory. Users can deploy their Cisco Transport Planner profiles in their own server home directory. The profile settings are saved in the server home directory for every user.

The user can work on the server and save the design files in a directory in the home directory or in a public directory. An FTP client can be used to download or upload design files to the server from the desktop.

GoodSync can be used for file synchronization. For more information about GoodSync, go to <http://www.goodsync.com>.



## Pay As You Grow Licensing

The Pay As You Grow (PAYG) licensing enables you to implement a cost effective solution when the wavelength requirements are comparatively less than the maximum capacity of the network.

For more information about the Pay As You Grow feature, see the [Understanding the Pay As You Grow Feature](#), on page 45.

- [Pay As You Grow](#), page 427
- [PAYG for Client Cards](#), page 428

### Pay As You Grow

On enabling the Pay As You Grow licensing, the CTP algorithm decides on whether to use a PAYG instead of a standard capacity card based on the lower implementation cost.

[Table 93: PAYG Licenses](#), on page 427 lists PAYG licenses.

### PAYG Licenses

Each PAYG license consists of cards or units, and a base license as listed in the following table.

**Table 93: PAYG Licenses**

| PAYG Licenses    | Description   |
|------------------|---|
| 15454-SMR1-LIC   | License restricted to the 40-SMR1-C card.                 |
| 15454-SMR2-LIC   | License restricted to the 40-SMR2-C card                  |
| 15216-MD-ODD-LIC | License restricted to the Cisco ONS 15216 MD-40-ODD unit. |
| 15454-WXC-LIC    | License restricted to the 80-WXC-C card.                  |

| PAYG Licenses       | Description   |
|---------------------|---|
| 15454-LIC-CH-10     | Capacity Expansion—License for ten additional add/drop or express channels.   |
| 15216-EF-ODD-LIC    | License for 10 channel exposed faceplate mux/demux ODD patch panel.   |
| L-NCS2K-CH-10       | NCS 2K/MSTP LIC ROADM add/drop or express 10 channel e-Delivery.  |
| <b>SMR-9</b>        |   |
| NCS-2K-9-SMR17FS-L= | Three licensable HW PIDs are provided (one for each PRE gain range).  |
| NCS-2K-9-SMR24FS-L= |   |
| NCS-2K-9-SMR34FS-L= |   |
| L-NCS2K-SMR-2P=     | Number of ports EXP-TX/RX can be expanded in steps of 2 using this license.   |
| <b>20-SMR-FS</b>    |   |
| NCS-2K-20SMRFS-L=   | License restricted to 20-SMR-FS card. Four ports are enabled (Entry configuration) and no Flex Spectrum capability. |
| L-NCS2K-SMR-4P=     | Number of ports EXP-TX/RX can be expanded in steps of 4 using this license.   |

## PAYG for Client Cards

The following table lists PAYG licenses for AR-MXP, AR-XP, 100G-LC-C, 10X10G-LC, WSE, and 400G-XP-LC cards.

**Table 94: PAYG for Client Cards**

| PAYG Licenses     | Description   |
|-------------------|---|
| 15454-AR-MXP-LIC= | ONS 15454 Any-Rate Muxponder—Software license, upgradeable.   |
| 15454-AR-XP-LIC=  | License restricted to the 40-SMR2-C card<br>ONS 15454 Any-Rate Xponder—Software license, upgradeable. |
| 15454-LIC-TXP-8G= | ONS 15454 Any-Rate Muxponder—8G FC TXP software license.  |

| PAYG Licenses        | Description  |
|----------------------|--|
| 15454-LIC-MXP-4x2.5= | ONS 15454 Any-Rate Muxponder—4xOC48 or 4xSTM16 software license.   |
| 15454-LIC-10G-DM=    | ONS 15454 Any-Rate Muxponder—Data Muxponder software license.  |
| 15454-LIC-MXP-AR=    | ONS 15454 Any-Rate Muxponder—Any Rate Muxponder software license.  |
| 15454-LIC-REG-10G=   | ONS 15454 Any-Rate Muxponder—10GE over OTN Regen software license..  |
| 15454-M-100GC-LIC=   | ONS 15454 100G-LC-C—Muxponder license.   |
| 15454-M-LIC-100G=    | ONS 15454 100G-LC-C—Transponder and Regeneration license.  |
| 15454-M-10X10-LIC=   | ONS 15454 10X10G-LC—Muxponder license.   |
| 15454-M-LIC-10G=     | ONS 15454 10X10G-LC—Muxponder license.   |
| 15454-M-WSE-L-K9=    | ONS 15454 WSE—Transponder license for one encryption stream and Regeneration license.  |
| L-NCS2K-WSE-1=       | ONS 15454 WSE—Upgrade license for additional encryption streams.   |
| L-NCS2K-100G-FFU=    | NCS 2K / MSTP License 100G LC—Full Feature Upgrade e-Delivery.   |
| L-NCS2K-100G-10G=    | NCS 2K / MSTP License 100G MXP—1x10G MR Port e-Delivery.   |
| L-NCS2K-CK-CL=       | Enables the CPAK client and allows to configure the TXP-100G operating mode  |
| L-NCS2K-SFEC-16Q     | <p>Enables 20% SD-FEC and 200G 16-QAM on the trunk port allowing the MXP_10x10G_100G, MXP_CK_100G and MXP_200G operating modes. This licence also enables CD range for the 200G application (+/-20000 ps/nm).</p> <p><b>Note</b> Two licenses, L-NCS2K-CK-CL=and L-NCS2K-SFEC-16Q, are required to configure the MXP_CK_100G operating mode.</p> |
| L-NCS2K-FS=          | Enables Flex Spectrum tunability on the trunk port. NCS Flex package is required to use this license.  |

| PAYG Licenses      | Description  |
|--------------------|--|
| L-NCS2K-SD-FEC=    | Enables wide CD range (+/- 70000 ps/nm) on standard FEC or enables 20% SD-FEC and wide CD range (+/- 92000 ps/nm) for 100G operating modes.  |
| L-NCS2K-MRE100GK9= | The High Speed Encryption license supports encryption in 100G-B2B and TXP-100G operating modes. This license is used when the 100G CPAK ports are used as clients.   |
| L-NCS2K-MRELRGK9=  | The Low Speed Encryption license supports encryption in MXP-200G, MXP-100G, 100G-B2B, and MXP_10x10G_100G operating modes. This license is used when the 10G SFP and QSFP+ ports are used as the client ports. |
| NCS2K-400G-XP-L-K9 | NCS2K-400G-XP base license with one 100G client and one 100G trunk.  |
| L-NCS2K-16QAM      | NCS2K-400G-XP license with 200G trunk.   |
| L-NCS2K-100G-LIC   | NCS2K-400G-XP license with 100G client.  |
| L-NCS2K-WDM-LIC    | NCS2K-400G-XP license with 100G trunk.   |





## APPENDIX

# G

## OSMINE Layout Rules

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In this appendix, “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.

- [OSMINE Layout Rules for Software Release 9.2.1](#) , page 431
- [OSMINE Layout Rules for Software Release 9.2.1 and 9.6.0.x](#) , page 464
- [OSMINE Layout Rules for Software Release 9.6.0.x](#) , page 470

## OSMINE Layout Rules for Software Release 9.2.1

The following table lists the OSMINE layout rules for various configurations and their card placements for Software Release 9.2.1.

Table 95: OSMINE Layout Rules for Software Release 9.2.1

| Configuration                | Card Placement  | Condition   |
|------------------------------|---|---|
| Hub node 32 channel (100GHz) | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —32 MUX-OS<br>Slot 5 and 6 —32 DMX-O<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 and 13 —32 DMX-O<br>Slot 14 and 15 —32 MUX-O<br>Slot 16 —Pre<br>Slot 17 —Booster (A)                                  | Node containing the following: <ul style="list-style-type: none"> <li>• pre and booster units.</li> <li>• 32-channel MUX-O and 32-channel DMX-O units.</li> </ul>   |
| OADM node                    | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 —AD-xC<br>Slot 4 —AD-xC<br>Slot 5 —AD-xC<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —MS-ISC<br>Slot 13 —AD-xC<br>Slot 14 —AD-xC<br>Slot 15 —AD-xC<br>Slot 16 —Pre<br>Slot 17 —Booster (A) | Nodes: <ul style="list-style-type: none"> <li>• containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |

| Configuration             | Card Placement  | Condition   |
|---------------------------|---|---|
| Line Amplifier mode       | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —BLANK<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —BLANK<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —Pre<br>Slot 17 —Booster (A)                               | Nodes: <ul style="list-style-type: none"> <li>• containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |
| Line Site with OPT-RAMP-C | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —BLANK or TXP<br>Slot 5 —BLANK or TXP<br>Slot 6 —BLANK or TXP<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —BLANK or TXP<br>Slot 13 —BLANK or TXP<br>Slot 14 —BLANK or TXP<br>Slot 15 —Booster<br>Slot 16 and 17 —OPT-RAMP-C | Nodes: <ul style="list-style-type: none"> <li>• containing pre units.</li> <li>• not containing booster units.</li> </ul>   |

| Configuration             | Card Placement   | Condition                                  |
|---------------------------|--|--|
| OSC Regenerator site      | Slot 1 —OSC-CSM<br>Slot 2 —BLANK<br>Slot 3 —BLANK Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —BLANK<br>Slot 7 —TCC2P<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2P<br>Slot 12 —BLANK<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —OSC-CSM | Nodes not containing pre and booster units |
| 32 channel ROADM/Hub node | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —32-WSS<br>Slot 5 —32-DMX<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —MS-ISC<br>Slot 13 —32-DMX<br>Slot 14 and 15 —32-WSS<br>Slot 16 —Pre<br>Slot 17 —Booster                    | Nodes containing pre and booster units.    |

| Configuration             | Card Placement  | Condition                               |
|---------------------------|---|---|
| 40 channel ROADM/Hub node | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —40-WSS<br>Slot 5 —40-DMX<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —MS-ISC<br>Slot 13 —40-DMX<br>Slot 14 and 15 —40-WSS<br>Slot 16 —Pre<br>Slot 17 —Booster | Nodes containing pre and booster units. |

| Configuration                        | Card Placement  | Condition   |
|--------------------------------------|---|---|
| 40 channel HUB/ROADM with OPT-RAMP-C | NC shelf<br>Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —Pre<br>Slot 5 —BLANK or TXP<br>Slot 6 —MS-ISC-100T<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC-100T<br>Slot 13 —40-DMX<br>Slot 14 and 15 —40-WSS<br>Slot 16 —BLANK or TXP<br>Slot 17 —BLANK or TXP              | <ul style="list-style-type: none"> <li>• OPT-RAMP-C or OPT-RAMP-CE on both sides.</li> <li>• OPT-RAMP-CE can replace OPT-RAMP-C cards.</li> </ul> |
|                                      | Subtended Opt shelf<br>Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —Pre<br>Slot 5 —BLANK or TXP<br>Slot 6 —BLANK or TXP<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —BLANK or TXP<br>Slot 13 —40-DMX<br>Slot 14 and 15 —40-WSS<br>Slot 16 —BLANK or TXP<br>Slot 17 —BLANK or TXP |   |

| Configuration                        | Card Placement  | Condition  |
|--------------------------------------|---|--|
| 40 channel HUB/ROADM with OPT-RAMP-C | NC shelf<br>Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —Pre<br>Slot 5 —BLANK or TXP<br>Slot 6 —MS-ISC-100T<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC-100T<br>Slot 13 —40-DMX<br>Slot 14 and 15 —40-WSS<br>Slot 16 —BLANK or TXP<br>Slot 17 —BLANK or TXP                              | <ul style="list-style-type: none"> <li>• OPT-RAMP-C or OPT-RAMP-CE on one side only.</li> <li>• OPT-RAMP-CE can replace OPT-RAMP-C.</li> </ul> |
|                                      | Subtended shelf<br>Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —40-WSS<br>Slot 5 —40-DMX<br>Slot 6 —BLANK or TXP<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —BLANK or TXP<br>Slot 13 —BLANK or TXP<br>Slot 14 —BLANK or TXP<br>Slot 15 —BLANK or TXP<br>Slot 16 —BLANK or TXP<br>Slot 17 —BLANK or TXP |  |

| Configuration                               | Card Placement  | Condition                               |
|---|---|---|
| 40 channel HUB with 40-MUX-C                | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 —40-DMX-C<br>Slot 4 —40-MUX-C<br>Slot 5 —BLANK or TXPs<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK or TXPs<br>Slot 14 —40-MUX-C<br>Slot 15 —40-DMX-C<br>Slot 16 —Pre<br>Slot 17 —Booster | Nodes containing pre and booster units. |
| 32 channel Terminal Site (Half of Hub node) | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —32-WSS<br>Slot 5 —32-DMX<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —BLANK                                       | Nodes containing pre and booster units. |



| Configuration                               | Card Placement   | Condition                               |
|---|--|---|
| 40 channel Terminal Site (Half of Hub node) | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —40-WSS<br>Slot 5 —40-DMX<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —BLANK                                      | Nodes containing pre and booster units. |
| 40 channel Terminal Site with OPT-RAMP-C    | NC shelf<br>Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —Pre<br>Slot 5 —BLANK or TXP<br>Slot 6 —MS-ISC-100T<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC-100T<br>Slot 13 —40-DMX<br>Slot 14 and 15 —40-WSS<br>Slot 16 —BLANK or TXP<br>Slot 17 —BLANK or TXP | Nodes containing pre and booster units. |

| Configuration                                     | Card Placement   | Condition                               |
|---|--|---|
| 40 channel Terminal Site with 40-MUX-C (Half Hub) | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 —40-DMX-C<br>Slot 4 —40-MUX-C<br>Slot 5 —BLANK or TXPs<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2P<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK or TXPs<br>Slot 14 —BLANK or TXPs<br>Slot 15 —BLANK or TXPs<br>Slot 16 —BLANK or TXPs<br>Slot 17 —BLANK or TXPs | Nodes containing pre and booster units. |
| 32 channel Gain Equalizer                         | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —32-WSS<br>Slot 5 —BLANK or TXPs<br>Slot 6 —BLANK or TXPs<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —BLANK or TXPs<br>Slot 13 —BLANK or TXPs<br>Slot 14 and 15 —32-WSS<br>Slot 16 —Pre<br>Slot 17 —Booster  | Nodes containing pre and booster units. |

| Configuration                             | Card Placement  | Condition   |
|---|---|---|
| 40 channel Gain Equalizer with OPT-RAMP-C | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 and 5 —40-WSS-C<br>Slot 6 —BLANK<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —BLANK<br>Slot 13 and 14 —40-WSS-C<br>Slot 15 —Booster<br>Slot 16 and 17 —OPT-RAMP-C                     | Nodes: <ul style="list-style-type: none"> <li>• not containing pre units.</li> <li>• containing booster units.</li> </ul> |
| 40 channel n-degree ROADM—Optical shelf   | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —40-WXC-C<br>Slot 5 —40-MUX-C<br>Slot 6 —40-DMX-C<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —40-DMX-C<br>Slot 13 —40-MUX-C<br>Slot 14 and 15 —40-WXC-C<br>Slot 16 —Pre<br>Slot 17 —Booster | Nodes containing pre and booster units.   |

| Configuration                                     | Card Placement  | Condition  |
|---|---|--|
| 40 channel 4-degree ROADM                         | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —40-WXC-C<br>Slot 5 —40-MUX-C<br>Slot 6 —40-DMX-C<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —40-DMX-C<br>Slot 13 —40-MUX-C<br>Slot 14 and 15 —40-WXC-C<br>Slot 16 —Pre<br>Slot 17 —Booster | <ul style="list-style-type: none"> <li>• Maximum 30 shelves.</li> <li>• Nodes containing pre and booster units.</li> </ul> |
| 40 channel 8-degree ROADM<br>(Maximum 30 shelves) | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —40-WXC-C<br>Slot 5 —40-MUX-C<br>Slot 6 —40-DMX-C<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —40-DMX-C<br>Slot 13 —40-MUX-C<br>Slot 14 and 15 —40-WXC-C<br>Slot 16 —Pre<br>Slot 17 —Booster | Nodes containing pre and booster units.  |

| Configuration                  | Card Placement   | Condition   |
|--------------------------------|--|---|
| n degree ROADM with OPT-RAMP-C | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —Pre<br>Slot 5 —BLANK or TXP<br>Slot 6 —MS-ISC-100T<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC-100T<br>Slot 13 —40-DMX-C<br>Slot 14 —40-MUX-C<br>Slot 15 and 16 —40-WXC-C<br>Slot 17 —BLANK or TXP   | <ul style="list-style-type: none"> <li>• MS-ISC-100T is optional.</li> <li>• NC shelf.</li> </ul>   |
|                                | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —Pre<br>Slot 5 —BLANK or TXP<br>Slot 6 —BLANK or TXP<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —BLANK or TXP<br>Slot 13 —40-DMX-C<br>Slot 14 —40-MUX-C<br>Slot 15 and 16 —40-WXC-C<br>Slot 17 —BLANK or TXP | <ul style="list-style-type: none"> <li>• MS-ISC-100T is optional.</li> <li>• Subtended ROADM shelf with OPT-RAMP-C or OPT-RAMP-CE.</li> </ul> |
|                                |  | <ul style="list-style-type: none"> <li>• Subtended TXP shelf.</li> <li>• Nodes not containing pre and booster units.</li> </ul>               |

| Configuration | Card Placement  | Condition   |
|---------------|---|---|
|               | Slot 1 —BLANK or TXP<br>Slot 2 —BLANK or TXP<br>Slot 3 —BLANK or TXP<br>Slot 4 —BLANK or TXP<br>Slot 5 —BLANK or TXP<br>Slot 6 —BLANK or TXP<br>Slot 7 —TCC2<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —BLANK or TXP<br>Slot 13 —BLANK or TXP<br>Slot 14 —BLANK or TXP<br>Slot 15 —BLANK or TXP<br>Slot 16 —BLANK or TXP<br>Slot 17 —BLANK or TXP |   |
|               | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —40-WXC-C<br>Slot 5 —40-MUX-C<br>Slot 6 —40-DMX-C<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —40-MUX-C<br>Slot 13 —40-DMX-C<br>Slot 14 and 15 —40-WXC-C<br>Slot 16 —Pre<br>Slot 17 —Booster   | <ul style="list-style-type: none"> <li>• Subtended ROADM shelf without OPT-RAMP-C or OPT-RAMP-CE.</li> <li>• Nodes containing pre and booster units.</li> </ul> |

| Configuration          | Card Placement  | Condition  |
|------------------------|---|--|
| PSM channel Protection | TXP shelf (Sample 1)<br>Slot 1 —PSM<br>Slot 2 —TXP<br>Slot 3 —PSM<br>Slot 4 —TXP<br>Slot 5 —PSM<br>Slot 6 —TXP<br>Slot 7 —TCC2<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —PSM<br>Slot 13 —TXP<br>Slot 14 —PSM<br>Slot 15 —TXP<br>Slot 16 —PSM<br>Slot 17 —TXP | <ul style="list-style-type: none"> <li>• TXP can be one slot or two slot.</li> <li>• Focus on 10-DME, 10-DMEX, 4x2.5 MUXP, and 40G.</li> </ul> |
|                        | TXP shelf (Sample 2)<br>Slot 1 —PSM<br>Slot 2 and 3 —TXP<br>Slot 4 —PSM<br>Slot 5 and 6 —TXP<br>Slot 7 —TCC2<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —PSM<br>Slot 13 —TXP<br>Slot 14 —PSM<br>Slot 15 —TXP<br>Slot 16 —PSM<br>Slot 17 —TXP                   |  |

| Configuration                      | Card Placement  | Condition   |
|------------------------------------|---|---|
| 40 channel ROADM/<br>HUB—40-SMR1-C | Sh1 - Option 1<br>Slot 1 —Booster<br>Slot 2 —40-SMR1-C<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —40-SMR1-C<br>Slot 17 —Booster | Nodes: <ul style="list-style-type: none"> <li>• not containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |
|                                    |   | Nodes: <ul style="list-style-type: none"> <li>• not containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |



| Configuration | Card Placement  | Condition |
|---------------|---|-----------|
|               | Sh1 - Option 2<br>Slot 1 —40-SMR1-C<br>Slot 2 —BLANK<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —40-SMR1-C |           |

| Configuration                                    | Card Placement  | Condition  |
|--|---|--|
| 40 channel ROADM/HUB—40-SMR1-C                   | Slot 1 —40-SMR2-C<br>Slot 2 —BLANK<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —40-SMR2-C | Nodes: <ul style="list-style-type: none"> <li>• not containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul>                          |
| 40 channel ROADM/HUB with OPT-RAMP-C – 40-SMR1-C | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —40-SMR1-C<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —40-SMR1-C<br>Slot 15 —Booster<br>Slot 16 and 17 —OPT-RAMP-C         | Nodes: <ul style="list-style-type: none"> <li>• not containing pre units.</li> <li>• containing booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |

| Configuration                      | Card Placement   | Condition  |
|------------------------------------|--|--|
| 40 channel Terminal Site—40-SMR1-C | Shelf 1 - Option A<br>Slot 1 —Booster<br>Slot 2 —40-SMR1-C<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —BLANK | Nodes: <ul style="list-style-type: none"> <li>• not containing pre units.</li> <li>• containing booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |
|                                    |  | Nodes: <ul style="list-style-type: none"> <li>• not containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul>                          |

| Configuration | Card Placement   | Condition |
|---------------|--|-----------|
|               | Shelf 1 - Option B<br>Slot 1 —40-SMR1-C<br>Slot 2 —BLANK<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —BLANK |           |

| Configuration  | Card Placement   | Condition  |
|--|--|--|
| 40 channel Terminal Site—40-SMR2-C                   | Shelf 1 - Option C<br>Slot 1 —40-SMR2-C<br>Slot 2 —BLANK<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —BLANK | Nodes: <ul style="list-style-type: none"> <li>• not containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul>                          |
| 40 channel Terminal Site with OPT-RAMP-C – 40-SMR1-C | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —40-SMR1-C<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —BLANK                           | Nodes: <ul style="list-style-type: none"> <li>• not containing pre units.</li> <li>• containing booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |

| Configuration                        | Card Placement  | Condition   |
|--------------------------------------|---|---|
| 40 channel 4-degree ROADM—40-SMR 1-C | Slot 1 —40-SMR2-C<br>Slot 2 —40-SMR2-C<br>Slot 3 —OSC-CSM<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —OSC-CSM<br>Slot 16 —40-SMR2-C<br>Slot 17 —40-SMR2-C | <ul style="list-style-type: none"> <li>• This 4-degree node may also be configured with the 4-degrees spanning two, three, or four shelves.</li> <li>• 40-SMR1-C and OSC-CSM are supported only for management supervisory channel capability.</li> </ul> |

| Configuration                           | Card Placement  | Condition  |
|---|---|--|
| 40 channel Gain Equalizer—<br>40-SMR1-C | Option A<br>Slot 1 —Booster<br>Slot 2 —40-SMR1-C<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —40-SMR1-C<br>Slot 17 —Booster | Nodes: <ul style="list-style-type: none"> <li>• not containing pre.</li> <li>• containing booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |
|   |   | Nodes: <ul style="list-style-type: none"> <li>• not containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul>                    |

| Configuration | Card Placement  | Condition |
|---------------|---|-----------|
|               | Option B<br>Slot 1 —40-SMR1-C<br>Slot 2 —BLANK<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —40-SMR1-C |           |



| Configuration   | Card Placement  | Condition  |
|---|---|--|
|   | Option C<br>Slot 1 —40-SMR2-C<br>Slot 2 —BLANK<br>Slot 3 —BLANK<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —40-SMR2-C | Nodes: <ul style="list-style-type: none"> <li>• not containing pre and booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul>                          |
| 40 channel Gain Equalizer with OPT-RAMP-C – 40-SMR1-C | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —Booster<br>Slot 4 —40-SMR1-C<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —40-SMR1-C<br>Slot 15 —Booster<br>Slot 16 and 17 —OPT-RAMP-C                     | Nodes: <ul style="list-style-type: none"> <li>• not containing pre units.</li> <li>• containing booster units.</li> <li>• not containing 32-channel MUX-O and 32-channel DMX-O units.</li> </ul> |

| Configuration  | Card Placement  | Condition  |
|--|---|--|
| 40 channel n-degree ROADM — omnidirectional colored side | Slot 1 —40-MUX-C<br>Slot 2 —40-DMX-C<br>Slot 3 —Pre<br>Slot 4 —Pre<br>Slot 5 and 6 —40-WXC-C<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —Any Other Side<br>Slot 11 —TCC2<br>Slot 12 —Any Other Side<br>Slot 13 —Any Other Side<br>Slot 14 —Any Other Side<br>Slot 15 —Any Other Side<br>Slot 16 —Any Other Side<br>Slot 17 —Any Other Side | Any other side can equip another omnidirectional side: <ul style="list-style-type: none"> <li>• Slot 12 and 13: 40-WXC-C</li> <li>• Slot 14: Pre</li> <li>• Slot 15: Pre</li> <li>• slot 16: DMX</li> <li>• slot 17: MUX</li> </ul>  |
| 40 channel colorless terminal site configuration         | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —80-WXC-C<br>Slot 5 and 6 —80-WXC-C<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2P<br>Slot 12 and 13 —80-WXC-C<br>Slot 14 and 15 —80-WXC-C<br>Slot 16 —BLANK<br>Slot 17 —BLANK  | Slot 16 can equip 40-DMX and slot 17 can equip 40-MUX to replace passive Odd (MD-40-ODD). They are connected to L1 MUX/DMX (port EAD 1).<br>WXC Role: <ul style="list-style-type: none"> <li>• Slot 3: L1 MUX</li> <li>• Slot 5: L1 DMX</li> <li>• Slot 12: L2 MUX</li> <li>• Slot 14: L2 DMX</li> </ul> |

| Configuration   | Card Placement   | Condition  |
|---|--|--|
| 40 channel n-degree<br>ROADM—WXC - colorless side               | Slot 1 —Booster<br>Slot 2 —Pre<br>Slot 3 and 4 —80-WXC-C<br>Slot 5 and 6 —80-WXC-C<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2P<br>Slot 12 and 13 —40-WXC-C<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —BLANK | <ul style="list-style-type: none"> <li>• 80 WXC is connected to the Add/Drop port of the 40-WXC-C card as a colorless MUX and DMX.</li> <li>• Add and drops ports from the 80-WXC-C can be OCH or OMS.</li> </ul>  |
| 40 channel n-degree<br>ROADM-colorless and omnidirectional side | Slot 1 and 2 —80-WXC-C<br>Slot 3 and 4 —80-WXC-C<br>Slot 5 —Pre<br>Slot 6 —Pre<br>Slot 7 —TCC2P<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2P<br>Slot 12 and 13 —40-WXC-C<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —BLANK<br>Slot 17 —BLANK    | <ul style="list-style-type: none"> <li>• Passive MD can be subtended to L1 MUX/DMX.</li> <li>• 80 WXC are connected to the pre amplifiers as colorless omnidirectional MUX and DMX.</li> <li>• Add and drop ports from the 80-WXC-C can be OCH or OMS.</li> </ul> <p>WXC Role:</p> <ul style="list-style-type: none"> <li>• Slot 1: MUX</li> <li>• Slot 3: DMX</li> </ul> <p>Additional cards:</p> <ul style="list-style-type: none"> <li>• Slot 14: MUX to extend add ports &gt; 9.</li> <li>• Slot 16: DMX to extend drop ports &gt; 9.</li> </ul> |

| Configuration       | Card Placement  | Condition                                    |
|---------------------|---|--|
| 40 channel–non DWDM | Standalone shelf<br>Slot 1 —Booster or TXP<br>Slot 2 —BLANK or Pre or Booster TXP<br>Slot 3 —BLANK or Pre or Booster TXP<br>Slot 4 —BLANK or Pre or Booster TXP<br>Slot 5 —BLANK or Pre or Booster TXP<br>Slot 6 —BLANK or Pre or Booster TXP<br>Slot 7 —TCC2<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —BLANK or Pre or Booster TXP<br>Slot 13 —BLANK or Pre or Booster TXP<br>Slot 14 —BLANK or Pre or Booster TXP<br>Slot 15 —BLANK or Pre or Booster TXP<br>Slot 16 —BLANK or Pre or Booster TXP<br>Slot 17 —Booster or TXP | Standalone transponder shelves can be added. |

| Configuration   | Card Placement  | Condition   |
|---|---|---|
| 40 channel n-degree ROADM – 40-SMR2-C – Two- colored omnidirectional side   | Slot 1 —BLANK<br>Slot 2 —BLANK<br>Slot 3 —40-SMR2-C<br>Slot 4 —40-SMR2-C<br>Slot 5 —BLANK<br>Slot 6 —BLANK<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —BLANK<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —BLANK<br>Slot 16 —40-SMR2-C<br>Slot 17 —40-SMR2-C | <ul style="list-style-type: none"> <li>• 40-SMR2-C cards in slot 3 and 4 are connected to passive omnidirectional MUX/DMX.</li> <li>• Optical safety must be disabled on 40-SMR2-C in slot 3 and 4.</li> </ul>  |
| 40 channel n-degree ROADM— 40-SMR2-C—Single- colorless omnidirectional side | Slot 1—BLANK<br>Slot 2 and 3 —80-WXC-C<br>Slot 4 and 5 —80-WXC-C<br>Slot 6 —40-SMR2-C<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —OSC-CSM<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —40-SMR2-C<br>Slot 16 —40-SMR2-C<br>Slot 17 —40-SMR2-C                | <ul style="list-style-type: none"> <li>• Additional shelf with 80-WXC-C cards to extend Add and Drop ports &gt; 9 (to equip L2 MUX and DMX).</li> <li>• 80 WXC are connected to the Line ports of the 40-SMR2 cards in slot 5 as colorless omnidirectional MUX and DMX.</li> <li>• Optical safety of the 40-SMR2 cards in Slot 5 must be disabled.</li> </ul> <p>WXC Role:</p> <ul style="list-style-type: none"> <li>• Slot 2: L1 MUX</li> <li>• Slot 4: L1 DMX</li> </ul> |

| Configuration  | Card Placement  | Condition   |
|--|---|---|
| 40 channel 4-degree ROADM –<br>40-SMR2-C –colorless side                               | Slot 1 —40-SMR2-C<br>Slot 2 and 3 —80-WXC-C<br>Slot 4 and 5 —80-WXC-C<br>Slot 6 —BLANK<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —Any Other Side<br>Slot 11 —TCC2P<br>Slot 12 —Any Other Side<br>Slot 13 —Any Other Side<br>Slot 14 —Any Other Side<br>Slot 15 —Any Other Side<br>Slot 16 —Any Other Side<br>Slot 17 —Any Other Side | 80 WXC are connected to the Add/Drop port of the 40-SMR2 card in slot 1 as colorless MUX and DMX.<br>WXC Role: <ul style="list-style-type: none"> <li>• Slot 1: MUX</li> <li>• Slot 3: DMX</li> </ul> |
| 40 channel n-degree ROADM —<br>40-SMR2-C – two- colorless omnidirectional side chassis | Slot 1 —BLANK<br>Slot 2 and 3 —80-WXC-C<br>Slot 4 and 5 —80-WXC-C<br>Slot 6 —40-SMR2-C<br>Slot 7 —TCC2P<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2P<br>Slot 12 —40-SMR2-C<br>Slot 13 and 14 —80-WXC-C<br>Slot 15 and 16 —80-WXC-C<br>Slot 17 —BLANK   | WXC Role: <ul style="list-style-type: none"> <li>• Slot 2,15: L1 MUX</li> <li>• Slot 3,13: L1 DMX</li> </ul>  |

| Configuration                                       | Card Placement  | Condition   |
|---|---|---|
| 40 channel ROADM/HUB with<br>OPT-RAMP-C – 40-SMR2-C | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —40-SMR2-C<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —40-SMR2-C<br>Slot 16 and 17 —OPT-RAMP-C | <ul style="list-style-type: none"> <li>• MS-ISC may or may not be present.</li> <li>• Without 15216MD (MD-40-ODD), this layout becomes a gain equalizer.</li> </ul> |

| Configuration  | Card Placement  | Condition  |
|--|---|--|
| 40 channel 4-degree ROADM with<br>OPT-RAMP-C – 40-SMR2-C | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —40-SMR2-C<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —MS-ISC<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —MS-ISC<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —40-SMR2-C<br>Slot 16 and 17 —OPT-RAMP-C | NC shelf.<br>Nodes not containing: <ul style="list-style-type: none"> <li>• pre and booster units.</li> <li>• MUX/DMX units.</li> </ul>        |
|  | Slot 1 and 2 —OPT-RAMP-C<br>Slot 3 —40-SMR2-C<br>Slot 4 —BLANK<br>Slot 5 —BLANK<br>Slot 6 —BLANK<br>Slot 7 —TCC2<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2<br>Slot 12 —BLANK<br>Slot 13 —BLANK<br>Slot 14 —BLANK<br>Slot 15 —40-SMR2-C<br>Slot 16 and 17 —OPT-RAMP-C   | Subtended shelf.<br>Nodes not containing: <ul style="list-style-type: none"> <li>• pre and booster units.</li> <li>• MUX/DMX units.</li> </ul> |



| Configuration  | Card Placement  | Condition   |
|--|---|---|
| 40 channel n-degree ROADM —<br>40-SMR2-C – 2 Colored<br>omnidirectional side with<br>OPT-RAMP-C or OPT-RAMP-CE | Slot 1 —BLANK<br>Slot 2 —BLANK<br>Slot 3 —40-SMR2-C<br>Slot 4 —40-SMR2-C<br>Slot 5 —BLANK<br>Slot 6 —BLANK<br>Slot 7 —TCC2P<br>Slot 8 —OSCM<br>Slot 9 —AIC-I<br>Slot 10 —OSCM<br>Slot 11 —TCC2P<br>Slot 12 —40-SMR2-C<br>Slot 13 and 14 —OPT-RAMP-C<br>Slot 15 —40-SMR2-C<br>Slot 16 and 17 —OPT-RAMP-C   | <ul style="list-style-type: none"> <li>• 40-SMR2-C in slot 3 and 4 are connected to passive omnidirectional MUX/DMX.</li> <li>• Optical safety must be disabled on 40-SMR2-C card in slot 3 and 4.</li> </ul> |
| 40 channel—Passive Mux/Demux terminal site   | Slot 1 —Booster<br>Slot 2 —BLANK or Pre or TXP<br>Slot 3 —BLANK or TXP<br>Slot 4 —BLANK or TXP<br>Slot 5 —BLANK or TXP<br>Slot 6 —BLANK or TXP<br>Slot 7 —TCC2<br>Slot 8 —BLANK<br>Slot 9 —AIC-I<br>Slot 10 —BLANK<br>Slot 11 —TCC2<br>Slot 12 —BLANK or TXP<br>Slot 13 —BLANK or TXP<br>Slot 14 —BLANK or TXP<br>Slot 15 —BLANK or TXP<br>Slot 16 —BLANK or TXP<br>Slot 17 —BLANK or TXP | Standalone transponder shelves can be added.  |

## OSMINE Layout Rules for Software Release 9.2.1 and 9.6.0.x

The following table lists the OSMINE layout rules for various configurations and their card placements for Software Release 9.2.1 and 9.6.0.x.

**Table 96: OSMINE Layout Rules for Software Release 9.2.1 and 9.6.0.x**

| Configuration  | Card Placement   | Condition  |
|----------------|--|--|
| Line Site (M6) | With two amplifiers per side<br>Slot 8 —TNC<br>Slot 7 —Booster (B)<br>Slot 6 —Pre (B)<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —Pre (A)<br>Slot 2 —Booster (A)<br>Slot 1 —TNC | Two sides accommodated in one chassis are placed in the order shown. |
|                | With one amplifier per side<br>Slot 8 —TNC<br>Slot 7 —Amp-C (B)<br>Slot 6 —BLANK<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —BLANK<br>Slot 2 —Amp-C (A)<br>Slot 1 —TNC          |  |

| Configuration          | Card Placement   | Condition   |
|------------------------|--|---|
| Transponder shelf (M6) | Slot 8 —TSC<br>Slot 7 —TXP<br>Slot 6 —TXP<br>Slot 5 —TXP<br>Slot 4 —TXP<br>Slot 3 —TXP<br>Slot 2 —TXP<br>Slot 1 —TSC | TXP and MXP cards do not have any forcing based on direction or slot placement. Therefore, it follows the same rules as optimized configurations (non OSMINE configurations). |
|                        | Slot 8 —TSC<br>Slot 6 and 7 —TXP<br>Slot 4 and 5 —TXP<br>Slot 3 and 2 —TXP<br>Slot 1 —TSC                            |   |

| Configuration                            | Card Placement | Condition  |
|--|----------------|--|
| 40 channel ROADM/HUB —<br>40-SMR1-C - M6 |                | 40-SMR1-C card configuration in a two-degree 40 channel ROADM/HUB with or without booster units. |

| Configuration | Card Placement   | Condition |
|---------------|--|-----------|
|               | 40 channel ROADM/HUB –<br>40-SMR1-C – M6<br>Shelf 1—Option A<br>Slot 8 —TNC<br>Slot 7 —Booster (B)<br>Slot 6 —40-SMR1-C<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —40-SMR1-C<br>Slot 2 —Booster (A)<br>Slot 1 —TNC<br>Shelf 1—Option B<br>Slot 8 —TNC<br>Slot 7 —40-SMR1-C<br>Slot 6 —BLANK<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —BLANK<br>Slot 2 —40-SMR1-C<br>Slot 1 —TNC<br>Shelf 1—Option C<br>Slot 8 —TNC<br>Slot 7 —Booster (B)<br>Slot 6 —40-SMR1-C<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —BLANK<br>Slot 2 —40-SMR1-C<br>Slot 1 —TNC<br>Shelf 1—Option D<br>Slot 8 —TNC<br>Slot 7 —40-SMR2-C<br>Slot 6 —BLANK<br>Slot 5 —BLANK |           |

| Configuration                            | Card Placement   | Condition  |
|--|--|--|
|  | Slot 4 —BLANK<br>Slot 3 —BLANK<br>Slot 2 —40-SMR2-C<br>Slot 1 —TNC   |  |
| 40 channel ROADM/HUB —<br>40-SMR2-C - M6 | 40 channel Terminal Site –<br>40-SMR2-C – M6<br>Shelf 1—Option A<br>Slot 8 —TNC<br>Slot 7 —BLANK<br>Slot 6 —BLANK<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —40-SMR1-C<br>Slot 2 —Booster (A)<br>Slot 1 —TNC | 40-SMR2-C card configuration in a two-degree 40 channel ROADM/HUB with or without booster units. |
|  | Shelf 1—Option B<br>Slot 8 —TNC<br>Slot 7 —BLANK<br>Slot 6 —BLANK<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —BLANK<br>Slot 2 —40-SMR1-C<br>Slot 1 —TNC   |  |
|  | Shelf 1—Option C<br>Slot 8 —TNC<br>Slot 7 —BLANK<br>Slot 6 —BLANK<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —BLANK<br>Slot 2 —40-SMR2-C<br>Slot 1 —TNC   |  |

| Configuration                            | Card Placement  | Condition  |
|--|---|--|
| 40 channel ROADM/HUB —<br>40-SMR1-C - M6 | 40 channel Gain Equalizer –<br>40-SMR1-C (M6)<br><br>Option A<br>Slot 8 —TNC<br>Slot 7 —Booster (B)<br>Slot 6 —40-SMR1-C<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —40-SMR1-C<br>Slot 2 —Booster (A)<br>Slot 1 —TNC | 40-SMR1-C card configuration in a two-degree 40 channel ROADM/HUB with or without booster units. |
|  | Option B<br>Slot 8 —TNC<br>Slot 7 —40-SMR1-C<br>Slot 6 —BLANK<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —BLANK<br>Slot 2 —40-SMR1-C<br>Slot 1 —TNC  |  |
|  | Option C<br>Slot 8 —TNC<br>Slot 7 —40-SMR2-C<br>Slot 6 —BLANK<br>Slot 5 —BLANK<br>Slot 4 —BLANK<br>Slot 3 —BLANK<br>Slot 2 —40-SMR2-C<br>Slot 1 —TNC  |  |

| Configuration        | Card Placement   | Condition  |
|----------------------|--|--|
| Omnidirectional side | 40 channel n-degree ROADM—omnidirectional side<br><br>Slot 8 —TNCSlot 7<br>—40-DMX-CSlot 6<br>—40-MUX-CSlot 5 —PreSlot 4<br>—PreSlot 3 and 2<br>—40-WXC-CSlot 1 —TNC | XC card are placed first. All other cards are placed in the default order. |

## OSMINE Layout Rules for Software Release 9.6.0.x

The following table lists the OSMINE layout rules for various configurations and their card placements for Software Release 9.6.0.x.

**Table 97: OSMINE Layout Rules for Software Release 9.6.0.x**

| Configuration                           | Card Placement   | Condition  |
|---|--|--|
| 80 channel n degree R-OADM with Chianti | n-degree 80 channel ROADM – Optical shelf (M6)<br><br>Slot 8 —TNCSlot 7 —BLANKSlot 6 —BLANKSlot 5 and 4<br>—80-WXC-CSlot 3 —PreSlot 2<br>—BoosterSlot 1 —TNC | One side per shelf.                                    |
| 80 channel n degree R-OADM              | 80 channel 8-degree ROADM (Maximum 50 shelves)<br><br>Slot 8 —TNCSlot 7 —BLANKSlot 6 —BLANKSlot 5 and 4<br>—80-WXC-CSlot 3 —PreSlot 2<br>—BoosterSlot 1 —TNC | Optical shelves—M6 only.<br>Client shelves—M6 and M12. |



| Configuration   | Card Placement  | Condition                                |
|---|---|--|
| 80 or 40 channel if two sides can fit in the same shelf | Interconnecting 80- channel and 40- channel networks<br>40-WXC-C and 80-WXC-C<br>Interconnecting Degrees (M6 shelf only)<br>80 channel 8-degree ROADM (Maximum 50 shelves)<br>Shelf M6<br>Slot 8 —TNC or TSCSlot 7<br>—BoosterSlot 6 and 5<br>—40-WXC-Cslot 4 and 3<br>—40-WXC-Cslot 2 —BoosterSlot 1 —TNC or TSC | Two sides are managed in the same shelf. |
|   | Shelf M6<br>Slot 8 —TNC or TSCSlot 7<br>—BoosterSlot 6 and 5<br>—80-WXC-Cslot 4 and 3<br>—80-WXC-Cslot 2 —BoosterSlot 1 —TNC or TSC<br>Slot 5,6, and 7—Optional two degree in the same shelf.   |  |





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