About this Guide

This document describes the installation, operation, turn-up, and maintenance functions for the Cisco Optical Networking System (ONS) 15216 Erbium Doped Fiber Amplifier 3 (EDFA3). This preface contains the following secctions:

- Document Organization, page 47
- Document Conventions, page 48
- Where to Find Safety and Warning Information, page 49
- Obtaining Documentation, page 49
- Documentation Feedback, page 50
- Cisco Product Security Overview, page 50
- Obtaining Technical Assistance, page 51
- Obtaining Optical Networking Information, page 52
- Obtaining Documentation, Obtaining Support, and Security Guidelines, page 53

Document Organization

Chapters in this document include:

- Chapter 1, “Introduction”
- Chapter 2, “Specifications”
- Chapter 3, “Installation Reference”
- Chapter 4, “Installing the ONS 15216 EDFA3”
- Chapter 5, “Communicating with the ONS 15216 EDFA3”
- Chapter 6, “About TL1 Commands”
- Chapter 7, “TL1 Turn Up”
- Chapter 8, “TL1 Commands and Autonomous Messages”
- Chapter 9, “Preparing to Use SNMP”
- Chapter 10, “SNMP and the Management Information Base”
- Chapter 11, “FTP Session”
- Chapter 12, “Software Upgrade”

- Chapter 13, “Network Access to the ONS 15216 EDFA3 Using the ONS 15454”
- Chapter 14, “Troubleshooting”

Appendix A, “Regulatory Compliance and Safety Information”

Document Conventions

This publication uses the following conventions:

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

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

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

Warning

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS

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 15xxx systems. It also includes translations of the safety warnings that appear in the ONS 15xxx system documentation.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/techsupport

You can access the Cisco website at this URL:

http://www.cisco.com

Product Documentation DVD

The Product Documentation DVD is a comprehensive library of technical product documentation on a portable medium. The DVD enables you to access multiple versions of installation, configuration, and command guides for Cisco hardware and software products. With the DVD, you have access to the same HTML documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .PDF versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD= or DOC-DOCDVD=SUB) from Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

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.

Ordering Documentation

Registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

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170 West Tasman Drive
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Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/web/about/security/psirt/security_vulnerability_policy.html

From this site, you will find information about how to:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

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http://www.cisco.com/go/psirt

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you have identified a vulnerability in a Cisco product, contact PSIRT:

- For Emergencies only—security-alert@cisco.com

  An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- For Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

We encourage you to use Pretty Good Privacy (PGP) or a compatible product (for example, GnuPG) to encrypt any sensitive information that you send to Cisco. PSIRT can work with information that has been encrypted with PGP versions 2.*x* through 9.*x*.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/web/about/security/psirt/security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

If you do not have or use PGP, contact PSIRT at the aforementioned e-mail addresses or phone numbers before sending any sensitive material to find other means of encrypting the data.

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Note Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command

output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer.

For S1 or S2 service requests, or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—An existing network is down, or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operations are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of the network is impaired, while most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Optical Networking Information

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

Where to Find Safety and Warning Information

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

Cisco Optical Networking Product Documentation CD-ROM

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

Obtaining Documentation, Obtaining Support, and Security Guidelines

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

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

Introduction

This introductory chapter is designed to provide you with information about the ONS 15216 EDFA3 optical repeater. You should read this information before proceeding in order to familiarize yourself with the basic introductory information about the unit.

This chapter contains the following sections:

- 1.1 ONS 15216 EDFA3 Applications
- 1.2 Optical Safety Information
- 1.3 Block Diagrams
- 1.4 ONS 15216 EDFA3 Features

1.1 ONS 15216 EDFA3 Applications

An erbium-doped fiber amplifier, or EDFA, is an optical repeater that amplifies an optical laser beam directly, bypassing opto-electronic and electro-optical (O/E and E/O) conversion. The EDFA uses a short length of optical fiber that has been treated or “doped” with the element erbium. When the laser that carries the signal causes the signal to pass through this fiber, energy is applied to boost, or amplify, the level of the signal.

In fiber optic systems, no fiber material is absolutely transparent. This causes the infrared light carried by a fiber to be attenuated as it travels through the material. Because of this attenuation, repeaters must be used in spans of optical fiber longer than approximately 100 kilometers.

The operating wavelength range of an EDFA extends over the entire C band (1530 to 1560 nm) and therefore provides a cost-effective solution for wavelength division multiplexing (WDM) applications. Where the use of O/E-E/O regenerators would require the demultiplexing and multiplexing of each single WDM channel at each regenerator site and an O/E-E/O pair for each channel, the ONS 15216 EDFA3 can regenerate all of the WDM signals together.

1.2 Optical Safety Information

The ONS 15216 EDFA3 is an optical device and requires attention to safety measures. See Appendix A, “Regulatory Compliance and Safety Information” for complete safety information.

Warning **Procedures that require the fiber connections to be open must only be performed by service personnel trained in laser safety requirements. Use of controls or performing adjustments or procedures other than those specified herein may result in hazardous radiation exposure.**

Warning **Anyone working with the ONS 15216 EDFA3 must not allow their eyes or body to be exposed to the laser beam or to a reflection from a mirror-like surface. Additionally, viewing the laser output with certain optical instruments (eye loupes, microscopes) within a distance of 100 mm may pose an eye hazard.**

Warning **In the event of a fiber cut or loss of connection when there is no input power, the ONS 15216 EDFA3 still has –3.5 dBm of optical output power.**

Warning **Follow all directions and warning labels when working with optical fibers. To prevent eye damage, never look directly into a fiber or connector.**

TL1 commands can be used to increase the level of laser energy. Necessary precautions must be taken to avoid exposure to laser energy when using these commands. Figure 1-1 and Figure 1-2 show laser safety warnings.

Figure 1-1 Laser Radiation Warning

INVISIBLE LASER RADIATION. DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. CLASS 1M LASER PRODUCT

Figure 1-2 Laser Specifications Warning

Peak Power: 500 mW
Wavelength: 1528 to 1610 nm
Class 1M Laser Product per IEC/EN 60825-1/A2:2001 standard

1.3 Block Diagrams

Figure 1-3 shows the block diagram of the ONS 15216 EDFA3. A Control Processor communicates with the gain block optical module via I2C protocol and runs the TL1 and SNMP agents for outside communication. The TL1 and SNMP interfaces are available on the two Ethernet ports. The TL1 interface is available also on the serial EIA/TIA-232 (RS-232) interface. The Control Processor also manages the alarm LEDs.

Figure 1-3 ONS 15216 EDFA3 Block Diagram

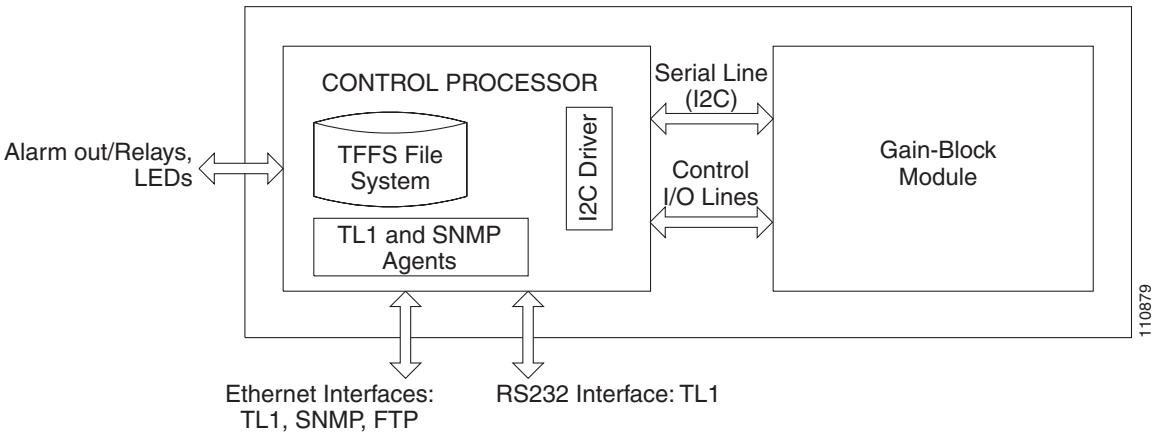
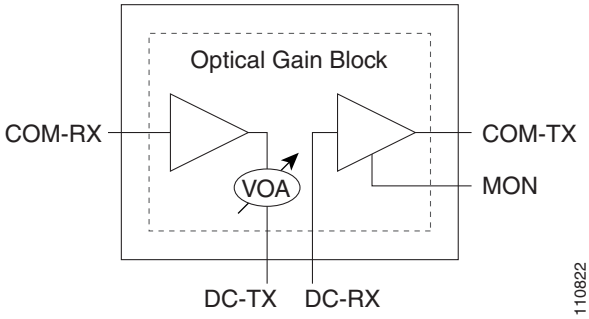


Figure 1-4 shows the block diagram of an optical module.

Figure 1-4 ONS 15216 EDFA3 Optical Gain Block Diagram



The Optical Gain Block is a two-stage amplifier. The signal enters through the port COM-RX and is amplified by the first stage. Then its accumulated chromatic dispersion is compensated by a Dispersion Compensation Unit (DCU) that is placed between the ports DC-TX and DC-RX. The signal is then amplified by the second stage of the amplifier and the signal exits from the port COM-TX. A MON port is provided to monitor the output signal. See Figure 2-3 on page 2-10 for a drawing of the actual unit.

1.4 ONS 15216 EDFA3 Features

The ONS 15216 EDFA3 optical amplifier enables the migration to next-generation all-optical networks, featuring:

- True Variable Gain: The EDFA3 varies its gain by changing the laser pump powers, optimizing the noise figure for each Gain Set-Point.
- Mid Access Loss port: The EDFA3 has two ports available for the insertion of Dispersion Compensation Units (DCU) between its two stages. This features makes the EDFA3 suited for 10 Gbps applications.

You need to have a Simple Network Management Protocol (SNMP) manager to issue SNMP commands. Third-party SNMP managers include Cisco Transport Manager (CTM), HP OpenView Network Node Manager (NNM), and Open Systems Interconnection (OSI) NetExpert. Descriptions of SNMP commands in this document assume that you will be using Cisco Transport Manager (CTM).

The following list shows key features of the ONS 15216 EDFA3:

- Fast transient suppression
- Non-distorting low frequency transfer
- Mid-stage access for dispersion compensation unit
- Variable optical attenuation (VOA) to ensure gain flatness
- Constant Output Power mode
- Constant Gain mode
- Amplified spontaneous emissions (ASE) compensation
- Programmable tilt
- Full monitoring and alarm handling capability
- Optical safety functionality through signal loss detection and alarming at any input port, fast power down control, and reduced maximum output power in Safe Power mode
- SNMP MIBs
- Transaction Language 1 (TL1)

The following sections describe some of the features in the ONS 15216 EDFA3.

1.4.1 Transient Suppression

When the EDFA3 is working in Constant Gain mode and the number of channels at the input of the amplifier suddenly changes, a finite time occurs before the amplifier readjusts the pump power to keep the gain constant. Also, when the EDFA3 is working in Constant Power mode, a finite time occurs before the population inversion of the amplifier adjusts to the new value. This dynamic behavior is undesirable as it might cause bit errors. The ONS 15216 EDFA3 uses transient suppression to reduce the gain transient and the amount of time that the amplifier requires to recover from a change. This contributes to the suitability of the amplifier for add/drop applications.

1.4.2 Constant Gain and Constant Pump Power Modes

The ONS 15216 EDFA3 can work in Constant Output Power mode or in Constant Gain mode. When the amplifier is driven in Constant Output Power mode, the amplifier keeps the output power constant regardless of the input power. In this mode, the amplifier works essentially as a saturated amplifier and the per channel output power changes as the input channel number varies.

In contrast, Constant Gain mode ensures that the channel power at the amplifier output remains constant when a sudden change in the number of input channels occurs. In this way, the optical link is resilient to changes in the link traffic. Channels can be added or removed from the optical link without having to perform any operation on the amplifier. Also, when the amplifier works in Constant Gain mode, the link is resilient to failures of some of the channels of the link; the surviving channels will still be transported along the link with the same channel power.

The true variable gain simultaneously maintains high power output, low noise, and flat gain over the entire gain range by varying the laser's pump power in addition to adjusting a mid-stage VOA.

Constant gain is achieved using an automatic control circuit that adjusts pump power when changes in input power are detected. The ONS 15216 EDFA3 operates in Constant Gain mode by default. The two operating modes of the ONS 15216 EDFA3 are the following:

- Constant Gain mode
- Constant Output Power mode

The ONS 15216 EDFA3 has two different gain ranges:

- Standard Gain Range (from 5 to 21 dB). In this gain range, the gain is flattened by automatically adjusting the internal VOA.
- Extended Gain Range (from 21 to 38.5 dB). In this range, the amplifier cannot control the gain flatness and introduces a finite gain tilt.

1.4.3 Dispersion Compensation

The mid-stage access ports (DC-TX and DC-RX) on the ONS 15216 EDFA3 are used to connect a Dispersion Compensation (DC) device between amplifier stages within the EDFA3. By placing the dispersion compensation between amplifier stages, the EDFA3 is compatible with 10-Gbps networks without compromising the optical link loss budget. This provides network designers with two benefits:

- Greater flexibility regarding amplifier placement
- Reduced network cost due to the decreased number of amplifiers required to maintain the minimum acceptable signal-to-noise ratio over a particular span

The insertion loss for the DC device must be between three and nine decibels (dB).

If a DC device is not going to be used, the mid-stage access ports need to be patched together with a 4-dB attenuator inline. This is because the firmware-controlled VOA that must used for gain flattening purposes has been designed around a minimum insertion loss of 3 dB. Without the DC-TX port being patched to the DC-RX either through a dispersion compensation device or a 4-dB attenuator, the EDFA3 does not operate properly.

1.4.4 Gain Flattening

The ONS 15216 EDFA3 automatically adjusts an internal VOA for gain flattening, to ensure constant gain over the entire wavelength range.

1.4.5 Low Noise

In analog and digital communications, signal-to-noise ratio is a measure of the relative strength of an optical signal compared to the electrical background noise, usually measured in decibels (dB).

An optical amplifier always adds optical noise to the amplified signal. The predominant source of noise in an EDFA is amplified spontaneous emissions (ASE). Usually the amount of noise inserted by an amplifier is measured by a figure of merit called Noise Figure (NF). In an optical amplifier, the NF depends on the gain (this usually gets higher when the gain decreases). The ONS 15216 EDFA3 has a worst case NF of 6.5 dB for a gain higher than 21 dB.

1.4.6 TL1 Interface

The ONS 15216 EDFA3 has a TL1 interface available to network operators and craftspersons. This TL1 interface is a line-oriented interface, allowing craft personnel and network operators to maintain a network element (NE) and the cards within an NE. The ONS 15216 EDFA3 uses a TL1 interface, which is described in Chapter 7, "TL1 Turn Up," Chapter 6, "About TL1 Commands," and Chapter 8, "TL1 Commands and Autonomous Messages."

1.4.7 SNMP MIBs

The ONS 15216 EDFA3 uses MIBs to contain definitions of management information that allow network systems to be remotely monitored, configured, and controlled.

A MIB is a formal description of a set of network objects that can be managed using SNMP. All other MIBs are extensions of the basic MIB. MIBs or MIB extensions exist for each set of manageable network entities.

1.4.8 Alarm LEDs

The ONS 15216 EDFA3 has seven LEDs:

- POWER
- FAIL
- LOS
- 2 LEDs for each of the front and the back Ethernet sockets

Three of these LEDs, POWER, FAIL, and Loss of Signal (LOS), are located at the left side of the front panel of the ONS 15216 EDFA3. The two Ethernet LEDs are located at the top left and right sides of each Ethernet socket. When the module is powered on, an LED test is performed.

Detailed information about these LEDs is contained in the "5.2 Alarm LEDs" section on page 5-2.

1.4.9 Ethernet Hub Functionality

The ONS 15216 EDFA3 is equipped with an Ethernet hub. A port of the hub is connected with the Control Processor, while two other ports are available to the user with RJ-45 connectors, one on the front and one on the rear. In this way, the user can connect to the unit on one Ethernet port and use the second one to cascade the communication to other units in a daisy-chain configuration.

The ONS 15216 EDFA3 hub detects and corrects port polarity reversals. The hub also reconditions all data flowing through it:

- Data is retimed and reshaped to its full signal amplitude.
- Any lost preamble bits are restored.

- Any packet fragments are extended.
- Any illegally long packets are truncated.

The hub monitors and detects collisions, and forces jamming bit streams to inform all ports about the collisions.

Specifications

The following material describes the specifications for the ONS 15216 EDFA3. The sections in this chapter describe the following:

- 2.1 Optical Specification, page 2-1
- 2.2 Operation Modes, page 2-4
- 2.3 Gain Tilt Control, page 2-5
- 2.4 Alarm Thresholds, page 2-5
- 2.5 Maximum Input Power Specification, page 2-7
- 2.6 Electrical Specifications, page 2-7
- 2.7 Mechanical Specifications, page 2-7
- 2.8 External Features, page 2-8
- 2.9 Measurement Units and Representation, page 2-11

2.1 Optical Specification

The specified values are valid over the full temperature range and full lifetime of the ONS 15216 EDFA3. ONS 15216 EDFA3 optical specifications are listed and described in Table 2-1 through Table 2-5.

Table 2-1 Wavelength Specification

Parameter	Comment	Value	Unit
DWDM[1] channel wavelength plan, 100 GHz	4 skip 1	ITU-T wavelength grid channels 20 to 59	—
DWDM channel wavelength plan, 50 GHz	8 skip 2	ITU-T wavelength grid channels 19.5 to 59	—
Channel spacing	—	100 and 50	GHz
Total operating wavelength range	—	1530.0 to 1561.3	nm

1. DWDM = dense wavelength division multiplexing

Table 2-2 Optical Parameters

Parameter	Comment	Min	Typ	Max	Unit
Gain ripple (peak to valley)	Tilt setpoint = 0 dB	—	—	1.5	dBm
Gain set resolution	Constant Gain mode	—	—	0.1	dB
Output power set resolution	Constant Power mode	—	—	0.1	dB
Mid-stage loss range	—	3	—	9	dB
Maximum total mid-stage output power	—	—	—	15	dBm
Maximum per-channel mid-stage output power	At 32 channels	—	—	0	dBm
Noise Figure at G >= 21 dB	VOA[1] at minimum loss	—	—	6.5	dB
Noise Figure at G = 5 dB	Tilt setpoint = 0 dB	—	—	24.7	dB
Noise Figure at 5 < G < 21 dB	See Figure 2-1	—	—	—	—
Polarization dependent gain	—	—	—	0.5	dB
Polarization mode dispersion	—	—	—	0.7	ps
Optical return loss	All optical ports	40	—	—	dB

1. VOA = variable optical attenuator

Figure 2-1 Noise Figure Mask as a Function of the Gain

G (dB)	max NF (dB)
5	24.7
6	22.6
7	20.7
8	18.9
9	17.2
10	15.4
11	13.8
12	12.6
13	11.4
14	10.3
15	9.6
16	9
17	8.4
18	7.8
19	7.4
20	7
21	6.5

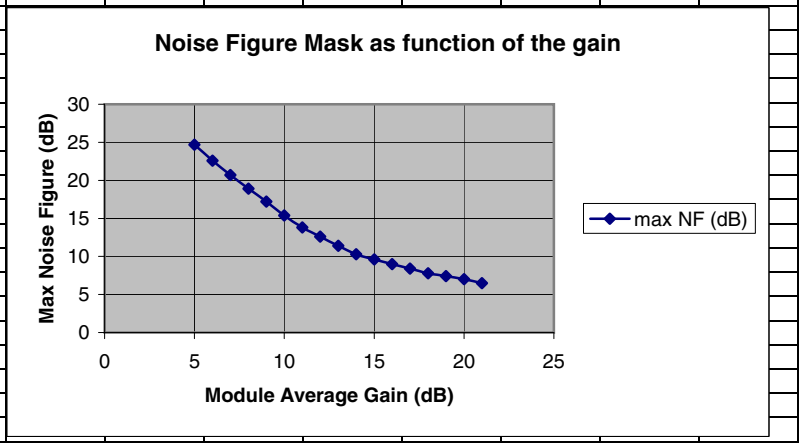


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Table 2-3 Optical Parameters—Standard Gain Range

Parameter	Comment	Min	Max	Unit
Input signal power range	Full channel load	–4	12	dBm
	Single channel	–22	–6	dBm
Maximum output signal power	Full channel load	17.0	17.5	dBm
	Single channel	–1.0	–0.5	dBm
Standard gain range	—	5	21	dB

Table 2-3 Optical Parameters—Standard Gain Range (continued)

Parameter	Comment	Min	Max	Unit
Gain tilt error	Tilt setpoint = 0 dB	—	+ 0.5	dB
Gain tilt range	—	–3	+3	dB

Table 2-4 Optical Parameters—Extended Gain Range

Parameter	Comment	Min	Max	Unit
Input signal power range	Full channel load	–21.5	–4	dBm
	Single channel	–39.5	–22	dBm
Maximum output signal power	Full channel load	17.0	17.5	dBm
	Single channel	–1.0	–0.5	dBm
Extended gain range	—	21	38.5	dB
Gain tilt error Tilt setpoint = 0 dB	Gain tilt error for each dB of gain setpoint higher than 21dB	—	–0.7	dB/dB

Table 2-5 Power Monitoring Specifications

Parameter	Min	Typ	Max	Unit
Input power measurement range	–39.5	—	12	dBm
Output power measurement range	–1	—	18	dBm
Power monitor measurement resolution	—	—	0.1	dB
Optical monitor port taps	–23	–20	–19	dB

2.1.1 Optical Safety Functions

The optical safety functions implemented on the ONS 15216 EDFA3 are:

- 2.1.1.1 Optical Safety Remote Interlock
- 2.1.1.2 Automatic Laser Shutdown
- 2.1.1.3 Automatic Power Reduction

2.1.1.1 Optical Safety Remote Interlock

The optical safety remote interlock (OSRI) function allows you to manually shut down the EDFA3 pump lasers using a TL1 command (ED-DWDM) or SNMP object (cerent15216EdfaGenericEdfa3Osri). This function is designed for safety purposes to avoid the risk for the operator to manage hazardous optical power level. The total time for laser shutdown after receiving a disable command is 100 ms.

Note The OSRI parameter must be set to DISABLE in order for the ONS 15216 EDFA3 to operate properly. Setting the OSRI parameter to ENABLE will activate the interlock, preventing the ONS 15216 EDFA3 from producing an optical output signal.

2.1.1.2 Automatic Laser Shutdown

The ONS 15216 EDFA3 performs an automatic laser shutdown (ALS) when a loss of input power (that is, power falls below the FailLow threshold) is detected at the input port of both stages:

- COM RX (first stage input port)
- DC RX (second stage input port)

The ALS shuts down the optical power at the following two optical output ports:

- DC TX (first stage output port)
- COM TX (second stage output port)

2.1.1.3 Automatic Power Reduction

The automatic power reduction function is used by the amplifier during the recovery after an ALS event. When the loss of signal (LOS) event is no longer present at the amplifier input, before going to the original power setpoint, the amplifier undergoes a transition to a safe reduced output power level of 8 dBm for 9 seconds.

2.1.2 Transient Suppression

Table 2-6 shows transient suppression specifications.

Table 2-6 Transient Suppression Specifications

Input Power Excursion (dB)	Maximum Undershoot and Overshoot	Maximum Setting Time (milliseconds)	Gain Error (dB)
15	3.7	500	1.7
6	2.2	800	1.7
3	–1.8	500	1.7

The previously indicated transient suppression specifications are referred to the following conditions:

- The values are for both ADD and DROP events
- Required input switch speed = 100 milliseconds (objective input switch speed = 5 milliseconds)
- The ONS 15216 EDFA3 is set in the standard range
- There is a flat output profile (with +/– 0.5 dB tolerance)
- The power per channel > –19 dBm

2.2 Operation Modes

The ONS 15216 EDFA3 can be driven in one the following working modes:

- 2.2.1 Constant Output Power Mode, page 2-5
- 2.2.2 Constant Gain Mode, page 2-5

2.2.1 Constant Output Power Mode

When the ONS 15216 EDFA3 is driven in Constant Output Power mode, the signal output power is set to the provisioned value. The user provisions the total power of the amplifier, while the firmware of the internal optical module automatically sets the output power of the two amplifier stages.

In this mode, the EDFA3 essentially works as a saturated amplifier. The output power remains constant when the input power changes. When channels are added or dropped at the amplifier input, the output channel power varies accordingly. In this mode, the amplifier is not resilient to the channel number variation at the amplifier input, so it should be used only in the installation phase.

The Constant Output Power control limits its action by constantly checking that the laser current never exceeds its maximum ratings. The control module calculates and provisions output power alarm thresholds every time the output power set point changes.

The firmware of the internal optical module compensates for the amplified spontaneous emission (ASE) noise generated by the amplifier. In other words, the amplifier computes the noise generated by the amplifier itself and sets the Signal Power to the provisioned value compensating for the Noise Power.

2.2.2 Constant Gain Mode

When the ONS 15216 EDFA3 is driven in Constant Gain mode, the amplifier gain is set to the provisioned value. The user provisions the total gain of the amplifier, while the firmware of the internal optical module automatically sets the gains of the two amplifier stages.

In this mode, the channel output power remains constant when the number of input channels changes. Therefore, in this mode, the amplifier is resilient to a failure of a transmitter or of an optical add/drop multiplexer (OADM) card. Also when the amplifier is in Constant Gain mode, the link can be upgraded adding or removing channels without performing any management operation on the amplifier. Therefore, this should be the preferred mode when the link is in normal operating conditions.

The firmware of the internal optical module compensates for the ASE noise generated by the amplifier. The amplifier computes the noise generated by the amplifier itself and sets the Signal Gain to the provisioned value compensating for the Noise Power.

2.3 Gain Tilt Control

As a default, the amplifier gain tilt is set to zero. The firmware automatically controls the internal VOA to achieve a flat gain.

The user can provision a gain tilt different from zero to compensate for gain tilt produced by other optical components preceding the amplifier. The gain tilt control is active only in the standard gain range (5 to 21 dB). The tilt can be set between –3 and + 3 dB.

2.4 Alarm Thresholds

The ONS 15216 EDFA3 uses thresholds. It raises or clears alarms when these thresholds are crossed. The EDFA3 has both absolute and relative thresholds. Absolute thresholds are independent of any other parameter setpoint and can be user-provisioned, whereas the relative thresholds are automatically calculated depending on the actual setpoint of a parameter, and their values cannot be provisioned by the user.

Table 2-7 lists all the provisionable thresholds, their description, their default value and their provisioning range.

Table 2-7 Threshold Behavior

Threshold	Description	Default	Range
GAINTHDL	Gain Degrade Low Threshold	Gain Setpoint – 2dB	—
GAINTHDH	Gain Degrade High Threshold	Gain Setpoint + 2dB	—
LINE1TXPWRTHDL	Power Degrade Low Threshold LINE1TX Port	LINE1TXPWRSP – 2dB	—
LINE1TXPWRTHDH	Power Degrade High Threshold LINE1TX Port	LINE1TXPWRSP + 2dB	—
LINE1TXPWRTHFL	Power Fail Low Threshold LINE1TX Port	–6 dBm	–10, +14 dBm See Note Below
LINE1RXPWRTHFL	Power Fail Low Threshold LINE1RX Port	+10 dBm	–49, +13 dBm
LINE2RXPWRTHFL	Power Fail Low Threshold LINE2RX Port	–33 dBm	–49, +15 dBm
PWRBUSMIN	Power Bus A and B Minimum Voltage	40 V	0, 47 V
PWRBUSMAX	Power Bus A and B Maximum Voltage	57 V	49, 57 V
MAXCTMP	Maximum Case Temperature	65 degrees C	60, 100 degrees C (140, 212 degrees F)
MINCTMP	Minimum Case Temperature	–5 degrees C	–10, 30 degrees C (14, 86 degrees F)

Note The maximum LINE1TXPWRTHFL threshold setting varies as a function of the LINE1TXPWRSP set point, with the following relationship:

(-10dBm) <= LINE1TXPWRTHFL<= (LINE1TXPWRSP - 3dBm)

This relationship implies that the LINE1TXPWRTHFL threshold must always be set at least 3dBm below the LINE1TXPWRSP set point (but not below -10dBm), as a result, the maximum +14dBm LINE1TXPWRTHFL threshold can only be set when the LINE1TXPWRSP set point is also set to it's maximum value of +17dBm.

(Refer to section 10.7.2 Table 10-24 for LINE1TXPWRSP range)

2.5 Maximum Input Power Specification

The ONS 15216 EDFA3 operates at a gain setting between 5 and 21 dB, standard gain range, and between 21 and 38.5 dB, extended gain range. As the total output power of the amplifier cannot exceed 17 dBm, each gain setting has a maximum input power. The maximum input power is given by the maximum output power, 17 dBm, minus the gain setting. For example, at a gain setting of 22 dB, the maximum input power is –5 dBm. Prolonged operation beyond the maximum input power can shorten the life of the ONS 15216 EDFA3.

Optical attenuators are required to bring total input power to less than the maximum input power when operating in constant gain mode.

2.6 Electrical Specifications

The ONS 15216 EDFA3 uses a power supply that meets the electrical specifications listed in Table 2-8.

Table 2-8 Electrical Specifications

Parameter	Specification
Input voltage	–48 VDC
Maximum power consumption	45 W at ambient (50 degrees C, 122 degrees F)
Minimum supply voltage	–40 VDC
Minimum turn-on supply voltage	–43 VDC
Maximum supply voltage	–57 VDC or under
Maximum current consumption	1.5 A at 45 W

A separate AC/DC converter for use with the ONS 15216 EDFA3 can be ordered from Cisco.

2.6.1 Electrical Interface

Table 2-9 describes the external electrical interfaces for the ONS 15216 EDFA3. See Figure 2-3 on page 2-10 for a graphic showing the electrical connectors.

Table 2-9 External Electrical Interface

Quantity	Type	Description	Location
2	RJ-45	Alarm ports	Front and back
2	RJ-45	Ethernet ports	With LED, front and back
1	EIA/TIA-232 (RS-232)	Port	Front
2/4	PWR SUP	Power supply	Front and back

2.7 Mechanical Specifications

Table 2-10 lists the ONS 15216 EDFA3 mechanical specifications.

Table 2-10 Mechanical Specifications

Parameter	Specification
Dimensions (H x W x D)	1-3/4 in. x 17-3/16 in. x 11 in. (4.4 cm x 43.7 cm x 27.9 cm)
Weight	5.45 lb (2.47 kg)
Ambient operating temperature	32 to 122 degrees F (0 to 50 degrees C)
Storage temperature	–40 to 185 degrees F (–40 to 85 degrees C)
Humidity operation	Relative humidities of 5 to 95%, noncondensing. With ambient temperatures above 84 degrees F (29 degrees C), the relative humidity might be limited to that corresponding to a specific humidity of 0.024 pounds of water per pound of dry air (0.01 kg per kilogram of dry air).
Humidity storage	Relative humidities of 5 to 95%, noncondensing. With ambient temperatures above 84 degrees F (29 degrees C), the relative humidity might be limited to that corresponding to a specific humidity of 0.024 pounds of water per pound of dry air (0.01 kg per kilogram of dry air).
Connector types	LC/UPC Bulkhead connectors
Mean time between failures (MTBF)	12.7 years as per the calculation procedure outlined in TR-NWT-000332, Issue 4, Method 1

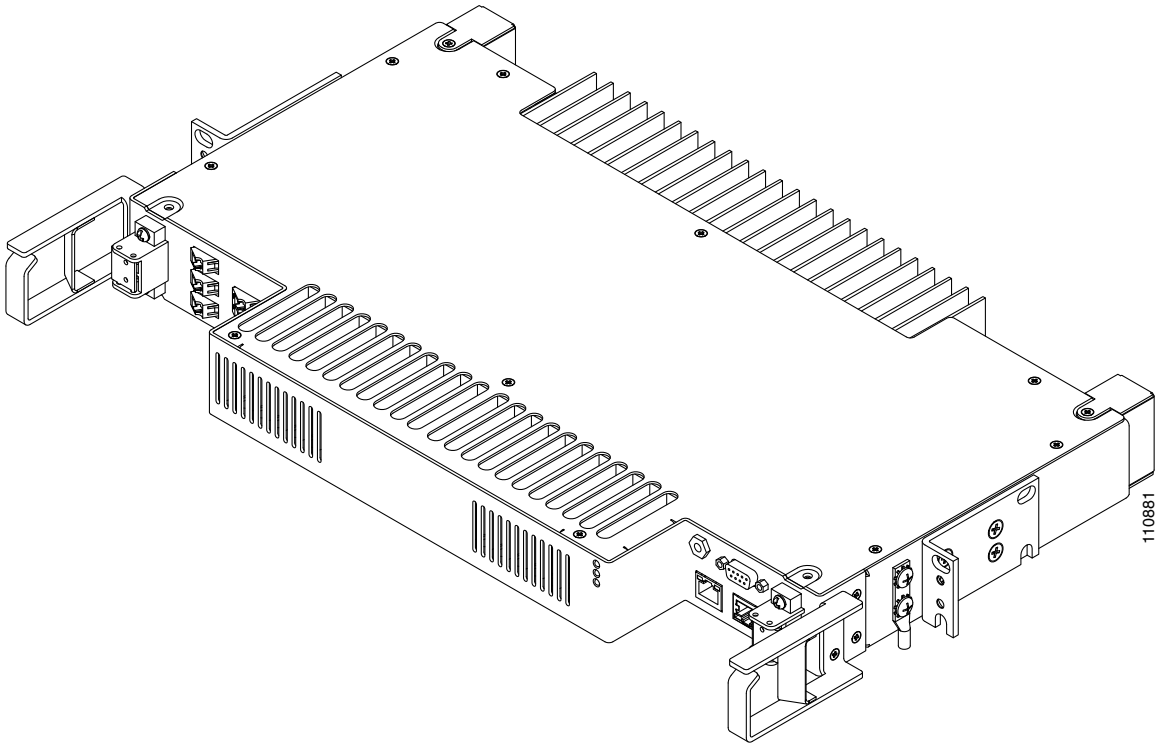
2.8 External Features

The ONS 15216 EDFA3 has the following external features:

- Front panel LEDs, graphics, and warning displays
- Brackets for rack mounting (including reversible ears that permit front, mid, and rear mounting)
- Front and rear cooling vents
- Fiber routing and retaining feature
- Two threaded grounding studs on rear and a pair of threaded grounding holes on each side
- Screw lug (front and rear) terminal blocks for power connection
- RJ-45 connector for external alarm connection on the front and rear
- RJ-45 connector for LAN connection on the front and rear
- LC/UPC connectors for optical interface
- DB-9 female connector for craft EIA/TIA-232 (RS-232) serial interface connection (front panel only)

Figure 2-2 displays a mechanical outline of the external features of the ONS 15216 EDFA3.

Figure 2-2 External Features



2.8.1 Footprint

The ONS 15216 EDFA3 is housed in a 1-RU, 19-inch/23-inch (482-mm/584-mm), rack-mounted shelf. However, a 3-RU spacing is required for ventilation. All-front access is available for fibers, power, alarm contacts, and management interfaces. Rear access is available for power, alarm, and management interfaces.

2.8.1.1 Front Panel

Figure 2-3 shows the ONS 15216 EDFA3 front panel in detail. The front panel provides an all-front access (fibers, power, alarm contact, and management interface) that complies with international standards.

Figure 2-3 ONS 15216 EDFA3 Front Panel

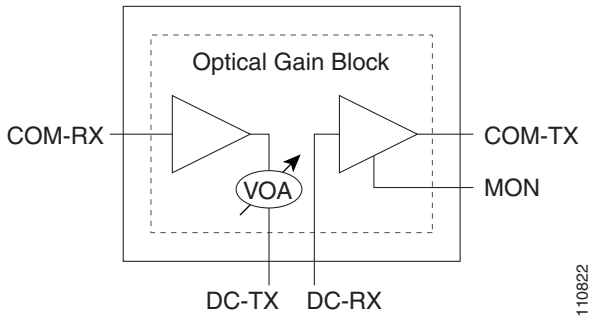


Table 2-11 describes the ONS 15216 EDFA3 front panel features.

Table 2-11 Front Panel Features

Feature	Description
Terminal strips A and B	Terminal strip for supplying power to the ONS 15216 EDFA3. Attach AWG 18 stranded power wires to appropriate terminals.
Threaded grounding holes	Threaded grounding holes (#10-32) to ground the ONS 15216 EDFA3.
Serial port connection (EIA/TIA-232 [RS-232])	Serial port for local or remote (modem) data communication connection.
Label	Laser warnings, designation labels, and power level warning.
Status LEDs	LEDs indicating status of power, fail, loss of signal, Ethernet link availability, and Ethernet link traffic.
Fiber input	LC/UPC fiber input port.
Fiber output	LC/UPC fiber output port.
DCU input	LC/UPC DCU input port.
DCU output	LC/UPC DCU output port.
Monitor output	LC/UPC port for fiber that taps off 1% of the output signal for monitoring purposes.
Alarm out	RJ-45 connector used for alarm system connection.
LAN	RJ-45 connector used for 10BaseT Ethernet connection.

2.8.1.2 Rear Panel

Figure 2-4 shows the ONS 15216 EDFA3 rear panel. Table 2-12 lists the rear panel features.

Figure 2-4 ONS 15216 EDFA3 Rear Panel

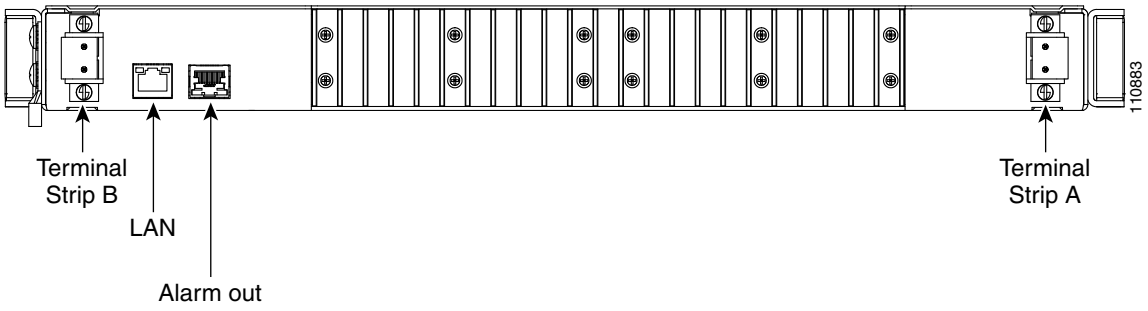


Table 2-12 Rear Panel Features

Feature	Description
Terminal strips A and B	Terminal strip for supplying power to the ONS 15216 EDFA3. Attach AWG 18 stranded power wires to appropriate terminals.
Alarm out	RJ-45 connector used for alarm system connection.
LAN	RJ-45 connector used for 10BaseT Ethernet connection.

2.9 Measurement Units and Representation

Table 2-13 lists the measurement units used for the ONS 15216 EDFA3 parameters exported to the TL1 and SNMP interfaces:

Table 2-13 Measurement Units for ONS 15216 EDFA3 Parameters

Measurement Unit	Represents
dBm	Power
dB	Gain and insertion loss
V	Power bus voltage

The TL1 interface represents the exported values as floating point. The SNMP interface represents the exported values as integers, removing the decimal point.

Installation Reference

This chapter contains reference information that you should read carefully before proceeding with installation of the ONS 15216 EDFA3.

This chapter contains the following sections:

- 3.1 Standard Precautions, page 3-1
- 3.2 Unit Placement and Power Connections, page 3-1
- 3.3 Grounding Precaution, page 3-2
- 3.4 ESD Wrist Strap Instructions, page 3-3

3.1 Standard Precautions

The following standard precautions should be taken when installing the ONS 15216 EDFA3:

- Basic electrical precautions should be followed when installing and powering up the ONS 15216 EDFA3.
- The use of standard fiber handling and cleaning procedures is critical when installing optical networking equipment.
- Eye safety precautions must be employed when handling fiber optic patch cords.

Refer to Appendix A, “Regulatory Compliance and Safety Information” for complete safety information.

3.2 Unit Placement and Power Connections

The following potential hazards should be considered when installing the ONS 15216 EDFA3 within a rack:

- Elevated operating ambient temperature—If the ONS 15216 EDFA3 is installed in a closed or multimodule rack assembly, the operating ambient temperature of the rack environment might be greater than the room ambient temperature. Consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature of 50 degrees Celsius (122 degrees Fahrenheit).

- Reduced air flow—Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. Do not block ventilation holes beyond what is allowed with the supplied mounting brackets. he unit be rack mounted and should have a space at least equal to the height of the ONS 15216 EDFA3 (1 RU) both above and below it.
- Mechanical loading—Mount the equipment in the rack to prevent uneven mechanical loading.
- Circuit overloading—Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits might have on overcurrent protection and supply wiring. Use appropriate consideration of equipment nameplate ratings.
- Reliable grounding—Reliable grounding of rack mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (that is, use of power strip, etc.).

Warning **The ONS 15216 EDFA3 is intended for installation in a restricted access area. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock, key, or other means of security. A restricted access area is controlled by the authority responsible for the location.**

3.3 Grounding Precaution

Electrostatic discharge (ESD) is a discharge of stored static electricity that can damage equipment and impair electrical circuitry. It occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Following are guidelines for preventing ESD damage:

- Before you open a chassis, ensure that power to the unit is off, but that the power cord is connected to the wall receptacle. Having the power cord connected ensures a ground path for any ESD voltages.
- Always use an ESD-preventive wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unpainted surface of the chassis frame or another proper grounding point or surface. Attach it to the inside bottom of the chassis or to the rear panel (inside or outside) without making contact with any connectors or appliques.
- Avoid contact between equipment and clothing. The wrist or ankle strap only protects the equipment from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Handle printed circuit cards and appliques by the edges only; avoid touching the components, traces, or any connector pins.
- Place a removed card component side up on an antistatic surface or in a static shielding bag. If the component is being returned to the factory, immediately place it in a static shielding bag.
- Do not remove the wrist or ankle strap until the installation is complete.

Caution To avoid damaging the equipment, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohms.

3.4 ESD Wrist Strap Instructions

Warning **Before accessing the chassis interior, turn off power to the chassis and unplug the power cord. Use extreme caution around the chassis because potentially harmful voltages are present.**

ESD is the release of stored static electricity that can damage electrical circuitry. Static electricity is often stored in your body, and discharged when you come in contact with an object with a different potential. The ESD wrist strap safely channels this electricity from your body to a proper ground (the chassis).

Use an ESD wrist strap whenever you open a chassis, particularly when you will be handling circuit cards and appliques. In order to work properly, the wrist strap must make good contact at both ends (with your skin at one end, and with the chassis at the other).

Warning **The wrist strap is intended for static control only. It will not reduce or increase your risk of receiving an electric shock from electrical equipment. Follow the same precautions you would use without a wrist strap.**

Ensure that equipment is properly grounded. Turn the chassis power switch off, but leave the power cord plugged in so it is still grounded by the plug.

Do not use the wrist strap while working on equipment with operating voltages greater than 250 V (all Cisco Systems chassis operate at less than 250 V).

3.4.1 Attaching the ESD Wrist Strap

The following steps describe using the wrist strap correctly.

Step 1 Remove the wrist strap from its envelope. One end terminates with a patch of copper foil (this is the equipment end), and the other end has an area with the black metal strip exposed (this is the wrist end).

Step 2 Unwrap the wrist end to expose the adhesive. Place the exposed metal strip (wrist end) against your skin, and wrap the strip firmly around your wrist for a snug fit.

Step 3 Unroll the rest of the strap, and peel the liner from the copper foil patch at the opposite end (equipment end).

Step 4 Attach the copper foil patch to a flat, unpainted surface on the chassis by pressing it firmly onto the surface. We recommend you attach it to the inside bottom of the chassis, the rear panel (inside or outside), or the chassis bottom. Do not make contact with any connectors or appliques.

Step 5 When you are finished working in the chassis, remove the wrist strap and replace the chassis covers.

Installing the ONS 15216 EDFA3

This chapter contains information about installing the Cisco ONS 15216 EDFA3, including:

- 4.1 Unpacking, page 4-1
- 4.2 Installing and Powering Up the EDFA3, page 4-2
- 4.3 Installing the AC Adapter, page 4-3
- 4.4 Verifying the Rack Installation, page 4-4
- 4.5 Connecting the Fiber to the Optical Ports, page 4-4

4.1 Unpacking

Use the following procedure to unpack the ONS 15216 EDFA3.

Step 1 Position the box containing the ONS 15216 EDFA3 with the Cisco ONS 15216 logo right side up.

Step 2 Examine the packing material for any other signs of shipping damage. Report any damage directly to the shipping company.

Step 3 Use a utility knife to slit the packing tape on the top center and top edges of the box and open the top.

Step 4 Remove the packing material.

Step 5 Carefully lift out the ONS 15216 EDFA3 and place it on a flat surface.

Step 6 Remove the ONS 15216 EDFA3 and the desiccant (small white pouch containing a preservative) from the plastic bag. Place the ONS 15216 EDFA3 on a flat surface and discard the desiccant.

Step 7 Read the software license agreement attached to the outside of the bag.

Step 8 Remove the bag. When you remove the bag you accept the conditions of the software license agreement.

4.1.1 Verifying the Unpacking

Before you continue, check to ensure that all equipment is present and is in good working order.

Step 1 Do a visual inspection of all equipment for any obvious damage. If equipment is damaged, contact the Cisco Technical Assistance Center (Cisco TAC). Refer to the Preface for Cisco TAC contact information.

Step 2 Check that the contents of the order match what your company ordered from Cisco. If the contents do not match your order, contact Cisco Customer Service.

Tip Save all packing materials.

4.2 Installing and Powering Up the EDFA3

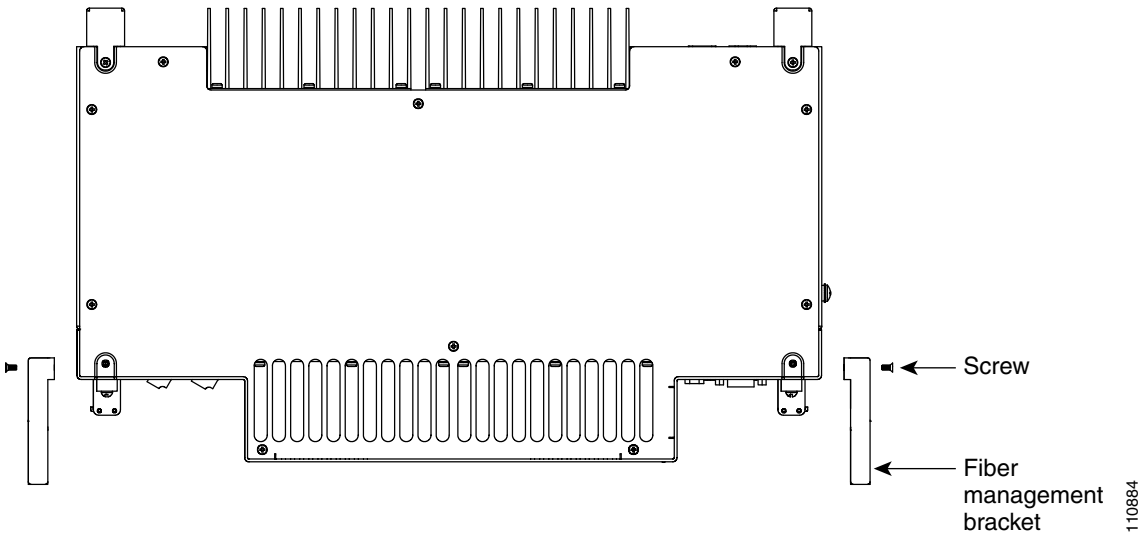
Warning **Before performing any of the following procedures, ensure that the power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

Warning **Be sure to connect ESD wrist or ankle straps prior to starting this procedure and any and all procedures where you are in contact with the rack and/or the EDFA3.**

Use the following steps to install the fiber management brackets, install the ONS 15216 EDFA3 into the rack, and correctly set up the power supply:

Step 1 Set the fiber management brackets on the left-front and right-front sides the unit. Refer to Figure 4-1 for bracket positioning information.

Figure 4-1 Fiber Management Bracket Positioning



Step 2 Secure the fiber management brackets using the four fiber-management mounting screws that are included with each ONS 15216 EDFA3.

Step 3 Mount the ONS 15216 EDFA3 in the rack (19-in. or 23-in. [482-mm or 584-mm) reversible ears). The unit should have a space at least equal to the height of the ONS 15216 EDFA3 (1 RU) both above and below it.

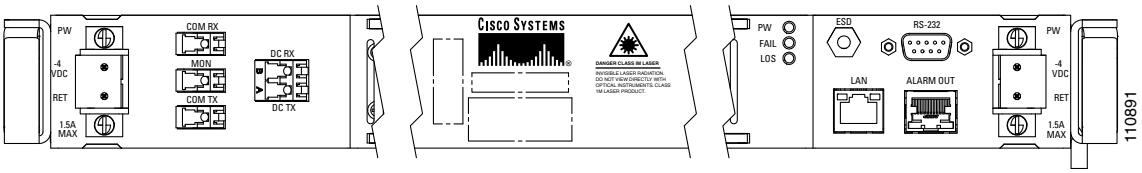
Step 4 Connect the –48 VDC power cable to the office fuse panel (user-provided).

a. 1.5-A fusing is required (user-provided).

b. Use #18 AWG stranded wire (and wire lugs as appropriate).

Step 5 Connect Power Bus A. Connect the power cable from the office fuse panel to the Power Bus A terminals on the ONS 15216 EDFA3. See Figure 4-2 for an illustration of the connections. If you will be using the AC adapter, see the "4.3 Installing the AC Adapter" section on page 4-3.

Figure 4-2 ONS 15216 EDFA3 Front Panel Connections



Step 6 Repeat Step 3 for Power Bus B, if a protection power feed is available. Otherwise, the EDFA3 can work with a single power feed.

Note If the EDFA3 is to be powered with a single power supply, Power Bus A must be used.

Step 7 Connect the facility ground to the ONS 15216 EDFA3 side panel ground using #10-32 x 3/8-inch fasteners with lock washers and ground lugs, or connect to the rear panel ground using ring lugs for #8 studs. Yellow/green striped wire must be used for the ground connection.

The crimping tool must be large enough to accommodate #10-14 AWG stranded wire or #10-12 AWG solid wire. (An example of an approved tool is the SPC Technology type CTT-8420-01 crimper which will accommodate #10-22 AWG wire.)

Step 8 Insert 1.5-A fuses into the fuse panel (user-provided).

Step 9 Untape and reactivate the circuit breaker.

4.3 Installing the AC Adapter

The ONS 15216 EDFA3 can be ordered with an AC adapter for use in locations that do not have –48-VDC electrical power available. The installation of the adapter is as follows:

Step 1 Connect the spade lugs of the AC adapter to Power Bus A of the EDFA3 unit before plugging the adapter into AC electrical power. The lug with the light blue sleeve is –48 V, while the lug with the black sleeve is the return (RTN).

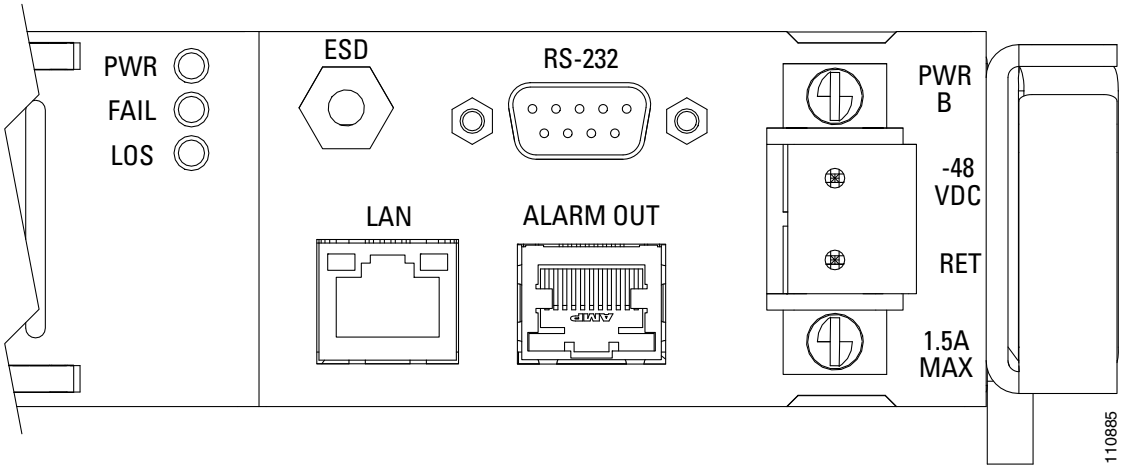
Warning **In case of AC adapter, single power supply on Power Bus A must be used. The AC adapter does not provide grounding; therefore, dual power supply can damage the EDFA3 by providing two potentially different voltage reference grounds.**

Step 2 Connect the AC plug of the adapter to 110 to 115 VAC at 60 Hz (or 120 VAC at 50 Hz). The adapter will automatically turn on, and the EDFA3 will power up.

4.4 Verifying the Rack Installation

The Power LED on the front panel of the ONS 15216 EDFA3 illuminates when the power is supplied (Figure 4-3).

Figure 4-3 Front Panel Power LED



4.5 Connecting the Fiber to the Optical Ports

The LC/UCP optical ports on the ONS 15216 EDFA3 are as follows:

- Optical input signal to be amplified (labeled COM-RX): Input must be between –40 dBm and +12 dBm.
- Optically amplified output (labeled COM-TX)
- Optical monitored output signal (labeled MON): 1 percent tap of output or 20 dB below output signal
- First stage output signal (labeled DC-TX)
- Second stage input signal (labeled DC-RX)

Warning **Follow all directions and warning labels when working with optical fibers. To prevent eye damage, never look directly into a fiber or connector.**

Warning **Invisible laser radiation. Do not view directly with optical instruments. Class 1m laser product.**

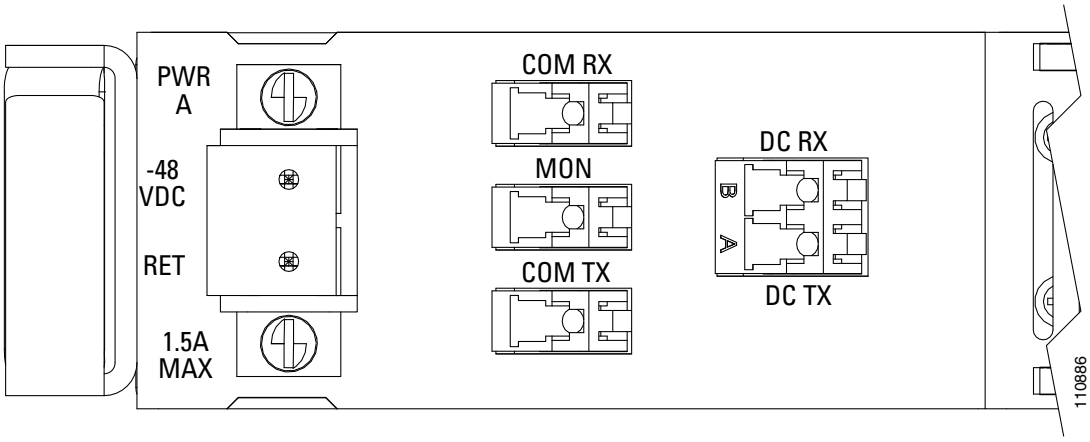
Warning **Laser specifications:**
Peak power: 500 mW
Wavelength: 1528 to 1610 nm
Safety: Class 1M Laser Product per IEC/EN 60825-1/A2:2001 standard

The optical connection procedure consists of:

- Cleaning the fibers
- Connecting the fibers to the relative amplifier ports

Connect the customer-supplied fiber optic patch cords to the LC/UPC optical ports of the ONS 15216 EDFA3 using the following procedure. Refer to Figure 4-4 while performing this procedure.

Figure 4-4 ONS 15216 EDFA3 Optical Connections



Step 1 Clean both ends of the two fiber optic patch cords, using your site procedure. If no site procedure exists, refer to the Cisco document "Cleaning Procedure for Fiber Optic Connectors."

Step 2 Connect a patch cord from the incoming outside plant fiber (that is, the port where the signal to be amplified is input) to the ONS 15216 EDFA3 COM-RX connector.

Step 3 Connect a patch cord from the DC-TX connector to the ONS 15216 Dispersion Compensating Unit (DCU) RX connector.

Step 4 Connect a patch cord from the ONS 15216 DCU TX port to the ONS 15216 EDFA3 DC-RX port.

Note If the DCU is not required by the network design, connect the DC-TX port and the DC-RX port with an LC loopback attenuator or an attenuating patch cord with 5 dB loss (supplied inside the package).

Step 5 Connect a patch cord from the COM-TX port to the outgoing outside plant fiber.

Note The ONS 15216 EDFA3 does not work until the LINE1RXPwrTHFailLow threshold is set (see the "7.5 Use TL1 to Set the Amplifier Alarm Thresholds" section on page 7-3).

Communicating with the ONS 15216 EDFA3

This chapter contains information about communicating with the ONS 15216 EDFA3. The sections in this chapter contain the following information:

- 5.1 Alarm Out Relay Interface (RJ-45), page 5-1
- 5.2 Alarm LEDs, page 5-2
- 5.3 Communicating with the EDFA3 Through a Serial EIA/TIA-232 (RS-232) Interface, page 5-4

5.1 Alarm Out Relay Interface (RJ-45)

The ONS 15216 EDFA3 Alarm Out (RJ-45) port reports alarm status for the following:

- Loss or degradation of electrical power
- Laser pump overheating or excessive pump current, output power, gain, or case temperature
- Loss or degradation of optical input signal

These alarms can be connected to a network operations center (NOC) using the following methods:

- Cisco ONS 15454 miscellaneous discrete input (See Chapter 13, "Network Access to the ONS 15216 EDFA3 Using the ONS 15454" for more details about the ONS 15454.)
- Central office (CO) alarm panel/system

Table 5-1 provides the ONS 15216 EDFA3 RJ-45 alarm pinout and alarm definitions.

Table 5-1 Alarm Pinout and Definitions (RJ-45)

Relay	Pinout	Description
0	1 (0+)	HW failure.
	2 (0–)	
1	3 (1+)	Laser pump temperature or bias is out of range.
	4 (1–)	
2	5 (2+)	Loss of optical input signal or input signal is below threshold.
	6 (2–)	
3	7 (3+)	Loss of electrical power or out of range for Bus A or Bus B while in duplex mode.
	8 (3–)	

The following procedure describes how to set up alarm contacts. In order to accomplish this, you must:

- Connect the RJ-45 cable to the panel of the ONS 15454 shelf
- Connect the alarm cable to the alarm system contacts

To set up alarm contacts, follow these steps:

Step 1 Connect the RJ-45 cable to the stub-end connector using a #22 AWG solid wire.

Note Note that the cable and connector are not provided.

Step 2 Connect the alarm cable to the alarm system contacts:

a. Cisco ONS 15454 medium-dependent interface (MDI) wire wrap pins, located on the rear panel of the ONS 15454 shelf

b. CO alarm panel

Refer to Table 5-1 for information concerning alarm contacts. Refer to the "5.2 Alarm LEDs" section for information about the ONS 15216 EDFA3 alarm LEDs.

5.2 Alarm LEDs

The ONS 15216 EDFA3 has seven LEDs:

- POWER
- FAIL
- LOS
- Ethernet socket (two sockets with two LEDs on each socket)

Three of these LEDs, POWER, FAIL, and loss of signal (LOS), are located at the left side of the front panel of the ONS 15216 EDFA3. The two Ethernet LEDs are located at the top left and right sides of the Ethernet socket. When the module is powered on, an LED test is performed.

The following table summarizes the external alarms LEDs and contacts.

Table 5-2 LED Indicators of Normal and Fault States

LED	LED Normal State	LED Fault State	Fault Description	ALARM OUT Pair	ALARM OUT Contact Normal State	ALARM OUT State	Serial Alarms
Power	ON	OFF	Both A and B DC Power have failed.	1	Open	Closed	None
		Flash	A or B power has failed.	4	Open	Closed	Either "A Power Fail" or "B Power Fail"

Table 5-2 LED Indicators of Normal and Fault States (continued)

LED	LED Normal State	LED Fault State	Fault Description	ALARM OUT Pair	ALARM OUT Contact Normal State	ALARM OUT State	Serial Alarms
Fail	OFF	ON	High pump laser current	2	Open	Closed	Fail
LOS	OFF	ON	Input optical signal is below provisioned threshold.	3	Open	Closed	LOS

5.2.1 POWER LED (Green)

The POWER LED is green. This LED functions as follows:

- ON: –48 VDC power is within tolerance. (Power Bus A and Power Bus B are powered normally.)
- OFF: No –48 VDC power, or power is out of tolerance from the internal power supply. (Power Bus A and Power Bus B are not powered.)
- Flashing: In duplex mode, Power Bus A or Power Bus B has failed or is out of tolerance. In simplex mode, Power Bus A is out of tolerance.

In the OFF condition, the first pair of alarm relay contacts in the RJ-45 connector changes from a normally open condition to a closed condition. The LED and alarm automatically reset when the condition clears. (For additional alarm contact closure information, see the "Alarm Out Relay Interface (RJ-45)" section on page 5-1.)

5.2.2 FAIL LED (Red)

The FAIL LED is red. This LED has two states:

- ON: The laser pump bias, laser pump temperature, output power, gain, or case temperature is out of tolerance. (A major internal failure has occurred.)
- OFF: The laser pump bias or laser pump temperature is in the specified range (or no –48 VDC power is present).

In the ON condition, the second pair of alarm relay contacts in the RJ-45 connector changes from a normally open to a closed condition. If an invalid input optical signal is applied to the ONS 15216 EDFA3, the FAIL LED is illuminated. The LED and alarm automatically reset when the condition clears.

5.2.3 LOS LED (Yellow)

The loss of signal (LOS) LED is yellow. This LED has two states:

- ON: The optical input power to the ONS 15216 EDFA3 is below the loss of input threshold. (A LOS threshold decision occurs.)
- OFF: The optical input power is within the input threshold (or no –48 VDC power is present).

In the ON condition, the third pair of alarm relay contacts in the RJ-45 connector changes from a normally open condition to a closed condition. The LED and alarm automatically reset when the condition clears.

5.2.4 Ethernet Socket LEDs

Two Ethernet socket LEDs are located at the top left and right sides of the Ethernet socket. These LEDs are both green. These LEDs function as follows:

- If the left Ethernet socket LED is on, the link is up.
- If the right Ethernet socket LED is on or flashing, there is Ethernet traffic.

5.3 Communicating with the EDFA3 Through a Serial EIA/TIA-232 (RS-232) Interface

This section describes communication with the ONS 15216 EDFA3 using a serial connection. Establishing a serial communications link with a ONS 15216 EDFA3 requires the equipment listed in Table 5-3.

Table 5-3 Equipment Checklist

Hardware	Comments
Laptop or VT100, running HyperTerminal.	User-provided. HyperTerminal can be found in the Microsoft Windows Accessories menu.
EIA/TIA-232 (RS-232) cable with DB-9F/DB-9M connectors wired.	Provides EIA/TIA-232 (RS-232) link to ONS 15216 EDFA3.

To set up an EIA/TIA-232 (RS-232) link to the ONS 15216 EDFA3, use the following procedure. (The procedure uses HyperTerminal and a connection through the COM1 port on the PC.)

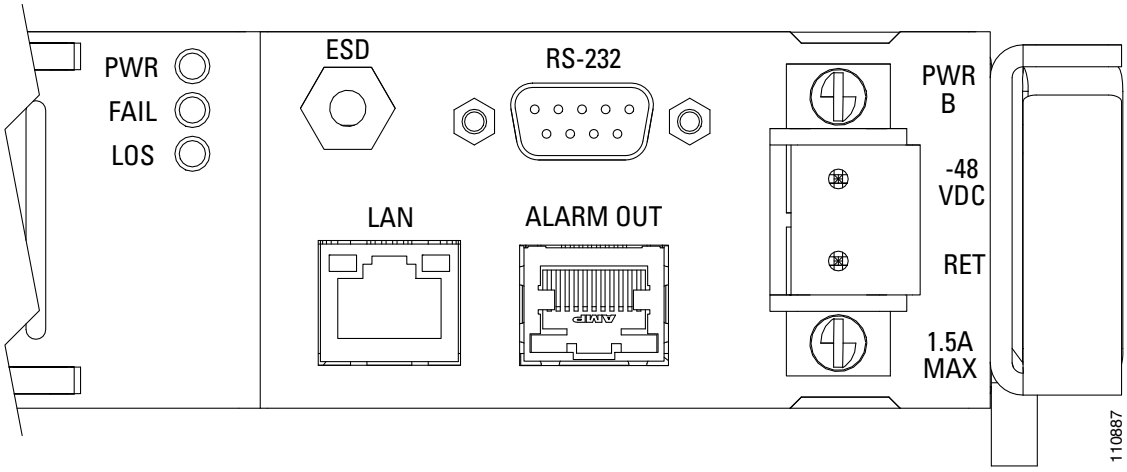
This procedure consists of:

- Physically connecting the ONS 15216 EDFA3 to a laptop
- Opening HyperTerminal
- Using HyperTerminal to set up communications between the PC and the ONS 15216 EDFA3
- Configure the port settings
- Configure the ASCII settings

Step 1 Connect the DB-9F end of the EIA/TIA-232 (RS-232) data cable (straight cable, user provided) to the laptop COM1 port.

Step 2 Connect the DB-9M end of the EIA/TIA-232 (RS-232) data cable to the EIA/TIA-232 (RS-232) serial port connection on the front panel of the ONS 15216 EDFA3 (Figure 5-1).

Figure 5-1 EIA/TIA-232 (RS-232) Serial Port Connector on the ONS 15216 EDFA3



Step 3 To configure a connection, open HyperTerminal. (HyperTerminal can be found in the Microsoft Windows **Accessories > Communications** menu.)

Step 4 A Connection Description dialog box appears (Figure 5-2). Type "Optical Amplifier" in the **Name** field and select an icon to use for the connection, for example the telephone icon at the bottom left of the dialog box.

Figure 5-2 Hyper Terminal Connection Description Dialog Box

Step 5 Click **OK**.

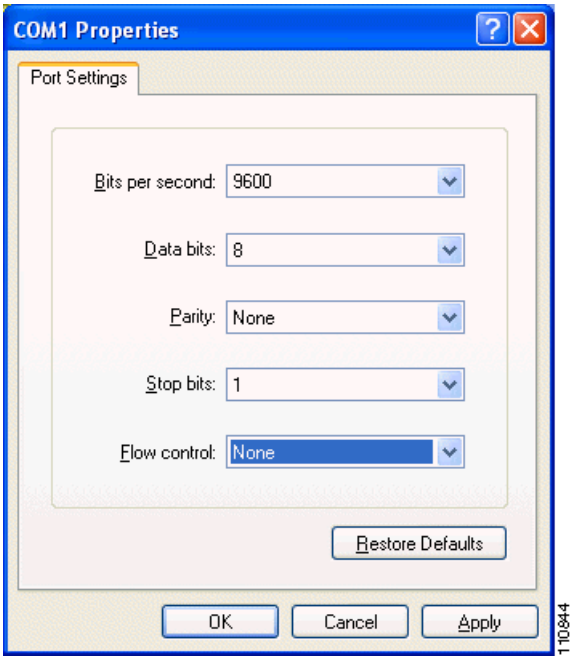
Step 6 In the Connect To dialog box (Figure 5-3), click **COM1** in the Connect using field.

Step 7 Click **OK**.

Figure 5-3 HyperTerminal Connect To Dialog Box

Step 8 Configure the Port Settings in the COM1 Properties dialog box as shown in Figure 5-4.

Figure 5-4 HyperTerminal COM1 Properties Dialog Box



Step 9 Click **OK** when done.

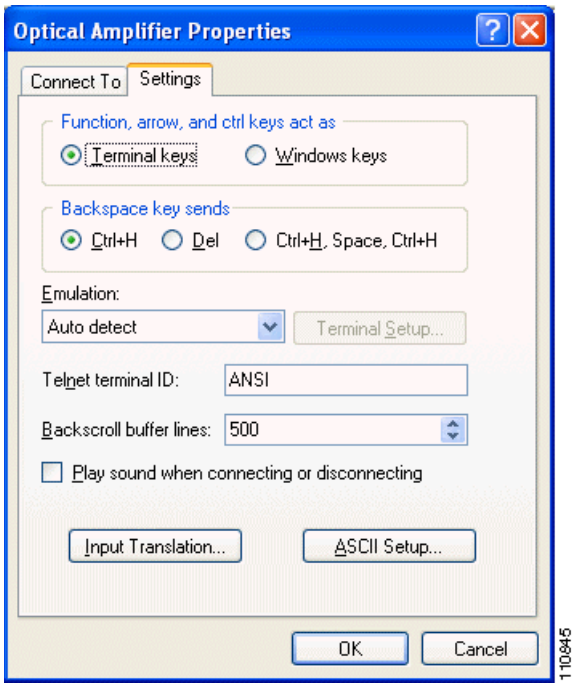
Step 10 In the HyperTerminal main window, select **File > Properties**.

Step 11 Make sure that the **Connect To** tab in the Optical Amplifier Properties dialog box is selected.

Step 12 Ensure that **Direct to Com1** is selected in the Connect using field.

Step 13 Click the **Settings** tab. The dialog box shown in Figure 5-5 appears.

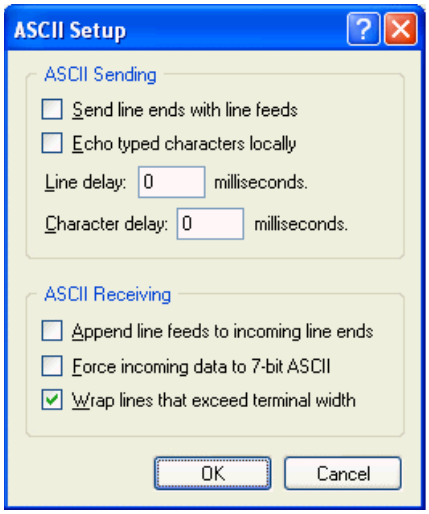
Figure 5-5 Optical Amplifier Properties Dialog Box (Settings Tab)



Step 14 Click the **ASCII Setup** button.

Step 15 Configure the selections in the ASCII Setup dialog box as shown in Figure 5-6.

Figure 5-6 HyperTerminal ASCII Setup Dialog Box



Step 16 Click **OK** when done.

Step 17 Click **OK** in the Optical Amplifier Properties dialog box to return to the main HyperTerminal window. The ONS 15216 EDFA3 default TL1 login screen appears.

Table 5-4 shows the Windows HyperTerminal configuration.

Table 5-4 Windows HyperTerminal Configuration Summary

Parameter	Value
Emulation	ANSI, 9600 bps
Data Bits	8
Parity	None
Stop Bit	1
Flow Control	None

About TL1 Commands

This chapter describes some reference information about using the TL1 commands supported by the Cisco ONS 15216 EDFA3.

Note TL1 commands that are not entered correctly will not be completed. Each TL1 command terminates with a semicolon (;).

This chapter contains the following information:

- 6.1 TL1 Command Rules, page 6-1
- 6.2 Parameter Persistence, page 6-2
- 6.3 Parameter Saving, page 6-3
- 6.4 Alarm Correlation, page 6-3
- 6.5 TL1 Help, page 6-5
- 6.6 Explanation of TL1 Command Parameters, page 6-5
- 6.7 TL1 Notation Symbols, page 6-10
- 6.8 Summary of TL1 Autonomous Alarms and Messages, page 6-10
- 6.9 Summary of TL1 Command Security Permissions, page 6-14

6.1 TL1 Command Rules

The following rules apply to all TL1 commands:

- All TL1 commands end with a semicolon (;).
- When you type a TL1 command, the command will return one of two responses:
  - `COMPLD` (The command was completed.)
  - `DENY` (Something was wrong with the command, and it was denied.)
- Ethernet TL1 sessions are available from TCP/IP port 3082 (for raw TL1 with no echo)
- Telnet TL1 sessions are available from TCP/IP port 3083

A list of TL1 errors is contained in the "8.7.1 TL1 Error Format" section on page 8-67.

6.2 Parameter Persistence

The ONS 15216 EDFA3 can save all configurable parameters and the alarm log files in a persistent area (EEPROM or Configuration File in FFS).

The ONS 15216 EDFA3 recovers with all configurable parameters set at values before the event occurrence in the following cases:

- Power failure
- Reset
- Software download

Configurable parameters will be reset to manufacturer's default values only in the following cases:

- When a reset equipment command (STA-LOCL-RST) has been issued by the administrative user
- When the configuration file has been deleted by the administrative user
- When the configuration file has been corrupted. In this case an alarm/trap DATAFLT is emitted to signal the abnormal condition. The alarm is cleared as soon as a correct file has been loaded.

Note A checksum test on the downloaded configuration file is performed to prevent to load wrong or corrupted files from being loaded on the ONS 15216 EDFA3.

The user can restore the configurable parameters even if saved in another ONS 15216 EDFA3.

The configuration file is composed of two sections. The first one (the header) shows the file type, description, software name, node name, and IP address parameters in a readable format, as reported in the following example:

```
FileType=CISCO ONS 15216 EDFA3 Database File
Description=CISCO ONS 15216
ActiveSoftwareName=ONS 15216Edfa3_01.00.00_003L_12.23
Node Name=Monza
IP-Address=10.51.100.95
```

Note that the active software name and IP address contained in the configuration file header might be different from the ones present in the node, if the configuration file has been created in one ONS 15216 EDFA3and then exported to another ONS 15216 EDFA3. These parameters must be updated with the information contained in the second ONS 15216 EDFA3 after the first unit reset. The node name in the header file is aligned with the name parameter contained in the second file section.

The second file section provides the configuration parameters and the information related to the accounts and passwords for TL1 and Simple Network Management Protocol (SNMP) Interfaces in an encrypted format. The configuration parameters are listed below:

- CTRLMODE
- GAINSP
- PWROFFSET
- LINE1TXPWRSP
- LINE1TXPWRTHFL
- LINE1RXPWRTHFL
- LINE2RXPWRTHFL
- TILTSP

- TILTOFFSET
- OSRI
- PWRBUSMODE
- NAME
- LONGITUDE
- LATITUDE
- DESCR
- PWRBUSMIN
- PWRBUSMAX
- MAXCTMP
- MINCTMP

When the configuration file is being backed up or restored, the ONS 15216 EDFA3 prevents any management operation that might change the current setting. In order to prevent this, the ONS 15216 EDFA3 generates an alarm (BACKUPREST) to signal that the backup/restore operation is in progress. When this happens, the ONS 15216 EDFA will complete the following:

1. Refuse any operations that change the configuration.
2. Perform the backup/restore.
3. Clear the BACKUPREST alarm and enable the configuration change.

6.3 Parameter Saving

When the user performs a setting operation using the TL1 or the SNMP interface, the parameters are automatically saved in persistent memory without requiring a further command.

6.4 Alarm Correlation

Typically, only the alarms that correspond to faults at the root level are relevant for system management. The alarm correlation processes try to eliminate all the alarms that are symptomatic effects of the fault root alarm.

An alarm filtering method is implemented in the ONS 15216 EDFA3. When one alarm at the root level causes a symptomatic effect on other alarms, only the root alarm will be notified.

To describe the rules implemented in the ONS 15216 EDFA3, we use a table like the one shown in Table 6-1. In Table 6-1, Alarm N (root), if present, masks Alarm M (symptomatic).

Table 6-1 Alarm Correlation Example

	Alarm 1	Alarm M
Alarm 1		
Alarm N		X

Table 6-2 shows the ONS 15216 EDFA3 alarm correlation information. Using Table 6-2, you can see the masking rules. Where an "x" is present, the alarms listed in the rows will mask the alarms listed in the columns. Where a "–" is present, the combination is invalid (for example, the L1TMP alarm cannot mask itself, so a dash is placed in that cell.

Table 6-2 ONS 15216 EDFA3 Alarm Correlation Table

	L1TMP	L2TMP	L1BIASD	L2BIASD	L1BIASF	L2BIASF	LINE1RXPWRFL	LINE2RXPWRFL	LINE1TXPWRFL	LINE1TXPWRDL	LINE1TXPWRDH	FTMP	CTMP	VOADL	VOADH	VOAFH	GAINDL	GAINDH	EQPT	COMFAIL	PWRBUSA	PWRBUSB	MEMLOW	FFSFULL	DATAFLT	SFTWDOWN	BACKUPREST
L1TMP	–																										
L2TMP		–																									
L1BIASD			–																								
L2BIASD				–																							
L1BIASF					–																						
L2BIASF						–																					
LINE1RXPWRFL				x		x	–	x	x							x	x	x									
LINE2RXPWRFL				x		x		–	x							x	x	x									
LINE1TXPWRFL									–							x	x	x									
LINE1TXPWRDL										–																	
LINE1TXPWRDH											–																
FTMP												–															
CTMP													–														
VOADL														–			–										
VOADH															–												
VOAFH																–											
GAINDL																	–										
GAINDH																		–									
EQPT	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	–	x								
COMFAIL																				–							
PWRBUSA																					–						
PWRBUSB																						–					
MEMLOW																							–				
FFSFULL																								–			
DATAFLT																									–		
SFTDOWN																										–	
BACKUPREST																											–

6.5 TL1 Help

After logging in, a TL1 command list can be displayed by typing a question mark, as shown in the following example.

Example 6-1 Displaying TL1 Commands

```
> ?
ACT-USER
ALW-MSG-ALL
APPLY
CANC-USER
COPY-RFILE
CPY-MEM
DLT-RFILE
DLT-USER-SECU
ED-DAT
---Type ? to continue or CTRL-Q to quit---
```

The number of commands displayed in the window depends on the size of the window.

To display the syntax of a command, type that command followed by a question mark. For example, typing `ACT-USER?` returns:

```
> ACT-USER?
ACT-USER:[<TID>]:<uid>:<ctag>::<pid>;
>
```

6.6 Explanation of TL1 Command Parameters

TL1 messages are grouped into autonomous and nonautonomous types.

Autonomous messages are generated as a result of activity on the network elements. This activity includes:

- Alarms
- Thresholds
- Alerts
- Status information

No request is required in order to receive autonomous messages.

Nonautonomous messages consist of a request command from the user and a response from the ONS 15216 EDFA3. Autonomous messages and nonautonomous commands use a common set of parameters. Some of the most common parameters are defined in the following sections.

6.6.1 Source Identifier (sid) and Target Identifier (tid) for TL1

The source identifier (sid) or target identifier (tid) parameters uniquely identify an ONS 15216 EDFA3. Each sid/tid can be up to twenty ASCII characters in length, limited to digits, letters, and hyphens. The tid can remain null (represented by two successive colons [::]).

6.6.2 TL1 Command Code Modifier (ccm)

The command code modifier (ccm) identifies the object of the action being applied by the verb of the TL1 command.

Some command code modifiers for the ONS 15216 EDFA3 are described in the Table 6-3.

Table 6-3 Command Code Modifiers

ccm	Description
DWDM	Optical parameters
EQPT	General parameters of the ONS 15216 EDFA3
INV	Inventory parameters
NE-GEN	IP communications parameters

6.6.3 Access Identifier (aid)

The access identifier (aid) parameter uniquely identifies a specific object within the ONS 15216 EDFA3. For the ONS 15216 EDFA3, there are four specific access identifiers. In addition, there is one nonspecific identifier.

- 1
- PWR-A
- PWR-B
- EQPT
- <IP address>

As well, there is an additional ALL aid, described in the Table 6-4.

All autonomous messages identify their specific aid in the message. For all command inputs that require an aid as a mandatory parameter, the ALL aid is accepted along with any relevant specific aids. If the ALL aid is used in a command, the response contains the appropriate specific aid. For the commands RTRV-ALM-EQPT and RTRV-COND-EQPT, inputting a specific aid filters the response to information relevant to that aid.

Table 6-4 Access Identifiers

aid	Description
1	Directly affecting the optical signal.
PWR-A	Affecting Power Bus A (or both A and B).
PWR-B	Affecting Power Bus B.

Table 6-4 Access Identifiers (continued)

aid	Description
EQPT	General parameters of the ONS 15216 EDFA3 (not directly affecting optical signal or power bus).
ALL	Any or all of the preceding (command input only).
<IP address>	Addresses a specific row of an SNMP Trap Destination Table.

6.6.4 TL1 Correlation Tag (ctag)

The correlation tag (ctag) is a unique user-specified tag associated with a command. If the user specifies a ctag while entering a command, the response of that command from the ONS 15216 EDFA3 TL1 agent carries the same ctag value. The ctag consists of no more than six alphanumeric characters. For example, the ctag in the following example is 123, which will be returned in any response to this command to correlate the command to the response.

```
ALW-MSG-ALL:TID:ALL:123::MJ,PWRBUSA,;
```

6.6.5 Automatic Tag (atag)

An automatic tag (atag) is a numeric transaction identifier in the range 0 through 999999. The value of the atag is automatically generated by a TL1 agent and is used as a sequence number for automated messages. When the atag value reaches 999999, the value wraps back to 0. The initial atag value is 0.

6.6.6 Notification Code (ntfcncode)

A notification code (ntfcncode) specifies the type of notification to be generated by the ONS 15216 EDFA3 on the occurrence of an event described by the condition. Notification codes are described in Table 6-5.

Table 6-5 Notification Code Descriptions

Notification Code Value	Description
CL	Cleared alarm—Indicates an alarm that is no longer present.
CR	Critical alarm—Indicates a severe, service-affecting alarm that needs immediate correction.
MJ	Major alarm—Serious alarm, but the failure has less impact on the network than a critical notification.
MN	Minor alarm—No serious affect on service.
NA	Not alarmed—Used to indicate a not alarmed object.
NR	Not reported—This is an alarm retained in the NE. It is recorded internally but is not reported when an event occurs.

6.6.7 Condition Effect (condeff)

A condition effect (condeff) indicates the effect of an event on the condition of the NE. Table 6-6 shows the possible condeff values used by the ONS 15216 EDFA3.

Table 6-6 Condition Effect Descriptions

Condition Effect Value	Description
CL	Standing condition cleared
SC	Standing condition raised
TC	Transient condition

6.6.8 Service Effect (serveff)

A service effect (serveff) indicates the effect of a reported alarm on the operation of the equipment.

Table 6-7 reports the possible values used by the ONS 15216 EDFA3.

Table 6-7 Service Effect Descriptions

Service Effect Value	Description
NSA	Non service affecting condition
SA	Service affecting condition

A service affecting (SA) failure affects a provided service or affects the network's ability to provide a service.

6.6.9 Private Identifier (pid)

A private identifier (pid) is the user password. It must be a string of up to 10 characters, where at least two are nonalphabetic characters and at least one is a special character. Special characters are +, #, %. The minimum length is six, except for the default password which is a null string.

The following security rules are implemented:

- The password identifier (pid) must not be the same as or contain the userid (uid). For example, if the userid is CISCO15, the password cannot be CISCO15#.
- There is no password identifier (pid) toggling. This means that if the current password is CISCO15#, the new password cannot be CISCO15#.
- The password is case sensitive.

6.6.10 User Identifier (uid)

The user identifier (uid) is a string consisting of any combination of up to ten alphanumeric characters. The minimum length of a uid is six.

6.6.11 User Access Privilege (uap)

The user access privilege (uap) is one of three levels of user access privileges:

- R: Read only privileges
- RW: Read and write privileges
- RWA: Read, write, and administrative privileges

6.6.12 Alarm Code (almcode)

An alarm code (almcode) indicates the severity of an automatic message. Table 10 reports the possible values.

Table 6-8 Alarm Code Descriptions

Alarm Code	Description
*C	Critical alarm
**	Major alarm
*^	Minor alarm
A^	Automatic message or no alarm

6.6.13 Date

The date parameter indicates the date of the event. The syntax is yyyy-mm-dd.

6.6.14 Time

The time parameter indicates the time of the event. The syntax is hh-mm-ss.

6.6.15 Occurrence Date (ocrdat)

An occurrence date (ocrdat) indicates the date (month-day) of an event occurrence. The format for ocrdat is MOY-DOM, where:

- MOY represents month of year and has a range of 1 to 12.
- DOM represents day of month and has a range of 1 to 31.

6.6.16 Occurrence Time (ocrtm)

An occurrence time (ocrtm) indicates the time (hour-minute-second) of an event occurrence. The format for ocrtm is HOD-MOH-SOM, where:

- HOD represents hour of day and has a range of 0 to 23.
- MOH represents minute of hour and has a range of 0 to 59.

- SOM represents second of minute and has a range of 0 to 59.

6.7 TL1 Notation Symbols

The commands described in this document use the symbols shown in the following table to describe the command format. These symbols are derived from the Telcordia Network Maintenance: Network Element and Transport Surveillance Messages Manual (Generic Requirements, GR-833-CORE).

Table 6-9 TL1 Notation Symbols

Symbol	Meaning	Description
[ ]	Optional expression	Square brackets indicate that the parameters are optional. An optional parameter means that if a user inputs an empty field for an optional parameter, then a default value (or a default action) will be substituted automatically in the transmitted input field. The default value, or null value, is defined in the parameter descriptions of the messages.
< >	Variable expression	Angle brackets enclose one or more variable items in the command line (for example, <date>, <time>, <aid>).
+	More than one time	A plus sign indicates that the preceding symbol or group of symbols (enclosed in parentheses) can occur one or more times.
text	Indent of three spaces	An indented line indicates an entry of three spaces in the command line.

6.8 Summary of TL1 Autonomous Alarms and Messages

Table 6-10 summarizes the ONS 15216 EDFA3 autonomous alarms.

For every alarm, the following fields are provided:

- Condition type (condtype)
- Condition descriptor (conddescr)
- Access identifier (aid)
- Notification code (ntfcncde)
- Service effect (sereff)

See the tables in the "6.6 Explanation of TL1 Command Parameters" section on page 6-5 for descriptions of the column values in Table 6-10.

Table 6-10 TL1 Autonomous Alarms

TL1 Autonomous Message	Condition Type (condtype)	Condition Descriptor (conddescr)	Access Identifier (aid)	Notification Code (ntfcncde)	Service Effect (sereff)
REPT ALM EQPT	PWRBUSA	Power Bus A Alarm	PWR-A	MN	NSA
REPT ALM EQPT	PWRBUSB	Power Bus B Alarm	PWR-B	MN	NSA

Table 6-10 TL1 Autonomous Alarms (continued)

TL1 Autonomous Message	Condition Type (condtype)	Condition Descriptor (conddescr)	Access Identifier (aid)	Notification Code (ntfcncde)	Service Effect (sereff)
REPT ALM EQPT	MEMLOW	Free Memory on System Very Low	EQPT	MN	NSA
REPT ALM EQPT	FFSSLOW	Flash File System Capacity Very Low	EQPT	MN	NSA
REPT ALM EQPT	DATAFLT	Data Integrity Fault	EQPT	MJ	SA
REPT ALM EQPT	BACKUPREST	BackUp/Restore ConfFile In Progress	EQPT	MN	NSA
REPT ALM EQPT	SFTWDOWN	Software Download In Progress	EQPT	MN	NSA
REPT ALM EQPT	EQPT	Equipment Failure	EQPT	CR	SA
REPT ALM EQPT	COMFAIL	Module Communication Failure	EQPT	MN	NSA
REPT ALM EQPT	CTMP	Case Temperature Out Of Range	EQPT	MN	NSA
REPT ALM EQPT	FTMP	Fiber Temperature Out Of Range	EQPT	MN	NSA
REPT ALM EQPT	L1TMP	Excessive Pump 1 Temperature	EQPT	MN	NSA
REPT ALM EQPT	L1BIASD	Laser 1 Bias Degrade	EQPT	MN	NSA
REPT ALM EQPT	L1BIASF	Laser 1 Bias Fail	EQPT	MJ	NSA
REPT ALM EQPT	L2TMP	Excessive Pump 2 Temperature	EQPT	MN	NSA
REPT ALM EQPT	L2BIASD	Laser 2 Bias Degrade	EQPT	MN	NSA
REPT ALM EQPT	L2BIASF	Laser 2 Bias Fail	EQPT	MJ	NSA
REPT ALM DWDM	LINE1RXPWRFL	Power Fail Low LINE1RX Port	1	CR	SA
REPT ALM DWDM	GAINDH	Gain Degrade High	1	MN	NSA
REPT ALM DWDM	GAINDL	Gain Degrade Low	1	MN	NSA
REPT ALM DWDM	LINE1TXPWRFL	Power Fail Low LINE1TX Port	1	CR	SA
REPT ALM DWDM	LINE1TXPWRDH	Power Degrade High LINE1TX Port	1	MN	NSA
REPT ALM DWDM	LINE1TXPWRDL	Power Degrade Low LINE1TX Port	1	MN	NSA
REPT ALM DWDM	LINE2RXPWRFL	Power Fail Low LINE2RX Port	1	CR	SA
REPT ALM DWDM	VOADH	VOA Degrade High	1	MN	NSA
REPT ALM DWDM	VOADL	VOA Degrade Low	1	MN	NSA
REPT ALM DWDM	VOAFH	VOA Fail High	1	CR	SA

6.8.1 Equipment Failure Alarms

The unit will generate the EQPT (Equipment Failure) alarm in either of the following cases:

- Retrieving or setting problem related to the setpoints, thresholds, and values.
- An unrecoverable communication problem between the unit and a plug-in interface.

The Unit software generates a Communication Failure alarm in the case of a communication problem between the unit and the plug-in interface. The unit software implements the following behavior:

1. The software tries to recover the communication, sending the command to module.

2. If the command answers fail, the Communication Failure alarm is raised, which resets the plug-in module.
3. If the reset command fails, the Hardware Failure alarm is generated.
4. In case of a Hardware Failure, every TL1/SNMP command relating to the module setting/retrieval, is refused.

The Fiber Temperature Fail High (FTMP) alarm is generated in the case of degrade high or low. The FTMP alarm is mapped on an EQPT alarm.

6.8.2 Other Alarms

The following additional alarms are possible:

- The L1TMP alarm is provided in case of degrade high or low of laser 1.
- The L2TMP alarm is provided in case of degrade high or low of laser 2.
- The L1BIASD alarm is provided in case of Laser Bias degrade high or low of laser 1.
- The L2BIASD alarm is provided in case of Laser Bias degrade high or low of laser 2.
- The L1BIASF is provided in case of Laser Bias Fail of laser 1.
- The L2BIASF is provided in case of Laser BIas Fail of laser 2.
- The CTMP alarm is generated in the case of degrade high or low.
- The GAINDH and GAINDL alarms are sent to the EM only if the EDFA3 control mode is set to Gain Control. If the user changes the EDFA3 control mode to Output Power Control, the alarms are cleared and resent (only if active) after subsequent changes to the EDFA3 control mode.

Note The LINE1TXPWRDH and LINE1TXPWRDL alarms have a similar behavior. They will be generated only if the EDFA3 control mode is set to Power Control.

- The Unit software generates a Communication Failure alarm if a communication problem exists between the unit and the plug-in interface.
- The MEMLOW alarm is generated if the memory usage reaches 90 percent of its capacity. The clear alarm is generated when the problem condition disappears.
- The FFSFULL alarm is generated if the flash file system (FFS) memory usage reach the 90 percent of its capacity.
- The clear alarm is generated when the problem condition disappear.

In the case of a communication failure, the unit software implements the following behavior:

1. The unit attempts to recover the communication, sending the command to the module.
2. If the command fails, the Communication Failure alarm is raised.
3. The module resets.
4. If the reset command fails, the Hardware Failure alarm is generated.
5. If the Hardware Failure alarm is generated, all TL1/SNMP commands related to the module setting/retrieval will be refused.

6.8.3 Autonomous Events

Table 6-11 summarizes the ONS 15216 EDFA3 autonomous events. In the Condition Effect column, TC indicates that this is a transient condition.

Table 6-11 TL1 Autonomous Events

TL1 Autonomous Message	Condition Type (condtype)	Condition Descriptor (conddescr)	Access Identifier (aid)	Condition Effect (condeff)
REPT EVT DWDM	CTRLMODE	Control Mode Changed	1	TC
REPT EVT DWDM	GAINCHGD	Gain Setpoint Changed	1	TC
REPT EVT DWDM	GAINTHDLCHGD	Gain Degrade Low Threshold Changed	1	TC
REPT EVT DWDM	GAINTHDHCHGD	Gain Degrade High Threshold Changed	1	TC
REPT EVT DWDM	OPOFFSET	Output Power Offset Changed	1	TC
REPT EVT DWDM	LINE1TXPWRCHGD	Power Setpoint Changed LINE1TX Port	1	TC
REPT EVT DWDM	LINE1TXPWRTHDLCHGD	Power Degrade Low Threshold Changed LINE1TX Port	1	TC
REPT EVT DWDM	LINE1TXPWRTHDHCHGD	Power Degrade High Threshold Changed LINE1TX Port	1	TC
REPT EVT DWDM	LINE1TXPWRTHFLCHGD	Power Fail Low Threshold Changed LINE1TX Port	1	TC
REPT EVT DWDM	LINE1RXPWRTHFLCHGD	Power Fail Low Threshold Changed LINE1RX Port	1	TC
REPT EVT DWDM	LINE2RXPWRTHFLCHGD	Power Fail Low Threshold Changed LINE2RX Port	1	TC
REPT EVT DWDM	TILTCHGD	Tilt Setpoint Changed	1	TC
REPT EVT DWDM	TILTOFFSETCHGD	Tilt Offset Changed	1	TC
REPT EVT DWDM	LASERCHGD	Laser Status Changed	1	TC
REPT EVT DWDM	OSRICHGD	OSRI Changed	1	TC
REPT EVT EQPT	CUTOVERRESET	Reset After Cutover	EQPT	TC
REPT EVT EQPT	SOFTWARERESET	Software Reset	EQPT	TC
REPT EVT EQPT	PWRBUSMODE	Power Bus Mode Changed	PWR-A/ PWR-B	TC
REPT EVT EQPT	SEVERITYCHGD	Severity Changed	EQPT	TC
REPT EVT EQPT	PWRBUSMAXCHGD	Power Bus Max (voltage) Changed	PWR-A/ PWR-B	TC
REPT EVT EQPT	PWRBUSMINCHGD	Power Bus Min (voltage) Changed	PWR-A/ PWR-B	TC
REPT EVT EQPT	MAXCTMPCHGD	Max Case Temperature Changed	EQPT	TC
REPT EVT EQPT	MINCTMPCHGD	Min Case Temperature Changed	EQPT	TC

6.8.4 File Transfer Events

Table 6-12 summarizes the ONS 15216 EDFA3 file transfer events.

Table 6-12 TL1 Autonomous File Transfer Events

Autonomous TL1 Message	File Transfer Status (fxfr_status)	File Transfer Result (fxfr_rslt)	Access Identifier (aid)
REPT EVT FXFR	START	—	EQPT
REPT EVT FXFR	COMPLD	—	EQPT
		SUCCESS	EQPT
		FAILURE	EQPT

Table 6-13 summarizes the ONS 15216 EDFA3 clear alarms.

Table 6-13 TL1 Autonomous Clear Alarms

TL1 Autonomous Message	Condition Type (condtype)	Condition Descriptor (conddescr)	Access Identifier (aid)	Notification Code (ntfcncde)	Service Effect (srveff)
REPT ALM DWDM	LOS	Loss Of Signal (input power)	1	CL	SA
REPT ALM DWDM	GAIN	Gain Out Of Range	1	CL	SA
REPT ALM DWDM	LPOUT	Loss Of Output Power	1	CL	SA
REPT ALM EQPT	CTMP	Case Temperature Out of Range	EQPT	CL	NSA
REPT ALM EQPT	LCRNT1	Excessive Pump1 Current	EQPT	CL	NSA
REPT ALM EQPT	LCRNT2	Excessive Pump2 Current	EQPT	CL	NSA
REPT ALM EQPT	LTMP1	Excessive Pump1 Temperature	EQPT	CL	NSA
REPT ALM EQPT	LTMP2	Excessive Pump2 Temperature	EQPT	CL	NSA

6.9 Summary of TL1 Command Security Permissions

Table 6-14 summarizes the security permissions (access levels) for each available TL1 command and autonomous message.

Table 6-14 Security Permissions for TL1 Commands

Command or Message	Description	User Access Levels		
		R	RW	RWA
ACT-USER	Activates user session (login). See 8.4.1 ACT-USER, page 8-6.	Yes	Yes	Yes
ALW-MSG-ALL	Allows automatic (REPT) messages. See 8.4.2 ALW-MSG-ALL, page 8-6.	Yes	Yes	Yes

Table 6-14 Security Permissions for TL1 Commands (continued)

Command or Message	Description	User Access Levels		
		R	RW	RWA
APPLY	Applies software cutover. See 8.4.3 APPLY, page 8-7.	No	No	Yes
CANC	Session is cancelled. See 8.5.1 CANC, page 8-54.	Yes	Yes	Yes
CANC-USER	Cancels user session (logoff). See 8.4.4 CANC-USER, page 8-8.	Yes	Yes	Yes
COPY-RFILE	Copies remote or local file to FFS. See 8.4.5 COPY-RFILE, page 8-9.	No	No	Yes
CPY-MEM	Copies log file from RAM to FFS. See 8.4.6 CPY-MEM, page 8-11.	No	Yes	Yes
DLT-RFILE	Deletes file from FFS. See 8.4.7 DLT-RFILE, page 8-12.	No	No	Yes
DLT-TRAPTABLE	Deletes a specific row or all rows in the traptable. See 8.4.8 DLT-TRAPTABLE, page 8-13.	No	No	Yes
DLT-USER-SECU	Deletes a user. See 8.4.9 DLT-USER-SECU, page 8-13.	No	No	Yes
ED-DAT	Edits date and time. See 8.4.10 ED-DAT, page 8-14.	No	Yes	Yes
ED-DWDM	Edits optical parameters. See 8.4.11 ED-DWDM, page 8-15.	No	Yes	Yes
ED-EQPT	Edits equipment parameters. See 8.4.12 ED-EQPT, page 8-16.	No	Yes	Yes
ED-NE-GEN	Edits general IP-related parameters. See 8.4.13 ED-NE-GEN, page 8-17.	No	Yes	Yes
ED-PID	Edits user password. See 8.4.14 ED-PID, page 8-18.	Yes (own UID)	Yes (own UID)	Yes (all UIDs)
ED-TRAPTABLE	Edit the Trap Table values. See 8.4.15 ED-TRAPTABLE, page 8-19.	No	No	Yes
ED-USER-SECU	Edits a user name and parameters. See 8.4.16 ED-USER-SECU, page 8-19.	No	No	Yes
ENT-TRAPTABLE	Add an entry in the SNMP Trap Destination Table. See 8.4.17 ENT-TRAPTABLE, page 8-20.	No	No	Yes
ENT-USER-SECU	Enters new user. See 8.4.18 ENT-USER-SECU, page 8-21.	No	No	Yes
INH-MSG-ALL	Inhibits some automatic messages. See 8.4.19 INH-MSG-ALL, page 8-22.	Yes	Yes	Yes
INIT-SYS	Initializes (reboots) system. See 8.4.20 INIT-SYS, page 8-23.	No	No	Yes
REPT ALM DWDM	Reports optical alarm activation/clearing. See 8.5.2 REPT ALM DWDM, page 8-55.	Yes	Yes	Yes

Table 6-14 Security Permissions for TL1 Commands (continued)

Command or Message	Description	User Access Levels		
		R	RW	RWA
REPT ALM EQPT	Reports general alarm activation/clearing. See 8.5.3 REPT ALM EQPT, page 8-56.	Yes	Yes	Yes
REPT EVT DWDM	Reports when a dense wavelength division multiplexing (DWDM) alarm is generated or cleared. See 8.5.4 REPT EVT DWDM, page 8-57.	Yes	Yes	Yes
REPT EVT EQPT	Reports changes related to equipment threshold settings. See 8.5.5 REPT EVT EQPT, page 8-57.	Yes	Yes	Yes
REPT EVT FXFR	Reports FTP file transfer. See 8.5.6 REPT EVT FXFR, page 8-58.	Yes	Yes	Yes
RTRV-ALM-ALL	Retrieves all current alarms. See 8.4.21 RTRV-ALM-ALL, page 8-24.	Yes	Yes	Yes
RTRV-ALM-DWDM	Retrieves current optical alarms. See 8.4.22 RTRV-ALM-DWDM, page 8-25.	Yes	Yes	Yes
RTRV-ALM-EQPT	Retrieves current general alarms. See 8.4.23 RTRV-ALM-EQPT, page 8-26.	Yes	Yes	Yes
RTRV-ATTR-ALL	Retrieves alarm severity. See 8.4.24 RTRV-ATTR-ALL, page 8-27.	Yes	Yes	Yes
RTRV-ATTR-DWDM	Retrieves the severity associated with an optical alarm. See 8.4.25 RTRV-ATTR-DWDM, page 8-28.	Yes	Yes	Yes
RTRV-ATTR-EQPT	Retrieves the severity associated with an equipment alarm. See 8.4.26 RTRV-ATTR-EQPT, page 8-30.	Yes	Yes	Yes
RTRV-AO	Retrieves most-recent autonomous output (REPT) messages. See 8.4.27 RTRV-AO, page 8-31.	Yes	Yes	Yes
RTRV-COND-ALL	Retrieves condition (state) of all current alarms. See 8.4.28 RTRV-COND-ALL, page 8-32.	Yes	Yes	Yes
RTRV-COND-DWDM	Retrieves condition (state) of current optical alarms. See 8.4.29 RTRV-COND-DWDM, page 8-33.	Yes	Yes	Yes
RTRV-COND-EQPT	Retrieves condition (state) of current general alarms. See 8.4.30 RTRV-COND-EQPT, page 8-34.	Yes	Yes	Yes
RTRV-DFLT-SECU	Retrieves timeouts for access levels. See 8.4.31 RTRV-DFLT-SECU, page 8-35.	No	No	Yes
RTRV-DWDM	Retrieves optical parameters. See 8.4.32 RTRV-DWDM, page 8-36.	Yes	Yes	Yes
RTRV-EQPT	Retrieves the Power Bus mode. See 8.4.33 RTRV-EQPT, page 8-37.	Yes	Yes	Yes
RTRV-HDR	Retrieves header (pings NE). See 8.4.34 RTRV-HDR, page 8-38.	Yes	Yes	Yes
RTRV-INV	Retrieves inventory parameters. See 8.4.35 RTRV-INV, page 8-39.	Yes	Yes	Yes
RTRV-NE-GEN	Retrieves general IP-related parameters. See 8.4.36 RTRV-NE-GEN, page 8-40.	Yes	Yes	Yes

Table 6-14 Security Permissions for TL1 Commands (continued)

Command or Message	Description	User Access Levels		
		R	RW	RWA
RTRV-RFILE	Retrieves files on FFS. See 8.4.37 RTRV-RFILE, page 8-42.	Yes	Yes	Yes
RTRV-STATUS	Retrieves the user logged on status. See 8.4.38 RTRV-STATUS, page 8-43.	Yes	Yes	Yes
RTRV-TH-DWDM	Retrieves optical thresholds. See 8.4.39 RTRV-TH-DWDM, page 8-43.	Yes	Yes	Yes
RTRV-TH-EQPT	Retrieves general thresholds. See 8.4.40 RTRV-TH-EQPT, page 8-45.	Yes	Yes	Yes
RTRV-TOD	Retrieves date and time. See 8.4.41 RTRV-TOD, page 8-46.	Yes	Yes	Yes
RTRV-TRAPTABLE	Provides information about the trap table. See 8.4.42 RTRV-TRAPTABLE, page 8-47.	Yes	Yes	Yes
RTRV-USER-SECU	Retrieves access level of user(s). See 8.4.43 RTRV-USER-SECU, page 8-48.	Yes (own UID)	Yes (own UID)	Yes (all UIDs)
SET-ATTR-DWDM	Permits changes to the severity associated with an optical alarm. See 8.4.44 SET-ATTR-DWDM, page 8-49.	No	Yes	Yes
SET-ATTR-EQPT	Permits changes to the severity associated with an equipment alarm. See 8.4.45 SET-ATTR-EQPT, page 8-50.	No	Yes	Yes
SET-ATTR-SECUDFLT	Sets timeout values for access levels. See 8.4.46 SET-ATTR-SECUDFLT, page 8-51.	No	No	Yes
SET-TH-DWDM	Sets optical thresholds. See 8.4.47 SET-TH-DWDM, page 8-52.	No	Yes	Yes
SET-TH-EQPT	Sets general threshold values. See 8.4.48 SET-TH-EQPT, page 8-53.	No	Yes	Yes
STA-LOCL-RST	Resets all parameters to manufacturer default values. See 8.4.49 STA-LOCL-RST, page 8-54.	No	No	Yes

TL1 Turn Up

This chapter describes how to provision the ONS 15216 EDFA3 using TL1 commands. Sections in this chapter include:

- 7.1 Start the TL1 Interface, page 7-2
- 7.2 Use TL1 to Log In with the Default Password, page 7-2
- 7.3 Use TL1 to Set the Date and Time, page 7-3
- 7.4 Use TL1 to Set the Power Bus Mode (Simplex or Duplex), page 7-3
- 7.5 Use TL1 to Set the Amplifier Alarm Thresholds, page 7-3
- 7.6 Use TL1 to Verify the Operational Status of the Amplifier, page 7-5
- 7.7 Use TL1 to Set the Amplifier Gain Level, page 7-5
- 7.8 Use TL1 to Set the Optical Input Power Threshold, page 7-6
- 7.9 Optical Amplification Test and Verification Procedure, page 7-6
- 7.10 Set the IP Address, page 7-7
- 7.11 Use the LAN Interface (Ethernet) to Open a Telnet Session, page 7-7
- 7.12 Use TL1 to Connect to the ONS 15216 EDFA3, page 7-8
- 7.13 Use TL1 to Add Users, page 7-8
- 7.14 Use TL1 to Modify User Information, page 7-9
- 7.15 Use TL1 to Set the Password for the Amplifier, page 7-9
- 7.16 Set the Community Name and Trap Destination, page 7-9
- 7.17 Use TL1 to Log Off, page 7-10
- 7.18 Automatic Log Off (Timeout), page 7-10

You must use TL1 to set some of the initial configuration parameters for the ONS 15216 EDFA3. After the initial parameters are set, you can issue Simple Network Management Protocol (SNMP) commands through an SNMP management interface or continue to work in TL1. See Chapter 10, "SNMP and the Management Information Base" for information about Cisco's SNMP management interface.

Note You must create a community in order to apply security. Without a community string, some TL1 commands such as ACT-USER cannot be successfully completed. See the "7.1 Start the TL1 Interface" section for information about adding users to the ONS 15216 EDFA3.

7.1 Start the TL1 Interface

The TL1 interface starts up when HyperTerminal is started. See the "5.3 Communicating with the EDFA3 Through a Serial EIA/TIA-232 (RS-232) Interface" section on page 5-4 for information about starting HyperTerminal.

The TL1 login prompt reports messages similar to the following:

```
WARNING
This system is restricted to authorized users for business purposes. Unauthorized access
is a violation of the law. This service may be monitored for administrative and security
reasons. By proceeding, you consent to this monitoring.
>
```

The > prompt appears when TL1 has successfully connected.

7.2 Use TL1 to Log In with the Default Password

Log in using the ACT-USER command (see the "8.4.1 ACT-USER" section on page 8-6) with the following syntax:

```
ACT-USER:[<tid>]:<uid>:<ctag>::<pid>;
```

For example, you would type:

```
> ACT-USER::CISCO15:123::**********;
```

where `ACT-USER` is the command, the tid is null by default so none is entered, `CISCO15` is the default user id, `123` is the ctag used to identify this command, and `**********` represents the password.

Note For security reasons, it is recommended that you change the password from its default value. (Use TL1 to set the password for the amplifier using the "7.15 Use TL1 to Set the Password for the Amplifier" section on page 7-9.)

The ONS 15216 EDFA3 displays the login response, as shown in Example 7-1.

Example 7-1 TL1 Shell Login Response

```
> ACT-USER::CISCO15:123;

EDFA3 2002-07-11 10:09:19
M 123 COMPLD
/* ACT-USER */
;
>
```

An EIA/TIA-232 (RS-232) link to the ONS 15216 EDFA3 is established. The user can now provision the ONS 15216 EDFA3.

7.3 Use TL1 to Set the Date and Time

Use the ED-DAT command (see the "8.4.10 ED-DAT" section on page 8-14) to set the date and time. A time zone cannot be set using TL1. The time setting is restricted to universal coordinated time (UTC) according to the following syntax:

```
ED-DAT:[<tid>]::<ctag>::<utcdate>,<utctime>;
```

The utcdate and utctime entries must follow the format yyyy-mm-dd, hh-mm-ss, as shown in Example 7-2.

Example 7-2 Setting the Date and Time Using TL1

```
> ED-DAT:::123::2003-09-18,02-24-55;
```

7.4 Use TL1 to Set the Power Bus Mode (Simplex or Duplex)

The ONS 15216 EDFA3 allows users to set a simplex (one power source-Bus A) or duplex (redundant power source-Bus A and Bus B) Power Bus mode. The default mode is duplex. Use the ED-EQPT command to set the desired power bus mode according to the following syntax:

```
ED-EQPT:[<tid>]:<aid>:<ctag>:::PWRBUSMODE=<pwrbusmode>;
```

The pwrbusmode value can be SIMPLEX or DUPLEX as shown in Example 7-3.

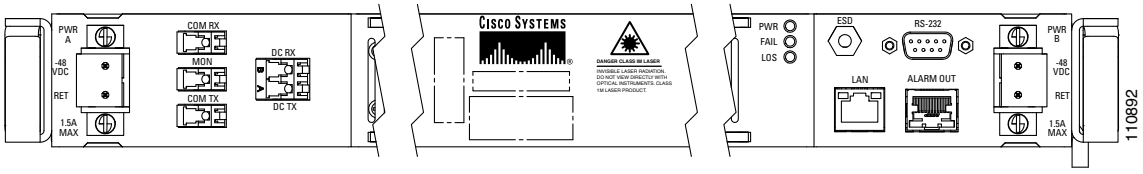
Example 7-3 Setting the Power Bus Mode Using TL1

```
> ED-EQPT::ALL:123:::PWRBUSMODE=SIMPLEX;
```

7.5 Use TL1 to Set the Amplifier Alarm Thresholds

Alarm thresholds are set so that the network operator can be notified when valid alarms occur through the RJ-45 ALARM OUT and RJ-45 LAN ports on the ONS 15216 EDFA3 front panel (Figure 7-1).

Figure 7-1 ONS 15216 EDFA3 Front Panel



Alarms are reported for the following conditions:

- Degradation of electrical power source
- Laser pump overheating or excessive pump current
- Loss or degradation of optical input (signal)
- Loss of output power or gain out of range

- Case temperature out of range

Alarms can be connected to a network operations center (NOC) network management system (NMS) through a network element miscellaneous discrete input and/or office alarm panel/system.

By default, the LINE1RXPwrTHFailLow is set to 10 dBm to maintain the amplifier and the laser status in an OFF state. For a full description of alarm threshold command attributes, refer to Chapter 8, "TL1 Commands and Autonomous Messages."

To display the alarm thresholds, use the RTRV-TH-DWDM and RTRV-TH-EQPT commands. Use the RTRV-TH-DWDM command according to the following syntax:

```
RTRV-TH-DWDM:[<tid>]:<aid>:<ctag>::[<thresholdtype>][,][,];
```

The response to the RTRV-TH-DWDM command is in the following format:

```
<sid> <date> <time> M <ctag> COMPLD "<aid>,DWDM:<thresholdtype>,,,<thresholdvalue>"
```

Use the RTRV-TH-EQPT command according to the following syntax:

```
RTRV-TH-EQPT:[<tid>]:<aid>:<ctag>::[<thresholdtype>][,][,];
```

The response to the RTRV-TH-EQPT command is in the following format:

```
<sid> <date> <time> M <ctag> COMPLD "<aid>:<thresholdtype>,,,<thresholdvalue>"
```

Example 7-4 shows sample command outputs.

Example 7-4 Displaying the Alarm Thresholds Using TL1

```
> RTRV-TH-DWDM::ALL:124;

   edfa3 2003-11-27 11:55:48
M  124 COMPLD
   "1,DWDM:GAINTHDH,,,23.0dB"
   "1,DWDM:GAINTHDL,,,19.0dB"
   "1,DWDM:LINE1RXPWRTHFL,,,-25.0dBm"
   "1,DWDM:LINE1TXPWRTHDH,,,12.0dBm"
   "1,DWDM:LINE1TXPWRTHDL,,, 8.0dBm"
   "1,DWDM:LINE1TXPWRTHFL,,,-6.0dBm"
   "1,DWDM:LINE2RXPWRTHFL,,,-33.0dBm"
;

> RTRV-TH-EQPT::ALL:124;

   edfa3 2003-11-27 11:56:40
M  124 COMPLD
   "EQPT,EQPT:MAXCTMP,,,65.0C"
   "EQPT,EQPT:MINCTMP,,,-5.0C"
   "EQPT,PWR-B:PWRBUSMAX,,,57.0V"
   "EQPT,PWR-B:PWRBUSMIN,,,40.0V"
;
```

To set the alarm thresholds, use the SET-TH-DWDM (see "8.4.47 SET-TH-DWDM" section on page 8-52) and SET-TH-EQPT (see the "8.4.48 SET-TH-EQPT" section on page 8-53) commands.

7.6 Use TL1 to Verify the Operational Status of the Amplifier

To ensure that the amplifier is working correctly on the optical level, you must verify the amplifier operational status. Use the RTRV-DWDM command (see "8.4.32 RTRV-DWDM" section on page 8-36) to verify amplifier operational status according to the following syntax:

```
RTRV-DWDM:[<tid>]:<aid>:<ctag>[::::];
```

The response to the RTRV-DWDM command is in the following format:

```
<sid> <date> <time> M <ctag>
"[<aid>]:[CTRLMODE=<ctrlmode>],[LINE1TXPWR=<line1txpwr>],[LINE1TXPWRSP=<line1txpwrsp>],
[LINE1RXPWR=<line1rxpwr>],[LINE2RXPWR=<line2rxpwr>],[LINE2TXPWR=<line2txpwr>],[PWROFFSET=<
pwroffset>],[GAIN=<gain>],[GAINSP=<gainsp>],[TILT=<tilt>],[TILTSP=<tiltsp>],[TILTOFFSET=<t
iltoffset>],[DCULOSS=<dculoss>],[OSRI=<on/off>],[LASTATUS=<on/off>],[VOA=<VOAvalue>]"
```

Example 7-5 displays a command example and the sample output for this command.

Example 7-5 Verifying the Amplifier Operations Status Using TL1

```
> RTRV-DWDM::ALL:123;

   EDFA3 2003-11-01 10:20:28
M  123 COMPLD

"1:CTRLMODE=CGAIN,LINE1TXPWR=-60.0dBm,LINE1TXPWRSP=10.0dBm,LINE1RXPWR=-5.1dBm,LINE2RXPWR=-
39.1dBm,LINE2TXPWR=-60.0dBm,PWROFFSET=0.0dB,GAIN=0.0dB,GAINSP=21.0dB,TILT=15.0dB,TILTSP=0.
0dB,TILTOFFSET=0.0dB,DCULOSS=14.8dB,OSRI=ON,LASSTATUS=OFF,VOA=0.0dB"
;
>
```

The input power should be consistent with the input power measured during the optical connection procedure. The output power value should be equal to the input power plus the gain value.

7.7 Use TL1 to Set the Amplifier Gain Level

To ensure that the ONS 15216 EDFA3 output signal is received by the transceiver in the network element, it is important that the amplifier gain is set correctly.

The desired output power per channel is dependent on the number of channels traversed in the amplifier. The user sets the gain of the amplifier depending on the input power level, the network application, and the required receiver specifications necessary for error-free operation.

To set the amplifier gain, use the ED-DWDM command (see "8.4.11 ED-DWDM" section on page 8-15), according to the following syntax:

```
ED-DWDM:[<tid>]:<aid>:<ctag>:::[GAINSP=<gain>];
```

Specify the GAINSP parameter, and a value that is appropriate for the level of optical power gain desired. Example 7-6 shows an example of using the ED-DWDM command to set the gain.

Example 7-6 Setting the Gain Using TL1

```
> ED-DWDM::1:123:::GAINSP=20;
```

Note Before changing or implementing gain changes, consult with Cisco TAC to ensure proper network operation.

If the amplifier is in COPWR mode, when issuing the ED-DWDM command it is necessary to set the CTRLMODE value to CGAIN. If the amplifier is already in CGAIN mode, then no modifications to the CTRLMODE parameter are necessary.

7.8 Use TL1 to Set the Optical Input Power Threshold

The ONS 15216 EDFA3 has a default value of 10 dBm for the input fail low threshold. This high default value is set to prevent the EDFA3 from turning on accidentally during the installation phase.

Use the following steps to set the optical input power threshold on the ONS 15216 EDFA3:

Step 1 Determine the current optical input power threshold by issuing the RTRV-TH-DWDM TL1 command.

Step 2 The optical input power threshold is the parameter named LINE1RXPWRTHFL in the response to the RTRV-TH-DWDM command.

Step 3 Issue the SET-TH-DWDM TL1 command to change the optical input power threshold for the first stage amplifier:

Step 4 Specify the LINE1RXPWRTHFL parameter, and a value for that parameter that is appropriate for the location in which the EDFA3 is installed.

Step 5 Once again issue the SET-TH-DWDM TL1 command in order to change the optical input power threshold for the second stage amplifier.

Step 6 Specify the LINE2RXPWRTHFL parameter and a value for that parameter that is appropriate for the location in which the EDFA3 is installed.

7.9 Optical Amplification Test and Verification Procedure

Note This procedure cannot be performed until the EDFA3 is configured so that it is operational. The necessary configuration includes providing an optical input signal, connecting the DC TX to the DC RX port through an optical attenuator or a dispersion compensation unit, and setting the optical power thresholds through the user interface.

When the EDFA3 is operational, an optical spectrum analyzer (OSA) can be connected to the MONITOR OUT port on the front of the EDFA3. Because the MONITOR OUT port represents a one percent tap off the second amplifier stage, any wavelengths displayed on the OSA are being amplified.

Step 1 Verify that the gain flatness is within range for the amplification range (standard or extended) in which the amplifier is being used.

Step 2 Verify that the gain tilt is within range for the amplification range (standard or extended) in which the amplifier is being used.

Table 7-1 Optical Amplifier Test Gain Range

Gain	Total Input Power (dBm)		Total Output Power (dBm)		
(dB)	Min	Max	Min	Max	Typ
22	–27	–5	–23	–19	–20

Note Unless overridden by the user, the gain per channel is by default set to 22 dB by the ONS 15216 EDFA3. Gain is fixed at 22 dB as long as total input power is less than or equal to –5 dBm. If your input power is higher than –5 dBm, reset the gain to a lower level.

7.10 Set the IP Address

Before connecting the ONS 15216 EDFA3 to a LAN, it is mandatory to set the ONS 15216 EDFA3 IP address through a local serial communication interface using the EIA/TIA-232 (RS-232) port on the front of the module. Setting the IP address consists of:

- Logging in as a TL1 user.
- Entering an ED-NE-GEN command with the IP address, subnet mask, and gateway address (see Example 7-7).
- The ONS 15216 EDFA3 reboots to make the IP address active.

Note If you do not know the IP address, subnet mask or gateway address for the ONS 15216 EDFA3, contact your network administrator.

Example 7-7 Setting IP Address, Subnet Mask, and Gateway Address

```
> ED-NE-GEN:::123:::IPADDR=129.9.0.6, IPMASK=255.255.255.0, DEFRTR=0.0.0.0;
```

7.11 Use the LAN Interface (Ethernet) to Open a Telnet Session

You can connect to the ONS 15216 EDFA3 to an Ethernet LAN for remote access.

Note Before communicating with and managing the ONS 15216 EDFA3 through the Ethernet port, the user must first enter an IP address. Your system administrator can provide you with an unused IP address. To set an IP address, see the "7.10 Set the IP Address" section on page 7-7. The IP address factory default is 0.0.0.0.

Telnet is an application that allows remote management using IP over the Ethernet LAN. TL1 commands can be issued through a Telnet session. Use the following procedure to configure the ONS 15216 EDFA3 module to accept SNMP and TL1 commands through its RJ-45 LAN port:

Step 1 Connect the ONS 15216 EDFA3 to the network using the LAN port.

Use a Category 5Ethernet cable with RJ-45 connectors to connect to a LAN or a PC. EDFA3 accepts both cross-over and straight-through Ethernet cables by auto-detection.

Step 2 At a terminal or workstation, open the Telnet application.

Note To send TL1 commands over IP, a Telnet client is required. For SNMP management over IP, a third-party SNMP manager is required.

Step 3 The EDFA3 can then be managed over Telnet by the user typing the following:

telnet *IP-address*

For example:

```
telnet 12.34.56.78 3083
```

Replace the IP address used in the example with the IP address entered in the previously issued ED-NE-GEN command. Port 3083 must be specified for Telnet character echo of the TL1 commands that are typed.

7.12 Use TL1 to Connect to the ONS 15216 EDFA3

The ONS 15216 EDFA3 system supports twenty total user accounts with up to ten simultaneous Telnet connections over the Ethernet LAN port. Ethernet TL1 sessions are available from TCP/IP port 3082 for raw use with TL1 commands (in accordance with NSIF-033-1999) and/or 3083 for TL1 over Telnet (in accordance with NSIF-033-1999). One FTP connection is allowed. When connected, the ACT-USER command activates a session.

If the number of connections exceeds the limit, the Telnet session is closed.

Note Every user with a defined user name and password can open only one connection at a time. There should never be any open ports other than those required for TL1, SNMP, the Debug interface and FTP.

Note The TL1 session on port 3082 has no character echo. This means that you will not be able to see the commands as you enter them.

7.13 Use TL1 to Add Users

Administrator level users can use the ENT-USER-SECU command to add new users to the ONS 15216 EDFA3 according to the following syntax:

```
ENT-USER-SECU:[<tid>]:<uid>:<ctag>::<pid>,,<al>[:];
```

The uid is the user name, pid is the password, and al is the access level (R, RW, RWA). Passwords must be an ASCII string of 6 to 10 characters, where at least 2 are nonalphabetic characters with at least one special character. Special characters are +, #, and % (defined in Telcordia GR-831-CORE). See Example 7-8.

Example 7-8 Adding a New User Using TL1

```
> ENT-USER-SECU::jsmith:140::jspaswds#1,,RW;
```

7.14 Use TL1 to Modify User Information

Administrator level users can use the ED-USER-SECU command to modify user information for the ONS 15216 EDFA3 according to the following syntax:

```
ED-USER-SECU:[<tid>]:<uid>:<ctag>::<newuid>,<pid>,,<al>[:];
```

The uid is the user name, pid is the password, and al is the access level (R, RW, RWA). Passwords must be an ASCII string of up to 10 characters, where at least 2 are nonalphabetic characters with at least one special character. Special characters are +, #, and % (defined in Telcordia GR-831-CORE). See Example 7-9.

Example 7-9 Modifying a User Using TL1

```
> ED-USER-SECU::jsmith:140::,anypaswd#2,,RWA;
```

7.15 Use TL1 to Set the Password for the Amplifier

To restrict access to the ONS 15216 EDFA3, use the ED-PID command (see the "8.4.14 ED-PID" section on page 8-18) to change the default user password according to the following syntax:

```
ED-PID:[<tid>]:<uid>:<ctag>::<oldpid>,<newpid>;
```

Note that the password must be a string of up to 10 characters, where at least 2 are nonalphabetic characters and at least 1 is a special character. See Example 7-10.

Example 7-10 Changing Current User's Password Using TL1

```
> ED-PID::CISCO15:130::OLDPW2#,NEWPW3#;
```

Note The default user name for the administrator level is CISCO15 with no default password.

7.16 Set the Community Name and Trap Destination

Use the TL1 ENT-TRAPTABLE (Enter TRAPTABLE) command to add an entry in the SNMP Trap Destination Table. Each IP address entry represents a new community string. The user defines the following fields:

- Trap Receiver IP Address
- UDP Port Number

- Community String
- Version

The command is sent in the following format:

```
ENT-TRAPTABLE:[<TID>]:<aid>:<ctag>::[TRAPCOM=<trapcom>],[TRAPPORT=<trapport>],[TRAPVER=<tr
apver>];
```

The <aid> consists of the IP address and is used by the command to identify a specific row in the SNMP Trap Destination Table (see Table 8-9). For this reason, each IP address must be unique inside the table.

The AID in the ENT-TRAPTABLE command is used not only for the trap receiver, but also for the SNMP manager. The user will not be able to browse the MIB unless the MIB browser workstation IP address is entered into the trap destination table.

Example 7-11 Using the ENT-TRAPTABLE Command to Set a Community String

```
ENT-TRAPTABLE::192.168.1.1:123::TRAPCOM=EDFA3_USER,TRAPPORT=162,TRAPVER=V1;

   EDFA3 2003-11-01 10:08:15
M  123 COMPLD
   /* ENT-TRAPTABLE */
;
>
```

The SNMP Trap destination Table can contain up to 10 rows.

7.17 Use TL1 to Log Off

At the end of a session, the user must log off of the ONS 15216 EDFA3. To log off, use the CANC-USER command (see the "8.4.4 CANC-USER" section on page 8-8) according to the following syntax:

```
CANC-USER:[<tid>]:<uid>:<ctag>;
```

See Example 7-12 for an example of using this command.

Example 7-12 Logging Off Using TL1

```
> CANC-USER::CISCO15:123;
```

7.18 Automatic Log Off (Timeout)

The default timeout settings are:

- 15 minutes for the RWA user
- 30 minutes for the RW user
- 60 minutes for the R user

Use the RTRV-DFLT-SECU TL1 command to retrieve the timeout values.

When a timeout occurs, the corresponding port must drop, so the next session initiation at that port requires the regular login procedure. The following message is visible.

```
>
[10.92.27.66: remote disconnect]
```

In the above example, 10.92.27.66 indicates the node IP address.

The CANC message is only used to indicate that a session has been terminated because of a timeout.

TL1 Commands and Autonomous Messages

This chapter describes the TL1 commands supported by the Cisco ONS 15216 EDFA3.

Each TL1 command is listed alphabetically according to the first character of the command string. Each TL1 command must be less than or equal to 255 characters in length. Any command longer than 255 characters must be split into multiple commands.

Note TL1 commands that are not entered correctly are not completed. Each TL1 command must terminate with a semicolon (;).

This chapter contains the following sections:

- 8.1 About TL1 Commands, page 8-1
- 8.2 TL1 Command Rules, page 8-2
- 8.3 TL1 Command Types, page 8-2
- 8.4 TL1 Commands and Descriptions, page 8-5
- 8.5 Autonomous Messages, page 8-54
- 8.6 Parameter Types, page 8-59
- 8.7 TL1 Errors, page 8-67
- 8.8 TL1/SNMP Mapping Tables, page 8-70
- 8.9 TL1/SNMP Alarm Mapping, page 8-72
- 8.10 TL1/SNMP Event Mapping, page 8-73
- 8.11 TL1 Errors Supported by Each Command, page 8-73

8.1 About TL1 Commands

The following material describes TL1 commands and autonomous messages supported by the ONS 15216 EDFA3. The ONS 15216 EDFA3 supports up to 5 simultaneous Telnet connections using the Ethernet LAN port. TL1 sessions are available using the TCP/IP port 3082 for raw TL1 and/or port 3083 for TL1 over Telnet. See Chapter 5, “Communicating with the ONS 15216 EDFA3,” for information about the various ways to connect to the ONS 15216 EDFA3.

After you have connected to a TL1 session, the ACT-USER command activates a user session.

TL1 messages are grouped into nonautonomous and autonomous types. Nonautonomous messages consist of a request command and a response from the ONS 15216 EDFA3. Autonomous messages and nonautonomous commands use a common set of parameters. Autonomous messages are generated as a result of activity on the network elements such as alarms, thresholds, alerts, and status information. No request is required in order to receive autonomous messages.

8.2 TL1 Command Rules

Commands can affect one or more entities. In general, this chapter specifies a TL1 interface where retrieval can be broad but changes are narrow in scope.

- Retrieve (requests). To allow as much bulk and flexible retrieval of information from an NE, the fields of retrieve requests permit the following values/operators.
  - Fields with default values are optional and permit the wildcard value ALL.
  - Fields are listable and rangeable wherever the syntax allows it.
  - Fields that do not allow a default indicate ALL by their absence.
  - The keyword ALL is implied, and is not required or needed.
- Other commands (requests): To ensure that changes are specific to the entities that they are intended for, the scope of provisioning commands in general is as narrow as possible.
  - Fields with defaults do NOT permit the value ALL.
  - Only fields with defaults are optional.
  - In limited circumstances, fields might be listable and rangeable.

8.3 TL1 Command Types

TL1 commands can be grouped into the following categories:

- 8.3.1 Equipment Commands, page 8-2
- 8.3.2 Facility Commands, page 8-3
- 8.3.3 Fault Commands, page 8-3
- 8.3.4 Log Commands, page 8-4
- 8.3.5 Performance Commands, page 8-4
- 8.3.6 Security Commands, page 8-4
- 8.3.7 System Commands, page 8-4
- 8.3.8 Other (Ungrouped) Commands, page 8-5

The commands in each category are outlined in the following sections.

8.3.1 Equipment Commands

Table 8-1 lists the TL1 equipment commands.

Table 8-1 TL1 Equipment Commands

Command	Description
ED-EQPT	Configures power bus mode
REPT ALM EQPT	Reports general alarm activation/clearing
REPT EVT EQPT	Reports equipment event logging
RTRV-ATTR-EQPT	Retrieves current equipment attributes
RTRV-COND-EQPT	Retrieves state of current general alarms
RTRV-EQPT	Retrieves equipment parameters
RTRV-TH-EQPT	Retrieves equipment threshold
SET-ATTR-EQPT	Changes equipment alarm severity
SET-TH-EQPT	Sets equipment threshold

8.3.2 Facility Commands

Table 8-2 lists the TL1 facility commands.

Table 8-2 TL1 Facility Commands

Command	Description
STA-LOCL-RST	Resets all parameters to manufacturer defaults

8.3.3 Fault Commands

Table 8-3 lists the TL1 fault commands.

Table 8-3 TL1 Fault Commands

Command	Description
REPT ALM DWDM	Reports optical alarm activation/clearing
REPT EVT DWDM	Reports optical event logging
REPT EVT FXFR	Reports FTP file transfer
RTRV-ALM-ALL	Retrieves all current alarms
RTRV-ATTR-ALL	Retrieves current attributes
RTRV-ALM-DWDM	Retrieves all current optical alarms
RTRV-COND-ALL	Retrieves state of all current alarms
SET-ATTR-DWDM	Changes optical alarm severity
RTRV-COND-DWDM	Retrieves state of all current optical alarms
SET-ATTR-SECUDFLT	Sets timeout values for access levels

8.3.4 Log Commands

Table 8-4 lists the TL1 log commands.

Table 8-4 TL1 Log Commands

Command	Description
RTRV-AO	Retrieves most recent autonomous output messages

8.3.5 Performance Commands

Table 8-5 lists the TL1 performance commands.

Table 8-5 TL1 Performance Commands

Command	Description
RTRV-TH-DWDM	Retrieves optical thresholds
SET-TH-DWDM	Sets optical thresholds

8.3.6 Security Commands

Table 8-6 lists the TL1 security commands.

Table 8-6 TL1 Security Commands

Command	Description
DLT-USER-SECU	Deletes a user
ED-PID	Edits a user password
ED-USER-SECU	Edits a user's name and parameters
ENT-USER-SECU	Enters a new user name
RTRV-DFLT-SECU	Retrieves timeouts for access levels
RTRV-USER-SECU	Retrieves user access levels

8.3.7 System Commands

Table 8-7 lists the TL1 system commands.

Table 8-7 TL1 System Commands

Command	Description
ACT-USER	Activates a user session (logs in)
ALW-MSG-ALL	Allows automatic messages
CANC-USER	Cancels (logs off) a user session
ED-DAT	Edits date and time

Table 8-7 TL1 System Commands (continued)

Command	Description
INH-MSG-ALL	Inhibits some automatic messages
INIT-SYS	Reboots the system
RTRV-HDR	Retrieves the header (pings the NE)
APPLY	Applies a software cutover
CANC	Automatic message transmitted to a user when a session is terminated
COPY-RFILE	Copies local or remote files to the flash file system
CPY-MEM	Copies a log file from RAM to the flash file system
DLT-RFILE	Deletes a file from the flash file system
DLT-TRAPTABLE	Deletes a specified row from the SNMP[1] Trap Destination Table
ED-NE-GEN	Edits general IP-related parameters
ED-TRAPTABLE	Edits a specified row in the SNMP Trap Destination Table
ENT-TRAPTABLE	Adds an entry to the SNMP Trap Destination Table
RTRV-INV	Retrieves inventory parameters
RTRV-NE-GEN	Retrieves IP-related parameters
RTRV-RFILE	Retrieves files on the flash file system
RTRV-STATUS	Retrieves the user logged-on status
RTRV-TOD	Retrieves the date and time
RTRV-TRAPTABLE	Retrieves a row from the Trap Table

1. SNMP = Simple Network Management Protocol

8.3.8 Other (Ungrouped) Commands

Table 8-8 lists the TL1 commands that do not belong to any group.

Table 8-8 TL1 Ungrouped Commands

Command	Description
ED-DWDM	Edits optical parameters
RTRV-DWDM	Retrieves optical parameters

8.4 TL1 Commands and Descriptions

The following subsections name each TL1 command, provide a sample of syntax and provide explanations of each command.

8.4.1 ACT-USER

Usage Guidelines

The ACT-USER command activates the user specified in the login string.

The command permits set up of a session with the NE. Until a successful login, the TL1 manager is not able to receive alarm or command responses from the NE. If a session is not established, issuing commands should generate a DENY as a command response, with no other information and a PLNA (Login Not Active) error code should be implemented for other commands.

Syntax Description

Input Format

```
ACT-USER:<tid>:<uid>:<ctag>::<pid>;
```

Input Parameters

uid	The user identifier is a string consisting of any combination of 7 to 10 characters.
pid	The user password, or private identifier is a string of 7 to 10 alphanumeric characters where at least one character is a special character (+, #, or %).

Examples

```
ACT-USER::EDFA3_USER:123::**********;

   EDFA3 2003-11-01 10:06:30
M  123 COMPLD
;
>
```

This command activates a user named “EDFA3_USER” with a password of PASSW2#000 (**********). The ctag 123 identifies any responses returned by this command.

Command Result

After a successful login, another ACT-USER command with the same <uid> and <pid> will be refused and the error code PICC (Illegal Command Code) is provided.

8.4.2 ALW-MSG-ALL

Usage Guidelines

The ALW-MSG-ALL command allows the reporting of all events.

This command permits or resumes the dispatch of automatic messages from the ONS 15216 EDFA3 that were inhibited by an INH-MSG call. All alarms in existence at the time that this command restores them are transmitted using REPT ALM and REPT EVT messages.

This command applies only to the current logged in user session. Other user sessions are not affected.

Note that if this command is used twice successively in the same session with the same parameter values, the SAAL (Already Allowed) error message will be returned.

The ALW-MSG-ALL command is valid if an alarm exists that satisfies the condition contained in the parameters <ntfcncde> and <condtype>. If one parameter is not provided, the alarms that satisfy the condition of the not null field are allowed.

Syntax Description

Input Format

```
ALW-MSG-ALL:<TID>:[<aid>]:<ctag>::[<ntfcncde>],[<Automsg>][,];
```

Input Parameters

aid	Access ID. For this command, the aid is null or ALL.
ntfcncde	Two-character notification code associated with some automatic messages. ntfcncde is of type NotificationCode. If ntfcncde is null, inhibitions are kept unchanged. If both ntfcncde and condtype are null, the command allows all messages (ALW-MSG-ALL:::123;). The notification code of the alarm or event that is to be allowed maps to the table cerent15216EdfaAlarmPriority for active alarms. A null maps to none of the codes, that is, with a null, all existing ntfcncde inhibitions are kept unchanged. Possible values are: • MJ: Major alarm • MN: Minor alarm • NA: No alarm • CL: Cleared alarm • condtype: Condition type of the alarm or event that is to be allowed. (Maps to cerent15216EdfaLogEventID.) ALL maps to all types. A null maps to none of the types, that is, with a null, all existing condtype inhibitions are kept unchanged.
Automsg	Automsg is the condition type of the allowed alarm or event. ALL maps to all types. If both ntfcncde and condtype are null, the command allows all messages (ALW-MSG-ALL:::123;).

Examples

```
ALW-MSG-ALL:::123;
EDFA3 2003-11-01 10:00:15
M  123 COMPLD
   /* ALW-MSG-ALL */
;
>
```

Command Result

All events will be reported.

8.4.3 APPLY

Usage Guidelines

The APPLY command applies a software cutover in memory.

There are two boot file entries. This command exchanges boot file entries 1 and 2 and automatically reboots the system.

Syntax Description

```
APPLY:<TID>::<ctag>;
```

Examples

```
APPLY:::123;
<IP 123
<IP 123
<

   EDFA3 2003-11-01 12:56:44
A  2 REPT EVT EQPT

"EQPT:CUTOVERRESET,TC,11-01,12-56-44,,,ONS15216Edfa3-0.4.8-003K-05.09,ONS152
1
6Edfa3-0.4.8-003K-05.09,:\"Reset After Cutover Changed \""
;

   EDFA3 2003-11-01 12:56:44
M  123 COMPLD
   /* APPLY- EDFA3 SOFTWARE UPGRADE */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

When the system is restarted, it will boot with the image that was formerly the inactive entry.

8.4.4 CANC-USER

Usage Guidelines

Cancels a login session (logoff) with the ONS 15216 EDFA3.

Note This command cannot be used to delete another user session and also closes the Telnet connection, as shown in the following example:

```
>
[10.92.27.66: remote disconnect]
```

Syntax Description

Input Format

```
CANC-USER:[TID]:<uid>:[CTAG];
```

Input Parameters

uid	The user identifier for the session to be cancelled, in the format of a string between 7 and 10 characters long.

Examples

```
CANC-USER::EDFA3_USER:123;

   EDFA3 2003-11-01 10:11:13
M  123 COMPLD
;
>
>
[192.168.1.2: remote disconnect]
```

Errors

This message can generate any of the default errors.

Command Result

The login session with the ONS 15216 EDFA3 is cancelled.

8.4.5 COPY-RFILE

Usage Guidelines

This command copies a local or remote file to the Flash File System (FFS) on the optical amplifier (OA).

Depending on the value specified for the TYPE parameter, this command can be used to download a remote software image file to the OA as the second boot entry (to cutover-upgrade later using the APPLY command), to copy a remote or local file to the OA flash file system, or to copy a file on the ONS 15216 EDFA3 flash file system to a remote or local file.

Syntax Description

Input Format

```
COPY-RFILE:<TID>::<ctag>::TYPE=<type>,SRC=<src>,[DEST=<dest>],[OVERWRITE=<overwrite>];
```

Input Parameters

type	Specifies the type and direction of transfer. Possible values are: • RFR: Restores a file from a remote server to the ONS 15216 EDFA3 flash file system • RFBU: Backs up a file from the ONS 15216 EDFA3 flash file system to the remote server (overwrite is always YES) • SWDL: Download a software file to the ONS 15216 EDFA3 flash file system and updates the second boot entry to point to this file

src/dest	Source and destination URLs, formatted as a string.
	An FTP URL has the following format:
	`ftp:[//[<userid>[:<password>]@]<ftphost>[:<port>]]/<urlpath>`
	A file URL (referring to the local system) has the following format:
	`file://localhost/<urlpath>`
	where:
	• <userid> is the FTP user identifier.
	• <password> is the FTP password for the user.
	• <ftphost> is the IP address of the FTP server.
	• <port> is the port number to connect to. Port number (21) is optional. 21 is the only supported port number. Leaving this field blank defaults to 21.
	• <urlpath> is the path in the following format:
	`<cwd1>/<cwd2>/.../<filename>`
	where <cwd1> and <cwdn> are directory levels and <filename> is the file name.

overwrite	Possible values are: • YES: Overwrite the existing file of the same name at the destination. • NO: Do not overwrite the existing file if a file with same name exists at the destination. This is the default if overwrites null. This parameter is a string.

Examples

```
COPY-RFILE:::123::TYPE=SWDL,SRC="ftp://cisco15:password@192.9.0.11:21/ONS15216Edfa3-00.04.
17-004A-16.18",DEST="file://fd1/ONS15216Edfa3-00.04.17-004A-16.18",OVERWRITE=YES;

COPY-RFILE:::123::TYPE=SWDL,SRC="ftp://cisco15:password@192.9.0.11:21/ONS15216
Edfa3-00.04.17-004A-16.18",DEST="file://fd1/ONS15216Edfa3-00.04.17-004A-16.18",
OVERWRITE=YES;

   EDFA3 2004-01-28 16:58:23
M  123 COMPLD
   /* COPY-RFILE */
;
>

   EDFA3 2004-01-28 16:58:23
*  20 REPT ALM EQPT
   "EQPT:MN,SFTWDOWN,NSA,01-28,16-58-23,,,:\"Software Download In Progress\""
;
```

```
   EDFA3 2004-01-28 16:58:25
A  21 REPT EVT FXFR
   "ONS15216Edfa3-00.04.17-004A-16.18,START,,"
;

   EDFA3 2004-01-28 16:58:25
A  22 REPT EVT FXFR
   "ONS15216Edfa3-00.04.17-004A-16.18,IP,,"
;

   EDFA3 2004-01-28 16:59:20
A  23 REPT EVT FXFR
   "ONS15216Edfa3-00.04.17-004A-16.18,COMPLD,SUCCESS,4282718"
;

   EDFA3 2004-01-28 16:59:20
A  24 REPT ALM EQPT
   "EQPT:CL,SFTWDOWN,NSA,01-28,16-59-20,,,:\"Software Download In Progress\""
;
```

Errors

This message can generate any of the default errors.

Command Result A local or remote file is copied to the FFS.

8.4.6 CPY-MEM

Usage Guidelines The Copy Memory command copies the log file from RAM to the FFS or from the FFS to an FFS with a specified name.

Syntax Description

Input Format

```
CPY-MEM:<TID>::<ctag>::[<fromfile>],[<fromdev>],[<tofile>];
```

Input Parameters

fromfile	Name of the source file, formatted as a string. A null value means LOG and null can only be used when <fromdev> is also null. The possible values are: • LOG: When <fromdev> is specified to be MEM or null • File_name: Name of the file on the FFS that is to be copied with <fromdev>
fromdev	The device on which the source file exists. A null means MEM. Possible values are: • MEM: Log file • FFS: File on flash (a string)
tofile	The name string of the destination file.

Examples

```
CPY-MEM:::123::aolog.txt,FFS,bolog.txt;

   EDFA3 2003-11-01 10:08:00
M  123 COMPLD
   /* CPY-MEM */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The log file is copied from RAM to the FFS or from the FFS to an FFS with a specified name.

8.4.7 DLT-RFILE

Usage Guidelines

The Delete RFILE command deletes a file from the FFS of the ONS 15216 EDFA3.

Syntax Description

Input Format

```
DLT-RFILE:<TID>::<ctag>::FILE=<localfilename>;
```

Input Parameters

localfilename	Name of the file on the FFS of the ONS 15216 EDFA3 that is to be deleted. File names are case sensitive. This parameter is a string.

Examples

```
DLT-RFILE:::123::FILE=bolog.txt;

   EDFA3 2003-11-01 10:08:07
M  123 COMPLD
   /* DLT-RFILE */
;
>
```

Errors

This message can generate any of the default errors.

Command Result The specified file is deleted from the FFS of the ONS 15216 EDFA3.

8.4.8 DLT-TRAPTABLE

Usage Guidelines The Delete Trap Table command is used to delete a specific row (if <aid> = IP address) or all rows (if <aid> = ALL or null) in the SNMP Trap Destination Table.

Syntax Description

Input Format

```
DLT-TRAPTABLE:[TID]:[<aid>]:<ctag>;
```

Input Parameters

aid	The aid is the IP address, formatted as a string. ALL or null deletes the entire trap table.
ip	The trap receiver IP address.

Examples

```
DLT-TRAPTABLE::192.168.1.1:123;

   EDFA3 2003-11-01 10:08:38
M  123 COMPLD
   /* DLT-TRAPTABLE */
;
>
```

Errors

This message can generate any of the default errors.

Command Result A specific row (if <aid> = IP address) or all rows (if <aid> = ALL or null) are deleted from the SNMP Trap Destination Table.

8.4.9 DLT-USER-SECU

Usage Guidelines The Delete User Security command removes a user. Only an administrator can use this command. The <aid> block contains the user identifier. This command cannot be used to delete a user who is currently logged on.

Syntax Description

Input Format

```
DLT-USER-SECU:[TID]:<uid>:<ctag>;
```

Input Parameters

uid	The user identifier, formatted as a string.

Examples

```
DLT-USER-SECU::EDFA3_USER:123;

   EDFA3 2003-11-01 10:14:08
M  123 COMPLD
   /* DLT-USER-SECU */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

A specified user is removed.

8.4.10 ED-DAT

Usage Guidelines

The Edit Date and Time command edits the date and time on the NE, as defined in Telcordia GR-199.

Syntax Description

Input Format

```
ED-DAT:[<TID>]::[CTAG]::[<date>],[<time>];
```

Input Parameters

date	Change the date to this value, in the format YYYY-MM-DD.
time	Change the time to this value, in the format HH-MM-SS.

Examples

```
ED-DAT:::123::2003-11-01,10-00-00;

   EDFA3 2003-11-01 10:00:00
M  123 COMPLD
   /* ED-DAT */
;
>
```

Errors

This message can generate any of the default errors.

Command Result The specified date and time become active.

8.4.11 ED-DWDM

Usage Guidelines The Edit DWDM command configures the ONS 15216 EDFA3 optical control parameters. It includes two modes:

- Constant Output Power mode (OPWR)
- Constant Gain mode (CGAIN)

Syntax Description

Input Format

```
ED-DWDM:[<TID>]:<aid>:<ctag>:::[CTRLMODE=<ctrlmode>],
[LINE1TXPWRSP=<line1txpwrsp>],[PWROFFSET=<pwroffset>,][GAINSP=<gainsp>,]
[TILTSP=<tiltsp>,][TILTOFFSET=<tiltoffset>,][OSRI=<osri>][:];
```

Input Parameters

aid	Access identifier. Use either 1 or ALL.
ctrlmode	Amplifier control mode (of type ctrlmode). There are two possible values: • COPWR: Constant output power • CGAIN: Constant gain (default)
line1txpwrsp	Amplifier output power setpoint value related to the LINE1TX Port measured in decibels referred to 1 milliwatt (dBm).
pwroffset	Output power offset measured in decibels (dB).
gainsp	Gain setpoint measured in decibels (dB).
tiltsp	Tilt setpoint measured in decibels (dB).
tiltoffset	Tilt offset measured in decibels (dB).
osri	Optical safety remote interlock, of type OSRI. There are two possible values: • ON: Forces the laser off. • OFF: (Default) Removes the laser lock, allowing the laser to turn on.

Examples

```
ED-DWDM::1:123:::CTRLMODE=CGAIN,LINE1TXPWRSP=10,PWROFFSET=0,GAINSP=15,TILTSP=0,TILTOFFSET=
0,OSRI=ON;

   EDFA3 2003-11-01 10:26:00
A  2 REPT EVT DWDM
   "DWDM:GAINTHDHCHGD,TC,11-01,10-26-00,,,17.0dB,23.0dB,:\"Gain Degrade High Threshold
Changed \""
;

  EDFA3 2003-11-01 10:26:00
A  3 REPT EVT DWDM
   "DWDM:GAINCHGD,TC,11-01,10-26-00,,,15.0dB,21.0dB,:\"Gain Setpoint Changed \""
;
```

```
EDFA3 2003-11-01 10:26:00
A  4 REPT EVT DWDM
   "DWDM:GAINTHDLCHGD,TC,11-01,10-26-00,,,13.0dB,19.0dB,:\"Gain Degrade Low Threshold
Changed \""
;

  EDFA3 2003-11-01 10:26:00
M  123 COMPLD
   /* ED-DWDM */
;
>
```

Errors

This message can generate any of the default errors.

Command Result The ONS 15216 EDFA3 optical control parameters are configured.

8.4.12 ED-EQPT

Usage Guidelines The Edit Equipment command is used to configure the Power Bus mode.

Syntax Description

Input Format

```
ED-EQPT:[<TID>]:<aid>:<ctag>:::PWRBUSMODE=<pwrbusmode>[:];
```

Input Parameters

aid	A string. Possible values are: • PWR-A: Assigns PWRBUSMODE=SIMPLEX • PWR-B: Assigns PWRBUSMODE=DUPLEX • ALL: Assigns PWRBUSMODE=SIMPLEX or PWRBUSMODE=DUPLEX
pwrbusmode	Power Bus Mode, of type PWRBUSMODE. Possible values are: • SIMPLEX: Simplex mode requires power only to Bus A. • DUPLEX: Duplex (default) requires power to both Bus A and Bus B.

Examples

```
ED-EQPT::ALL:123:::PWRBUSMODE=DUPLEX;

EDFA3 2003-11-01 10:28:36
M  123 COMPLD
   /* ED-EQPT */
;
>
```

Errors

This message can generate any of the default errors.

Command Result The Power Bus mode is reconfigured.

8.4.13 ED-NE-GEN

Usage Guidelines The Edit Network Element GEN command is used to edit the following NE attributes: NE TID, node name, longitude, latitude, IP address, IP mask, default router, and the standby file filename. The command is also used to enable or disable the SNMP Set Request operation.

Note The IP address and IP mask must be input at the same time. After an IP address is changed, the system is restarted with the new IP address.

Syntax Description

Input Format

```
ED-NE-GEN:[TID]::<ctag>:::[NAME=<name>],[DESCR=<descr>],[LONGITUDE=<longitude>],
[LATITUDE=<latitude>],[IPADDR=<ipaddr>],[IPMASK=<ipmask>],[DEFRTR=<defrtr>], [STANDBYSW=
<standbysw>],[SNMPSETREQ=<snmpsetreq>];
```

Input Parameters

name	The system's sid/tid name is a string. The default value is EDFA3.
descr	The EDFA3 description, formatted as a string, with a maximum length of 64 characters.
longitude	Longitude of the NE location, formatted as a string.
latitude	Latitude of the NE location, formatted as a string.
ipaddr	The NE's IP address, formatted as a string. The default value is 0.0.0.0.
ipmask	The NE's subnet mask, formatted as a string, with a default value of 255.255.255.255.
defrtr	The IP address of the default router, formatted as a string with a default value of 0.0.0.0.
standbysw	The file name for standby file, formatted as a string.
snmpsetreq	A flag to enable/disable the SNMP Set Request operation, formatted as a string. There are two possible values: ENABLE (default) and DISABLE.

Examples The following example changes the IP address:

```
ED-NE-GEN:::123:::IPADDR=192.168.1.2;

   EDFA3 2003-11-01 10:29:47
M  123 COMPLD
   /* CHANGING IP, EDFA3 RESTART */
;
>
```

Errors

This message can generate any of the default errors.

Command Result The NE attributes are modified according to the values in the command.

8.4.14 ED-PID

Usage Guidelines The Edit Password command allows a user to change their own password. The changed password does not appear in the TL1 log on the NE. The password cannot be null. Other user identification and access changes can only be made by privileged/superusers with the ED-USER-SECU command.

Syntax Description

Input Format

```
ED-PID:[TID]:<uid>:<ctag>::<oldpw>,<newpw>;
```

Input Parameters

uid	The user identifier, formatted as a string.
oldpw	The password must include at least one special character (#, +, or %) and at least one nonalphabetic character besides the special character(s). The string length of the password is between 6 and 10.
newpw	The password must include at least one special character (#, +, or %) and at least one nonalphabetic character besides the special character(s). The string length of the password is between 6 and 10.

Examples

```
ED-PID::EDFA3_USER:123::**********,**********;

   EDFA3 2003-11-01 10:11:01
M  123 COMPLD
   /* ED-PID */
;
>
```

Errors

This message can generate any of the default errors.

Command Result The user's own password is modified according to the values in the command.

8.4.15 ED-TRAPTABLE

Usage Guidelines

The Edit Trap Table command allows the user to edit the values for the trap table's community string, UDP port, and version.

Syntax Description

Input Format

```
ED-TRAPTABLE:[TID]:<aid>:<ctag>:::[TRAPCOM=<community>,][TRAPPORT=<port>,]
[TRAPVER=<trap-version>][:];
```

Input Parameters

aid	The aid is the trap receiver IP address. The IP cannot be 0.0.0.0.
community	community is the community string, not less than 6 characters and not more than 32 characters. It cannot be null.
port	The UDP port number, formatted as an integer.
trap version	The trap version, formatted as a string. The possible values are v1 or v2.

Examples

```
ED-TRAPTABLE::192.168.1.1:123:::TRAPCOM=EDFA3_USER,TRAPPORT=162,TRAPVER=V1;

   EDFA3 2003-11-01 10:08:25
M  123 COMPLD
   /* ED-TRAPTABLE */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The trap table values are modified according to the values in the command.

8.4.16 ED-USER-SECU

Use the Edit User Security command to edit a user's privileges, password, or user ID. Only an administrator can use this command.

Syntax Description

Input Format

```
ED-USER-SECU:[TID]:<uid>:<ctag>::<newuid>,<newpid>,,<uap>:;
```

Input Parameters

uid	The user identifier, formatted as a string.
newuid	New user ID, formatted as a string.
newpid	The new password must include at least one special character (#, +, or %) and at least one nonalphabetic character besides the special character(s). The string length of the password is between 6 and 10.
uap	Access privilege, of type UserPrivilege.

Examples

```
ED-USER-SECU::EDFA3_USER:123::EDFA_USER,**********,,RW;

   EDFA3 2003-11-01 10:18:29
M  123 COMPLD
   /* ED-USER-SECU */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The user's userid and password are modified according to the values in the command.

8.4.17 ENT-TRAPTABLE

Usage Guidelines

The Enter Trap Table command is used to add an entry in the SNMP Trap Destination Table. Each IP address entry represents a new community string. The user defines the following fields:

- Trap receiver IP address
- UDP port number
- Community string, not less than 6 characters and not more than 32 characters
- Version

The <aid> consists of the IP address and is used by the command to identify a specific row in the SNMP Trap Destination Table (see Table 8-9). Therefore, the IP address must be unique inside the table.

The SNMP Trap destination Table can contain up to 10 rows.

Note The <aid> in the ENT-TRAPTABLE command is essential. It is used not only for the trap receiver, but also for the SNMP manager. A user will not be able to browse the MIB unless the browser workstation's IP address is entered into the trap destination table.

Table 8-9 SNMP Trap Destination Table Example

IP Address <aid>	UDP Port Number <trapport>	Community String <trapcom>	Version <trapver>
10.51.100.65	162	Community_string1	v1
10.51.100.66	163	Community_string2	v2
10.51.100.67	164	Community_string3	v1

Syntax Description

Input Format

```
ENT-TRAPTABLE:[<TID>]:<aid>:<ctag>::[TRAPCOM=<trapcom>],[TRAPPORT=<trapport>],
[TRAPVER=<trapver>];
```

Input Parameters

aid	The trap receiver IP address. It must contain a value different from 0.0.0.0.
trapcom	The community string, formatted as a string with a minimum length of 6 characters and a maximum length of 32 characters. If <trapcom> is not provided, the default value CISCO15 is assigned.
trapport	The UDP port number. If <port> is not provided, it is assigned the value 162.
trapver	The trap version. The possible value are v1 or v2. If the <trapversion> is not provided, v1 is assigned as a default value.

Examples

```
ENT-TRAPTABLE::192.168.1.1:123::TRAPCOM=EDFA3_USER,TRAPPORT=162,TRAPVER=V1;

   EDFA3 2003-11-01 10:08:15
M  123 COMPLD
   /* ENT-TRAPTABLE */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The trap table is modified according to the values in the command.

8.4.18 ENT-USER-SECU

Usage Guidelines

Use the Enter User Security command to add a user account. Only administrators can use this command.

Syntax Description

Input Format

```
ENT-USER-SECU:[<TID>]:<uid>:<ctag>::<pid>,,<uap>:;
```

Input Parameters

uid	The user identifier, formatted as a string.
pid	This is the password or private identifier of the user, formatted as a string.
uap	This is the access privilege of the user, which is of type UserPrivilege.

Examples

```
ENT-USER-SECU::EDFA3_USER:123::**********,,RWA;

   EDFA3 2003-11-01 10:14:16
M  123 COMPLD
   /* ENT-USER-SECU */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

A new user is entered into the system, including security parameters and access levels.

8.4.19 INH-MSG-ALL

Usage Guidelines

The Inhibit Message All command instructs the NE to disable the transmission of autonomous messages. This instruction can be reversed using ALW-MSG.

Note Alarms will still be generated and are available using RTRV-COND or RTRV-ALM.

If this command is used twice successively in the same session with the same parameter values (that is, without performing the ALW-MSG-ALL between the two commands), the SAIN (Already Inhibited) error message is generated.

The INH-MSG-ALL command is valid if an alarm exists that satisfies the condition contained in the parameter <ntfcncde> and <condtype>. For example, if the user inhibits a specific alarm with the notification code (ntfcncde) equal to MN and subsequently provides the same command to inhibit all the alarms with ntfcncde equal to MN, the second command is valid because the object of the second alarm is different from the object of the first.

Syntax Description

Input Format

```
INH-MSG-ALL:[<TID>]:[<aid>]:[CTAG]::[<ntfcncde>],[<condtype>][,];
```

Note If any parameter is not provided, the alarms that satisfy the condition of the not null field will be inhibited.

Input Parameters

aid	Access identifier. For this command the <aid> is ALL.
ntfcncde	A two-character notification code associated with some automatic messages. ntfcncde is of type NotificationCode. With a null value, all existing <ntfcncde> inhibitions are kept unchanged.
condtype	This is the condition type of the alarm or event that is to be inhibited. ALL maps to all types. If a null value exists in ntfcncde, inhibitions are unchanged. If both ntfcncde and condtype are null, all messages will be inhibited.

Examples

```
INH-MSG-ALL:::123;

EDFA3 2003-11-01 10:00:11
M  123 COMPLD
   /* INH-MSG-ALL */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

All REPT ALM and REPT EVT autonomous messages are inhibited.

8.4.20 INIT-SYS

Usage Guidelines

The Initialize System command reboots the ONS 15216 EDFA3.

Syntax Description

Input Format:

```
INIT-SYS:[<TID>]:<aid>:<ctag>::<ph>;
```

Input Parameters

aid	The possible values are EQPT and ALL, which have the same input effect.
ph	This is the level of the initialization, routine, or function being performed. The <ph> parameter must be an integer and currently the only acceptable value is the single digit numeric value of “1” , which will cause the system to soft reboot and restart with the current default code image (same firmware).

Note INIT-SYS restarts the ONS 15216 EDFA3 with the current default code image (same firmware). To restart the system and switch to a newly downloaded code image (new firmware) see the 8.4.3 APPLY command.

Examples

```
INIT-SYS::EQPT:123::1;

   EDFA3 2003-11-01 11:55:52
A  24 REPT EVT EQPT
   "EQPT:SOFTWARERESET,TC,11-01,11-55-52,,,,:\"Software Reset \""
;

  EDFA3 2003-11-01 11:55:52
M  123 COMPLD
   /* INIT-SYS */
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The system reboots.

8.4.21 RTRV-ALM-ALL

Usage Guidelines

The Retrieve Alarm All command retrieves and sends the current status of all active alarm conditions. The alarm condition or severity to be retrieved can be specified by using the input parameters as a filter.

Syntax Description

Input Format

```
RTRV-ALM-ALL:[TID]::<123>::[<ntfcncde>],[<alarmMsg>],[<srveff>][,,,,,];
```

Input Parameters

ntfcncde	Notification code, of type NotificationCode. A null value is equivalent to ALL.
alarmMsg	Alarm condition type, of type AlarmMsg. A null value is equivalent to ALL.
srveff	Service Effect, of type ServiceEffect. A null value is equivalent to ALL.

Output Format

```
<sid> <date> <time>
M  # COMPLD
   "<aid>,<aidtype>:<ntfcncde>,<alarmMsg>,<srveff>,<ocrdat>,<ocrtm>,,:<conddescr>"
;
```

Output Parameters

aid	The access ID, formatted as a string.
aidtype	The aid type, formatted as a string. The value can be either DWDM or EQPT.
ntfcncde	Notification code, of type NotificationCode.
alarmMsg	Alarm condition, of type AlarmMsg.
srveff	This is the effect on service caused by alarm condition, of type ServiceEffect.
ocrdat	The date when the triggered alarm occurred, in date format.
ocrtm	The time when the triggered alarm occurred, in time format
conddescr	Detailed description of alarm in string format.

Examples

```
RTRV-ALM-ALL:::123;

EDFA3 2003-11-01 11:54:40
M  123 COMPLD
   "1,DWDM:CR,LINE1RXPWRFL,SA,11-01,11-54-38,,:\"Power Fail Low LINE1RX Port \""
   "PWR-B,EQPT:MN,PWRBUSB,NSA,11-01,11-51-42,,:\"POWER BusB Alarm\""
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The current status of all active alarm conditions is retrieved and displayed.

8.4.22 RTRV-ALM-DWDM

Usage Guidelines

The Retrieve Alarm DWDM command generates a report about active DWDM alarms.

Syntax Description

Input Format

```
RTRV-ALM-DWDM:[TID]::<ctag>::[<ntfcncde>],[<alarmDwdm>],[<srveff>][,,,,,];
```

Input Parameters

ntfcncde	Notification code, of type NotificationCode. A null value is equivalent to ALL.
alarmDwdm	Alarm condition, of type Alarm_DWDM. A null value is equivalent to ALL.
srveff	Service Effect, of type ServiceEffect. A null value is equivalent to ALL.

Output Format

```
<sid> <date> <time>
M <ctag> COMPLD
"1, DWDM:<ntfcode>,<alarmDwdm>,<srveff>,<ocrdat>,<ocrtm>,,:<conddescr>"
```

Output Parameters

ntfcncde	Notification code, of type NotificationCode.
alarmDwdm	Alarm Type, of type Alarm_DWDM.
srveff	Service Effect, of type ServiceEffect.
ocrdat	The date when the triggering event occurred in date format.
ocrtm	The time of day when the triggering event occurred in time format.
conddescr	A detailed description of the alarm in string format.

Examples

```
RTRV-ALM-DWDM:::123;

   EDFA3 2003-11-01 11:54:49
M  123 COMPLD
   "1,DWDM:CR,LINE1RXPWRFL,SA,11-01,11-54-38,,:\"Power Fail Low LINE1RX Port \""
;
```

Errors

This message can generate any of the default errors.

Command Result

A report about active DWDM alarms is generated.

8.4.23 RTRV-ALM-EQPT

Usage Guidelines

The Retrieve Alarm Equipment command generates a report on active equipment alarms.

Syntax Description

Input Format

```
RTRV-ALM-EQPT:[TID]::<ctag>::[<ntfcncde>],[<alarmMsg>],[<srveff>][,,,];
```

Input Parameters

ntfcncde	Notification code, of type NotificationCode. A null value is equivalent to ALL.
alarmMsg	Alarm Condition type, of type Alarm_EQPT. A null value is equivalent to ALL.
srveff	Service Effect, of type ServiceEffect. A null value is equivalent to ALL.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "EQPT,EQPT:<ntfcncde>,<alarmMsg>,<srveff>,<ocrdat>,<ocrtm>,,:<conddescr>"
;
```

Output Parameters

ntfcncde	Notification node, of type NotificationCode.
alarmMsg	Alarm condition type, of type Alarm_EQPT.
srveff	Service effect, of type ServiceEffect.
ocrdat	The date when the triggering event occurred, in date format.
ocrtm	The time of day when the triggering event occurred, in time format
conddescr	Detailed description of the alarm, in string format.

Examples

```
RTRV-ALM-EQPT:::123;

   EDFA3 2003-11-01 11:54:53
M  123 COMPLD
   "EQPT,EQPT:MN,PWRBUSB,NSA,11-01,11-51-42,,:\"POWER BusB Alarm\""
;
```

Errors

This message can generate any of the default errors.

Command Result

A report on active equipment alarms is generated.

8.4.24 RTRV-ATTR-ALL

Usage Guidelines

The Retrieve Alarm Severity command generates a report on alarm severity.

Syntax Description

Input Format

```
RTRV-ATTR-ALL:[TID]::<CTAG>::[<ntfcncde>],[<condtype>][,,,];
```

Input Parameters

ntfcncde	Notification code, of type NotificationCode. A null value is equivalent to ALL.
condtype	The condition type. A null value is equivalent to ALL.

Output Format

```
<sid> <date> <time>
M  # COMPLD
   "EQPT,EQPT:MN,CTMP,,"
    "EQPT,EQPT:MJ, DATAFLT"
```

Output Parameters

ntfcncde	Notification code, of type NotificationCode.
aid	This is EQPT or 1.
aidtype	This is one of the following: 1, PWR-A, PWR-B, or EQPT.

Examples

```
RTRV-ATTR-ALL:::123;

   EDFA3 2003-11-01 11:48:11
M  123 COMPLD
   "EQPT,EQPT:MN,BACKUPREST,,"
   "EQPT,EQPT:MJ,COMFAIL,,"
   "EQPT,EQPT:MN,CTMP,,"
   "EQPT,EQPT:MJ,DATAFLT,,"
   "EQPT,EQPT:CR,EQPT,,"
   "EQPT,EQPT:MJ,FFSFULL,,"
   "EQPT,EQPT:MN,FTMP,,"
   "1,1:NA,GAINDH,,"
   "1,1:NA,GAINDL,,"
   "EQPT,EQPT:MJ,L1BIASD,,"
   "EQPT,EQPT:CR,L1BIASF,,"
   "EQPT,EQPT:MN,L1TMP,,"
   "EQPT,EQPT:MJ,L2BIASD,,"
   "EQPT,EQPT:CR,L2BIASF,,"
   "EQPT,EQPT:MN,L2TMP,,"
   "1,1:CR,LINE1RXPWRFL,,"
   "1,1:NA,LINE1TXPWRDH,,"
   "1,1:NA,LINE1TXPWRDL,,"
   "1,1:NA,LINE1TXPWRFL,,"
   "1,1:NA,LINE2RXPWRFL,,"
   "EQPT,EQPT:MJ,MEMLOW,,"
   "PWR-A,EQPT:MN,PWRBUSA,,"
   "PWR-B,EQPT:MN,PWRBUSB,,"
   "EQPT,EQPT:MN,SFTWDOWN,,"
   "1,1:NA,VOADH,,"
   "1,1:NA,VOADL,,"
   "1,1:NA,VOAFH,,"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

This command is valid if an alarm exists that satisfies the conditions contained in the parameters <ntfcncde> and <condtype>. If one parameter is not provided, the alarms that satisfy the condition of the not null field are allowed.

8.4.25 RTRV-ATTR-DWDM

Usage Guidelines

The Retrieve Optical Alarm Severity command retrieves the severity associated with an optical alarm.

Syntax Description

Input Format

```
RTRV-ATTR-DWDM:[<TID>]:[<aid>]:<ctag>::[<ntfcncde>],[<condtype>] [,,,];
```

Input Parameters

aid	1 or ALL.
ntfcncde	A null value is equivalent to ALL.
condtype	Null or ALL. A null value defaults to ALL of the condition types.

Output Format

```
   <sid> <date> <time>
M  <ctag> COMPLD
   "<aid>[,<aidtype>]:[<ntfcncde>],<condtype>,,"
;
```

Output Parameters

aid	Always 1.
aidtype	Always 1.
ntfcncde	Notification code, of type NotificationCode.
condtype	The condition type of the alarm or event that is retrieved. ALL maps to all types.

The RTRV-ATTR-DWDM is valid if an alarm exists that satisfies the condition contained in the parameter <ntfcncde> or <condtype>. If a parameter is not provided, the alarms that satisfy the condition of the not null field are allowed.

Examples

```
RTRV-ATTR-DWDM:::123;
```

```
   EDFA3 2003-11-01 11:43:08
M  123 COMPLD
   "1,1:MN,GAINDH,,"
   "1,1:MN,GAINDL,,"
   "1,1:CR,LINE1RXPWRFL,,"
   "1,1:MN,LINE1TXPWRDH,,"
   "1,1:MN,LINE1TXPWRDL,,"
   "1,1:CR,LINE1TXPWRFL,,"
   "1,1:CR,LINE2RXPWRFL,,"
   "1,1:MN,VOADH,,"
   "1,1:MN,VOADL,,"
   "1,1:CR,VOAFH,,"
;
>
```

Command Result

The severity associated with an optical alarm is retrieved.

8.4.26 RTRV-ATTR-EQPT

Usage Guidelines

The Retrieve Equipment Alarm Severity command retrieves the severity associated with an equipment alarm.

Syntax Description

Input Format

```
RTRV-ATTR-EQPT:[<TID>]:[<aid>]:<ctag>::[<ntfcncde>],[<condtype>] [,,,];
```

Input Parameters

aid	PWR-A, PWR-B, EQPT, or ALL.
ntfcncde	A null value is equivalent to ALL.
condtype	Null or ALL. A null value defaults to ALL the condition types.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<aid>[,<aidtype>]:[<ntfcncde>],<condtype>,,"
;
```

Output Parameters

aid	EQPT
aidtype	PWR-A, PWR-B or EQPT
ntfcncde	Notification code, of type NotificationCode.
condtype	The condition type of the alarm or event that is retrieved. ALL maps to all types.

The RTRV-ATTR-EQPT command is valid if an alarm exists that satisfies the condition contained in the parameters <ntfcncde> and <condtype>. If a parameter is not provided, the alarms that satisfy the condition of the not null field will be allowed.

Examples

```
RTRV-ATTR-EQPT:::123;

    EDFA3 2003-11-01 11:48:05
M  123 COMPLD
    "EQPT,EQPT:MN,BACKUPREST,,"
    "EQPT,EQPT:MJ,COMFAIL,,"
    "EQPT,EQPT:MN,CTMP,,"
    "EQPT,EQPT:MJ,MEMLOW,,"
    "PWR-A,EQPT:MN,PWRBUSA,,"
    "PWR-B,EQPT:MN,PWRBUSB,,"
    "EQPT,EQPT:MN,SFTWDOWN,,"
;
>
```

Command Result The severity associated with an equipment alarm is retrieved.

8.4.27 RTRV-AO

Usage Guidelines The Retrieve Autonomous Output command allows the operating system to retrieve a copy of queued autonomous messages or missing autonomous messages that cannot be sent to the operating system because of the unavailability of a communications link. Examples of autonomous messages are REPT ALM, and REPT EVT.

While a user can retrieve the latest 1000 autonomous (alarms and events) messages, normally the user should limit the retrieved messages to less than 200. Otherwise, the alarm report and other users' active sessions might be impacted. To retrieve a large number of messages, we suggest that the user retrieve the log file using FTP.

Note If atagseq is NULL, the 20 latest messages will be retrieved.

Syntax Description

Input Format

```
RTRV-AO:[<TID>]::<ctag>:::[ATAGSEQ=<atagseq>],[MSGTYPE=<msgtype>];
```

Input Parameters

atagseq	This is an integral part of the ATAG of the autonomous message to be retrieved. ATAGSEQ = a&&b, means to list ATAG range from a to b. a and b are integers. atagseq is a integer within a range. A null value is equivalent to ALL.
msgtype	This is the message type, including EVT and ALM. msgtype is of type MessageType. A null value is equivalent to ALL.

Output Parameters

If none of the stored automatic messages satisfy the selection criteria, then a complete normal response is sent. If one or more stored autonomous messages satisfies the criteria, then the messages are reported in the normal response in ATAG order.

Examples

Input Example

```
RTRV-AO:::123;
```

Output Example

```
TID-000 03-09-20 14-30-00
M  001 COMPLD
A 2 REPT EVT DWDM
"DWDM LASEARCHGD,TC,09-20,00-14:30:30,,,OV,APR,:\"Laser Status Changed\"
;
```

Errors

This message can generate any of the default errors.

Command Result

A copy of queued autonomous messages or missing autonomous messages that cannot be sent to the operating system because of the unavailability of a communications link is retrieved.

8.4.28 RTRV-COND-ALL

Usage Guidelines

The Retrieve Condition All command returns the current conditions related to the NE.

Syntax Description

Input Format

```
RTRV-COND-ALL:[<TID>]::<ctag>::[<alarmMsg>],,,;
```

Input Parameters

alarmMsg	This is the Alarm Message type. alarmMsg is of type AlarmMsg. A null value is equivalent to ALL.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
    "<aid>,<ccm>:<ntfcncde>,<alarmMsg>,<svreff>,<ocrdat>,<ocrtm>,,,:
        <conddescr>"
;
```

Output Parameters

aid	Use one of the following values: PWR-A, PWR-B, 1, or EQPT.
ccm	Use one of the following values: DWDM or EQPT.
ntfcncde	This is the notification code. ntfcncde is of type NotificationCode.
alarmMsg	This is the Alarm Type. alarmMsg is of type AlarmMsg.
srveff	This is the service effect. srveff is of type ServiceEffect.
ocrdat	This is the date when the triggering event occurred, in date format.
ocrtm	This is the time of day when the triggering event occurred, in time format.
conddescr	This is a detailed description of the alarm, in string format.

Examples

```
RTRV-COND-ALL:::123;

EDFA3 2003-11-01 11:54:57
M  123 COMPLD
"1,DWDM:CR,LINE1RXPWRFL,SA,11-01,11-52-39,,,:\"Power Fail Low LINE1RX Port\""
"PWR-B,EQPT:MN,PWRBUSB,NSA,11-01,11-23-34,,,:\"POWER BusB Alarm\""
;
```

Errors

This message can generate any of the default errors.

Command Result This command returns the current conditions related to the NE.

8.4.29 RTRV-COND-DWDM

Usage Guidelines The Retrieve Condition DWDM command returns the current DWDM conditions.

Syntax Description

Input Format

```
RTRV-COND-DWDM:[<TID>]::<ctag>::[<alarmDwdm>],,,;
```

Input Parameters

alarmDwdm	Alarm condition, of type Alarm_DWDM. A null value is equivalent to ALL.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<aid>,DWDM:<ntfcncde>,<alarmDwdm>,<srveff>,<ocrdat>,<ocrtm>,,,:<conddescr>"
;
```

Output Parameters

aid	One of the following values: PWR-A, PWR-B, 1, or EQPT.
ntfcncde	Notification code, of type NotificationCode.
alarmDwdm	Alarm Type. alarmDwdm is of type Alarm_DWDM.
srveff	Service Effect. srveff is of type ServiceEffect.
ocrdat	The date when the triggering event occurred in date format.
ocrtm	The time when the triggering event occurred in time format
conddescr	Detailed description of the alarm, in string format.

Examples

```
RTRV-COND-DWDM:::123;

EDFA3 2003-11-01 11:55:11
M  123 COMPLD
"1,DWDM:CR,LINE1RXPWRFL,SA,11-01,11-52-39,,,:\"Power Fail Low LINE1RX Port\""
;
>
```

Errors

This message can generate any of the default errors.

Command Result Returns the current DWDM conditions.

8.4.30 RTRV-COND-EQPT

Usage Guidelines The Retrieve Condition Equipment command returns the current equipment conditions.

Syntax Description

Input Format

```
RTRV-COND-EQPT:[<TID>]::<ctag>::[<alarmEqpt>],,,;
```

Input Parameters

alarmEqpt	Alarm condition, of type Alarm_EQPT. A null value is equivalent to ALL.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<aid>,<ccm>:<ntfcncde>,<alarmEqpt>,<srveff>,<ocrdat>,<ocrtm>,,,<conddescr>"
;
```

Output Parameters

aid	The access identifier for the ONS 15216 EDFA3.
ccm	Always EQPT.
ntfcncde	Notification code. ntfcncde is of type NotificationCode.
alarmEqpt	Alarm condition. alarmEqpt is of type Alarm_EQPT.
srveff	Service effect. srveff is of type ServiceEffect.
ocrdat	This is the date when the triggering event occurred, in date format.
ocrtm	is the time when the triggering event occurred, in time format.
conddescr	Detailed description of the condition, in string format.

Examples

```
RTRV-COND-EQPT:::123;

EDFA3 2003-11-01 11:55:27
M  123 COMPLD
"PWR-B,EQPT:MN,PWRBUSB,NSA,11-01,11-23-34,,,:\"POWER BusB Alarm\""
;
```

Errors

This message can generate any of the default errors.

Command Result Returns the current equipment conditions.

8.4.31 RTRV-DFLT-SECU

Usage Guidelines The Retrieve Default Security command is used to retrieve the time interval of automatic logout associated with different user security levels.

Syntax Description

Input Format

```
RTRV-DFLT-SECU:[<TID>]:<uap>:<ctag>;
```

Input Parameters

uap	User access privilege. uap is of type UserPrivilege. uap must not be null.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<aid>:AL=<uap>,TMOUT=<tmout>"
;
```

Output Parameters

aid	Either EQPT or ALL.
tmout	Time interval of automatic logout, in string format. Value range is from 1 minute to 999 minutes.
uap	User access privilege.

Examples

```
RTRV-DFLT-SECU::ALL:123;

   EDFA3 2003-11-01 11:37:18
M  123 COMPLD
   "EQPT:AL=RWA,TMOUT=15MIN"
   "EQPT:AL=RW,TMOUT=30MIN"
   "EQPT:AL=R,TMOUT=60MIN"
;
>
```

Errors

This message can generate any of the default errors.

Command Result Retrieves the time interval of automatic logout associated with different user security levels.

8.4.32 RTRV-DWDM

Usage Guidelines The Retrieve DWDM command retrieves the ONS 15216 EDFA3 optical parameters.

Syntax Description

Input Format

```
RTRV-DWDM:[<TID>]:<aid>:<ctag>[::::];
```

Input Parameters

aid	Identifies the entity in the NE to which the command pertains. Use either 1 or ALL.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
"[<aid>]:[CTRLMODE=<ctrlmode>],[LINE1TXPWR=<line1txpwr>],[LINE1TXPWRSP=<line1txpwrsp>],
[LINE1RXPWR=<line1rxpwr>],[LINE2RXPWR=<line2rxpwr>],[LINE2TXPWR=<line2txpwr>], [PWROFFSET=
<pwroffset>],[GAIN=<gain>],[GAINSP=<gainsp>],[TILT=<tilt>],[TILTSP=<tiltsp>], [TILTOFFSET=
<tiltoffset>],[DCULOSS=<dculoss>],[OSRI=<on/off>],[LASTATUS=<on/off>],[VOA=<voa>]"
;
```

Output Parameters

aid	1
ctrlmode	Amplifier control mode. There are two possible values: • COPWR: Constant Output Power • CGAIN: Constant Gain
LINE1TXpwr	Amplifier output power value related to the LINE1TX Port, in dBm.
LINE1TXpwrsp	Amplifier output power setpoint value related to the LINE1TX Port, in dBm.
LINE1RXpwr	Amplifier input power value related to the LINE1RX Port, in dBm
LINE2RXpwr	Power value related to the LINE2RX Port, in dBm.
LINE2TXpwr	Power value related to the LINE2TX Port, in dBm.
pwroffset	Output power offset, in dB.
gain	Gain value, in dB.
gainsp	Gain setpoint, in dB.
tilt	Tilt value, in dB.
tiltsp	Tilt setpoint, in dB.
tiltoffset	Tilt offset, in dB.
dculoss	DCU insertion loss value, in dB.

osri	Optical safety remote interlock, of type OSRI. There are two possible values: • ON: Forces the laser off. • OFF: (Default) Removes the laser lock, allowing the laser to turn on.
lasstatus	The laser status summarizes the status (On, Off, APR) of all lasers present in the EDFA3.
voa	VOA value, in dB.

Examples

```
RTRV-DWDM::ALL:123;

   EDFA3 2003-11-01 10:20:28
M  123 COMPLD
"1:CTRLMODE=CGAIN,LINE1TXPWR=-60.0dBm,LINE1TXPWRSP=10.0dBm,LINE1RXPWR=-5.1dBm,
LINE2RXPWR=-39.1dBm,LINE2TXPWR=-60.0dBm,PWROFFSET=0.0dB,GAIN=0.0dB,GAINSP=21.0dB,
TILT=15.0dB,TILTSP=0.0dB,TILTOFFSET=0.0dB,DCULOSS=14.8dB,OSRI=ON,LASSTATUS=OFF,VOA=0.0dB"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The ONS 15216 EDFA3 optical parameters are retrieved.

8.4.33 RTRV-EQPT

Usage Guidelines

The Retrieve Equipment command retrieves the Power Bus mode.

Syntax Description

Input Format:

```
RTRV-EQPT:[<tid>]:<aid>:<ctag>[::::];
```

Input Parameters:

aid	Identifies the entity in the NE to which the command pertains. Use one of the following: • PWR-A: Retrieves PWRBUSMODE and POWERBUSAVAL • PWR-B: Retrieves PWRBUSMODE and POWERBUSBVAL • EQPT: Retrieves CASETEMP, FIBERTEMP, LASERBIAS (1 and 2), and PUMPTEMP (1 and 2) • ALL: Retrieves PWRBUSMODE, POWERBUSAVAL, POWERBUSBVAL, CASETEMP, FIBERTEMP, LASERBIAS (1 and 2), and PUMPTEMP (1 and 2)

Output Format:

```
<sid> <date> <time>
```

```
M <ctag> COMPLD
"<aid>:[PWRBUSMODE=<pwrbusmode>,][POWERBUSAVAL=<powerbusaval>,]
[POWERBUSBVAL=<powerbusbval,>][CASETEMP=<casetemp>,][FIBERTEMP=<fibertemp>,]
[LASERBIAS1=<laserbias1>,][LASERBIAS2=<laserbias2>,][PUMPTEMP1=<pumptemp1>,]
[PUMPTEMP2=<pumptemp2>]
```

Output Parameters:

aid	Retrieves PWR-A for PWRBUSMODE=SIMPLEX and POWERBUSAVAL, and PWR-B for PWRBUSMODE=DUPLEX and POWERBUSBVAL.
pwrbusmode	Power Bus mode. • SIMPLEX: Requires power only to Power Bus A • DUPLEX: Requires power to both Power Bus A and Power Bus B
powerbusaval	The Power Bus A current value.
powerbusbval	The Power Bus B current value.
casetemp	Case Temperature value.
fibertemp	Fiber Temperature value.
laserbias1	The first stage laser bias value.
laserbias2	The second stage laser bias value.
pumptemp1	The first stage pump temperature value.
pumptemp2	The second stage pump temperature value.

Examples

```
IRTRV-EQPT::ALL:123;

   EDFA3 2003-11-01 10:27:23
M  123 COMPLD

"EQPT:PWRBUSMODE=DUPLEX,POWERBUSAVAL=48.2V,POWERBUSBVAL=48.2V,CASETEMP=32.2C,FIBERTEMP=50.
0C,LASERBIAS1=0.0mA,LASERBIAS2=0.0mA,PUMPTEMP1=24.9C,PUMPTEMP2=25.0C"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The Power Bus mode is retrieved.

8.4.34 RTRV-HDR

Usage Guidelines

The Retrieve Header command is a standard keep alive message, used to ping the network element. It also returns the current time and TID of the NE. If you do not specify a TID then you can find the TID in the response to RTRV-HDR. This command is essential to NMA.

Syntax Description

```
RTRV-HDR:[TID]::[CTAG];
```

Examples

```
RTRV-HDR:::123;

   EDFA3 2003-11-01 11:49:53
M  123 COMPLD
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The network element is pinged.

8.4.35 RTRV-INV

Usage Guidelines

The Retrieve Inventory command retrieves inventory information for the ONS 15216 EDFA3, including the Common Language Equipment Identifier (CLEI) code.

Syntax Description

Input Format

```
RTRV-INV:[<TID>]:<aid>:<ctag>[::::];
```

Input Parameters

aid	The aid parameter can be EQPT or ALL.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
"[<aid>]:[CLEICODE=<cleicode>],[HARDWAREREV=<hardwarerev>],[FIRMWAREREV=<firmwarerev>],
[SOFTWAREREV=<softwarerev>],[SOFTWAREUPDATE=<softwareupdate>],[SERIALNUM=<serialnum>],
[MFGNAME=<mfgname>],[MODELNAME=<modelname>]"
;
```

Output Parameters

aid	This is a fixed string. aid is optional.
cleicode	This is the CLEI code. cleicode is a string. cleicode is optional.
hardwarerev	The hardware version is a string. hardwarerev is optional.
firmwarerev	The firmware version is a string. firmwarerev is optional.
softwarerev	The software version is a string. softwarerev is optional.
softwareupdate	The software update date is a string. softwareupdate is optional.
serialnum	The serial number is a string. serialnum is optional.
mfgname	The manufacturer name is a string. mfgname is optional.
modelname	The model name is a string. modelname is optional.

Examples

```
RTRV-INV::ALL:123;

   EDFA3 2003-11-01 11:50:02
M  123 COMPLD
"EQPT:CLEI=WMM7BG0ARA,HARDWAREREV=1.0.4,FIRMWAREREV=3.11.0,SOFTWAREREV=01.00.00,
HARDWAREREV=3.11.0,SOFTWAREUPDATE=1980-01-0108-30-38,SERIALNUM=ANX00000001,
MFGNAME=Cisco Systems,MODELNAME=PEMLB0C17CS03R6"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

Inventory information for the ONS 15216 EDFA3 is retrieved.

8.4.36 RTRV-NE-GEN

Usage Guidelines

The Retrieve Network Element GEN command retrieves an NE's generic information, including:

- NE TID
- Node name
- Longitude
- Latitude
- IP address
- IP subnet mask
- Gateway
- MAC address
- Boot table content

Syntax Description

Input Format

```
RTRV-NE-GEN:[<TID>]::[CTAG];
```

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
"<aid>:NAME=<name>,DESCR=<descr>,LONGITUDE=<longitude>,LATITUDE=<latitude>,
IPADDR=<ipaddr>,IPMASK=<ipmask>,DEFRTR=<defrtr>,MACADDRESS=<macaddress>,
ACTIVESW=<activesw>,STANDBYSW=<standbysw>,SNMPSETREQ=<snmpsetreq>"
;
```

Output Parameters

aid	Always use EQPT for this command.
name	The system sid/tid, in string format.
descr	The EDFA3's description with a maximum length of 64 characters, in string format.
longitude	Longitude of the system, in string format.
latitude	Latitude of the system, in string format.
ipaddr	IP address, in string format.
ipmask	IP subnet mask, in string format.
defrtr	Gateway, in string format.
macaddress	MAC address, in string format.
activesw	The file name for the active software file, in string format.
standbysw	Standby software file, in string format.
snmpsetreq	The status of the SNMP Set Request operation (ENABLE or DISABLE), in string format.

Examples

```
RTRV-NE-GEN:::123;

   EDFA3 2004-01-28 16:28:08
M  123 COMPLD
"EQPT:NAME=EDFA3,DESCR=ONS15216EDFA3,LONGITUDE=,LATITUDE=,IPADDR=192.9.0.7,
IPMASK=255.255.255.0,DEFRTR=0.0.0.0,MACADDRESS=0010EC8042B0,
ACTIVESW=ONS15216Edfa3-00.04.17-004A-16.18,STANDBYSW=ONS15216Edfa3-00.04.17-004A-16.18,
SNMPSETREQ=ENABLE"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

Network element generic information is retrieved.

8.4.37 RTRV-RFILE

Usage Guidelines

The Retrieve RFILE command lists a specific file or lists all files on the flash file system.

Syntax Description

Input Format

```
RTRV-RFILE:[<TID>]::<ctag>::[<localfilename>];
```

Input Parameters

localfilename	Name of the file on the flash file system that is to be listed. localfilename is a string. A null value is equivalent to ALL.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<aid>:<localfilename>,<filesize>"
;
```

Output Parameters

aid	This is the aid EQPT.
localfilename	Name of the file on the flash file system that is to be listed. localfilename is a string.
filesize	File size in bytes. filesize is a string.

Examples

```
RTRV-RFILE:::123;

   EDFA3 2003-11-01 10:04:26
M  123 COMPLD
   "EQPT:ONS15216DataBase,10456"
   "EQPT:aolog.txt,7000"
   "EQPT:aologA.txt,180261"
   "EQPT:ONS15216Edfa3_01.00.00_003L_12.23,4257054"
   "EQPT:snmpNotifyLogB,200704"
   "EQPT:snmpNotifyLogA,20188"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

Lists a specific file or lists all files on the flash file system.

8.4.38 RTRV-STATUS

Usage Guidelines

The Retrieve STATUS command retrieves the user logged on status for the past 1 day from the current date and time.

Syntax Description

Input Format

```
RTRV-STATUS:[TID]:<ocrdat>,<ocrtm>:<ctag>;
```

Input Parameters

ocrdat	Date. ocrdat is a string. ocrdat must not be null.
ocrtm	Time. ocrtm is a string. ocrtm must not be null.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<ocrdat>,<ocrtm>:,<uid>"
;
```

Output Parameters

ocrdat	This is the date. ocrdat is a string.
ocrtm	This is the time. ocrtm is a string.
uid	This is the user ID. uid is a string.

Examples

```
RTRV-STATUS::2003-11-01,11-50-00:123;

   EDFA3 2003-11-01 11:50:59
M  123 COMPLD
   "2003-11-01,11-50-00:,CISCO15,"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

Retrieves the user logged on status for the past 1 day from the current date and time.

8.4.39 RTRV-TH-DWDM

Usage Guidelines

The Retrieve Threshold DWDM command retrieves optical thresholds related to gain and optical power.

Syntax Description

Input Format

```
RTRV-TH-DWDM:[TID]:<aid>:<ctag>::[<thDwdm>][,,];
```

Input Parameters

aid	Access ID. For this command, the aid is AID_EDFA3. aid must not be null.
thDwdm	Threshold type. thDwdm is of type TH_DWDM. A null value is equivalent to ALL.

Output Format

```
   <sid> <date> <time>
M  <ctag> COMPLD
   "<aid>,<aidtype>:<thDwdm>,,,<thlev>"
;
```

Output Parameters

aid	Always 1.
aidtype	The aid type, either DWDM or NULL.
thDwdm	Threshold type, of type TH_DWDM.
thlev	Threshold level. thlev is a string. Possible values are: • GAINTHDL: Gain Degrade Low Threshold • GAINTHDH: Gain Degrade High Threshold • LINE1TXPWRTHDL: Power Degrade Low Threshold LINE1TX Port • LINE1TXPWRTHDH: Power Degrade High Threshold LINE1TX Port • LINE1TXPWRTHFL: Power Fail Low Threshold LINE1TX Port • LINE1RXPWRTHFL: Power Fail Low Threshold LINE1RX Port • LINE2RXPWRTHFL: Power Fail Low Threshold LINE2RX Port

Examples

```
> RTRV-TH-DWDM::ALL:124;

    2037-03-12 12:17:07
M  124 COMPLD
   "1,DWDM:GAINTHDH,,,23.0dB"
   "1,DWDM:GAINTHDL,,,19.0dB"
   "1,DWDM:LINE1RXPWRTHFL,,,10.0dBm"
   "1,DWDM:LINE1TXPWRTHDH,,,12.0dBm"
   "1,DWDM:LINE1TXPWRTHDL,,, 8.0dBm"
   "1,DWDM:LINE1TXPWRTHFL,,,-6.0dBm"
   "1,DWDM:LINE2RXPWRTHFL,,,-33.0dBm"
;
```

Errors

This message can generate any of the default errors.

Command Result Retrieves optical thresholds related to gain and optical power.

8.4.40 RTRV-TH-EQPT

Usage Guidelines The Retrieve Threshold Equipment command retrieves general threshold values for the ONS 15216 EDFA3.

Syntax Description

Input Format

```
RTRV-TH-EQPT:[<tid>]:<aid>:<ctag>::[<montype>][,][,];
```

Input Parameters

aid	Use one of the following aids: • PWR-A or PWR-B to retrieve the Power Bus A and B thresholds • EQPT to retrieve Case Temperature Thresholds • ALL to retrieve Power Bus A and B and Case Temperature thresholds
montype	Type of threshold to monitor. Use one of the following: • PWRBUSMIN to retrieve Power Bus A and B minimum voltage • PWRBUSMAX to retrieve Power Bus A and B maximum voltage • MAXCTMP to retrieve Maximum Case Temperature • MINCTMP to retrieve Minimum Case Temperature

Output Format

```
   <sid> <date> <time>
M  <ctag> COMPLD
   "<aid>:<thresholdtype>,,,<thresholdvalue>"
;
```

Output Parameters

aid	EQPT and ALL have same input effect. • EQPT: General parameters of the ONS 15216 EDFA3 (not directly affecting optical signal or power bus) • ALL: Any or all of the preceding (command input only)
threshholdtype and thresholdvalue pairs	Type of threshold or setpoint that is retrieved. Values are retrieved for the following: • MAXCTMP: Maximum case temperature (cerent15216EdfaCtmpMax), between 60 and 100, with a default of 65 degrees C. • MINCTMP: Minimum case temperature (cerent15216EdfaCtmpMin), between –10 and 30, with a default of –5 degrees C. • PWRBUSMIN: The minimum power bus value, between 0 and 47, with a default value of –40V. • PWRBUSMAX: The minimum power bus value, between 49 and 70, with a default value of –57V.

Examples

```
RTRV-TH-EQPT::ALL:1;

   EDFA3 2004-01-28 17:47:26
M  1 COMPLD
   "EQPT,EQPT:MAXCTMP,,,65.0C"
   "EQPT,EQPT:MINCTMP,,,-5.0C"
   "PWR-B,EQPT:PWRBUSMAX,,,57.0V"
   "PWR-B,EQPT:PWRBUSMIN,,,40.0V"
;
```

Command Result Power Bus A and B and Case Temperature threshold information is retrieved.

8.4.41 RTRV-TOD

Usage Guidelines The Retrieve Time of Day command retrieves the date and time of day of the ONS 15216 EDFA3.

Syntax Description

Input Format

```
RTRV-TOD:[TID]::[ctag]::;
```

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<year>,<month>,<day>,<hour>,<minute>,<second>"
;
```

Output Parameters

year	This is the year. year is an integer.
month	This is the month. month is an integer.
day	This is the day. day is an integer.
hour	This is the hour. hour is an integer.
minute	This is the minutes. minute is an integer.
second	This is the seconds. Second is an integer.

Examples

```
RTRV-TOD:::123;

   EDFA3 2003-11-01 10:00:03
M  123 COMPLD
   "2003,11,01,10,00,03"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

The date and time of day of the ONS 15216 EDFA3 is retrieved.

8.4.42 RTRV-TRAPTABLE

Usage Guidelines

The Retrieve Trap Table command retrieves information about the trap table. This command can be used to retrieve a specific row (if aid = IP address) or all the rows (if aid = ALL or null) of the SNMP Trap Destination Table.

Syntax Description

Input Format

```
RTRV-TRAPTABLE:[TID]:[<aid>]:[ctag];
```

Input Parameters

aid	The aid is composed of the IP address. aid is a string. A null value is equivalent to ALL and returns all values in the table.

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<ip>,<port>,<community>,<trapversion>"
;
```

Output Parameters

ip	The trap receiver IP address. ip is a string.
port	The UDP port number. port is a integer.
community	The community string. community is a string.
trapversion	The trap version. The possible value are v1 or v2. trapversion is a string.

Examples

```
RTRV-TRAPTABLE:::123;

   EDFA3 2003-11-01 10:08:29
M  123 COMPLD
   "129.9.0.11,162,USER_01,v1"
   "192.168.1.1,162,EDFA3_USER,v1"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

Provides information about the trap table.

8.4.43 RTRV-USER-SECU

Usage Guidelines

The Retrieve User Security command retrieves the privilege/security level of one or all users. It does not return a user's password. Under normal circumstances, only an administrator can invoke the general version of this command, however individual users might be able to retrieve their own information. The aid block contains the user identifier(s).

Syntax Description

Input Format

```
RTRV-USER-SECU:[TID]:<uid>:[CTAG];
```

Input Parameters

uid	The uid field is the user identifier. The <uid> field may be used to retrieve the security data for a single user by entering that users <uid>or set to ALL to retrieve the records of all users. The <uid> must not be null (empty).

Output Format

```
<sid> <date> <time>
M  <ctag> COMPLD
   "<uid>:,<uap>:LOGGEDIN=<loggedin>,[NUMSESSIONS=<numsessions>]"
;
```

Output Parameters

uid	The user identifier. uid is a string.
uap	uap is of type UserPrivilege.
loggedin	loggedin is a string. • YES: The user is logged in. • NO: The user is not logged in.
numsessions	numsessions is a string. numsessions is optional.

Examples

```
RTRV-USER-SECU::ALL:123;

   EDFA3 2003-11-01 10:13:54
M  123 COMPLD
   "CISCO15:,RWA:LOGGEDIN=YES,NUMSESSIONS=1"
   "EDFA3_USER:,RWA:LOGGEDIN=NO,NUMSESSIONS=1"
;
>
```

Errors

This message can generate any of the default errors.

Command Result

Retrieves the privilege/security level of one or more users.

8.4.44 SET-ATTR-DWDM

Usage Guidelines

The Set DWDM Attributes command changes the optical alarm severity for the ONS 15216 EDFA3. The command is valid if an alarm exists that satisfies the condition contained in the parameters <ntfcncde> and <condtype>. If a parameter is not provided, the alarms that satisfy the condition of the not null field are allowed.

When the command has been provided and the alarm is active, the alarm is cleared and then raised again with the new severity (without a reboot of the ONS 16216 EDFA3). A REPT^EVT message is generated, stating the change of the severity (SEVERITYCHGD) and containing both the old and the new severities.

Values CR, MJ, and MN are reported with the REPT^ALM message, while NA is reported with the REPT^EVT message.

The change of the severity impacts the RTRV-COND-ALL/RTRV-COND-DWDM commands that report the alarm.

Syntax Description

Input Format

```
SET-ATTR-DWDM:[<TID>]:[<aid>]:<ctag>::[<ntfcncde>],[<condtype>][,,,];
```

Input Parameters

aid	Use either 1 or ALL.
ntfcncde	A null value defaults to NA.[1]
condtype	Null or ALL. A null value defaults to ALL.

1. Not reported when the event occurs, information is retained in the NE.

Examples

```
SET-ATTR-DWDM::ALL:123::CR,LINE1RXPWRFL;

   EDFA3 2003-11-01 11:47:46
M  123 COMPLD
   /* SET-ATTR-DWDM */
;
>
```

Command Result

Changes the severity associated with an optical alarm.

8.4.45 SET-ATTR-EQPT

Usage Guidelines

The Set Equipment Attributes command changes the equipment alarm severity. the command is valid if an alarm exists that satisfies the condition contained in the parameters <ntfcncde> and <condtype>. If a parameter is not provided, the alarms that satisfy the condition of the not null field are allowed.

When the command has been issued and the alarm is active, the alarm is cleared and then raised again with the new severity (without a reboot of the EDFA3). A REPT^EVT message is generated, stating the change of the severity (SEVERITYCHGD) and containing both the old and the new severity.

Values CR, MJ, and MN are reported with the REPT^ALM message, while NA is reported with the REPT^EVT message.

The change of the severity impacts the RTRV-ALM-ALL/RTRV-ALM-EQPT and RTRV-COND-ALL/RTRV-COND-EQPT commands that report the alarm.

Syntax Description

Input Format

```
SET-ATTR-EQPT:[<TID>]:[<aid>]:<ctag>::[<ntfcncde>],[<condtype>][,,,];
```

Input Parameters

aid	Use one of the following values: PWR-A, PWR-B, EQPT, or ALL.
ntfcncde	A null value defaults to NA.[1]
condtype	Null or ALL. A null value defaults to ALL.

1. Not reported when the event occurs, information is retained in the NE.

Examples

```
SET-ATTR-EQPT::ALL:123::MJ,COMFAIL;

   EDFA3 2003-11-01 11:49:02
M  123 COMPLD
   /* SET-ATTR-EQPT */
;
>
```

Command Result

Changes the severity associated with an equipment alarm.

8.4.46 SET-ATTR-SECUDFLT

Usage Guidelines

The Set Attribute Security Default command is used to set the time interval for automatic logout associated with different user security levels.

The default settings are:

- 15 minutes for the RWA user
- 30 minutes for the RW user
- 60 minutes for the R user

If no communication occurs during the specified time, the user session is closed by the EDFA3 TL1 agent, generating a CANC event.

Users affected by changes to the timeout must log out and log in again for the change to take effect.

Syntax Description

Input Format

```
SET-ATTR-SECUDFLT:[TID]::[CTAG]::AL=<al>,TMOUT=<tmout>,,,,;
```

Input Parameters

al	User privilege. al is of type UserPrivilege, and must not be null.
tmout	The time interval of automatic logout. Value range is from 1 to 99 minutes. tmout is an integer. A value of 0 disables the automatic logout feature.

Examples

```
SET-ATTR-SECUDFLT:::123::AL=RWA,TMOUT=10;
```

```
   EDFA3 2003-11-01 11:39:06
M  123 COMPLD
   /* SET-ATTR-SECUDFLT */
;
>
```

Errors

This message can generate any of the default errors.

Command Result Sets the time interval for auto logout associated with different user security levels.

8.4.47 SET-TH-DWDM

Usage Guidelines The Set Threshold DWDM command sets the optical threshold values for the ONS 15216 EDFA3.

Related Commands RTRV-TH-DWDM

Syntax Description

Input Format

```
SET-TH-DWDM:[TID]:<aid>:[CTAG]::<thresholdDWDM>,<thlev>[,,];
```

Input Parameters

aid	Access ID. 1 and ALL have the same effect.
thresholdDWDM	Type of threshold that is to be set. thresholdDWDM is of type TH_DWDM. Possible values are: • LINE1TXPWRTHFL: Power Fail Low Threshold LINE1 TX port • LINE1RXPWRTHFL: Power Fail Low Threshold LINE1 RX port • LINE2RXPWRTHFL: Power Fail Low Threshold LINE2 RX port
thlev	Threshold level. thlev is a float.

Examples

```
SET-TH-DWDM::ALL:123::LINE1TXPWRTHFL,-5;

   EDFA3 2003-11-01 11:41:20
A  1 REPT EVT DWDM
   "DWDM:LINE1TXPWRTHFLCHGD,TC,11-01,11-41-20,,,-5.0dBm,-6.0dBm,:\"Power Fail Low
Threshold Changed, LINE1TX Port \""
;

  EDFA3 2003-11-01 11:41:20
M  123 COMPLD
   /* SET-TH-DWDM */
;
>
```

Errors

This message can generate any of the default errors.

Command Result Sets optical threshold values for the ONS 15216 EDFA3.

8.4.48 SET-TH-EQPT

Usage Guidelines The **Set Threshold Equipment command s**ets general threshold values for the ONS 15216 EDFA3.

Syntax Description

Input Format

```
SET-TH-EQPT:[<tid>]:<aid>:<ctag>::<thEQPT>,<thLEV>[,,];
```

Input Parameters

aid	Possible values are EQPT, PWR-A, PWR-B and ALL, which are used as follows: • PWR-A or PWR-B to set Power Bus A and B thresholds • EQPT: General parameters of the ONS 15216 EDFA3 (not directly affecting optical signal or power bus). • ALL: Any or all of the preceding (command input only).
thEQPT and thLEV pairs	Type of threshold that is to be set. The threshold is set to the thLEV or thEQPT value that follows the comma. It is possible to specify values for one or more of the following: • PWRBUSMIN: Power Bus A and B minimum voltage. • PWRBUSMAX: Power Bus A and B maximum voltage. • MAXCTMP: Maximum case temperature (cerent15216EdfaCtmpMax), between 60 and 100, with a default of 65 degrees C. • MINCTMP: Minimum case temperature (cerent15216EdfaCtmpMin), between –10 and 30, with a default of –5 degrees C.

Examples

```
SET-TH-EQPT::EQPT:123::MINCTMP,0;

   EDFA3 2003-11-01 11:42:51
A  2 REPT EVT EQPT
   "EQPT:MINCTMPCHGD,TC,11-01,11-42-51,,, 0.0C,-5.0C,:\"Min Case Temperature Changed \""
;

  EDFA3 2003-11-01 11:42:51
M  123 COMPLD
   /* SET-TH-EQPT */
;
>
```

Command Result Sets general threshold values for the ONS 15216 EDFA3.

8.4.49 STA-LOCL-RST

Usage Guidelines The Start LOCL Restore command restores all the manufacturing default settings. These include:

- Resetting the IP address
- Deleting the user and password database
- Reverting CISCO15 to the default username and blank to the password
- Resetting other parameters to restore the unit to its state as shipped from manufacturing

The files on the FFS, the date and time, and the values of manufacturing calibration are not affected.

This command must be followed by the INIT-SYS command in order for the restoration to take effect.

Syntax Description

```
STA-LOCL-RST:[TID]::[CTAG];
```

Examples

```
STA-LOCL-RST:::123;

   EDFA3 2003-11-01 11:55:23
M  123 COMPLD
   /* STA-LOCL-RST */
;
>
```

Errors

This message can generate any of the default errors.

Command Result Restores all the manufacturing default settings

8.5 Autonomous Messages

The following subsections name each TL1 autonomous message, provide a sample of syntax and provide examples of each command.

8.5.1 CANC

Usage Guidelines The Cancel message is an automatic message transmitted by the network element (NE) to a user when a session that was established by that user is terminated because no messages were exchanged for a defined period of time (a timeout).

The timeout period is set based on the user privilege and can be configured with the SET-ATTR-SECUDFLT command. The default timeout settings are:

- 15 minutes for the RWA user
- 30 minutes for the RW user
- 60 minutes for the R user

Use the RTRV-DFLT-SECU command to retrieve the timeout values.

When a timeout occurs, the corresponding port must drop, so the next session initiation at that port requires the regular login procedure. The following message is visible.

```
>
[10.92.27.66: remote disconnect]
```

In the above example, 10.92.27.66 indicates the node IP address.

Syntax Description

Output Format

```
<sid> <date> <time>
A  <ATAG> CANC
   "<uid>"
;
```

Output Parameters

uid	uid is a string that identifies the user whose session is terminated due to a timeout.

Examples

```
   EDFA3 03-06-20 14-30-00
A  001 CANC
    CISCO19
;
.
```

8.5.2 REPT ALM DWDM

Usage Guidelines

The Report Alarm DWDM message reports when a DWDM alarm is generated or cleared.

Syntax Description

Output Format

```
<SID> <DATE> <TIME>
** <ATAG> REPT ALM DWDM
   "DWDM:<ntfcncde>,<condtype>,<srveff>,<ocrdat>,<ocrtm>,,<monval>,:<conddescr>"
;
```

Output Parameters

ntfcncde	Notification code. ntfcncde is of type NotificationCode.
condtype	Alarm condition type. alarmMsg is of type Alarm_DWDM.
srveff	Service effect. srveff is of type ServiceEffect.
ocrdat	This is the date when the event occurred in date format.
ocrtm	This is the time when the event occurred in time format
monval	This is the measured value of a monitored parameter. monval is a string.
conddescr	This is a detailed description of the alarm. conddescr is a string.

Examples

```
EDFA3 2003-11-01 11:43:23
A  10 REPT ALM DWDM
   "DWDM:CL,LINE2RXPWRFL,SA,11-01,11-43-23,,0.0dBm,:\"Power Fail Low, LINE2RX Port \""
;
```

8.5.3 REPT ALM EQPT

Usage Guidelines

The Report Alarm Equipment message reports when a general alarm (one not directly affecting the optical signal or power bus) is generated or cleared.

Syntax Description

Output Format

```
<sid> <date> <time>
** <ATAG> REPT ALM EQPT
   "<aid>:<ntfcncde>,<condtype>,<srveff>,<ocrdat>,<ocrtm>,,<monval>,<conddescr>"
;
```

Output Parameters

aid	aid is a string.
ntfcncde	Notification code. ntfcncde is of type NotificationCode.
condtype	Alarm condition type, of type Alarm_EQPT.
srveff	Service effect. srveff is of type ServiceEffect.
ocrdat	This is the date when the event occurred in date format.
ocrtm	This is the time when the event occurred in time format
monval	This is the measured value of a monitored parameter. monval is a string.
conddescr	This is the detailed description of alarm. conddescr is a string.

Examples

```
EDFA3 2003-11-01 11:51:42
*  18 REPT ALM EQPT
   "PWR-B:MN,PWRBUSB,NSA,11-01,10-29-57,,0.0V,\"Power BusB Alarm \""
;
```

8.5.4 REPT EVT DWDM

Usage Guidelines

The Report Event DWDM message reports changes related to DWDM threshold settings and tilt or gain configuration.

Syntax Description

Output Format

```
<SID> <DATE> <TIME>
A  <ATAG> REPT EVT DWDM
   "DWDM:<crtlmode>,[<condeff>],[<ocrdat>],[<ocrtm>],,,[<newval>],[<oldval>],:<conddescr>"
;
```

Output Parameters

crtlmode	This is the control mode. crtlmode is of type Evt_DWDM.
condeff	This indicates the effect of the event on the condition of the NE. condeff is of type ConditionEffect.
ocrdat	This is the date when the event occurred, in date format
ocrtm	This is the time of day when event occurred, in time format.
newval	This is the new threshold for the parameter. newval is a string.
oldval	This is the old threshold value for the parameter. oldval is a string.
conddescr	This is a detailed description of an alarm condition. conddescr is a string.

Examples

```
EDFA3 2003-11-01 10:26:00
A  2 REPT EVT DWDM
   "DWDM:GAINTHDHCHGD,TC,11-01,10-26-00,,,17.0dB,23.0dB,:\"Gain Degrade High Threshold
Changed \""
;
```

8.5.5 REPT EVT EQPT

Usage Guidelines

The Report Event Equipment message reports changes related to equipment threshold settings and software reset.

Syntax Description

Output Format

```
<SID> <DATE> <TIME>
A  <ATAG> REPT EVT EQPT
   "<aid>:<EvtEqpt>,[<condeff>],[<octdat>],[<ocrtm>],,,[<newval>],[<oldval>],:<conddescr>"
;
```

Output Parameters

aid	Choose one of the following: • PWR-A: If PWRBUSMODE has been changed to SIMPLEX • PWR-B: If PWRBUSMODE has been changed to DUPLEX • EQPT: For CUTOVERRESET or SOFTWARERESTET
EvtEqpt	Event condition, of type Evt_EQPT.
condeff	Condition effect, of type ConditionEffect.
octdat	The date when the event occurred, in date format.
ocrtm	The time when the event occurred, in time format
newval	The new threshold for the parameter. newval is a string.
oldval	The old threshold for the parameter. oldval is a string.
conddescr	Detailed description of alarm. conddescr is a string.

Examples

```
EDFA3 2003-11-01 11:42:51
A  2 REPT EVT EQPT
   "EQPT:MINCTMPCHGD,TC,11-01,11-42-51,,, 0.0C,-5.0C,:\"Min Case Temperature Changed \""
;
```

8.5.6 REPT EVT FXFR

Usage Guidelines

The Report Event File Transfer message reports events related to software download.

Syntax Description

Output Format

```
<sid> <date> <time>
A  <ATAG> REPT EVT FXFR
   "<filename>,<fxfrStatus>,[<fxfrRslt>],[<Bytesxfrd>]"
;
```

Output Parameters

filename	This parameter identifies the name of the file that is being transferred. filename is a string.
fxfrStatus	This parameter indicates the file transferred status. fxfrStatus is of type Evt_fxfrStatus.
fxfrRslt	The file transfer result parameter indicates success or failure of the file transfer. This is displayed only when the file transfer has completed. fxfrRslt is of type Evt_fxfrrslt.
Bytesxfrd	This parameter reports the transferred byte count. Bytesxfrd is a string.

Examples

```
EDFA3 2003-11-01 12:42:51
A  3 REPT EVT FXFR
   "ONS15216Edfa3-0.4.6-003J-22.17,COMPLD,SUCCESS,4180222"
;
```

8.6 Parameter Types

Various types of parameters can be added to TL1 commands to return specific values. The following sections describe the TL1 parameters that can be used with the ONS 15216 EDFA3.

8.6.1 Access Identifiers

Access identifiers (AID) direct input commands to their intended physical or data entity inside the NE. Equipment modules and facilities are typical examples of entities addressed by the access code. AID_EDFA3 can have multiple patterns, described in Table 8-10.

Table 8-10 AID_EDFA3 Pattern Descriptions

Pattern	Description
1	Optical channel related.
ALL	Any or all of the preceding (command input only).
DWDM	Optical channel related.
EQPT	General parameters of the ONS 15216 EDFA3 (not directly affecting optical signal or power bus).
<IP Address>	AID for trap table.
PWR-A	Power Bus A.
PWR-B	Power Bus B.

8.6.2 Alarm_DWDM

The values described in Table 8-11 are for alarms related to the optical signal.

Table 8-11 Alarm_DWDM Value Descriptions

Value	Description
GAINDH	Gain Degrade High
GAINDL	Gain Degrade Low
LINE1RXPWRFL	Power Fail Low COM RX Port
LINE1TXPWRDH	Power Degrade High LINE1TX Port
LINE1TXPWRDL	Power Degrade Low LINE1TX Port
LINE1TXPWRFL	Power Fail Low LINE1TX Port
LINE2RXPWRFL	Power Fail Low DC RX Port
VOADH	VOA Degrade High
VOADL	VOA Degrade Low
VOAFH	VOA Fail High

8.6.3 Alarm_EQPT

The values described in Table 8-12 are for alarms related to the equipment.

Table 8-12 Alarm_EQPT Value Descriptions

Value	Description
COMFAIL	Module Communication Failure
CTMP	Case Temperature Out of Range
DATAFLT	Data Failure
EQPT	Equipment Failure
FFSLOW	Flash File System Capacity Very Low
FTMP	Fiber Temperature Out of Range
L1BIASD	Laser 1 Bias Degrade
L2BIASD	Laser 2 Bias Degrade
L1BIASF	Laser 1 Bias Fail
L2BIASF	Laser 2 Bias Fail
L1TMP	Excessive Pump 1 Temperature
L2TMP	Excessive Pump 2 Temperature
MEMLOW	Free Memory on System Very Low
PWRBUSA	Power Bus A
PWRBUSB	Power Bus B

8.6.4 AlarmMsg

The values in Table 8-13 relate to the EDFA alarm messages type.

Table 8-13 AlarmMsg Value Descriptions

Value	Description
COMFAIL	Module Communication Failure
CTMP	Case Temperature Out of Range
DATAFLT	Data Failure
EQPT	Equipment Failure
FFSLOW	Exceeding Memory Capacity
FTMP	Fiber Temperature Out of Range
GAINDH	Gain Degrade High
GAINDL	Gain Degrade Low
LBIASD	Laser Bias Degrade
LBIASF	Laser Bias Fail
LINE1RXPWRFL	Power Fail Low COM RX Port

Table 8-13 AlarmMsg Value Descriptions (continued)

Value	Description
LINE1TXPWRDH	Power Degrade High LINE1TX Port
LINE1TXPWRDL	Power Degrade Low LINE1TX Port
LINE1TXPWRFL	Power Fail Low LINE1TX Port
LINE2RXPWRFL	Power Fail Low DC RX Port
LTMP	Excessive Pump Temperature
MEMLOW	Exceeding Memory Capacity
PWRBUSA	Power Bus A Alarm
PWRBUSB	Power Bus B Alarm
VOADH	VOA degrade High
VOADL	VOA Degrade Low
VOAFH	VOA Fail High

8.6.5 Autologoutinterval

The values in Table 8-14 reflect the inactive time interval for automatic logout.

Table 8-14 Autologoutinterval Value Descriptions

Value	Description
10MIN	10 minutes
1MIN	1 minute
30MIN	30 minutes
5MIN	5 minutes
60MIN	60 minutes

8.6.6 Automsg

The values in Table 8-15 relate to EDFA3 autonomous messages type.

Table 8-15 Automsg Value Descriptions

Value	Description
COMFAIL	Module Communication Failure
COMPLD	File Transfer Completed
CTMP	Case Temperature Out of Range
CTRLMODE	Control Mode Changed
CUTOVERRESET	Reset After Cutover
DATAFLT	Data Failure
EQPT	Equipment Failure

Table 8-15 Automsg Value Descriptions (continued)

Value	Description
FFSSLOW	Flash File System Capacity Very Low
FTMP	Fiber Temperature Out of Range
GAINCHGD	Gain Setpoint Changed
GAINDH	Gain Degrade High
GAINDL	Gain Degrade Low
GAINTHDHCHGD	Gain Degrade Low Threshold Changed
GAINTHDLCHGD	Gain Degrade High Threshold Changed
IP	File Transfer In Progress
LASERCHGD	Laser Status Changed
LBIASD	Laser Bias Degrade
LBIASF	Laser Bias Fail
LINE1RXPWRFL	Power Fail Low COM RX Port
LINE1RXPWRTHFLCHGD	Power Fail Low Threshold Changed COM RX Port
LINE1TXPWRCHGD	Power set point Changed LINE1TX Port
LINE1TXPWRDH	Power Degrade High LINE1TX Port
LINE1TXPWRDL	Power Degrade Low LINE1TX Port
LINE1TXPWRFL	Power Fail Low LINE1TX Port
LINE1TXPWRTHDHCHGD	Power Degrade High Threshold Changed LINE1TX Port
LINE1TXPWRTHDLCHGD	Power Degrade Low Threshold Changed LINE1TX Port
LINE1TXPWRTHFLCHGD	Power Degrade High Threshold Changed LINE1TX Port
LINE2RXPWRFL	Power Fail Low DC RX Port
LINE2RXPWRTHFLCHGD	Power Fail Low Threshold Changed DC RX Port
LTMP	Excessive Pump Temperature
MEMLOW	Free Memory On System Very Low
OPOFFSET	Output Power Offset Changed
OSRICHGD	OSRI Changed
PWRBUSA	Power Bus A Alarm
PWRBUSB	Power Bus B Alarm
PWRBUSMODE	Power Supply Bus Mode
SOFTWARERESET	Software Reset
START	File Transfer Start
TILTCHGD	Tilt Setpoint Changed
TILTOFFSETCHGD	Tilt Offset Changed
VOADH	VOA Degrade High
VOADL	VOA Degrade Low
VOAFH	VOA Fail High

8.6.7 ConditionEffect

The values in Table 8-16 reflect the effect of a condition on the NE. A null value defaults to a transient condition (TC).

Table 8-16 ConditionEffect Value Descriptions

Value	Description
CL	Standing Condition Cleared
SC	Standing Condition Raised
TC	Transient Condition

8.6.8 ctrlmode

The values in Table 8-17 reflect the Pump1 or Pump2 control mode.

Table 8-17 ctrlmode Value Descriptions

Value	Description
CGAIN	Constant Gain Mode
COPWR	Constant Output Power

8.6.9 Evt_DWDM

The values in Table 8-18 reflect EDFA3 events related to the optical signal.

Table 8-18 Evt_DWDM Value Descriptions

Value	Description
CTRLMODE	Control Mode Changed
GAINCHGD	Gain Setpoint Changed
GAINTHDHCHGD	Gain Degrade High Threshold Changed
GAINTHDLCHGD	Gain Degrade Low Threshold Changed
LASERCHGD	Laser Status Changed
LINE1RXPWRTHFLCHGD	Power Fail Low Threshold Changed COM RX Port
LINE1TXPWRCHGD	Power Setpoint Changed LINE1TX Port
LINE1TXPWRTHDHCHGD	Power Degrade High Threshold Changed LINE1TX Port
LINE1TXPWRTHDLCHGD	Power Degrade Low Threshold Changed LINE1TX Port
LINE1TXPWRTHFLCHGD	Power Fail Low Threshold Changed LINE1TX Port
LINE2RXPWRTHFLCHGD	Power Fail Low Threshold Changed DC RX Port
OPOFFSET	Output Power Offset Changed
OSRICHGD	OSRI Changed

Table 8-18 Evt_DWDM Value Descriptions (continued)

Value	Description
TILTCHGD	Tilt Setpoint Changed
TILTOFFSETCHGD	Tilt Offset Changed

8.6.10 Evt_EQPT

The values in Table 8-19 reflect the events related to equipment.

Table 8-19 Evt_EQPT Value Descriptions

Value	Description
CUTOVERRESET	Reset After Cutover
PWRBUSMODE	Power Bus Mode
SOFTWARERESET	Software Reset

8.6.11 Evt_fxfrrslt

The values in Table 8-20 reflect the file transfer results.

Table 8-20 Evt_fxfrrslt Value Descriptions

Value	Description
FAILURE	Transfer Failure
SUCCESS	Transfer Success

8.6.12 Evt_fxfrStatus

The values in Table 8-21 reflect the file transfer status.

Table 8-21 Evt_fxfrStatus Value Descriptions

Value	Description
COMPLD	Complete
IP	In Progress
START	Start

8.6.13 LogName

The values in Table 8-22 allow the user to manually specify the name of a log file that can be used for specific message categories. Values for LogName include TL1 identifiers and text strings.

Table 8-22 LogName Value Descriptions

Value	Description
ALL	All logs
ALM	Alarm log
EVT	Event logs

8.6.14 MessageType

The values in Table 8-23 specify the type of autonomous message to be retrieved. Valid values are modifiers of any valid TL1 autonomous message, for example ALM and EVT. These values might be used together with ATAGSEQ or NULL.

Table 8-23 MessageType Value Descriptions

Value	Description
ALM	Alarm message
EVT	Event message

8.6.15 NotificationCode

The values in Table 8-24 are used to indicate the alarm level.

Table 8-24 NotificationCode Value Descriptions

Value	Description
CL	Cleared Alarm
CR	Critical Alarm
MJ	Major Alarm
MN	Minor Alarm
NA	Not Alarmed
NR	Not Reported

8.6.16 OSRI

The values in Table 8-25 relate to the optical safety remote interlock (OSRI).

Table 8-25 OSRI Value Descriptions

Value	Description
ON	Forces the laser off.
OFF	Removes the laser lock, allowing the laser to turn on.

8.6.17 PWRBUSMODE

The values in Table 8-26 relate to the Power Bus mode.

Table 8-26 PWRBUSMODE Value Descriptions

Value	Description
DUPLEX	Duplex Mode
SIMPLEX	Simplex Mode

8.6.18 ServiceEffect

The values in Table 8-27 indicate the effect of a reported alarm on service.

Table 8-27 ServiceEffect Value Descriptions

Value	Description
NSA	Non-service-affecting condition
SA	Service-affecting condition

8.6.19 TH_DWDM

The values in Table 8-28 relate to the threshold value selected for the optical signal.

Table 8-28 TH_DWDM Value Descriptions

Value	Description
GAINTHDH	Gain Degrade High Threshold
GAINTHDL	Gain Degrade Low Threshold
LINE1RXPWRTHFL	Power Fail Low Threshold COM RX Port
LINE1TXPWRTHDH	Power Degrade High Threshold LINE1TX Port
LINE1TXPWRTHDL	Power Degrade Low Threshold LINE1TX Port
LINE1TXPWRTHFL	Power Fail Low Threshold LINE1TX Port
LINE2RXPWRTHFL	Power Fail Low Threshold DC RX Port

8.6.20 Transfer_type

The values in Table 8-29 relate to the file transfer type and direction.

Table 8-29 Transfer_type Value Descriptions

Value	Description
RFBU	Back up a file from the OA's FFS to the remote server. Overwrite is always YES for this type.
RFR	Restore a file from remote server to the OA's FFS.
SWDL	Download a software image file to the OA's FFS and update the second boot entry to point to this file.

8.6.21 UserPrivilege

There are four possible privileges or permissions for an ONS 15216 EDFA3 user.

Note A fuller security policy would allow individual messages (commands) to be controlled per user as opposed to this more generic policy. Even the right to access individual resources could be controlled. Few NEs, however, implement individual resource access as its administration becomes too complex for network operators.

Table 8-30 describes each existing UserPrivilege value. An RWA user can change these values, add a category, or delete a category.

Table 8-30 UserPrivilege Value Descriptions

Value	Description
NULL	User has no access rights.
R	Report only and Retrieve user. The R user can monitor the state of an NE but cannot issue provisioning commands.
RW	An RW user can receive notifications, read information and provision the NE. However, the user cannot carry out system administrator tasks including NE management.
RWA	An RWA user can perform all operations, including receiving notifications, reading information and provisioning the NE, including NE management. Items provisioned for management include the TID, the date for the NE as a whole, and the addition and management of other users.

8.7 TL1 Errors

This section describes the TL1 errors for the ONS 15216 EDFA3.

8.7.1 TL1 Error Format

TL1 errors can be generated by any command or command response message. The format of a TL1 error message is as follows:

```
<sid> <date> <time>
```

```
M ctag DENY
<errcde>
/* <errmsg> */
;
```

8.7.2 Default Errors

The ONS 15216 EDFA3 generates a set of default TL1errors. Table 8-31 lists the default errors for the ONS 15216 EDFA3.

Table 8-31 Default TL1 Errors

Error Code (errcde)	Error Type	Error Message (errmsg)
EATN	EQUIPAGE	Not Valid for Access Type
ENAD	EQUIPAGE	Not Equipped with Audit Capability
ENAR	EQUIPAGE	Not Equipped with Automatic Reconfiguration
ENDG	EQUIPAGE	Not Equipped with Diagnostic Capability
ENDS	EQUIPAGE	Not Equipped with Duplex Switching
ENEA	EQUIPAGE	Not Equipped with Error Analysis Capability
ENEQ	EQUIPAGE	Not Equipped
ENEX	EQUIPAGE	Not Equipped with Exercise Capability
ENFL	EQUIPAGE	Not Equipped for Fault Locating
ENMD	EQUIPAGE	Not Equipped with Memory Device
ENPM	EQUIPAGE	Not Equipped for Performance Monitoring
ENPS	EQUIPAGE	Not Equipped with Protection Switching
ENRI	EQUIPAGE	Not Equipped for Retrieving Specified Information
ENRS	EQUIPAGE	Not Equipped for Restoration
ENSA	EQUIPAGE	Not Equipped for Scheduling Audit
ENSI	EQUIPAGE	Not Equipped for Setting Specified Information
ENSS	EQUIPAGE	Not Equipped with Synchronization Switching
EQWT	EQUIPAGE	Invalid Parameter, Value
IBEX	INPUT	Block Extra
IBMS	INPUT	Block Missing
IBNC	INPUT	Block Not Consistent
ICNC	INPUT	Command Not Consistent
ICNV	INPUT	Command Not Valid
IDMS	INPUT	Data Missing
IDNC	INPUT	Data Not Consistent
IDNV	INPUT	Data Not Valid
IDRG	INPUT	Data Range Error
IIAC	INPUT	Invalid Access Identifier (AID)

Table 8-31 Default TL1 Errors (continued)

Error Code (errcde)	Error Type	Error Message (errmsg)
IICM	INPUT	Invalid Command
IICT	INPUT	Invalid Correlation Tag
IIDT	INPUT	Invalid Data Parameter
IIFM	INPUT	Invalid Data Format
IIPG	INPUT	Invalid Parameter Grouping
IISP	INPUT	Invalid Syntax or Punctuation
IITA	INPUT	Invalid Target Identifier
INAC	INPUT	Invalid Access Number
INDV	STATUS	Invalid AID
INUP	INPUT	Non-Null Unimplemented Parameter
IPEX	INPUT	Parameter Extra
IPMS	INPUT	Parameter Missing
IPNC	INPUT	Parameter Not Consistent
IPNV	INPUT	Parameter Not Valid
ISCH	INPUT	Syntax Invalid Character
ISPC	INPUT	Syntax Punctuation
ITSN	INPUT	Invalid/Inactive Test Session Number
MERR	STATUS	Multiple Error
PICC	PRIVILEGE	Illegal Command Code
PIFC	PRIVILEGE	Illegal Field Code
PIMA	PRIVILEGE	Invalid Memory Address
PIMF	PRIVILEGE	Invalid Memory File
PIRC	PRIVILEGE	Illegal Record Control
PIUC	PRIVILEGE	Illegal User Code
PIUI	PRIVILEGE	Illegal User Identity, Invalid UID
PLNA	PRIVILEGE	Login Not Active
SAAL	STATUS	Already Allowed
SAAS	STATUS	Already Assigned
SABT	STATUS	Aborted
SAIN	STATUS	Already Inhibited
SAIS	STATUS	Already In-Service
SAOP	STATUS	Already Operated
SAPR	STATUS	Already in Protection State
SARB	STATUS	All Resources Busy
SATF	STATUS	Automatic Test Failed
SCNA	STATUS	Command Cannot Be Aborted

Table 8-31 Default TL1 Errors (continued)

Error Code (errcde)	Error Type	Error Message (errmsg)
SCNF	STATUS	Command Not Found
SDAS	STATUS	Diagnosis Already Started
SDFA	STATUS	Duplex Unit Failed
SDLD	STATUS	Duplex Unit Locked
SDNA	STATUS	Duplex Unit Not Available
SDNC	STATUS	Data Not Consistent
SDNR	STATUS	Data Not Ready
SDNS	STATUS	Diagnosis Not Started Yet
SFAS	STATUS	Fault Locating Already Started
SFNS	STATUS	Fault Locating Not Started yet
SLBM	STATUS	List Below Minimum
SLEM	STATUS	List Exceeds Maximum
SLNS	STATUS	Log Not Started Yet
SNOS	STATUS	NTE is Out-of-Service
SNPR	STATUS	Not in Protection State
SNRM	STATUS	System Not in Restoration Mode
SNSR	STATUS	No Switch Request Outstanding
SNVS	STATUS	Not in Valid State
SPFA	STATUS	Protection Unit Failed
SPLD	STATUS	Protection Unit Locked
SPNA	STATUS	Process Cannot be Aborted
SPNF	STATUS	Process Not Found
SRCI	STATUS	Requested Command(s) Inhibited
SROF	STATUS	Requested Operation Failed
SSRD	STATUS	Switch Request Denied
SSRE	STATUS	System Resources Exceeded
SSTP	STATUS	Stopped
STAB	STATUS	Test Aborted
SVNS	STATUS	Not in Valid State
SWFA	STATUS	Working Unit Failed
SWLD	STATUS	Working Unit Locked

8.8 TL1/SNMP Mapping Tables

Table 8-32 shows the mappings between TL1 and SNMP parameters.

Table 8-32 TL1/SNMP Command Mapping

TL1 Parameter	SNMP Attribute
LINE1RXPWR	cerent15216EdfaGenericEdfa3Line1RXPwr
LINE1TXPWR	cerent15216EdfaGenericEdfa3Line1TXPwr
LINE2RXPWR	cerent15216EdfaGenericEdfa3Line2RXPwr
LINE2TXPWR	cerent15216EdfaGenericEdfa3Line2TXPwr
GAIN	cerent15216EdfaGenericEdfa3Gain
TILT	cerent15216EdfaGenericEdfa3Tilt
LASSTATUS	cerent15216EdfaGenericEdfa3AmpLaserStatus
DCULOSS	cerent15216EdfaGenericEdfa3DcuLoss
CTRLMODE	cerent15216EdfaGenericEdfa3ControlMode
GAINSP	cerent15216EdfaGenericEdfa3GainSetpoint
GAINTHDL	cerent15216EdfaGenericEdfa3GainThDegLow
GAINTHDH	cerent15216EdfaGenericEdfa3GainThDegHigh
PWROFFSET	cerent15216EdfaGenericEdfa3PwrOffset
LINE1TXPWRSP	cerent15216EdfaGenericEdfa3Line1TXPwrSetpoint
LINE1TXPWRTHDL	cerent15216EdfaGenericEdfa3Line1TXPwrThDegLow
LINE1TXPWRTHDH	cerent15216EdfaGenericEdfa3Line1TXPwrThDegHigh
LINE1TXPWRTHFL	cerent15216EdfaGenericEdfa3Line1TXPwrThFailLow
LINE1RXPWRTHFL	cerent15216EdfaGenericEdfa3Line1RXPwrThFailLow
LINE2RXPWRTHFL	cerent15216EdfaGenericEdfa3Line2RXPwrThFailLow
TILTSP	cerent15216EdfaGenericEdfa3TiltSetpoint
TILTOFFSET	cerent15216EdfaGenericEdfa3TiltOffset
OSRI	cerent15216EdfaGenericEdfa3Osri
IPADDR	cerent15216EdfaGenericIpAddress
IPMASK	cerent15216EdfaGenericIpNetMask
DEFRTR	cerent15216EdfaGenericIpDefaultGateway
MACADDR	ipPhysAddress (RFC 2233)
NAME	sysName (RFC 1213)
LONGITUDE	sysLocation (RFC 1213)
LATITUDE	sysLocation (RFC 1213)
CLEI	cerent15216EdfaGenericCleiCode
DESCR	sysDescription (RFC 1213)
HARDWAREREV	entPhysicalHardwareRev (RFC 2737)
FIRMWAREREV	entPhysicalFirmwareRev (RFC 2737)
SOFTWAREREV	entPhysicalSoftwareRev (RFC 2737)
SWUPDATE	cerent15216EdfaGenericSoftwareTimeStamp
SERIALNUM	entPhysicalSerialNumber (RFC 2737)

Table 8-32 TL1/SNMP Command Mapping (continued)

TL1 Parameter	SNMP Attribute
MFGNAME	entPhysicalMfgName (RFC 2737)
MODELNAME	entPhysicalModelName (RFC 2737)
SNMPSETREQ	cerent15216EdfaGenericEnableSetRequestProcessing
ACTIVESW	cerent15216EdfaGenericSoftwareStatus—Active (10)
STANDBYSW	cerent15216EdfaGenericSoftwareStatus—Standby (20)

8.9 TL1/SNMP Alarm Mapping

Table 8-33 shows the mapping between TL1 and SNMP alarms.

Table 8-33 TL1/SNMP Alarm Mapping

TL1 Condition	SNMP Trap
PWRBUSA	cerent15216EdfaGenericEdfa3PwrAlarmBusA
PWRBUSB	cerent15216EdfaGenericEdfa3PwrAlarmBusB
MEMLOW	cerent15216EdfaGenericEdfa3FreeMemoryOnSystemVeryLow
FFSLOW	cerent15216EdfaGenericEdfa3FFSCapacityVeryLow
EQPT	cerent15216EdfaGenericEdfa3EqptFailure
COMFAIL	cerent15216EdfaGenericEdfa3ModuleCommFailure
CTMP	cerent15216EdfaGenericEdfa3CaseTempOutOfRange
FTMP	cerent15216EdfaGenericEdfa3FiberTempOutOfRange
LTMP	cerent15216EdfaGenericEdfa3ExcessivePumpTemperature
LBIASD	cerent15216EdfaGenericEdfa3LaserBiasDegrade
LBIASF	cerent15216EdfaGenericEdfa3LaserBiasFail
LINE1RXPWRFL	cerent15216EdfaGenericEdfa3PwrFailureLowLine1Rx
GAINDH	cerent15216EdfaGenericEdfa3GainDegradeHigh
GAINDL	cerent15216EdfaGenericEdfa3GainDegradeLow
LINE1TXPWRFL	cerent15216EdfaGenericEdfa3PwrFailLowLine1Tx
LINE1TXPWRDH	cerent15216EdfaGenericEdfa3PwrDegradeHighLine1Tx
LINE1TXPWRDL	cerent15216EdfaGenericEdfa3PwrDegradeLowLine1Tx
LINE2RXPWRFL	cerent15216EdfaGenericEdfa3PwrFailLowLine2Rx
VOADH	cerent15216EdfaGenericEdfa3VoaDegradeHigh
VOADL	cerent15216EdfaGenericEdfa3VoaDegradeLow
VOAFH	cerent15216EdfaGenericEdfa3VoaFailHigh
DATAFLT	cerent15216EdfaGenericEdfa3DataIntegrityFault
BACKUPREST	cerent15216EdfaGenericBackupRestoreInProgress
SFTWDOWN	cerent15216EdfaGenericSoftwareDownloadInProgress

8.10 TL1/SNMP Event Mapping

Table 8-34 shows the mapping between the TL1 and SNMP events.

Table 8-34 TL1/SNMP Event Mapping

TL1 Condition	SNMP Trap
CTRLMODE	cerent15216EdfaGenericEdfa3ControlModeChanged
GAINCHGD	cerent15216EdfaGenericEdfa3GainSetpointChanged
GAINTHDLCHGD	cerent15216EdfaGenericEdfa3GainDegradeLowThresholdChanged
GAINTHDHCHGD	cerent15216EdfaGenericEdfa3GainDegradeHighThresholdChanged
OPOFFSET	cerent15216EdfaGenericEdfa3OutputPwrOffsetChanged
LINE1TXPWRCHGD	cerent15216EdfaGenericEdfa3PwrsetpointChangedLine1Tx
LINE1TXPWRTHDLCHGD	cerent15216EdfaGenericEdfa3PwrDegradeLowThresholdChangedLine1Tx
LINE1TXPWRTHDHCHGD	cerent15216EdfaGenericEdfa3PwrDegradeHighThresholdChangedLine1Tx
LINE1TXPWRTHFLCHGD	cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine1Tx
LINE1RXPWRTHFLCHGD	cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine1Rx
LINE2RXPWRTHFLCHGD	cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine2Rx
TILTCHGD	cerent15216EdfaGenericEdfa3TiltSetpointChanged
TILTOFFSETCHGD	cerent15216EdfaGenericEdfa3TiltOffsetChanged
LASERCHGD	cerent15216EdfaGenericEdfa3LaserStatusChanged
OSRICHGD	cerent15216EdfaGenericEdfa3OsriChanged
CUTOVERRESET	cerent15216EdfaGenericResetAfterCutover
SOFTWARERESET	cerent15216EdfaGenericSoftwareReset
IP (File Transfer Status)	cerent15216EdfaGenericSoftwareDownloadInProgress
COMPLD (File Transfer Status) SUCCES (File Transfer Result)	cerent15216EdfaGenericSoftwareDownloadComplete
COMPLD (File Transfer Status) FAILURE (File Transfer Result)	cerent15216EdfaGenericSoftwareDownloadFailed
SEVERITYCHANGED	cerent15216EdfaGenericEventProfileChanged
PWRBUSMAXCHGD	cerent15216EdfaGenericEdfa3PwrBusVoltageMax
PWRBUSMINCHGD	cerent15216EdfaGenericEdfa3PwrBusVoltageMin
MAXCTMPCHGD	cerent15216EdfaGenericEdfa3CaseTempMax
MINCTMPCHGD	cerent15216EdfaGenericEdfa3CaseTempMin

8.11 TL1 Errors Supported by Each Command

Table 8-35 contains the TL1 errors supported by each command.

Table 8-35 TL1 Errors Supported by Each Command

Command	Error Code
ACT-USER	PICC
ALW-MSG-ALL	IIAC, IICT, IISP, IITA, SAAL, SROF
APPLY	IICT, IITA, SROF
CANC-USER	IICT, IITA,IISP, SROF
COPY-RFILE	IIAC, IICT, SROF
CPY-MEM	IIAC, IICT, SROF
DLT-RFILE	IIAC, IICT, SROF
DLT-TRAPTABLE	IITA, IISP, IICT, PICC, SROF
DLT-USER-SECU	IICT, IISP, IITA, PICC, PIUC, SROF
ED-DAT	IICT, IISP, IITA, SROF
ED-DWDM	IITA, IISP, IIAC, IICT, SROF
ED-EQPT	IITA, IISP, IIAC, IICT, SROF
ED-NE-GEN	IITA, IISP, IICT, SROF
ED-PID	IITA, IISP, IICT, SROF
ED-TRAPTABLE	IITA, IISP, IICT, SROF
ED-USER-SECU	IITA, IISP, IICT, SROF
ENT-TRAPTABLE	IITA, IISP, IICT, SROF
ENT-USER-SECU	IITA, IISP, IICT, SROF
INH-MSG-ALL	IITA, IISP, IICT, SAIN, SROF
INIT-SYS	IITA, IISP, IIAC, IICT, SROF
RTRV-ALM-ALL	IITA, IISP, IICT, SROF
RTRV-ALM-DWDM	IITA, IISP, IICT, SROF
RTRV-ALM-EQPT	IITA, IISP, IICT, SROF
RTRV-ATTR-ALL	IITA, IISP, IICT, SROF
RTRV-AO	IITA, IISP, IICT, SROF
RTRV-COND-ALL	IITA, IISP, IICT, SROF
RTRV-COND-DWDM	IITA, IISP, IICT, SROF
RTRV-COND-EQPT	IITA, IISP, IICT, SROF
RTRV-DFLT-SECU	IITA, IISP, IIAC, IICT, SROF
RTRV-DWDM	IITA, IISP, IIAC, IICT, SROF
RTRV-EQPT	IITA, IISP, IIAC, IICT, SROF
RTRV-HDR	IITA, IISP, IICT, SROF
RTRV-NE-GEN	IITA, IISP, IIAC, IICT, SROF
RTRV-RFILE	IITA, IISP, IICT, SROF
RTRV-TH-DWDM	IITA, IISP, IIAC, IICT, SROF
RTRV-TH-EQPT	IITA, IISP, IIAC, IICT, SROF

Table 8-35 TL1 Errors Supported by Each Command (continued)

Command	Error Code
RTRV-TOD	IITA, IISP, IICT, SROF
RTRV-TRAPTABLE	IITA, IISP, IICT, SROF
RTRV-USER-SECU	IITA, IISP, IICT, SROF
SET-ATTR-ALL	IITA, IISP, IICT, SROF
SET-ATTR-SECUDFLT	IITA, IISP, IICT, SROF
SET-TH-DWDM	IITA, IISP, IIAC, IICT, SROF
SET-TH-EQPT	IITA, IISP, IIAC, IICT, SROF
STA-LOCL-RST	IITA, IISP, IICT, SROF

Preparing to Use SNMP

This chapter contains information about preparing to use SNMP with the ONS 15216 EDFA3 and has the following sections:

- 9.1 About SNMP and the ONS 15216 EDFA3, page 9-1
- 9.2 Setting the SNMP Manager Community String, page 9-1

9.1 About SNMP and the ONS 15216 EDFA3

The ONS 15216 EDFA3 supports both SNMPv1 and SNMPv2c traps and requests. The Simple Network Time Protocol (SNMP) MIBs can be used to define alarms, traps, and status information.

Using SNMP, network management system (NMS) applications can query a management agent using a supported MIB. The functional entities include Ethernet switches and other multiplexers. See Chapter 10, "SNMP and the Management Information Base," for procedures to set up or change SNMP settings.

The SNMP agent can operate with various settings of the common SNMP agent. The following information will help you to set the SNMP manager.

9.2 Setting the SNMP Manager Community String

The ten SNMP manager community strings are set using the SNMP agent trap manager community string. SNMP uses any one of these ten community names to check the community name in order to accept SNMP REQUEST commands.

The operator must set at least one community name in order to start SNMP. To set the SNMP manager community string:

Step 1 Ping the SNMP agent from the command shell. Example 9-1 shows an example.

Example 9-1 Pinging the SNMP Agent

```
C:\ftp> ping 129.9.0.6
Pinging 129.9.0.6 with 32 bytes of data:
Reply from 129.9.0.6:bytes=32 time<10ms TTL=64
Reply from 129.9.0.6:bytes=32 time<10ms TTL=64
Reply from 129.9.0.6:bytes=32 time<10ms TTL=64
Reply from 129.9.0.6:bytes=32 time<10ms TTL=64
```

```
C:\ftp>
```

If the system cannot respond to the ping command, log in through an EIA/TIA-232 (RS-232) port and use TL1 to set up the SNMP agent IP address. To set the first community string, the operator needs to use the TL1 command ED-TRAPTABLE. The cerent15216EdfaGenericNotifDestn table community strings can be set only through TL1.

Step 2 To log in, type the following in a TL1 shell:

```
ACT-USER::EDFA3_USER:123::**********;
```

If an existing community string name is not known, you can retrieve the SNMP trap manager community string using the TL1 RTRV-TRAPTABLE command, described in the "8.4.42 RTRV-TRAPTABLE" section on page 8-47. To create a new community name, see the "8.4.17 ENT-TRAPTABLE" section on page 8-20.

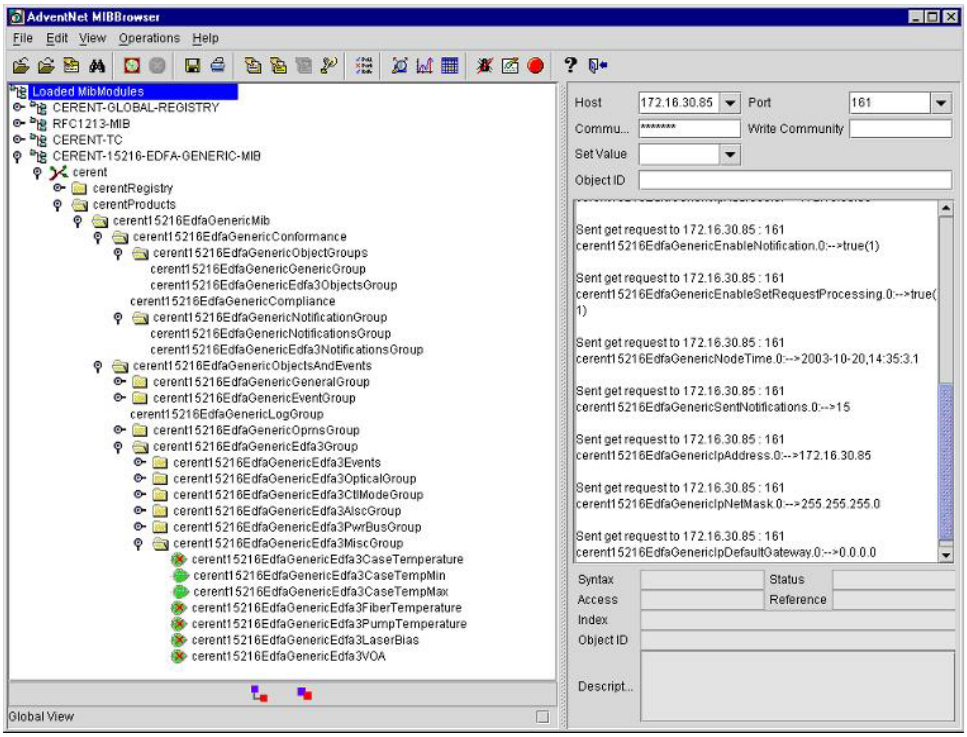
Example 9-2 shows an example of creating a public community.

Example 9-2 Creating a Public Community

```
ENT-TRAPTABLE::172.16.30.82:123::TRAPCOM=public,TRAPPORT=162;
```

Step 3 Start the MIB Browser. You can use any MIB browser, for example, SimpleTest for testing or another tool such as AdventNet MIB Browser (Figure 9-1).

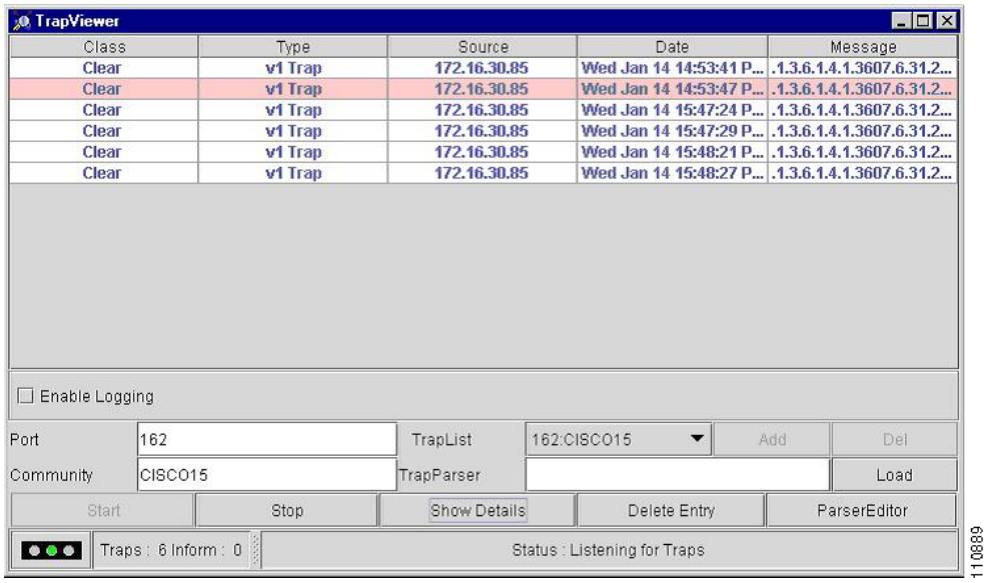
Figure 9-1 AdventNet MIB Browser



Step 4 Browse the MIBs.

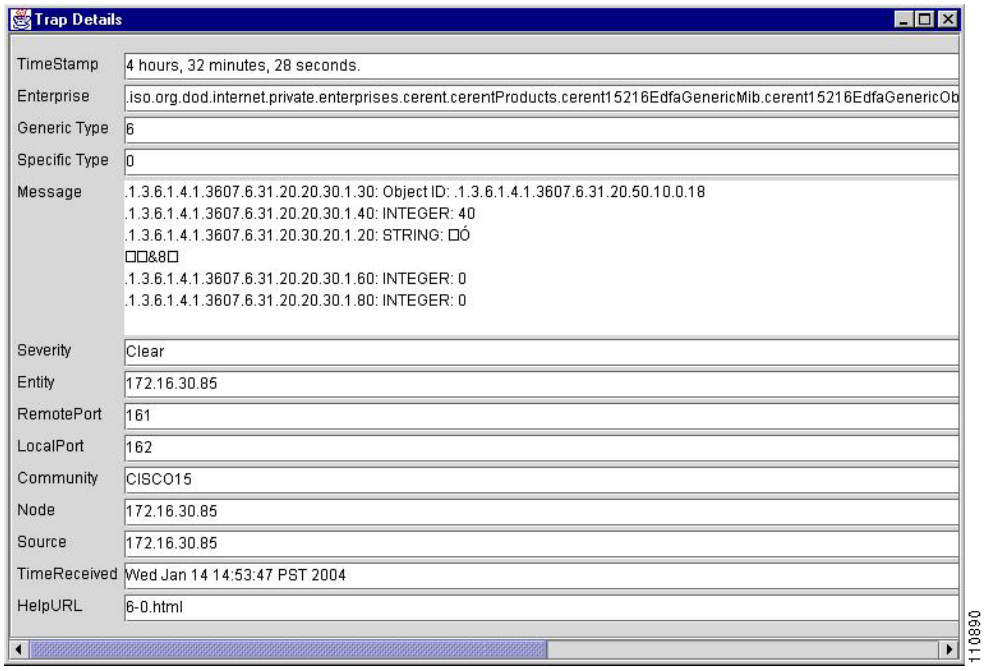
Step 5 View the Traps. (See Figure 9-2 for an example.)

Figure 9-2 TrapViewer



Step 6 Select a trap and click the **View Details** button to view the details. (See Figure 9-3 for an example.)

Figure 9-3 Trap Details



CHAPTER 10

SNMP and the Management Information Base

A Simple Network Management Protocol (SNMP) Management Information Base (MIB) is a hierarchically organized collection of information, such as Loss of Signal Alarm Thresholds, about the network. MIBs consist of managed objects that are identified by object identifiers (OIDs). An MIB supplies the pertinent attributes of a device. Some attributes are fixed in the MIB while others are dynamic values calculated by the agent software running on the device.

SNMP is an application-layer protocol enabling a device user to retrieve and modify management information from a MIB and to provide event notification to a network management system (NMS).

This chapter explains how to read and understand the SNMP MIB as it relates to the Cisco ONS 15216 EDFA3. This chapter contains the following sections:

- 10.1 Overview, page 10-1
- 10.2 SNMP MIBs and Message Types, page 10-5
- 10.3 SNMP Capabilities, page 10-6
- 10.4 ONS 15216 EDFA3 Tables and Groups, page 10-7
- 10.5 SNMP Traps, page 10-19
- 10.6 SNMP Generic Objects, page 10-24
- 10.7 SNMP Specific Objects, page 10-25

10.1 Overview

The ONS 15216 EDFA3 SNMP implementation uses standard Internet Engineering Task Force (IETF) MIBs to convey inventory, fault, and performance management information. SNMP allows management of the ONS 15216 EDFA3 by a generic third-party SNMP manager such as Cisco Transport Manager (CTM), HP OpenView Network Node Manager (NNM), or Open Systems Interconnection (OSI) NetExpert. While an SNMP agent is included with the ONS 15216 EDFA3, no SNMP manager is included with the ONS 15216 EDFA3.

The ONS 15216 EDFA3 supports SNMP Version 1 (SNMPv1) and SNMP Version 2c (SNMPv2c).

SNMP includes a limited set of management commands and responses that can be used in order to retrieve a single object variable or multiple object variables or to establish the value of a single variable. When an SNMP command is sent, the managed agent sends a Response message to indicate completion of the Get, GetNext, GetBulk, or Set. The managed agent sends an event notification, called a trap, to the management system in order to identify the occurrence of conditions such as a threshold that exceeds a preset value.

10.1.1 SNMP Components

An SNMP-managed network consists of three primary components:

- Managed devices (for example, the ONS 15216 EDFA3and ONS 15454)
- Agents (for example, the SNMP agent that resides on the ONS 15216 EDFA3)
- Management systems (for example, CTM or HP OpenView NNM)

A managed device is a network node that contains an SNMP agent and resides on an SNMP-managed network. Managed devices collect and store management information and use SNMP to make this information available to management systems that use SNMP. Managed devices include routers, access servers, switches, bridges, hubs, computer hosts, and network elements such as the ONS 15216 EDFA3.

10.1.2 ONS 15216 EDFA3 SNMP Elements

The following three SNMP elements can used with the ONS 15216 EDFA3:

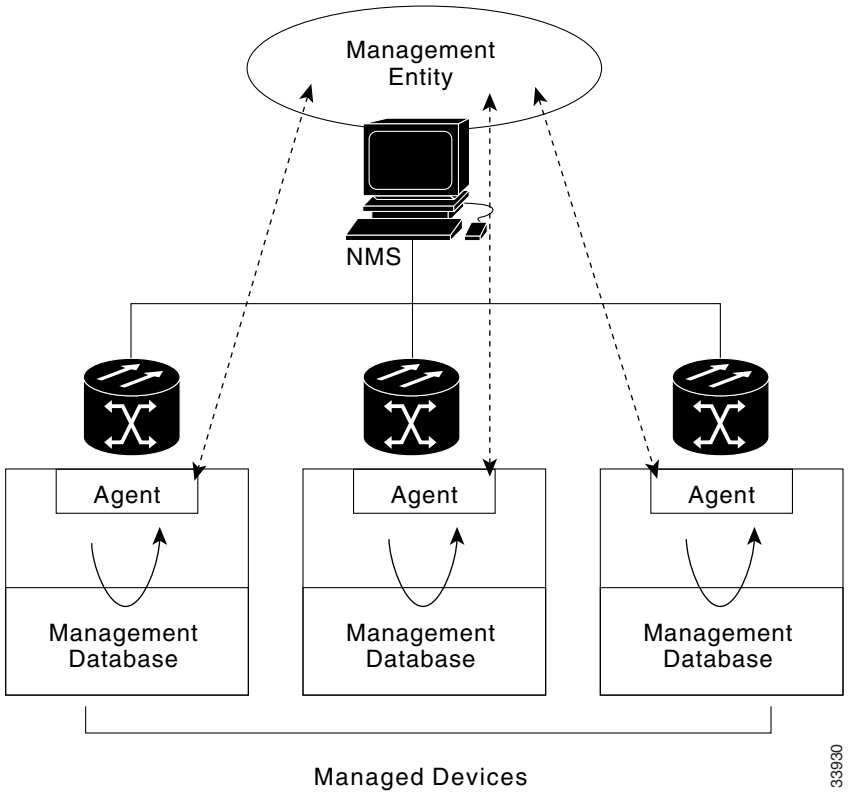
- SNMP agent
- SNMP MIB
- A third-party SNMP manager

The MIB file names are:

- rfc 1155.mib
- rfc 1212.mib
- rfc 1213.mib
- rfc 1157.mib
- rfc 1445.mib
- rfc 1901.mib
- rfc 1906.mib
- rfc 1907.mib
- rfc 1908.mib
- rfc 2011.mib
- rfc 2012.mib
- rfc 2013.mib
- rfc 2579.mib
- rfc 2580.mib
- rfc 2737.mib
- rfc 3014.mib
- cerentedfa3.mib
- CERENT-GLOBAL-REGISTRY.mib
- CERENT-TC.mib

The SNMP elements are shown in Figure 10-1.

Figure 10-1 SNMP Elements



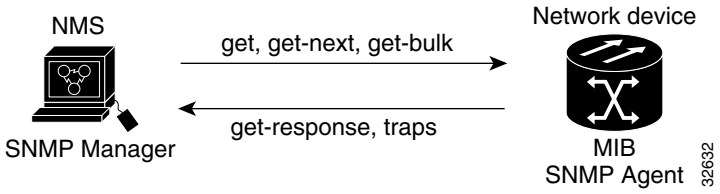
10.1.2.1 SNMP Agent

An agent is an entity that assumes an operational role to receive, process, and respond to requests and generated event reports. The SNMP agent gathers data from the MIB, which is the repository for device parameters and network data. To respond to requests, the agent must have network management information access. To generate reports, an agent must be notified of internal events.

Cisco provides an SNMP agent (installed on the ONS 15216 EDFA3) and an SNMP MIB to monitor and configure parameters for the ONS 15216 EDFA3. The SNMP agent software and MIB are preinstalled on each ONS 15216 EDFA3.

Figure 10-2 shows the relationship between the SNMP agent and the MIB.

Figure 10-2 SNMP Agent and MIB



10.1.2.2 SNMP MIB

A MIB is a collection of definitions of the properties of each managed object within a managed device. Each managed device keeps a corresponding database of values for each of the definitions written in the MIB.

The SNMP MIBs (CERENT-15216-EDFA-MIB.mib and CERENT-GLOBAL-REGISTRY.mib) are files written in ASN.1 syntax. The CERENT-15216-EDFA-MIB.mib file specifies what ONS 15216 EDFA3 information needs to be monitored. The CERENT-15216-EDFA-MIB.mib file and other MIBs can also be installed on a third-party SNMP manager located at a network management center. The SNMP manager at the network management center uses the SNMP MIBs to communicate with the SNMP agent.

10.1.2.3 SNMP Manager

The ONS 15216 EDFA3 requires a third-party SNMP manager in order to use SNMP commands. The SNMP manager can be accessed and used to communicate with the SNMP agent that is preinstalled on each ONS 15216 EDFA3. This document shows examples of issuing SNMP commands to the amplifier using the CTM SNMP manager.

Note The community string must be set up using TL1 before SNMP commands can be used. The string can be set using TL1 commands (see Chapter 9, "Preparing to Use SNMP").

SNMP managers from third-party vendors running on a separate computer located at a network management center are used to manage network elements. The third-party SNMP manager must be able to communicate with the SNMP agent preinstalled on the ONS 15216 EDFA3.

Each vendor-specific SNMP manager has an unique set of instructions for SNMP MIB installation. For directions on loading the SNMP MIBs, refer to your SNMP manager documentation. Cisco does not provide a standard third-party SNMP manager. See the *Cisco Transport Manager Operations Guide* for information about using CTM.

10.1.2.4 SNMP Traps

The ONS 15216 EDFA3 can receive SNMP requests from a number of SNMP managers and send traps to ten trap receivers. The ONS 15216 EDFA3 generates all alarms and events as SNMP traps. These traps will send to a maximum of ten different managers (include ten different IP addresses).

The ONS 15216 EDFA3 generates traps containing an object ID that uniquely identifies the alarm. An entity identifier uniquely identifies the entity that generated the alarm. The traps give the severity of the alarm (critical, major, minor, event, etc.) and indicate whether the alarm is service affecting or non-service affecting. The traps also contain a date/time stamp that shows the date and time the alarm occurred. The ONS 15216 EDFA3 also generates a trap for each alarm when the alarm condition clears. The trap for SNMPv2c also includes the sender IP address.

Each SNMP trap contains eleven variable bindings. The standard bindings for the ONS 15216 EDFA3 are listed in Table 10-1.

Table 10-1 Standard SNMP Trap Variable Bindings for ONS 15216 EDFA3

Trap	From RFC	Description
coldStart	RFC1907-MIB	Agent up, cold start (delay for system routing).
warmStart	RFC1907-MIB	Agent up, warm start (delay for system routing).

Table 10-1 Standard SNMP Trap Variable Bindings for ONS 15216 EDFA3 (continued)

Trap	From RFC	Description
authenticationFailure	RFC1907-MIB	Community string does not match.
entConfigChange	RFC2737/ENTITY-MIB	The entLastChangeTime value has changed.

10.1.2.5 SNMP Generic Objects

All sent traps are saved to the log file for viewing by the operator. One log file stores up to 1024 traps and events. There are two SNMP trap files:

- snmpNotifyLofA
- snmpNotifyLogB

In total, 2048 traps can be stored. The SNMP agent can be used to save or clear important traps and event statuses on the cerent15216EdfaGenericStandingCondnTable.

10.1.3 Entering Measurement Units with SNMP Commands

The SNMP interface for the ONS 15216 EDFA3 does not understand decimals. For this reason, when a decimal value (10.1, for example) is entered, you must specify that value as 101. In order to provide consistency, whole numbers also must have an additional digit appended to them (10, for example, would be entered as 100).

The TL1 interface represents values as floating points.

10.2 SNMP MIBs and Message Types

Using SNMP operations, a manager can retrieve or modify the value of management information accessible by an agent. An agent can report an event to a manager. A manager can inform another manager of the value of management information on an agent.

Using retrieval and modification operations, the manager can cause an agent to perform an action or to execute a command. The manager can also create new and delete existing instances of management information in the MIB.

A MIB is a hierarchically organized collection of information. Network management protocols, such as SNMP, gain access to these MIBs. MIBs consist of managed objects that are identified by object identifiers (OID). To view the contents of a table, select the table, and perform a GET operation on the table.

The ONS 15216 EDFA3 SNMP agent communicates with an SNMP management application (a third-party application) using SNMP messages. Table 10-2 describes SNMP operation types.

Table 10-2 SNMP Operation Types

SNMP Operation	Description
get-request	Retrieves a value from a specific variable in the MIB.
get-next-request	Retrieves the value following the named variable; this operation is often used to retrieve variables in a table. With this operation, an SNMP agent does not need to know the exact variable name. The SNMP manager searches sequentially to find the needed variable in the MIB.
get-response	The reply to a get-request, get-next-request, get-bulk-request, or set-request sent by an NMS.
get-bulk-request	Similar to a get-next-request, but this operation fills the get-response with up to the max-repetition number of get-next interactions.
trap	An unsolicited message sent by an SNMP agent to an SNMP manager indicating that an event has occurred.
set-request	Sets the value of a specific variable.

10.3 SNMP Capabilities

This section discusses some of the capabilities of SNMP.

10.3.1 Community String Support

The SNMP implementation allows the Community String parameter to be configurable for each SNMP manager.

10.3.2 Trap Destination Table

For security purposes, the Trap Destination Table cannot be modified through the SNMP interface. It can be modified through the TL1 interface.

10.3.3 Enable/Disable SNMP set-request Operations

The SNMP agent provides a parameter to enable or disable the set-request operations. This parameter can be modified only through the TL1 interface.

10.3.4 Log

The SNMP agent can manage trap accumulations for up to 1000 events. When the limit has been reached, the log wraps without sending any notification. Every trap is saved into the log file in real time.

10.3.5 SNMP Attribute Value Change Notification

The SNMP agent sends an event to all connected SNMP managers to notify them of any changes in the ONS 15216 EDFA3 database.

10.3.6 General Software Downloading

Only one download session is permitted at a time (using FTP, TL1, or the SNMP interface). During the download, the SNMP command to start and to apply the cutover is inhibited. The EDFA3 can store and retrieve the two versions of its software on its flash file system (FFS):

- Active (specified in the first boot entry)
- Standby (specified in the second boot entry)

The module firmware download is transparent to the user (the user is not aware of it happening during software download). A checksum test on the downloaded software file is performed to prevent loading the wrong files on the ONS 15216 EDFA3. To activate the download, the user provides the following parameters:

- IP address, user identifier, and password for the FTP server
- Name and path of the file to be downloaded

The agent download is accomplished using FTP protocol, according to this procedure:

1. The agent receives the command to start the download.
2. The agent acts as a FTP client to open a connection to the specified FTP server. The agent returns an error message if the connection fails.
3. The TL1 agent posts the get command to the FTP server and then sends the event to indicate that the download is in progress (ipdownload).
4. Upon successful file transfer, the agent issues a (compldownload) event that indicates the success of the operation.
5. In case of transfer failure or checksum failure, the agent generates an event (failuredownload) to notify the ONS 15216 EDFA3 that the download attempt failed.

The agent does not process any other download command during an active download.

The download replaces the software file contained in the secondary boot entry. To activate the new software file a command is used to apply the software cutover in memory and to reset the EDFA3. One event is generated to communicate the software cutover and the EDFA3 reset (cutoverreset) to the ONS 15216 EDFA3.

10.4 ONS 15216 EDFA3 Tables and Groups

The cerent15216Edfa.mib contains several key tables that are used to review and provision the ONS 15216 EDFA3. These tables are listed and described in the following sections:

- 10.4.1 CERENT-15216-EDFA-GENERIC-MIB, page 10-8
- 10.4.2 cerent15216EdfaGenericGeneralGroup Table, page 10-9
- 10.4.3 cerent15216EdfaGenericSoftware Table, page 10-10
- 10.4.4 cerent15216EdfaGenericNotifDestn Table, page 10-10

- 10.4.5 cerent15216EdfaGenericStandingCondn Table, page 10-11
- 10.4.6 cerent15216EdfaGenericEdfa3Group Table, page 10-11
- 10.4.7 cerent15216EdfaGenericEventProfileTable, page 10-16
- 10.4.8 GenericEdfa3MiscGroup, page 10-17
- 10.4.9 GenericOprnsGroup, page 10-17

The MIB used in the ONS 15216 EDFA3 contains several key tables and groups. To fully understand and use them, Table 10-3 lists the main object identifier, syntax, access, and description.

Table 10-3 Standard MIB

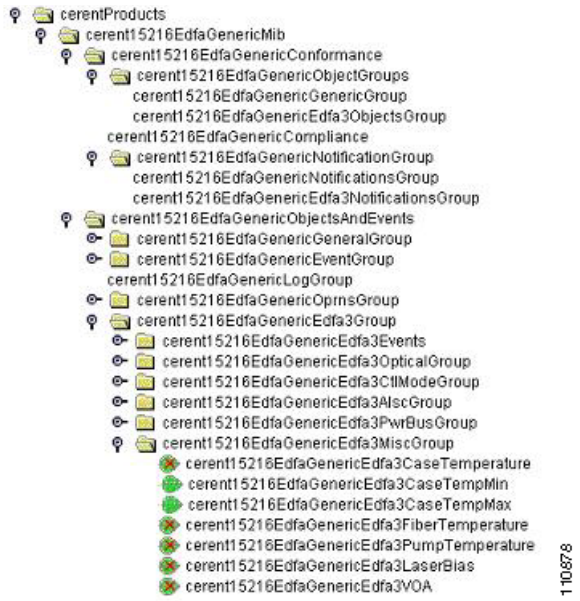
MIB Variable	Syntax	Maximum Access	Description
sysDescr	DisplayString (SIZE (0..255))	read-only	A textual description of the entity. This value should include the full name and version identification of the system hardware type, software operating system, and networking software. Modify using TL1.
sysName	DisplayString (SIZE (0..255))	read-write	An administratively assigned name for this managed node. By convention, this is the node's fully qualified domain name. If the name is unknown, the value is the zero-length string. Modify using TL1.
sysLocation	DisplayString (SIZE (0..255))	read-write	The physical location of this node (for example, “telephone closet, 3rd floor'”. If the location is unknown, the value is the zero-length string. This can be modified to Longitude and Latitude, separated by a colon.
ifAdminStatus	INTEGER up(1), down(2), testmode(3)	read-write	The desired state of the interface. The testing (3) state indicates that no operational packets can be passed. When a managed system initializes, all interfaces start in the down (2) state. As a result of either explicit management action or configuration information retained by the managed system, ifAdminStatus is then changed to either the up (1) or testing (3) state (or remains in the down (2) state). This can be modified to write up (1) only.

10.4.1 CERENT-15216-EDFA-GENERIC-MIB

The CERENT-15216-EDFA-GENERIC-MIB is used to set or get ONS 15216 EDFA3 configuration data and operation modes as well as management and performance information. The tree structure of the MIB is shown as Figure 10-3. When there is a plus sign (+) to the left of an entry in this tree structure, the tree can be expanded to reveal branches of the tree as shown in Figure 10-4.

Figure 10-3 CERENT-15216-EDFA-GENERIC-MIB Generic Structure

Figure 10-4 Cerent Products Main Groups and Tables



10.4.2 cerent15216EdfaGenericGeneralGroup Table

The cerent15216EdfaGenericGroup table (Table 10-4) is used to hold generic information.

Table 10-4 cerent15216EdfaGenericGeneralGroup Table

Generic General Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericEnableNotification	TruthValue	read/write	By setting this object to enable/ disable, the management station can turn the notification generation from the device to ON or OFF.
cerent15216EdfaGenericEnableSetRequestProcessing	TruthValue	read only	This object indicates whether the device can be provisioned through the SNMP interface. If set to disable, the device will reject all SNMP set requests. This object cannot be provisioned through the SNMP interface for security reasons.
cerent15216EdfaGenericNodeTime	DateAndTime	read/write	The wall clock time at the device.
cerent15216EdfaGenericSentNotifications	Counter32	read only	A count of SNMPv1 plus SNMPv2 notifications sent out by the agent. The count resets to zero after a cold/warm start. The NMS should use this to detect loss of communication to the ONS 15216 EDFA3.

Table 10-4 cerent15216EdfaGenericGeneralGroup Table (continued)

Generic General Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericIpAddress	IpAddress	read/write	The IP address of the ONS 15216 EDFA3.
cerent15216EdfaGenericIpNetMask	IpAddress	read/write	The network mask used by the ONS 15216 EDFA3.
cerent15216EdfaGenericIpDefaultGateway	IpAddress	read/write	The default gateway used by the ONS 15216 EDFA3.
cerent15216EdfaGenericCleiCode	OCTET STRING (SIZE (0..10))	read-only	The CLEI code assigned to the ONS 15216 EDFA3.

10.4.3 cerent15216EdfaGenericSoftware Table

The cerent15216EdfaGenericSoftware table (Table 10-5) is used to store information about the software.

Table 10-5 cerent15216EdfaGenericSoftware Table

Generic Software Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericSoftwareStatus	INTEGER {active(10),standby(20)}	read only	This object indicates the active/ standby status of the software load.
cerent15216EdfaGenericSoftwareName	DisplayString	read only	The name of the software load file in the FFS.
cerent15216EdfaGenericSoftwareTimeStamp	DateAndTime	read only	The timestamp that indicates when this software is to be copied to the nonvolatile file system.

10.4.4 cerent15216EdfaGenericNotifDestn Table

The cerent15216EdfaGenericNotifDestn table (Table 10-6) is used to hold information about generic notifications. Values in the cerent15215EdfaGenericNotifDestn table can be created only through TL1.

Table 10-6 cerent15216EdfaGenericNotifDestn Table

Generic Notification Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericNotifDestnIpAddr	IpAddress	Not-accessible	—
cerent15216EdfaGenericNotifDestnCommName	OCTET STRING (SIZE (0..64))	read-only	Remote manager community name for security.
cerent15216EdfaGenericNotifDestnPort	Integer32	read-only	Remote manager SNMP trap receive port number. The default is 162. The user can set any value above 2000.

Table 10-6 cerent15216EdfaGenericNotifDestn Table (continued)

Generic Notification Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericNotifDestnVersion	INTEGER {snmpV1(10), snmpV2(20), unknown(1) }	read-only	The SNMP version that the remote manager will receive.
cerent15216EdfaGenericNotifDestnStatus	RowStatus	read-only	From SNMPv2-TC: • 1: active • 2: notInService • 3: notReady • 4: createAndGo • 5: createAndWait • 6: destroy

10.4.5 cerent15216EdfaGenericStandingCondn Table

The cerent15216EdfaGenericStandingCondn table (Table 10-7) is used to store information about standing conditions.

Table 10-7 cerent15216EdfaGenericStandingCond Table

Standing Condition Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericStandingCondnTimeStamp	DateAndTime	read-only	The time the trap occurred.
cerent15216EdfaGenericStandingCondnType	OBJECT IDENTIFIER	read-only	The Trap and event OID number.
cerent15216EdfaGenericStandingCondnState	CerentNotificationClass	read-only	The state of the trap or event.
cerent15216EdfaGenericStandingCondnVariableOneOid	OBJECT IDENTIFIER	read-only	Additional OID 1.
cerent15216EdfaGenericStandingCondnVariableOneValue	Integer 32	read-only	Additional Value 1.
cerent15216EdfaGenericStandingCondnVariableTwoOid	OBJECT IDENTIFIER	read-only	Additional OID 2.
cerent15216EdfaGenericStandingCondnVariableTwoValue	Integer 32	read-only	Additional Value 2.

10.4.6 cerent15216EdfaGenericEdfa3Group Table

The cerent15216EdfaGenericEdfa3Group table contains five subgroups. The groups are listed in Table 10-8. The groups are outlined in Sections 10.4.6.1 through 10.4.6.4 .

Table 10-8 cerent15216EdfaGenericEdfa3Group Tables

Group	Description
cerent15216EdfaGenericEdfa3OpticalGroup	Contains parameters related to optical input and output lines.
cerent15216EdfaGenericEdfa3CtlModeGroup	Used to retrieve and configure the ONS 15216 EDFA3 operational mode.
cerent15216EdfaGenericEdfa3AlscGroup	Contains amplifier laser status (ALS) and optical safety remote interlock (OSRI) related objects.
cerent15216EdfaGenericEdfa3PwrBusGroup	Contains all power bus related parameters.
cerent15216EdfaGenericEdfa3MBCGroup	Contains all temperature and laser current parameters.

10.4.6.1 cerent15216EdfaGenericEdfa3OpticalGroup

The cerent15216EdfaGenericEdfa3OpticalGroup table (Table 10-9) contains parameters related to optical input and output lines.

Table 10-9 cerent15216EdfaGenericEdfa3OpticalGroup Table

Optical Group Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericEdfa3Line1RxPwr	Integer32 (–600..250) unit 0.1 dBm	read-only	Amplifier input power value related to the LINE1RX port.
cerent15216EdfaGenericEdfa3Line1RxPwrThFailLow	Integer32 (–490..130) unit 0.1 dBm	read-write	Fail low threshold value associated to the input power value related to the LINE1RX port.
cerent15216EdfaGenericEdfa3Line2TxPwr	Integer32 (–600..250) unit 0.1 dBm	read-only	Mid-stage access output power value related to the LINE2TX port.
cerent15216EdfaGenericEdfa3Line2RxPwr	Integer32 (–600..250) unit 0.1 dBm	read-only	Mid-stage access input power value related to the LINE2RX port.
cerent15216EdfaGenericEdfa3Line2RxPwrThFailLow	Integer32 (–490..150) unit 0.1 dBm	read-write	Fail low threshold associated to the input power value related to the port LINE2RX port.
cerent15216EdfaGenericEdfa3Tilt	Integer32 (–150..150) unit 0.1 dB	read-only	The tilt for all wavelengths.
cerent15216EdfaGenericEdfa3TiltSetpoint	Integer32 (–150..150) unit 0.1 dB	read-write	The tilt set point for all wavelengths.

Table 10-9 cerent15216EdfaGenericEdfa3OpticalGroup Table (continued)

Optical Group Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericEdfa3TiltOffset	Integer32 (–200..200) unit 0.1 dB	read-write	The tilt set offset for all wavelengths. Used to compensate for possible wavelength dependency of an optical component placed at the output of the amplifier.
cerent15216EdfaGenericEdfa3DcuLoss	Integer32 (0..200) unit 0.1 dB	read-only	DCULoss measures the insertion loss of the Dispersion Compensating Unit located between stages.

10.4.6.2 cerent15216EdfaGenericEdfa3CtlModeGroup

The cerent15216EdfaGenericEdfa3CtlModeGroup table (Table 10-10) is used to retrieve and configure the EDFA3 operational mode.

Table 10-10 cerent15216EdfaGenericEdfaCtlModeGroup Table

Control Mode Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericEdfa3ControlMode	Integer {constantOutputPower(1), constantGain(2) }	read-write	There are two control modes. (1) Constant Output Power mode: In this mode it is possible to set the EDFA3 LINE1TXPwrSetpoint. (2) Constant Gain mode: In this mode, it is possible to set the GainSetpoint of the whole amplifier. The internal optical module firmware sets the gain of the two stages separately.
cerent15216EdfaGenericEdfa3Line1TxPwr	Integer (–600..250) units 0.1 dBm	read-only	This is the amplifier output power value related to the LINE1TX port.
cerent15216EdfaGenericEdfa3Line1TxPwrThDegLow	Integer32 (–90..150) units 0.1 dBm	read-write	Degrade low threshold associated to the amplifier output power value related to the LINE1TX port. The threshold is only valid when amplifier is used in Constant Output Power mode of operation.

Table 10-10 cerent15216EdfaGenericEdfaCtlModeGroup Table (continued)

Control Mode Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericEdfa3Line1TxPwrSetpoint	Integer (–70..170) units 0.1 dBm	read-write	Amplifier output power setpoint value related to the LINE1TX Port. The setpoint object is only valid when the amplifier is used in Constant Output Power mode of operation.
cerent15216EdfaGenericEdfa3Line1TxPwrThDegHigh	Integer (–50..190) units 0.1 dBm	read-write	Degrade high threshold associated with the amplifier output power value related to the LINE1TX port. The threshold is only valid when the amplifier is used in Constant Output Power mode of operation.
cerent15216EdfaGenericEdfa3Line1TxPwrThFailLow	Integer32 (–100..140) units 0.1 dBm	read-write	Fail low threshold associated with the output power value related to the LINE1TX port.
cerent15216EdfaGenericEdfa3PwrOffset	Integer32 (–200..200) units 0.1 dB	read-write	The output power offset is the difference between the output power measured at the output photodiode and the output power in the fiber. The power offset includes power losses due to cabling or inserted attenuators.
cerent15216EdfaGenericEdfa3Gain	Integer32 (0..400) units 0.1 dB	read-only	Gain value.
cerent15216EdfaGenericEdfa3GainSetpoint	Integer32 (50..385) units 0.1 dB	read-write	The gain setpoint object is only valid when the amplifier is used in Constant Gain mode of operation.

Table 10-10 cerent15216EdfaGenericEdfaCtlModeGroup Table (continued)

Control Mode Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericEdfa3GainThDegHigh	Integer32 (0..400) units 0.1 dB	read-write	Degrade high threshold associated with the amplifier gain. The threshold is only valid when the amplifier is used in Constant Gain mode of operation.
cerent15216EdfaGenericEdfa3GainThDegLow	Integer32 (0..400) units 0.1 dB	read-write	Degrade low threshold associated with the amplifier gain. The threshold is only valid when the amplifier is used in Constant Gain mode of operation.

10.4.6.3 cerent15216EdfaGenericEdfa3AlscGroup

The cerent15216EdfaGenericEdfa3AlscGroup table (Table 10-11) contains ALS and OSRI related objects.

Table 10-11 cerent15216EdfaGenericEdfa3AlscGroup Table

Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericEdfa3AmpLaserStatus	INTEGER { off(1), on(2), automaticPwrReduction Mode(3) }	read-only	ALS. There are three possible states. • On: The two EDFA3 lasers are on. • APR: The two lasers are in the Automatic Power Reduction state. • Off: The two lasers are off.
cerent15216EdfaGenericEdfa3Osri	INTEGER {off(1), on(2) }	read-write	OSRI. There are two possible states. • On: The lasers remain off (that is, it locks the lasers switch on). • Off: Default. No lock.

10.4.6.4 cerent15216EdfaGenericEdfa3PwrBusGroup

Table 10-12 describes the variable, syntax, maximum access and description for entries in the cernet15216EdfaGenericEdfa3PwrBus group.

Table 10-12 cernet15216EdfaGenericEdfa3PwrBus Group

Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericEdfa3PwrBusMode	Integer { simplex (1), duplex (2) }	read-write	Simplex mode requires power only to Bus A. Duplex mode requires power to both Bus A and Bus B.
cerent15216EdfaGenericEdfa3PwrBusAvoltage	Integer (0–9999)	read-only	
cerent15216EdfaGenericEdfa3PwrBus	Integer (0–9999)	read-only	
cerent15216EdfaGenericEdfa3PwrBus	Integer (0–470)	read-write	
cerent15216EdfaGenericEdfa3PwrBus	Integer (490–700)	read-write	

10.4.7 cerent15216EdfaGenericEventProfileTable

The cerent15216EdfaGenericEventProfileTable (Table 10-13) is used to retrieve and configure the EDFA3 generic event profile.

Table 10-13 cerent15216EdfaGenericEventProfileTable

Variable	Syntax	Description
cerent15216EdfaGenericEventProfileIndex	Integer32 (1–511)	OID of the events index from 1 to 27.
cerent15216EdfaGenericEventProfileEvent	Object identifier	OID of the event with a profile represented in this row.
cerent15216EdfaGenericEventProfileState	CerentNotification Class	Indicates the class of the event being sent out. Possible values are: • notReported: Condition not reported as a trap. • administrative: Informational trap (for example, IETF trap). • notAlarmedNonServiceAffecting: Nonalarmable event that is not service affecting. • notAlarmedServiceAffecting: Nonalarmable event that is service affecting. • cleared: This alarm has been cleared. • minorNonServiceAffectin: Minor and NSA • majorNonServiceAffecting: Major and NSA • criticalNonServiceAffecting: Critical and NSA • minorServiceAffecting: Minor and SA • majorServiceAffecting: Major and SA • criticalServiceAffecting: Critical and SA • other
cerent15216EdfaGenericEventProfileEvent Inhibit	TruthValue	When the value of this object is false, the event is dispatched as specified in the MIB module. When the value of this object is true, dispatch of this event is inhibited. The default value is false.

10.4.8 GenericEdfa3MiscGroup

The GenericEdfa3MiscGroup (Table 10-14) contains the case temperature thresholds.

Table 10-14 GenericEdfa3MiscGroup

Case Temperature Object	Range Value	Default Value	Access	Description
CaseTempMax	60...100	65 degrees C	RW	Maximum allowable case temperature threshold
CaseTempMin	–10...30	–5 degrees C	RW	Minimum allowable case temperature threshold
Case Temperature	–100...150	—	R	Case temperature
Fiber Temperature	–100...150	—	R	Fiber temperature
Pump One Temperature	–100...150	—	R	Pump 1 temperature
Pump Two Temperature	–100...150	—	R	Pump 2 temperature
Laser 1 Bias	0...1500	—	R	Laser 1 bias
Laser 2 Bias	0...1500	—	R	Laser 2 bias
VOA	–100...100	—	R	VOA value

10.4.9 GenericOprnsGroup

Table 10-15 lists the variables, syntax, maximum access, and variable descriptions for the cerent15216EdfaGenericOprns Group.

Table 10-15 cerent15216EdfaGenericOprns Group

Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericOprnsMode	INTEGER {idle(1), rebooting(2), applyingCutover(3), downloading(4), savingFile(5)—to remote location from node, restoringFile(6)—from remote location to node}	read-write	When the remote location and the file names are provisioned, setting this value to appropriate mode will commence the selected operation. ApplyingCutover(3) will download(4) the standby file first, then excise cutover(3)
cerent15216EdfaGenericOprnsOwner	DisplayString	read-write	The management station that intends to commence an operation should set this object to an unique string as the first step. As soon as the operation is complete, the management station should set this back to a null string. This enables multiple management stations to coordinate their operations on this device among themselves

Table 10-15 cerent15216EdfaGenericOprns Group (continued)

Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericOprnsSrcFileLoc	DisplayString	read-write	The fully qualified file name used as the source file in transfer operations. The object is used to specify userid, password, the server IP address (or hostname), and the name of the software file including the full directory path. The format of the data is identical to what is used by HTTP browsers for FTP operations (for example, `ftp://loginname:password@ftpserverIPaddress.com/home/directory/filename`). Refer to appropriate documentation for more details. The following options are available: 4: Download the system and get the file (filename) from the directory of the outside ftp server directly store into standby position. 5: (File save) System puts file from the directory /fd1 named from agent file system cerent15216EdfaGenericOprnsDestFileLoc to outside ftp server directory with name from cerent15216EdfaGenericOprnsDestFileLoc . 6: (Restore) Agent system gets file as download (4) but stores it on /fd1as name in cerent15216EdfaGenericOprnsDestFileLoc .

Table 10-15 cerent15216EdfaGenericOprns Group (continued)

Variable	Syntax	Maximum Access	Description
cerent15216EdfaGenericOprnsDestFileLoc	DisplayString	read-write	The fully qualified file name used as the destination file in the transfer operations. The object is used to specify the name of the software file including the full directory path, for example, /fd1/destname where the directory fd1 is the node where the file should be copied and destname is the name of the file being copied.
cerent15216EdfaGenericOprnsResult	INTEGER {none(1), success(10), connectionTime dOut(20), fileReadError(30), fileWriteError(40), noStandbySoftw are(50) }	read only	This object indicates the end result of the operation. When any of the following objects are changed, the value of this object is reset to none by the SNMP agent. cerent15216EdfaGenericOprnsSrcfileLoc cerent15216EdfaGenericOprnsmode cerent15216EdfaGenericOprnsowner cerent15216EdfaGenericOprnsDestfileLoc As soon as the operation is completed, the resulting status is reflected in this object.

10.5 SNMP Traps

Traps are asynchronous notifications sent from the ONS 15216 EDFA3 to a predetermined location (IP address, subnet mask, etc.). A community entry must be created prior to remotely setting up traps using either Telnet or a terminal server.

The ONS 15216 EDFA3 can receive SNMP requests from a number of SNMP managers and can send traps to ten trap receivers. The ONS 15216 EDFA3 generates all alarms and events as SNMP traps which can be sent to a maximum of ten different managers (including ten different IP addresses).

The ONS 15216 EDFA3 generates traps containing an object ID that uniquely identifies the alarm. An entity identifier uniquely identifies the entity that generated the alarm. The traps give the severity of the alarm (critical, major, minor, event, etc.) and indicate whether the alarm is service affecting or non-service affecting. The traps also contain a date/time stamp that shows the date and time when the alarm occurred. The ONS 15216 EDFA3 also generates a trap for each alarm when the alarm condition clears.

Table 10-16 shows the Notification Type and the MIB object for each event notification.

Table 10-16 Notification Types and the MIB Event Notification Objects

Notification Type	Priority	SA/NSA	Alarm Description	Additional Info (MIB Object)
cerent15216EdfaGenericEdfa3PwrAlarmBusA	MN	NSA	Power BusA Alarm	cerent15216EdfaGenericEdfa3PwrBusAvoltage
cerent15216EdfaGenericEdfa3PwrAlarmBusB	MN	NSA	Power BusB Alarm	cerent15216EdfaGenericEdfa3PwrBusBvoltage

Table 10-16 Notification Types and the MIB Event Notification Objects (continued)

Notification Type	Priority	SA/NSA	Alarm Description	Additional Info (MIB Object)
cerent15216EdfaGenericEdfa3FreeMemoryOnSystemVeryLow	MN	NSA	Exceeding Memory Capacity	—
cerent15216EdfaGenericEdfa3FFSCapacityVeryLow	MN	NSA	Exceeding FFS Capacity	—
cerent15216EdfaGenericEdfa3EqptFailure	CR	SA	Equipment Failure	—
cerent15216EdfaGenericEdfa3ModuleCommFailure	MJ	NSA	Module Communication Failure	—
cerent15216EdfaGenericEdfa3CaseTempOutOfRange	MN	NSA	Case Temperature Out Of Range	cerent15216EdfaGenericEdfa3CaseTemperature
cerent15216EdfaGenericEdfa3FiberTempOutOfRange	MN	NSA	Fiber Temperature Out Of Range	cerent15216EdfaGenericEdfa3FiberTemperature
cerent15216EdfaGenericEdfa3ExcessivePumpOneTemperature	MN	NSA	Excessive Pump 1 Temperature	cerent15216EdfaGenericEdfa3PumpOneTemperature
cerent15216EdfaGenericEdfa3LaserBiasOneDegrade	MN	NSA	Laser Bias 1 Degrade	cerent15216EdfaGenericEdfa3LaserBiasOne
cerent15216EdfaGenericEdfa3LaserBiasOneFail	MJ	NSA	Laser Bias 1 Fail	cerent15216EdfaGenericEdfa3LaserBiasOne
cerent15216EdfaGenericEdfa3ExcessivePumpTwoTemperature	MN	NSA	Excessive Pump 2 Temperature	cerent15216EdfaGenericEdfa3PumpTwoTemperature
cerent15216EdfaGenericEdfa3LaserBiasTwoDegrade	MN	NSA	Laser Bias 2 Degrade	cerent15216EdfaGenericEdfa3LaserBiasTwo
cerent15216EdfaGenericEdfa3LaserBiasTwoFail	MJ	NSA	Laser Bias 2 Fail	cerent15216EdfaGenericEdfa3LaserBiasTwo
cerent15216EdfaGenericEdfa3PwrFailureLowLine1Rx	CR	SA	Power Fail Low LINE1RX Port	cerent15216EdfaGenericEdfa3Line1RxPwr cerent15216EdfaGenericEdfa3Line1RxPwrThFailLow
cerent15216EdfaGenericEdfa3GainDegradeHigh	MN	NSA	Gain Degrade High	cerent15216EdfaGenericEdfa3Gain cerent15216EdfaGenericEdfa3GainThDegHigh
cerent15216EdfaGenericEdfa3GainDegradeLow	MN	NSA	Gain Degrade Low	cerent15216EdfaGenericEdfa3Gain cerent15216EdfaGenericEdfa3GainThDegLow
cerent15216EdfaGenericEdfa3PwrFailLowLine1Tx	CR	SA	Power Fail LINE1TX Port	cerent15216EdfaGenericEdfa3Line1TxPw cerent15216EdfaGenericEdfa3Line1TxPwrThFailLow
cerent15216EdfaGenericEdfa3PwrDegradeLowLine1Tx	MN	NSA	Power Degrade Low LINE1TX Port	cerent15216EdfaGenericEdfa3Line1TxPw cerent15216EdfaGenericEdfa3Line1TxPwrThDegHigh
cerent15216EdfaGenericEdfa3PwrDegradeHighLine1Tx	MN	NSA	Power Degrade High LINE1TX Port	cerent15216EdfaGenericEdfa3Line1TxPw cerent15216EdfaGenericEdfa3Line1TxPwrThDegHigh

Table 10-16 Notification Types and the MIB Event Notification Objects (continued)

Notification Type	Priority	SA/NSA	Alarm Description	Additional Info (MIB Object)
cerent15216EdfaGenericEdfa3PwrFailLowLine2Rx	CR	SA	Power Fail Low LINE2RX Port	cerent15216EdfaGenericEdfa3Line2RxPwr cerent15216EdfaGenericEdfa3Line2RxPwrThFailLow
cerent15216EdfaGenericEdfa3VoaDegradeLow	MN	NSA	VOA Degrade Low	cerent15216EdfaGenericEdfa3VOA
cerent15216EdfaGenericEdfa3VoaDegradeHigh	MN	NSA	VOA Degrade High	cerent15216EdfaGenericEdfa3VOA
cerent15216EdfaGenericEdfa3VoaFailHigh	CR	SA	VOA Fail High	cerent15216EdfaGenericEdfa3VOA
cerent15216EdfaGenericEdfa3DataIntegrityFault	MJ	SA	Data Integrity Fault	—
cerent15216EdfaGenericBackupRestoreInProgress	MN	NSA	BackUp Restore In Progress	—

Table 10-17 shows the Notification Type and the MIB object for each alarm notification.

Table 10-17 Notification Type and the MIB Object for Each Alarm Notification

Notification Type/Object Identity	Priority	Event Description	Additional Info
cerent15216EdfaGenericEdfa3ControlModeChanged	NA	Control Mode Changed	cerent15216EdfaGenericEdfa3ControlMode
cerent15216EdfaGenericEdfa3GainSetpointChanged	NA	Gain Setpoint Changed	cerent15216EdfaGenericEdfa3GainSetpoint
cerent15216EdfaGenericEdfa3GainDegradeLowThresholdChanged	NA	Gain Degrade Low Threshold Changed	cerent15216EdfaGenericEdfa3GainThDegLow
cerent15216EdfaGenericEdfa3GainDegradeHighThresholdChanged	NA	Gain Degrade High Threshold Changed	cerent15216EdfaGenericEdfa3GainThDegHigh
cerent15216EdfaGenericEdfa3OutputPwrOffsetChanged	NA	Output Power Offset Changed	cerent15216EdfaGenericEdfa3PwrOffset
cerent15216EdfaGenericEdfa3PwrsetpointChangedLine1Tx	NA	Power Setpoint Changed Line1 Tx	cerent15216EdfaGenericEdfa3Line1TxPwrSetpoint
cerent15216EdfaGenericEdfa3PwrDegradeLowThresholdChangedLine1Tx	NA	Power Degrade Low Threshold Changed Line1 Tx	cerent15216EdfaGenericEdfa3Line1TxPwrThDegLow
cerent15216EdfaGenericEdfa3PwrDegradeHighThresholdChangedLine1Tx	NA	Power Degrade High Threshold Changed Line1 Tx	cerent15216EdfaGenericEdfa3Line1TxPwrThDegHigh
cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine1Tx	NA	Power Fail Low Threshold Changed Line1 Tx	cerent15216EdfaGenericEdfa3Line1TxPwrThFailLow
cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine1Rx	NA	Power Fail Low Threshold Changed Line1 Rx	cerent15216EdfaGenericEdfa3Line1RxPwrThFailLow

Table 10-17 Notification Type and the MIB Object for Each Alarm Notification (continued)

Notification Type/Object Identity	Priority	Event Description	Additional Info
cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine2Rx	NA	Power Fail Low Threshold Changed Line2 Rx	cerent15216EdfaGenericEdfa3Line2RxPwrThFailLow
cerent15216EdfaGenericEdfa3TiltSetpointChanged	NA	Tilt Setpoint Changed	cerent15216EdfaGenericEdfa3TiltSetpoint
cerent15216EdfaGenericEdfa3TiltOffsetChanged	NA	Tilt Offset Changed	cerent15216EdfaGenericEdfa3TiltOffset
cerent15216EdfaGenericEdfa3LaserStatusChanged	NA	Laser Status Changed	cerent15216EdfaGenericEdfa3AmpLaserStatus
cerent15216EdfaGenericEdfa3OsriChanged	NA	OSRI Changed	cerent15216EdfaGenericEdfa3Osri
cerent15216EdfaGenericResetAfterCutover	NA	Reset After Cutover	—
cerent15216EdfaGenericSoftwareReset	NA	Software Reset	—
cerent15216EdfaGenericSoftwareDownloadInProgress	NA	Download in Progress	—
cerent15216EdfaGenericSoftwareDownloadComplete	NA	Download Completed	—
cerent15216EdfaGenericSoftwareDownloadFailed	NA	Download Failure	—
cerent15216EdfaGenericEventProfileChanged	NA	Severity Changed	cerent15216EdfaGenericEventProfileEvent, cerent15216EdfaGenericEventProfileState
cerent15216EdfaGenericEdfa3PwrBusVoltageMaxChanged	NA	Power Bus Max (voltage) Changed	cerent15216EdfaGenericEdfa3PwrBusVoltageMax
cerent15216EdfaGenericEdfa3PwrBusVoltageMinChanged	NA	Power Bus Min (voltage) Changed	cerent15216EdfaGenericEdfa3PwrBusVoltageMin
cerent15216EdfaGenericEdfa3CaseTempMaxChanged	NA	Max Case Temperature Changed	cerent15216EdfaGenericEdfa3CaseTempMax
cerent15216EdfaGenericEdfa3CaseTempMinChanged	NA	Min Case Temperature Changed	cerent15216EdfaGenericEdfa3CaseTempMin

Each SNMP trap contains eleven variable bindings listed in Table 10-18 and Table 10-19 for the ONS 15216 EDFA3.

Table 10-18 Standard SNMP Trap Variable Bindings for ONS 15216 EDFA3

Trap	From RFC# MIB	Description
coldStart	RFC1907-MIB	Agent up, cold start [1]
warmStart	RFC1907-MIB	Agent up, warm start

Table 10-18 Standard SNMP Trap Variable Bindings for ONS 15216 EDFA3 (continued)

Trap	From RFC# MIB	Description
authenticationFailure	RFC1907-MIB	Community string does not match
entConfigChange	RFC2737/ENTITY-MIB	The entLastChangeTime value has changed

1. A cold start should occur only after the router has become active.

Table 10-19 TL1 (Other Management) and SNMP Trap Variable Bindings for ONS 15216 EDFA3

TL1 Condition	SNMP Trap
PWRBUSA	cerent15216EdfaGenericEdfa3PwrAlarmBusA
PWRBUSB	cerent15216EdfaGenericEdfa3PwrAlarmBusB
MEMLOW	cerent15216EdfaGenericEdfa3FreeMemoryOnSystemVeryLow
FFSFULL	cerent15216EdfaGenericEdfa3FFSCapacityVeryLow
EQPT	cerent15216EdfaGenericEdfa3EqptFailure
COMFAIL	cerent15216EdfaGenericEdfa3ModuleCommFailure
CTMP	cerent15216EdfaGenericEdfa3CaseTempOutOfRange
FTMP	cerent15216EdfaGenericEdfa3FiberTempOutOfRange
L1TMP	cerent15216EdfaGenericEdfa3ExcessivePumpOneTemperature
L1BIASD	cerent15216EdfaGenericEdfa3LaserBiasOneDegrade
L1BIASF	cerent15216EdfaGenericEdfa3LaserBiasOneFail
L2TMP	cerent15216EdfaGenericEdfa3ExcessivePumpTwoTemperature
L2BIASD	cerent15216EdfaGenericEdfa3LaserBiasTwoDegrade
L2BIASF	cerent15216EdfaGenericEdfa3LaserBiasTwoFail
LINE1RXPWRFL	cerent15216EdfaGenericEdfa3PwrFailureLowLine1Rx
GAINDH	cerent15216EdfaGenericEdfa3GainDegradeHigh
GAINDL	cerent15216EdfaGenericEdfa3GainDegradeLow
LINE1TXPWRFL	cerent15216EdfaGenericEdfa3PwrFailLowLine1Tx
LINE1TXPWRDH	cerent15216EdfaGenericEdfa3PwrDegradeHighLine1Tx
LINE1TXPWRDL	cerent15216EdfaGenericEdfa3PwrDegradeLowLine1Tx
LINE2RXPWRFL	cerent15216EdfaGenericEdfa3PwrFailLowLine2Rx
VOADH	cerent15216EdfaGenericEdfa3VoaDegradeHigh
VOADL	cerent15216EdfaGenericEdfa3VoaDegradeLow
VOAFH	cerent15216EdfaGenericEdfa3VoaFailHigh
DATAFLT	cerent15216EdfaGenericEdfa3DataIntegrityFault

Table 10-20 reports the mapping between the TL1 and SNMP events.

Table 10-20 TL1 (other management) and SNMP Events Variable Bindings for ONS 15216 EDFA3

TL1 Conditions	SNMP Traps
CTRLMODE	cerent15216EdfaGenericEdfa3ControlModeChanged
GAINCHGD	cerent15216EdfaGenericEdfa3GainSetpointChanged
GAINTHDLCHGD	cerent15216EdfaGenericEdfa3GainDegradeLowThresholdChanged
GAINTHDHCHGD	cerent15216EdfaGenericEdfa3GainDegradeHighThresholdChanged
OPOFFSET	cerent15216EdfaGenericEdfa3OutputPwrOffsetChanged
LINE1TXPWRCHGD	cerent15216EdfaGenericEdfa3PwrsetpointChangedLine1Tx
LINE1TXPWRTHDLCHGD	cerent15216EdfaGenericEdfa3PwrDegradeLowThresholdChangedLine1Tx
LINE1TXPWRTHDHCHGD	cerent15216EdfaGenericEdfa3PwrDegradeHighThresholdChangedLine1Tx
LINE1TXPWRTHFLCHGD	cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine1Tx
LINE1RXPWRTHFLCHGD	cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine1Rx
LINE2RXPWRTHFLCHGD	cerent15216EdfaGenericEdfa3PwrFailLowThresholdChangedLine2Rx
TILTCHGD	cerent15216EdfaGenericEdfa3TiltSetpointChanged
TILTOFFSETCHGD	cerent15216EdfaGenericEdfa3TiltOffsetChanged
LASERCHGD	cerent15216EdfaGenericEdfa3LaserStatusChanged
OSRICHGD	cerent15216EdfaGenericEdfa3OsriChanged
CUTOVERRESET	cerent15216EdfaGenericResetAfterCutover
SOFTWARERESET	cerent15216EdfaGenericSoftwareReset
IP (File Transfer Status)	cerent15216EdfaGenericSoftwareDownloadInProgress
COMPLD (File Transfer Status) SUCCES (File Transfer Result)	cerent15216EdfaGenericSoftwareDownloadComplete
COMPLD (File Transfer Status) FAILURE (File Transfer Result)	cerent15216EdfaGenericSoftwareDownloadFailed

All sent traps are saved to the log file for operator viewing. The log file stores up to 1024 traps and events. The SNMP agent will save or clear some important traps and event statuses for the manager of system operations.

10.6 SNMP Generic Objects

The SNMP agent provides the following functionality:

- Retrieve and configure ONS 15216 EDFA3 parameters (Table 10-21)
- Retrieve inventory parameter (Table 10-22)

Table 10-21 Retrieve and Configure Parameters

Parameter Default Value	Access	Description	Notes
0.0.0.0	RW	IP Address	—
255.255.255.255	RW	IP Mask	—
0.0.0.0	RW	Default Gateway	—
—	R	Mac Address	—
Null string	RW	Host Name [1]	According to sysName (RFC1213) size.
Null string	R	Description	According to sysDescr (RFC1213). The default value is ONS 15216 EDFA3.
Null string	RW	Latitude	A string with a maximum length of 15 characters.
Null string	RW	Longitude	A string with a maximum length of 15 characters.

1. The SNMP parameter Host Name corresponds to the TL1 NAME parameter (the system sid/tid name). The TL1 NAME parameter only shows the first 20 characters.

Table 10-22 ONS 15216 EDFA3 Inventory Parameters

Parameter Default Value	Access	Description	Notes
Null string	R	CLEI code	A string with a maximum length of 10 characters.
Null string	R	Hardware revision number	A string with a maximum length of 10 characters.
Null string	R	Firmware revision number	A string with a maximum length of 10 characters.
Null string	R	Software revision number	A string with a maximum length of 10 characters.
Null string	R	Software update date	A string with a maximum length of 20 characters. The format is <date> <time> (for example, 2003-03-13 05:44:06).
Null string	R	System serial number	A string with a maximum length of 20 characters.
Null string	R	Manufacturer name	A string with a maximum length of 15 characters.
Null string	R	Model name	A string with a maximum length of 15 characters.

10.7 SNMP Specific Objects

The following objects are used to configure the ONS 15216 EDFA3 optical and the Power Bus Voltage parameters.

- 10.7.1 OpticalParamCfgGroup, page 10-26
- 10.7.2 ControlModeCfgGroup, page 10-26
- 10.7.3 ALSCfgGroup, page 10-28
- 10.7.4 PwrBusVoltageCfgGroup, page 10-28

10.7.1 OpticalParamCfgGroup

The OpticalParamCfgGroup (Table 10-23) is used to retrieve and configure the optical parameters.

Table 10-23 OpticalParamCfgGroup

Optical Parameter Object	Range Value	Default Value	Access	Description
LINE1RXPwr	–60 to 25dBm	—	R	Amplifier input power value related to the LINE1RX Port.
LINE1RXPwrTHFailLow	–49 to 13dBm	10 dBm	RW	Fail low threshold associated with the input power value related to the LINE1RX port.
LINE2TXPwr	–60 to 25dBm	—	R	Mid-stage access output power value related to the LINE2TX port.
LINE2RXPwr	–60 to 25dBm	—	R	Mid-stage access input power value related to the LINE2RX port.
LINE2RXPwrTHFailLow	–49 to 15dBm	–33 dBm	RW	Fail low threshold associated with the mid-stage access input power related to the LINE2RX port.
Tilt	–15 to 15dB	—	R	Tilt value.
TiltSetpoint	–15 to 15dB	0 dB	RW	Tilt setpoint.
TiltOffset	–20 to 20dB	0 dB	RW	Tilt offset, used to compensate for possible wavelength dependency of optical component placed at the output of the amplifier.
DCULoss	0 to 20dB	—	R	Measures the insertion loss of the DCU inserted in the mid-stage.

10.7.2 ControlModeCfgGroup

The ControlModeCfgGroup (Table 10-24) is used to retrieve and configure the EDFA3 operational mode:

- Constant Output Power mode: The EDFA3 LINE1TXPwrSetpoint can be set.
- Constant Gain mode: The gain setpoint of the entire amplifier can be set.

The internal optical module firmware sets the gain of the two stages separately.

Table 10-24 ControlModeCfgGroup

Control Mode Object	Range Value	Default Value	Access	Description
ControlMode	Constant Output Power, Constant Gain	Constant Gain	RW	Amplifier control mode.
LINE1TXPwr	–60 to 25 dBm	—	R	Amplifier output power value related to the LINE1TX port.

Table 10-24 ControlModeCfgGroup (continued)

Control Mode Object	Range Value	Default Value	Access	Description
LINE1TXPwrSetpoint	–7 to 17 dBm	10 dBm	RW	Amplifier output power setpoint value related to the LINE1TX port. The setpoint object is only valid when the amplifier is used in Constant Output Power mode of operation. The LINE1TXPwrSetpoint must also be set to be compatible with the setting of the LINE1TXPwrTHFailLow threshold in accordance with the following relationship: (LINE1TXPwrTHFailLow + 3dBm) <= LINE1TXPwrSetpoint <= (+17dBm) This means that the LINE1TXPwrSetpoint must always be set at least 3dBm above the value set for the LINE1TXPwrTHFailLow threshold.(but not above +17dBm)
LINE1TXPwrTHDegHigh	–5 to 19 dBm	LINE1TXPwrSetpoint + 2 dB	RW	Degrade high threshold value associated with the amplifier output power value related to the LINE1TX port. The threshold is only valid when the amplifier is used in Constant Output Power mode of operation.
LINE1TXPwrTHDegLow	–9 to 15 dBm	LINE1TXPwrSetpoint – 2 dB	RW	Degrade low threshold associated with the amplifier output power value related to the LINE1TX port. The threshold is only valid when the amplifier is used in Constant Output Power mode of operation.
LINE1TXPwrTHFailLow	–10 to 14 dBm	–6	RW	Fail low threshold associated with the output power value related to the LINE1TX port. The acceptable setting range for the LINE1TXPwrTHFailLow threshold varies as a function of the LINE1TXPwrSetpoint with the following relationship: (-10dBm) <= LINE1TXPwrTHFailLow <= (LINE1TXPwrSetpoint - 3dBm). Therefore the LINE1TXPwrTHFailLow threshold must always be set at least 3dBm below the set point of LINE1TXPwrSetpoint (but not below -10dBm). For example, the maximum 14dBm LINE1TXPwrTHFailLow threshold can only be set when the set point for LINE1TXPwrSetpoint is also set to it's maximum value of 17dBm.
PowerOffset	–20 to 20 dB	0	RW	Output power offset is the difference between the output power measured at output photodiode and the output power in the fiber. The power offset includes power losses due to cabling or inserted attenuators.
Gain	0 to 40 dB	—	R	Gain value.

Table 10-24 ControlModeCfgGroup (continued)

Control Mode Object	Range Value	Default Value	Access	Description
GainSetpoint	5 to 38.5 dB	21 dB	RW	Gain setpoint. The setpoint object is valid only when the amplifier is used in Constant Gain mode of operation.
GainTHDegHigh	0 to 40 dB	GainSetpoint + 2dB	RW	Degrade high threshold associated with the amplifier gain.The threshold is only valid when the amplifier is used in Constant Gain mode of operation.
GainTHDegLow	0 to 40 dB	GainSetpoint – 2dB	RW	Degrade low threshold associated to the amplifier gain. The threshold is only valid when the amplifier is used in Constant Gain mode of operation.

10.7.3 ALSCfgGroup

The ALSCfgGroup (Table 10-25) is used to configure the ALS parameter.

Table 10-25 ALSCfgGroup

Configuration Object	Range Value	Default Value	Access	Description
LaserStatus3	On, APR, Off	Off	R	ALS. There are three possible states. • On: The two EDFA3 lasers are on. • APR: The two lasers are in the Automatic Power Reduction state. • Off: The two lasers are off.
OSRI	On, Off	Off	RW	OSRI. There are two possible states. • On: The lasers remain off (that is, the laser switch is locked on). • Off: Default. No lock.

10.7.4 PwrBusVoltageCfgGroup

The PwrBusVoltageCfgGroup is used to configure the power bus parameter.

Note If both PWRA and PWRB are active, it is not possible to change from duplex to simplex mode.

FTP Session

This chapter discusses the Cisco ONS 15216 EDFA3 FTP command line and explains how to get and send image and configuration files between an FTP server and the ONS 15216 EDFA3.

FTP (File Transfer Protocol) is a client/server protocol for sharing files between machines over a TCP/IP network. The local machine runs an FTP client. The remote machine contains an FTP server that must be connected to before exchanging files between the two machines.

A typical FTP session consists of:

- 11.1 Logging into an FTP Session, page 11-1
- 11.2 Getting a File, page 11-1
- 11.3 Logging Out of an FTP Session, page 11-2
- 11.4 FTP Commands, page 11-2

11.1 Logging into an FTP Session

To start an FTP session, use the following command:

```
> ftp server_IP_address
```

for example, type:

```
> ftp 100.110.120.100
```

where 100.110.120.100 is the IP address of the host.

When the connection is made, a read/write/administration (RWA) user can log in with the user name and password. When you are connected to the FTP host, you can list files using the **dir** command. This lists files and directories on the remote server. If no filenames are specified, **dir** lists all files in the current directory.

11.2 Getting a File

Because the file to be retrieved is not a text file, use binary mode to transfer the file. Use the bin command to indicate that this is a binary file transfer.

The **get** command downloads a single file. An example of the get command is:

```
get remote-file local-file
```

where *remote-file* is the file that you want to retrieve and *local-file* (optional) is the name for the file on your file system. The **get** command copies the remote file from the remote server to the local machine. If a local file filename is specified, the downloaded file uses this name. If the local file name is omitted, the file is copied to the local default directory with the same name.

11.3 Logging Out of an FTP Session

To log off an FTP session, type **quit**, **bye**, or **disconnect** at the FTP command line. Any of these commands disconnects the user from the remote server and exits the FTP shell.

11.4 FTP Commands

Typing the **help** or **?** command in FTP command line mode displays a list of all FTP commands. See Example 11-1.

Example 11-1 FTP Help Command

```
ftp> ?
Commands may be abbreviated.  Commands are:

!               delete          literal         prompt          send
?               debug           ls              put             status
append          dir             mdelete         pwd             trace
ascii           disconnect      mdir            quit            type
bell            get             mget            quote           user
binary          glob            mkdir           recv            verbose
bye             hash            mls             remotehelp
cd              help            mput            rename
close           lcd             open            rmdir
```

For help on specific commands, use **help** or **?** followed by the command name, as shown in Example 11-2.

Example 11-2 Help on Specific Command

```
ftp> ? put
put             send one file

ftp> help get
get             receive file
```

Note The EDFA3 FTP Server does not support wildcard (*) commands, multiple file send/receive commands (mget, mput, etc.), or mkdir/rmdir and rename commands.

Note The user can use the **delete** command instead of rmdir to delete a directory.

CHAPTER 12

Software Upgrade

This chapter describes the methods available for upgrading software on the ONS 15216 EDFA3. It provides both procedures for upgrading an ONS 15216 EDFA3 release, and a software uninstall procedure to return to the old release. This chapter contains the following sections:

- 12.1 Upgrading the Software, page 12-1
- 12.2 Uninstalling the Software Using TL1, page 12-7

12.1 Upgrading the Software

During the download of new software file, the NE supervision is granted with no traffic disruption. Only one download session at time (using FTP or TL1) is permitted. During the download, the TL1 commands COPY-RFILE and APPLY are inhibited. The ONS 15216 EDFA3 stores two versions of its software on its flash file system (FFS):

- Active version (specified in the first boot entry)
- Standby version (specified in the second boot entry).

The module firmware download is transparent to the user (that is, the user is not aware of it happening during the software download). A checksum test on the downloaded software file is performed to prevent loading of wrong or corrupted files on the ONS 15216 EDFA3. The agent download message contains the following parameters:

- FTP server IP address
- Name and path of the file to be downloaded

The agent download is accomplished using FTP protocol as follows:

1. The agent receives the start download message COPY-RFILE.
2. The agent acts as an FTP client opening a connection toward the specified FTP server.
3. The agent returns a DENY notification with an error message if the connection fails. The error messages in Table 12-1 are provided to clarify the fail problem.

Table 12-1 Download Failure Messages

Message	Description
SROF	Connection to Server Failed
SROF	User Login Failed
SROF	File Not Found

Table 12-1 Download Failure Messages (continued)

Message	Description
SROF	File Exists
SROF	FFS Full

4. The agent sends the following messages to all connected element managers (EMs), signaling that a download procedure is started:
   a. `REPT EVT FXFR - START`: The file transfer process is started.
   b. `REPT ALM EQPT - SOFTDOWN`: The software download is in progress.
5. The TL1 agent posts the **get** command to the FTP server (`REPT EVT FXFR - IP`).
6. Upon successful file transfer completion, the agent issues a `REPT EVT FXFR - COMPLD - SUCCESS` message to indicate the success of the operation. In case of transfer failure or checksum failure, the agent issues an event `FXFR - COMPLD - FAILURE` message to notify the EM that the download attempt failed.

   The agent will not process any other download command (`COPY-RFILE` and `APPLY`) during an active download. The following error message is issued during the download:

   ```
   SROF - "Software Download In Progress"
   ```

7. The download replaces the software file contained in the secondary boot entry (standby) and the SOFTDOWN alarm is cleared.

To activate the new software, issue the APPLY command to apply the software cutover in memory and to reset the EDFA3. An event is generated to communicate the software cutover and the EDFA3 reset to the EM (CUTOVERRESET). The APPLY command immediately resets the ONS 15216 EDFA3.

12.1.1 Software Upgrade Using the TL1 Shell

The following procedure is used to upgrade the software image from the most recent release to the new release using TL1 commands. To upgrade using FTP, see the "12.1.2 Software Upgrade Using FTP" section on page 12-5. A firmware image upgrade is not required. This procedure is not service affecting as the ONS 15216 EDFA3 reboots.

Note For correct operation of your ONS 15216 EDFA3, you must have already upgraded to the most recent software release before performing this procedure.

Step 1 If the ONS 15216 EDFA3 has already been assigned an IP address, subnet mask, gateway address, and sid/tid name, proceed to Step 9.

Step 2 Connect to the EIA/TIA-232 (RS-232) port on the ONS 15216 EDFA3.

Step 3 Open a Terminal application. (In Microsoft Windows, HyperTerminal can be used. HyperTerminal is found in the **Accessories > Communications** menu.) The port settings should be:

- 9600 bps
- 8 data bits, no parity
- 1 stop bit
- No flow control

Step 4 Verify that the ONS 15216 EDFA3 TL1 login prompt appears (you might need to press **Enter** one or more times for the system to respond), as shown below:

```
>
```

Step 5 At the command prompt, log in as a user with administrative (RWA) privileges (the default is CISCO15 with no password).

Step 6 Issue the ACT-USER command according to the syntax in the following example:

```
> ACT-USER::CISCO15:100;
```

where 100 is the ctag for this command. A semicolon ends each TL1 command. You should receive the following response:

```
EDFA3 2003-09-30 11:29:49
M 100 COMPLD
/* ACT-USER */
;
>
```

Step 7 At the command prompt, set the IP address using the ED-NE-GEN command according to the syntax in the following example:

```
>
ED-NE-GEN:::101:::NAME=Amp01,IPADDR=192.167.3.4,IPMASK=255.255.255.0,DEFRTR=192.167.3.20;
```

Step 8 If any changes were made, the system must be rebooted to make the IP address active. Enter the INIT-SYS command according to the syntax in the following example:

```
> INIT-SYS::ALL:102::1;
```

Step 9 Put the software image file for the new release on a PC or server that has an FTP server and is on the same LAN as the ONS 15216 EDFA3.

Step 10 Verify that the ONS 15216 EDFA3 is connected to the LAN using the module LAN port.

If not connected, use a straight-through or crossover CAT-5 Ethernet cable with RJ-45 connectors to connect from the LAN port to a LAN switch or hub.

Step 11 Open a Telnet session to the 3083 port of the ONS 15216 EDFA3. In Microsoft Windows, click **Start > Run**, and type the following in the Open field:

telnet *<ONS-15216-EDFA3-IP-address>* **3083**

Step 12 Verify that the ONS 15216 EDFA3 TL1 login prompt appears:

```
WARNING
This system is restricted to authorized users for business purposes. Unauthorized access
is a violation of the law. This service may be monitored for administrative and security
reasons. By proceeding, you consent to this monitoring.
```

Step 13 Log into the ONS 15216 EDFA3 as a user with administrative privileges.

Step 14 Issue the RTRV-NE-GEN command to identify the standby software as shown in the following example:

```
> RTRV-NE-GEN:EDFA3::123;
```

You will receive a response similar to the following:

```
    EDFA3 1970-01-12 05:58:18
M   12 COMPLD
   "EQPT:NAME=EDFA3,DESCR=ONS15216EDFA3,LONGITUDE=,LATITUDE=,IPADDR=172.16.30.85,
IPMASK=255.255.255.0,DEFRTR=0.0.0.0,MACADDRESS=00059A3DEB28,
ACTIVESW=ONS15216Edfa3-00.04.15-003L-23.23,STANDBYSW=NS15216Edfa3-00.4.14-003L-12.09,
SNMPSETREQQ=ENABLE"
```

```
;
```

Step 15 Issue the DLT-RFILE command to delete the standby software file unless it is identical to ACTIVESW. This ensures that there will be enough space for the next step.

Step 16 At the command prompt, enter the COPY-RFILE command, specifying TYPE=SWDL, the FTP parameters (user identifier, password, and IP address of the FTP server), and the filename. Use the syntax in the following example to transfer the file:

```
> COPY-RFILE:::123::TYPE=SWDL,SRC="ftp://user1:passwd@192.168.85.10:21/bin/
15216EdfaSw_x.x.x",DEST="file://fd1/15216EdfaSw_x.x.x",OVERWRITE=YES;
```

where 15216EdfaSw-x.x.x is the new filename.

An FTP URL has the following format:

```
ftp:[//[<userid>[:<password>]@]<ftphost>[:<port>]]/<urlpath>
```

A file URL (referring to the local system) has the following format:

```
file://localhost/<urlpath>
```

Table 12-2 describes the parameters in the FTP and file URLs.

Table 12-2 FTP URL and File URL Parameters

Parameter	Description
<userid>	FTP user identifier
<password>	FTP password for the user
<ftphost>	IP address of the FTP server
<port>	Port number to connect to
<urlpath>	Path in the following format: `<cwd1>/<cwd2>//<cwdn>/<filename>` where <cwd1> and <cwdn> are directory levels and <filename> is the file name.

The ONS 15216 EDFA3 should respond with autonomous messages using syntax similar to the following examples:

```
EDFA3 2003-09-30 11:34:05
M 123 COMPLD
/* COPY-RFILE */
;
EDFA3 2003-09-30 11:34:05
A 7 REPT EVT FXFR
EQPT:bin/15216EdfaSw_2.2.1,START,,
;
EDFA3 2003-09-30 11:35:24
A 8 REPT EVT FXFR
EQPT:bin/15216EdfaSw_2.2.1,COMPLD,SUCCESS,1963195
;
```

When the SUCCESS message appears, the file transfer is complete.

Step 17 Ensure that the entire new software image file was downloaded. The number after SUCCESS in the final REPT EVT FXFR - COMPLD message indicates the number of bytes transferred.

Step 18 Check that the correct software was downloaded by issuing RTRV-NE-GEN command and verify that the STANDBYSW is now the new upgraded software.

Step 19 At the command prompt, enter the APPLY command to make the new image current, using the syntax in the following example:

```
> APPLY:::123;
```

The ONS 15216 EDFA3 logs you off and reboots with the new software version. The software upgrade procedure is complete. Press **Enter** to get out of the present console. You can now Telnet again to open a session with the new console.

12.1.2 Software Upgrade Using FTP

The following procedure is used to upgrade the software image using FTP. To upgrade using TL1 commands, see the "12.1.1 Software Upgrade Using the TL1 Shell" section on page 12-2. A firmware image upgrade is not required. This procedure is not service affecting, as the ONS 15216 EDFA3 processor reboots.

Note For correct operation of your ONS 15216 EDFA3, you must have already upgraded to the most recent software release before performing this procedure.

Step 1 If the ONS 15216 EDFA3 already has been assigned and IP address, subnet mask, gateway address, and host name, skip to Step 4.

Step 2 Connect to the EIA/TIA-232 (RS-232) port on the ONS 15216 EDFA3.

Step 3 Open a Terminal application. (In Microsoft Windows, HyperTerminal can be used. HyperTerminal is found in the **Accessories > Communications** menu.) The port settings should be:

- 9600 bps
- 8 data bits, no parity
- 1 stop bit
- No flow control

Step 4 Put the new software image file on a PC or server that has an FTP server and is on the same LAN as the ONS 15216 EDFA3.

Step 5 Verify that the ONS 15216 EDFA3 is connected to the LAN via the module LAN port.

If not connected, use a straight-through CAT-5 Ethernet cable with RJ-45 connectors to connect from the LAN port to a LAN switch or hub.

Step 6 Open an FTP session to the IP address of the ONS 15216 EDFA3. Provide the administrator user name and password. At the ftp> prompt, enter the following command to complete the FTP logon:

```
ftp> login FTP_username
```

Step 7 When prompted, enter the FTP user password as follows:

```
Password: ********
```

The password that you enter is masked by asterisks (*). The ONS 15216 EDFA3 should respond as follows:

```
230 User FTP_username logged in
```

Step 8 At the FTP prompt, enter the following command:

```
ftp> cd /Directory_of_FTP_site
```

Step 9 At the command prompt, log in as a user with administrative (RWA) privileges (the default is CISCO15 with no password) by issuing the ACT-USER command according to the syntax in the following example:

```
> ACT-USER::CISCO15:100;
```

where 100 is the ctag for this command. A semicolon ends each TL1 command. You should receive the following response:

```
EDFA3 2003-09-30 11:29:49
M 100 COMPLD
/* ACT-USER */
;
>
```

Step 10 Issue the RTRV-NE-GEN command and identify the standby software name.

Step 11 If the standby SW is not the same as the ACTIVESW then issue DLT-RFILE command to delete the standby software file. Alternatively, in the FTP window, issue the following command to delete that file:

```
> del <STANDBYSW>
```

This ensures that there will be enough space for the next step.

Step 12 At the ftp> prompt, enter the following command to set the file transfer type to binary:

```
ftp> bin
```

The ONS 15216 EDFA3 responds as follows:

```
200 Type set to I,binary mode
```

Step 13 At the FTP prompt, enter the following command:

```
ftp> put <new-software-version>
```

Step 14 Press **Enter** to begin the file transfer. When the file transfer is complete, the following information should be displayed:

```
226 Transfer complete
ftp: 4266558 bytes sent in 59.58 seconds 71.62Kbytes/sec.
```

Step 15 At the FTP prompt, enter the following command:

```
ftp> quit
```

The FTP session is terminated and the following response displays:

```
221 Bye...see you later
```

The ONS 15216 EDFA3 then returns to the hostname prompt.

Step 16 In the TL1 window, issue the ED-NE-GEN command. Include the following parameter:

```
STANDBYSW=<new-software-file-name>
```

Step 17 Issue the APPLY command to apply the software cutover in memory and to reset the ONS 15216 EDFA3.

The ONS 15216 EDFA3 logs you off and reboots with the new software version. The software upgrade procedure is complete.

12.1.3 Software Upgrade Using SNMP

The following procedure is used to upgrade the software image using Simple Network Management Protocol (SNMP).

Step 1 Set the outside FTP server information by using SNMP to set the cerent15216EdfaGenericOprnsSrcFileLoc. Any of the following formats are supported:

- ftp://username:passwd@IPaddress/subdirectory/../filename
- ftp://username:passwd@IPaddress/Filename
- ftp://Ipaddress/subdirectory/../filename
- ftp://Ipaddress/filename
- ftp://username@IPaddress/subdirectory/../filename

Use the command format shown in the following example:

```
snmpset -v 2c 10.51.100.233 cerent15216EdfaGenericOprnsSrcFileLoc.0=
"ftp://ctmsvt:ctm456%@144.254.170.95/ONS15216Edfa3-0.4.5-003J-13.18"
```

Step 2 Set the inside EDFA3 file current only if the /fd1 subdirectory is open. For FTP using cerent15216EdfaGenericOprnsDestFileLoc, the EDFA3 side should be /fd1/filename or file://fd1/filename. Use the command format shown in the following example:

```
snmpset -v 2c 10.51.100.233 cerent15216EdfaGenericOprnsDestFileLoc.0=
"/fd1/ONS15216Edfa3-0.4.7-003J-27.18"
```

Step 3 Set the cerent15216EdfaGenericOprnsOwner with your personal name so that the system know who is using it. Use the command format shown in the following example:

```
snmpset -v 2c 10.51.100.233 cerent15216EdfaGenericOprnsOwner.0="<yourname>"
```

Step 4 Set the operation mode in cerent15216EdfaGenericOprnsMode to download the image software program, update the SNMP FTP client, and automatically put the download file on the /fd1. The destination name variable is not necessary for SNMP operation mode 4 (for software download), mode 5 (for file upload), or mode 6 (to restore files). After setting values 4 through 6, the load will process as defined. Use the command format shown in the following example:

```
snmpset -v 2c 10.51.100.233 cerent15216EdfaGenericOprnsMode.0=4
```

Step 5 Using the SNMP get command to get the status by checking cerent15216EdfaGenericOprnsResult. Use the command format shown in the following example:

```
snmpget -v 2c 10.51.100.233 cerent15216EdfaGenericOprnsResult.0=success (10)
```

Step 6 Go back to cerent15216EdfaGenericOprnsMode and set the variable to 3 (CutOver) to reset the system to use the new software. Use the command format shown in the following example:

```
snmpset -v 2c 10.51.100.233 cerent15216EdfaGenericOprnsMode.0=3
```

12.2 Uninstalling the Software Using TL1

The following procedure is used to change the software image from a new release back to the previous release using TL1 commands. This procedure is not service affecting.

Step 1 Log into the TL1 shell as a user with administrative privileges. (If using a Telnet session, specify port 3083 to be sure to log into the TL1 shell.)

Step 2 At the command prompt, enter the RTRV-NE-GEN command to check the active and standby software images. Use the syntax shown in the following example:

```
> RTRV-NE-GEN:Amp01::101;
```

Step 3 From the response, check that ACTIVESW is the new filename and STANDBYSW is the old filename.:

Step 4 At the command prompt, enter the APPLY command to make the old image. Use the command format shown in the following example:

```
> APPLY:Amp01::102;
```

Note The APPLY command automatically resets the ONS 15216 EDFA3. After this command, the system will self-restart in a few seconds. The user must log in again after the restart.

The software uninstall procedure is complete.

CHAPTER 13

Network Access to the ONS 15216 EDFA3 Using the ONS 15454

The Cisco ONS 15454 is Cisco's metro optical transport system. The ONS 15454 combines supercharged SONET/SDH transport and integrated optical networking (including ITU grid wavelengths and dense wavelength division multiplexing [DWDM]) with multiservice interfaces on demand (including Ethernet) and time division multiplexing (TDM) services to deliver economic benefits to service providers. The ONS 15454 provides the functions of multiple network elements in a single platform.

This chapter contains the following sections:

- 13.1 Using the ONS 15454 with the ONS 15216 EDFA3, page 13-1
- 13.2 Before You Begin, page 13-2
- 13.3 Static Routes, page 13-3
- 13.4 OSPF, page 13-6
- 13.5 Using Routing Information Protocol, page 13-12
- 13.6 Using the Proxy Server Features, page 13-13
- 13.7 Viewing the ONS 15454 Routing Table, page 13-17

A video tutorial for the ONS 15454 is located at:

http://www.cisco.com/warp/public/cc/pd/olpl/metro/on15454

Note All references to ONS 15454 pertain to the SONET product. The ONS 15216 EDFA3 is not compatible with ONS 15454 SDH.

13.1 Using the ONS 15454 with the ONS 15216 EDFA3

This chapter explains how to set up Cisco ONS 15454 nodes in IP networks. The chapter does not provide a comprehensive explanation of IP networking concepts and procedures.

Note To set up ONS 15454 nodes within an IP network, you must work with a LAN administrator or other individual at your site who has IP network training and experience. To learn more about IP networking, many outside resources are available. *IP Routing Fundamentals*, by Mark Sportack (Cisco Press, 1999), provides a comprehensive introduction to routing concepts and protocols in IP networks.

In order to use the ONS 15216 EDFA3 with the ONS 15454, the following setup is required:

- The ONS 15216 EDFA3 must be on the same subnetwork as the ONS 15454.
- The firewall on the ONS 15454 must be disabled on the gateway network element (GNE) and on the node where the ONS 15216 EDFA3 is connected.
- On the node where the GNE is connected to the ONS 15454, you must install a static route as follows:
  - Destination: ONS 15216 EDFA3 address
  - Mask: 255.255.255.255
  - Next Hop: IP address of the node where the ONS 15216 EDFA3 is connected

You will also need to install a default route (0.0.0.0) on the GNE. The connection from the ONS 15216 EDFA3 to the Timing, Communications, and Control (TCC) card uses a cross-over cable.

This manual contains the following IP networking procedures for the ONS 15454 SONET:

- 13.3.1 Creating a Static Route, page 13-3
- 13.4.1 Using OSPF, page 13-6
- 13.4.2 Setting Up OSPF, page 13-8
- 13.5 Using Routing Information Protocol, page 13-12
- 13.6 Using the Proxy Server Features, page 13-13
- 13.7 Viewing the ONS 15454 Routing Table, page 13-17

13.2 Before You Begin

Determine how your network will be connected. There are many different ONS 15454 connection options within an IP environment:

- ONS 15454 nodes can be connected to LANs directly or through a router.
- IP subnetting can create ONS 15454 node groups, allowing you to provision nodes in a network that are not connected to a data communications channel (DCC).
- Different IP functions and protocols can be used to achieve specific network goals. For example, Proxy Address Resolution Protocol (ARP) enables one LAN-connected ONS 15454 to serve as a gateway for ONS 15454 nodes that are not connected to the LAN.
- You can create static routes to enable connections among multiple Cisco Transport Controller (CTC) sessions with ONS 15454 nodes that reside on the same subnet but have different destination IP addresses.
- If ONS 15454 nodes are connected to Open Shortest Path First (OSPF) networks. ONS 15454 network information is automatically communicated across multiple LANs and WANs.

Table 13-1 provides a general list of items to check when setting up ONS 15454 nodes in IP networks. Additional procedures for troubleshooting Ethernet connections and IP networks are contained in the ONS 15454 documentation.

Table 13-1 General ONS 15454 IP Networking Checklist

Item	What to Check
PC/workstation	Each CTC computer must have the following: • Web browser • Java Runtime Environment (JRE) • Java.policy file (modified for CTC) See the ONS 15454 documentation for detailed information.
Link integrity	Link integrity exists between: • CTC computer and network hub/switch • ONS 15454 nodes (backplane wire-wrap pins or RJ-45 port) and network hub/switch • Router ports and hub/switch ports
ONS 15454 hub/switch ports	Set the hub or switch port that is connected to the ONS 15454 to 10 Mbps half-duplex.
Ping	Ping the node to test connections between computers and ONS 15454 nodes.
IP addresses/subnet masks	Ensure that ONS 15454 IP addresses and subnet masks are set up correctly.
Optical connectivity	Ensure that ONS 15454 optical trunk ports are in service and that DCC is enabled on each trunk port.

13.3 Static Routes

Static routes are used for two purposes:

- To connect ONS 15454 nodes to CTC sessions on one subnet connected by a router to ONS 15454 nodes residing on another subnet.
- To enable multiple CTC sessions among ONS 15454 nodes residing on the same subnet.

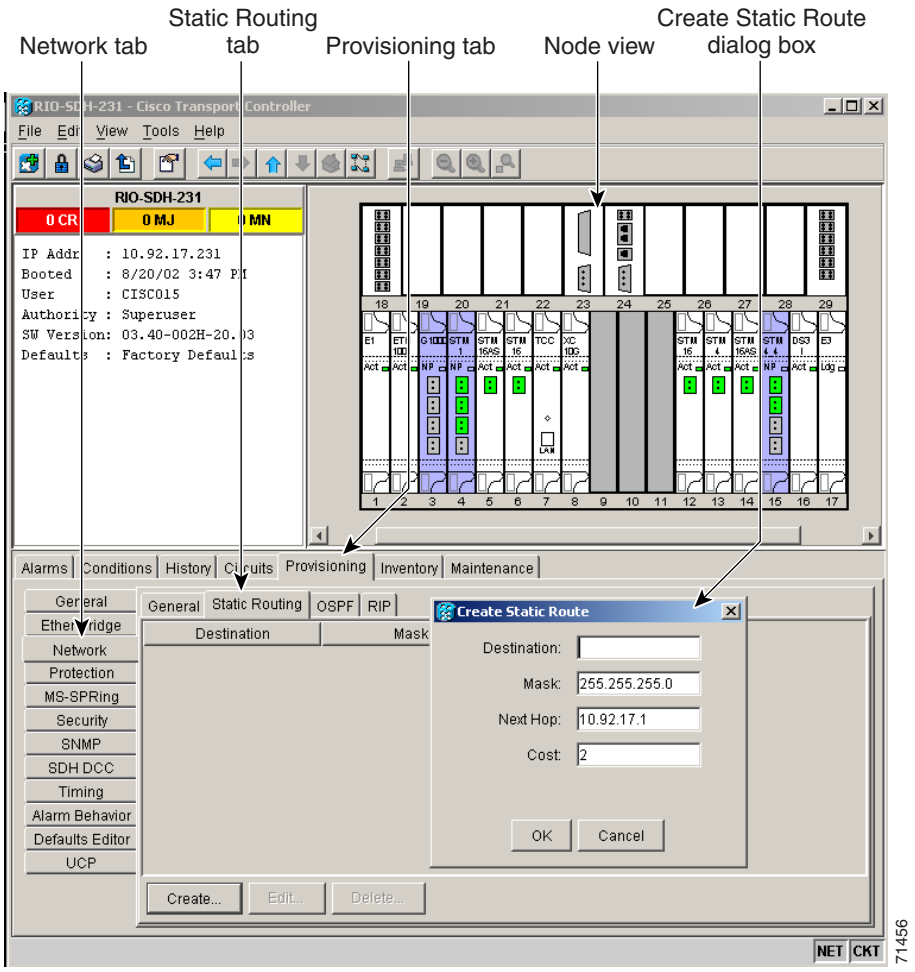
13.3.1 Creating a Static Route

Use this procedure to create a static route. Static routes are used for two purposes:

Step 1 Start CTC for an ONS 15454 node and choose the **Provisioning > Network** tabs (Figure 13-1).

Step 2 Click the **Static Routing** tab. Click **Create**.

Figure 13-1 Create Static Route Dialog Box



Step 3 In the Create Static Route dialog box, enter the following:

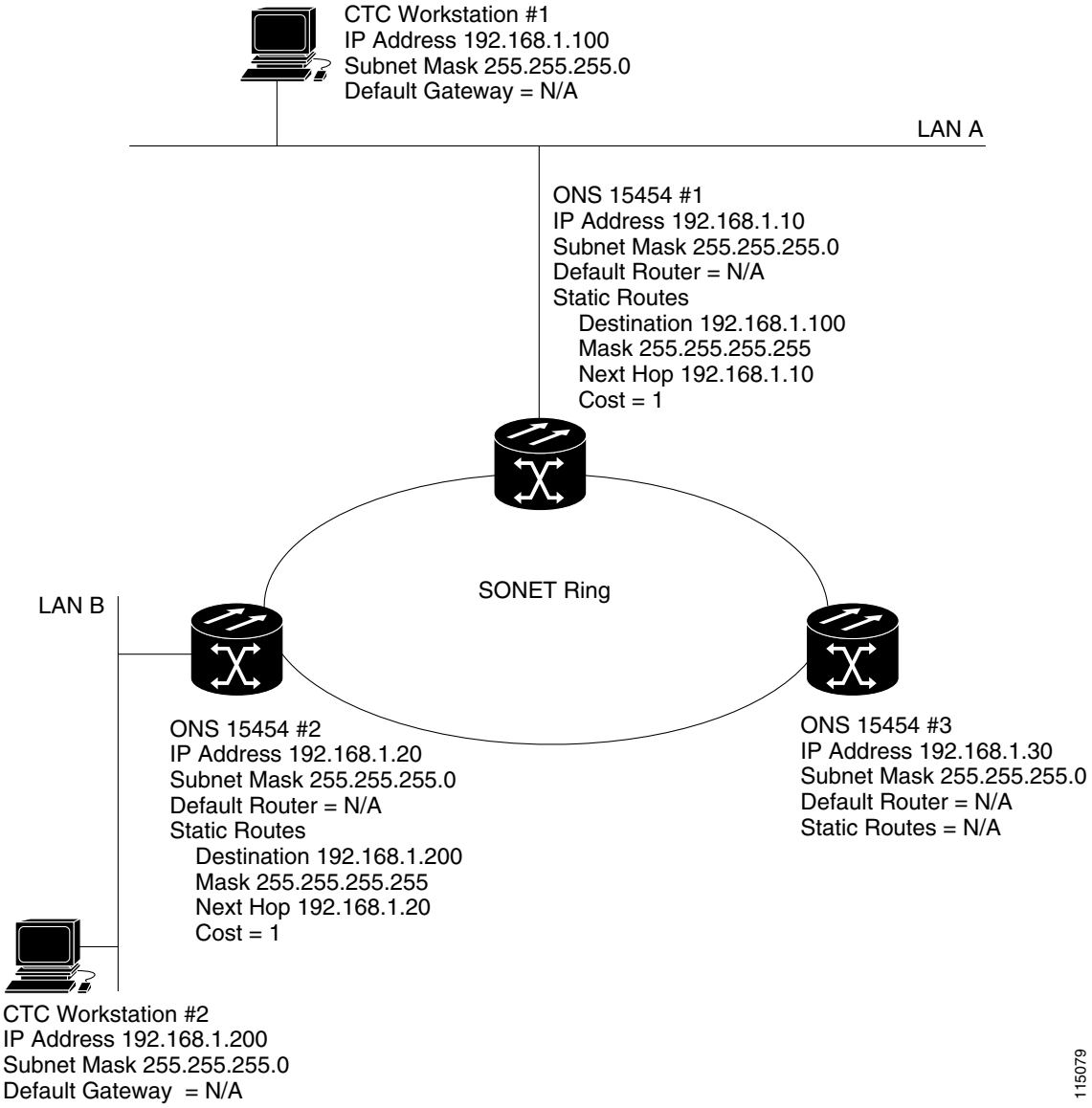
- Destination—Enter the IP address of the computer running CTC. To limit access to one computer, enter the full IP address (in the example, 192.168.1.100). To allow access to all computers on the 192.168.1.0 subnet, enter 192.168.1.0 and a subnet mask of 255.255.255.0. You can enter a destination of 0.0.0.0 to allow access to all CTC computers that connect to the router.
- Mask—Enter a subnet mask. If the destination is a host route (that is, one CTC computer), enter a 32-bit subnet mask (255.255.255.255). If the destination is a subnet, adjust the subnet mask accordingly, for example, 255.255.255.0. If the destination is 0.0.0.0, enter a subnet mask of 0.0.0.0 to provide access to all CTC computers.
- Next Hop—Enter the IP address of the router port (in this example, 192.168.90.1) or the node IP address if the CTC computer is connected to the node directly.
- Cost—Enter the number of hops between the ONS 15454 and the computer. In this example, the cost is two: one hop from the ONS 15454 to the router and a second hop from the router to the CTC workstation.

Step 4 Click **OK**. Verify that the static route displays in the Static Route window, or ping the node.

13.3.2 Static Route for Multiple CTCs

Figure 13-2 shows a static route used when multiple CTC computers need to access ONS 15454 nodes residing on the same subnet. In this scenario, CTC Workstations #1 and #2 and all ONS 15454 nodes are on the same IP subnet; ONS 15454 #1 and CTC Workstation #1 are attached to LAN A. ONS 15454 #2 and CTC Workstation #2 are attached to LAN B. Static routes are added to ONS 15454 #1 pointing to CTC Workstation #1, and to ONS 15454 #2 pointing to CTC Workstation #2. The static route is entered from the node's perspective.

Figure 13-2 Static Route for Multiple CTCs



13.4 OSPF

Open Shortest Path First (OSPF) is a link state Internet routing protocol. Link state protocols use a "hello protocol" to monitor their links with adjacent routers and to test the status of their links to their neighbors. Link state protocols advertise their directly connected networks and their active links. Each link state router captures the link state "advertisements" and puts them together to create a topology of the entire network or area. From this database, the router calculates a routing table by constructing a shortest path tree. Routes are continuously recalculated to capture ongoing topology changes.

13.4.1 Using OSPF

ONS 15454 nodes use the OSPF protocol in internal ONS 15454 networks for node discovery, circuit routing, and node management. You can enable OSPF on the ONS 15454 nodes so that the ONS 15454 topology is sent to OSPF routers on a LAN. Advertising the ONS 15454 network topology to LAN routers eliminates the need to manually enter static routes for ONS 15454 subnetworks. Figure 13-3 shows a network enabled for OSPF. Figure 13-4 on page 13-8 shows the same network without OSPF. Static routes must be manually added to the router in order for CTC computers on LAN A to communicate with ONS 15454 #2 and #3 because these nodes reside on different subnets.

OSPF divides networks into smaller regions, called areas. An area is a collection of networked end systems, routers, and transmission facilities organized by traffic patterns. Each OSPF area has a unique ID number, known as the area ID, that can range from 0 to 4,294,967,295. Every OSPF network has one backbone area called area 0. All other OSPF areas must connect to area 0.

When you enable ONS 15454 OSPF topology for advertising to an OSPF network, you must assign an OSPF area ID to the ONS 15454 network. Coordinate the area ID number assignment with your LAN administrator. In general, all DCC-connected ONS 15454 nodes are assigned the same OSPF area ID.

Figure 13-3 OSPF Enabled

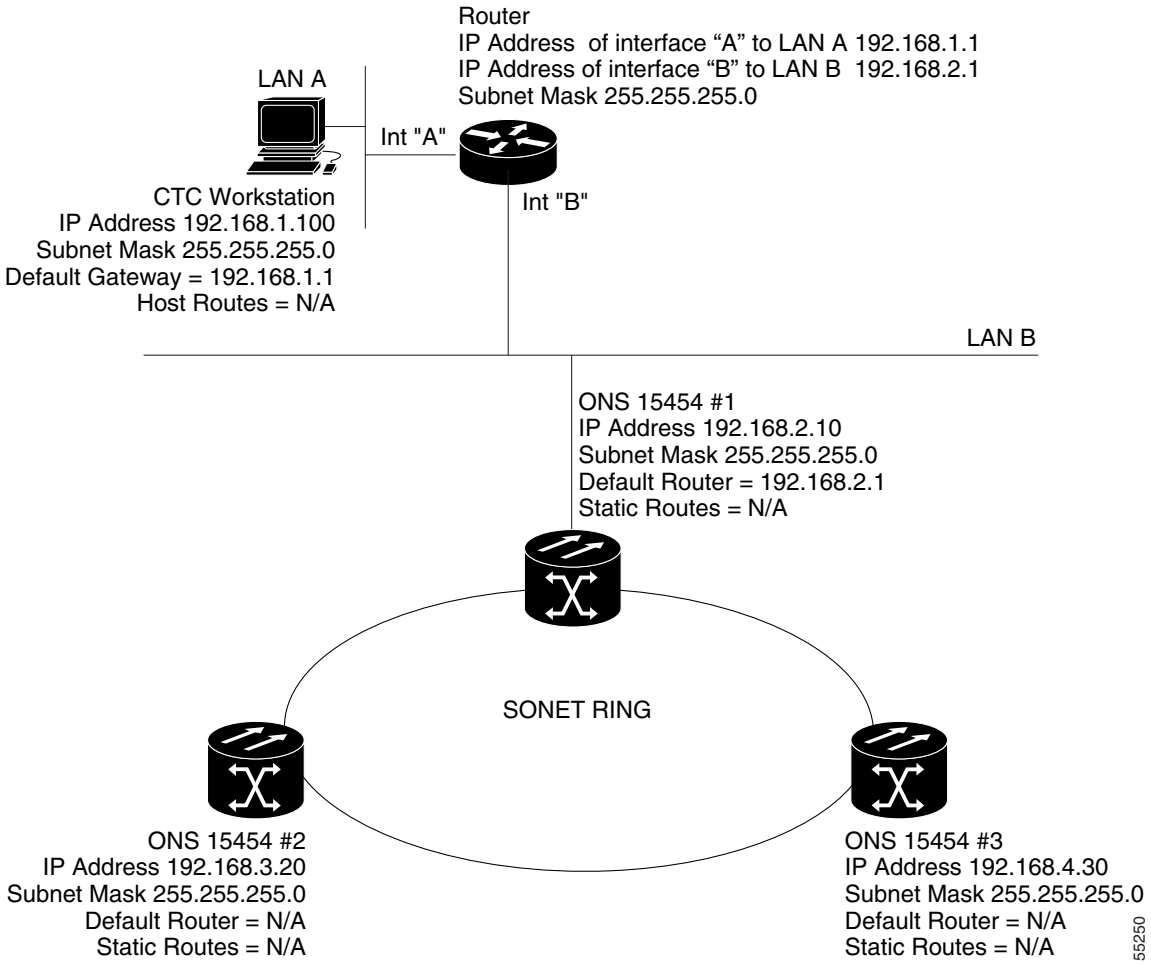
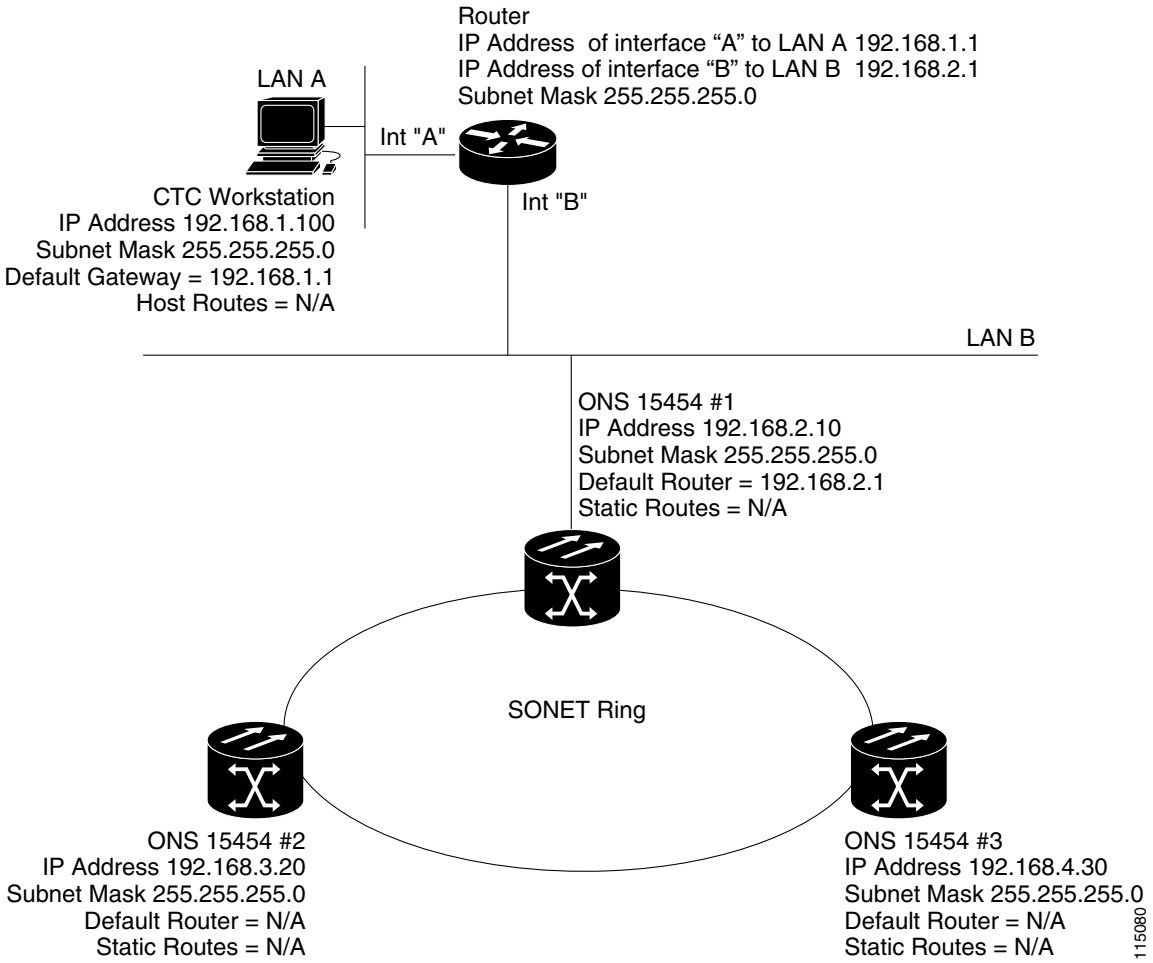


Figure 13-4 OSPF Not Enabled



13.4.2 Setting Up OSPF

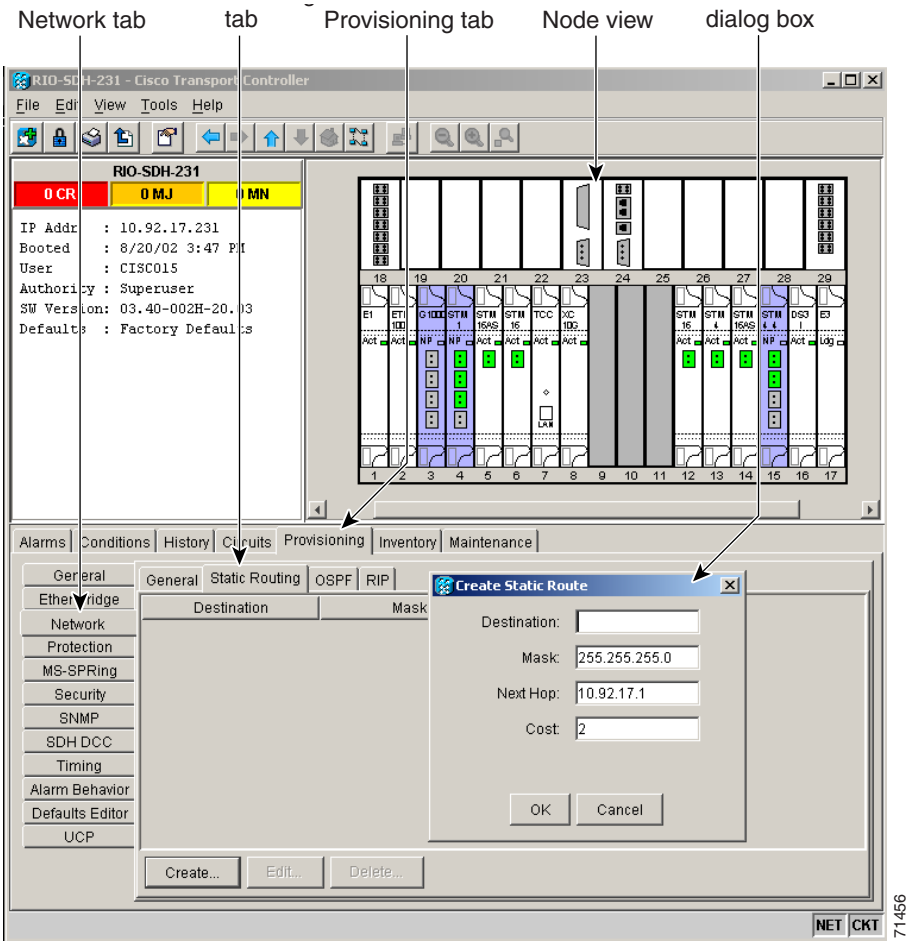
Use the following procedure to enable OSPF on each ONS 15454 node that you want included in the OSPF network topology.

ONS 15454 OSPF settings must match the router OSPF settings, so you must get the OSPF area ID, Hello and Dead intervals, and authentication key (if OSPF authentication is enabled) from the router to which the ONS 15454 network is connected before enabling OSPF.

Step 1 Start CTC for an ONS 15454 node.

Step 2 In node view, choose the **Provisioning** > **Network** > **OSPF** tabs. The OSPF pane has several options (Figure 13-5).

Figure 13-5 Enabling OSPF on the ONS 15454 SONET



Step 3 Complete the following:

- DCC OSPF Area ID—Click the area ID next to the slot and port field. Enter the number that identifies the ONS 15454 nodes as a unique OSPF area. The OSPF area number can be an integer between 0 and 4294967295, and it can take a form similar to an IP address. The number must be unique to the LAN OSPF area.
- DCC Metric—This value is normally unchanged. It sets a cost for sending packets across the DCC, which is used by OSPF routers to calculate the shortest path. This value should always be higher than the LAN metric. The default DCC metric is 100.

Step 4 In the OSPF on LAN area, complete the following:

- OSPF active on LAN—When checked, enables ONS 15454 OSPF topology to be advertised to OSPF routers on the LAN. Enable this field on ONS 15454 nodes that directly connect to OSPF routers.
- LAN Port Area ID—Enter the OSPF area ID for the router port where the ONS 15454 is connected. (This number is different from the DCC area ID.)

Step 5 In the **Authentication** Type area, click the button that says **No Authentication** or **Simple Password** and complete the following:

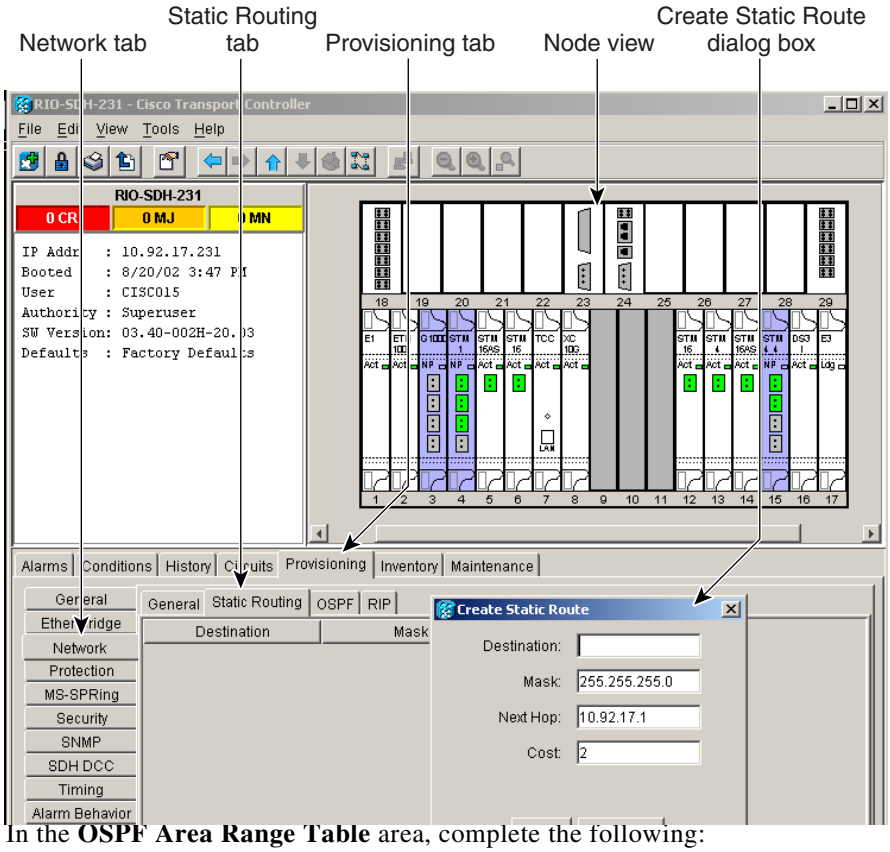
- Authentication Type—Use the menu to select **Simple Password** or **No Authentication**. (The button name depends on the options selected.) If the router where the ONS 15454 is connected uses authentication, choose **Simple Password**. Otherwise, choose **No Authentication**.
- Enter Authentication Key—If authentication is enabled, enter the OSPF key (password).
- Confirm Authentication Key—Enter the OSPF key again for confirmation purposes.

Step 6 Complete the following (Figure 13-6):

Note The OSPF priority and intervals default to values most commonly used by OSPF routers. In the Priority and Intervals area, verify that these values match those used by the OSPF router where the ONS 15454 is connected.

- Router Priority—Select the designated router for a subnet.
- Hello Interval (sec)—Set the number of seconds between OSPF hello packet advertisements sent by OSPF routers. Ten seconds is the default.
- Dead Interval—Set the number of seconds that will pass while an OSPF router's packets are not visible before its neighbors declare the router down. Forty seconds is the default.
- Transit Delay (sec)—Indicate the service speed. One second is the default.
- Retransmit Interval (sec)—Set the time that will elapse before a packet is resent. Five seconds is the default.
- LAN Metric—Set a cost for sending packets across the LAN. This value should always be lower than the DCC metric. Ten is the default.

Figure 13-6 OSPF Area Range Table and Virtual Link Table



Step 7 In the **OSPF Area Range Table** area, complete the following:

Note Area range tables consolidate the information that is propagated outside an OSPF Area border. One ONS 15454 in the ONS 15454 OSPF area is connected to the OSPF router. An area range table on this node points the router to the other nodes that reside within the ONS 15454 OSPF area.

a. Under OSPF Area Range Table, click **Create**.

b. In the Create Area Range dialog box, enter the following:

- Range Address—Enter the area IP address for the ONS 15454 nodes that reside within the OSPF area. For example, if the ONS 15454 OSPF area includes nodes with IP addresses 10.10.20.100, 10.10.30.150, 10.10.40.200, and 10.10.50.250, the range address would be 10.10.0.0.
- Range Area ID—Enter the OSPF area ID for the ONS 15454 nodes. This is either the ID in the DCC OSPF area ID field or the ID in the area ID for LAN Port field.
- Mask Length—Enter the subnet mask length. In the Range Address example, this is 16.
- Mask—Displays the subnet mask used to reach the destination host or network.
- Advertise—Check if you want to advertise the OSPF range table.

c. Click **OK**.

Step 8 All OSPF areas must be connected to area 0. If the ONS 15454 OSPF area is not physically connected to area 0, use the following steps to create a virtual link table that will provide the disconnected area with a logical path to area 0:

a. Under OSPF Virtual Link Table, click **Create**.

b. In the Create Virtual Link dialog box, complete the following fields. (The OSPF settings must match OSPF settings for the ONS 15454 OSPF area.)

- Neighbor—Enter the router ID of the area 0 router.
- Transit Delay (sec)—The service speed. One second is the default.
- Retransmit Int (sec)—Sets the time that will elapse before a packet is resent. Five seconds is the default.
- Hello Int (sec)—The number of seconds between OSPF hello packet advertisements sent by OSPF routers. Ten seconds is the default.
- Dead Int (sec)—Sets the number of seconds that will pass while an OSPF router's packets are not visible before its neighbors declare the router down. Forty seconds is the default.
- Auth Type—If the router where the ONS 15454 is connected uses authentication, choose **Simple Password**. Otherwise, set it to **No Authentication**.

c. Click **OK**.

Step 9 After entering ONS 15454 OSPF area data, click **Apply**.

If you changed the area ID, the TCC cards will reset, one at a time.

13.5 Using Routing Information Protocol

The Routing Information Protocol (RIP) is widely used for routing traffic in the global Internet. RIP is an interior gateway protocol, which means that it performs routing within a single autonomous system. Exterior gateway protocols, such as the Border Gateway Protocol (BGP), perform routing between different autonomous systems.

RIP sends routing-update messages at regular intervals and when the network topology changes. When a router receives a routing update that includes changes to an entry, it updates its routing table to reflect the new route. The metric value for the path is increased by one, and the sender is indicated as the next hop. RIP routers maintain only the best route (the route with the lowest metric value) to a destination. After updating its routing table, the router immediately begins transmitting routing updates to inform other network routers of the change. These updates are sent independently of the regularly scheduled updates that RIP routers send. Use the following procedure to configure the ONS 15454 for RIP:

Step 1 Log into CTC.

Note You must create a static route to the router adjacent to the ONS 15454 in order for the ONS 15454 to send its routing information out to the network.

Step 2 Display the node view.

Step 3 Click the **Provisioning** > **Network** > **RIP** tabs.

Step 4 Check the **RIP Active** check box if you are activating RIP.

Step 5 Choose either **RIP Version 1** or **RIP Version 2** from the drop-down menu, depending on which version is supported in your network.

Step 6 Set the RIP metric. The RIP metric can be set to a number between 1 and 15 and represents the number of hops.

Step 7 Under **Authentication**, select the authentication type. If the router where the ONS 15454 is connected requires authentication, choose **Simple Password**. Otherwise, choose **No Authentication**. (default). You must click the **No Authentication** button to choose the Simple Password option.

13.6 Using the Proxy Server Features

The ONS 15454 proxy server is a set of functions that allows you to network ONS 15454 nodes in environments where visibility and accessibility between ONS 15454s and CTC computers must be restricted. For example, you can set up a network so that field technicians and network operation center (NOC) personnel can both access the same ONS 15454 nodes while preventing the field technicians from accessing the NOC LAN. To do this, one ONS 15454 is provisioned as a gateway NE (GNE) and the other ONS 15454 nodes are provisioned as element NEs (ENEs). The GNE ONS 15454 tunnels connections between CTC computers and ENE ONS 15454 nodes, providing management capability while preventing access for non-ONS 15454 management purposes.

The ONS 15454 proxy server performs the following tasks:

- Isolates DCC IP traffic from Ethernet (craft port) traffic and accepts packets based on filtering rules. The filtering rules (see Table 13-3 on page 13-16 and Table 13-4 on page 13-17) depend on whether the packet arrives at the ONS 15454 DCC interface or the TCC Ethernet interface.
- Monitors ARP request packets on its Ethernet port. If the ARP request is from an address that is not on the current subnet, the ONS 15454 creates an entry in its ARP table. The ARP entry allows the ONS 15454 to reply to an address over the local Ethernet so craft technicians can connect to ONS 15454 nodes without changing the IP addresses of their computers.
- Processes Simple Network Time Protocol/Network Time Protocol (SNTP/NTP) requests. Element ONS 15454 NEs can derive time of day from an SNTP/NTP LAN server through the GNE ONS 15454 SONET.
- Process SNMPv1 traps. The GNE ONS 15454 receives SNMPv1 traps from the ENE ONS 15454 nodes and forwards them to all provisioned SNMPv1 trap destinations.

The ONS 15454 proxy server is provisioned using the following three check boxes in the Provisioning > Network > General tab (see Figure 13-7 on page 13-14):

- Craft Access Only—When this option is enabled, the ONS 15454 neither installs nor advertises default or static routes. CTC computers can communicate with the ONS 15454 SONET, but they cannot communicate directly with any other DCC-connected ONS 15454 SONET.
- Enable Proxy—When this option is enabled, the ONS 15454 serves as a proxy for connections between CTC clients and ONS 15454 nodes that are DCC-connected to the proxy ONS 15454 SONET. The CTC client establishes connections to DCC-connected nodes through the proxy node. The CTC client can connect to nodes that it cannot directly reach from the host on which it runs. If Enable Proxy is off, the node does not establish proxy connections for any CTC clients, although any established proxy connections will continue until the CTC client exits.

- Enable Firewall—If this option is selected, the node prevents IP traffic from being routed between the DCC and the LAN port. The ONS 15454 can communicate with machines connected to the LAN port or connected through the DCC. However, the DCC-connected machines cannot communicate with the LAN-connected machines, and the LAN-connected machines cannot communicate with the DCC-connected machines. A CTC client using the LAN to connect to the firewall-enabled node can use the proxy capability to manage the DCC-connected nodes that would otherwise be unreachable. A CTC client connected to a DCC-connected node can only manage other DCC-connected nodes and the firewall itself.

Figure 13-7 Proxy Server Gateway Settings

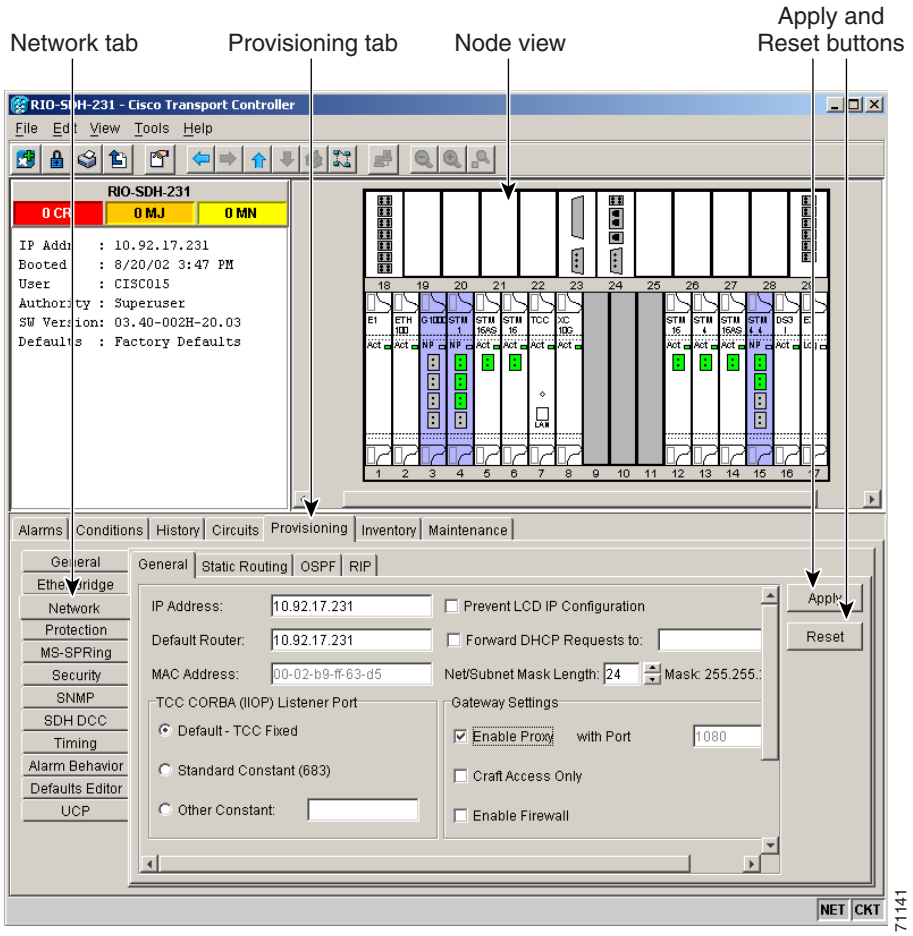


Figure 13-8 on page 13-15 shows an ONS 15454 proxy server implementation. A GNE ONS 15454 is connected to a central office LAN and to ENE ONS 15454 nodes. The central office LAN is connected to a NOC LAN, which has CTC computers. The NOC CTC computer and craft technicians must both be able to access the ONS 15454 ENEs. However, the craft technicians must be prevented from accessing or seeing the NOC or central office LANs.

In the example, the ONS 15454 GNE is assigned an IP address within the central office LAN and is physically connected to the LAN through its LAN port. ONS 15454 ENEs are assigned IP addresses that are outside the central office LAN and given private network IP addresses. If the ONS 15454 ENEs are colocated, the craft LAN ports could be connected to a hub. However, the hub should have no other network connections.

Figure 13-8 ONS 15454 Proxy Server with GNE and ENEs on the Same Subnet

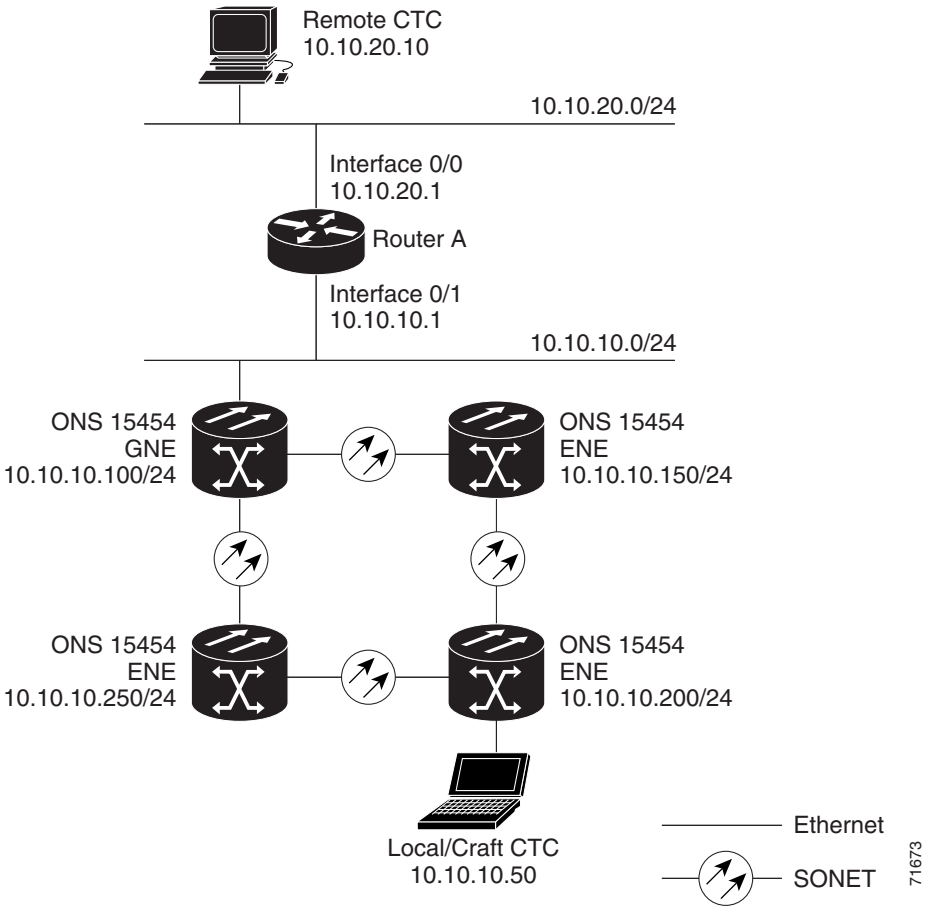


Table 13-2 shows recommended settings for ONS 15454 GNEs and ENEs in the configuration shown in Figure 13-8.

Table 13-2 ONS 15454 Gateway and Element NE Settings

Setting	ONS 15454 Gateway NE	ONS 15454 Element NE
Craft Access Only	Off	On
Enable Proxy	On	On
Enable Firewall	On	On
OSPF	Off	Off
SNTP Server (if used)	SNTP server IP address	ONS 15454 GNE IP address
SNMP (if used)	SNMPv1 trap destinations	Set SNMPv1 trap destinations to ONS 15454 GNE

Figure 13-9 on page 13-16 shows the implementation with ONS 15454 ENEs in multiple rings. In each example, ONS 15454 GNEs and ENEs are provisioned with the settings shown in Table 13-2.

Figure 13-9 ONS 15454 Proxy Server with ENEs on Multiple Rings

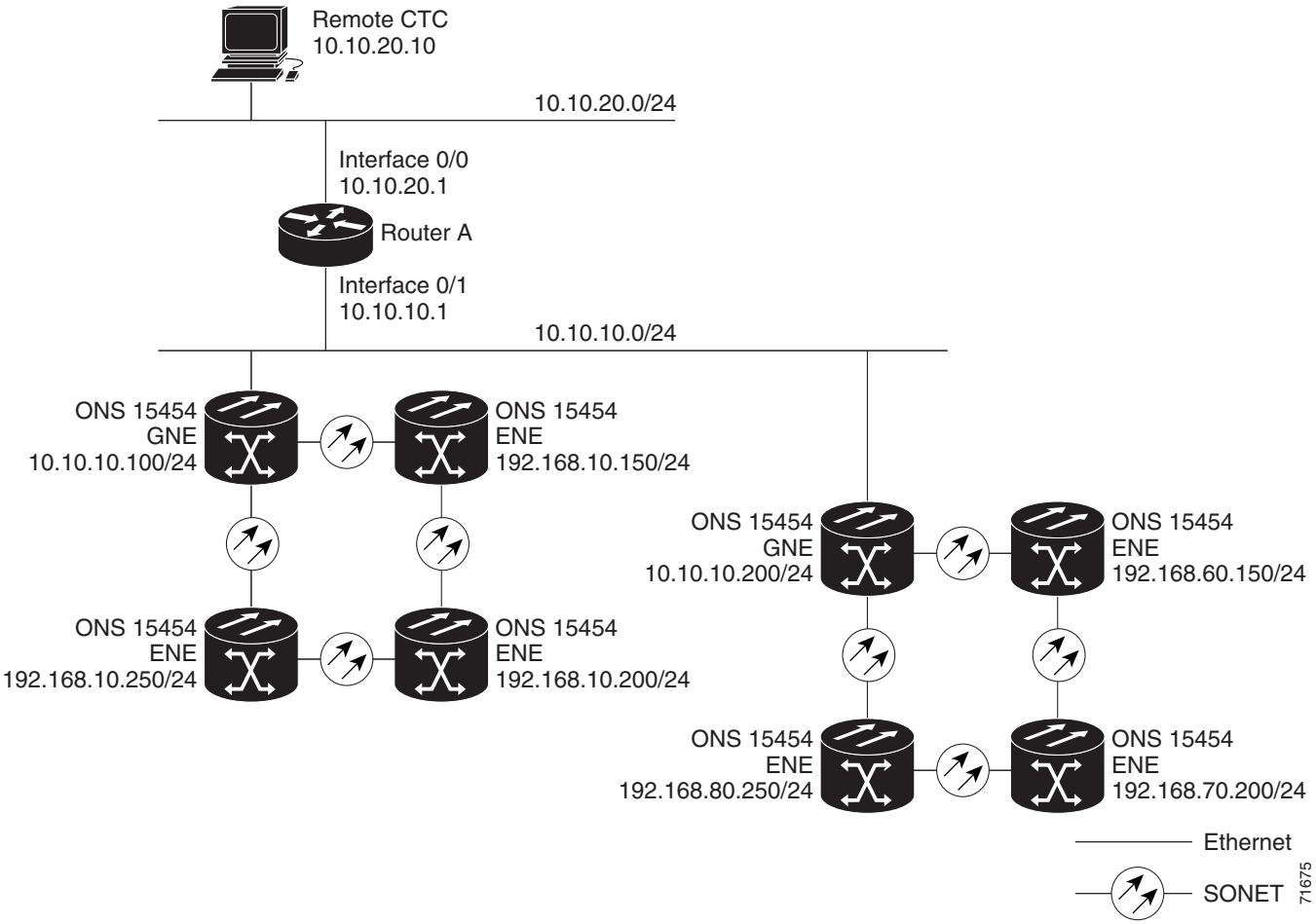


Table 13-3 shows the rules the ONS 15454 follows to filter packets when Enable Firewall is enabled. If the packet is addressed to the ONS 15454 SONET, additional rules, shown in Table 13-4 on page 13-17, are applied. Rejected packets are silently discarded.

Table 13-3 Proxy Server Firewall Filtering Rules

Packets Arrive At	Accepted
TCC Ethernet interface	• The ONS 15454 itself • The ONS 15454 subnet broadcast address • Within the 224.0.0.0/8 network (reserved network used for standard multicast messages) • 255.255.255.255
DCC interface	• The ONS 15454 itself • An OSPF peer (another DCC-connected ONS 15454 SONET) • Within the 224.0.0.0/8 network

Table 13-4 Proxy Server Firewall Filtering Rules When Packet Addressed to ONS 15454 SONET

Packets Arrive At	Accepted	Rejected
TCC Ethernet interface	• All UDP packets except those in the Rejected column	• UDP packets addressed to the SNMP trap relay port (391)
DCC interface	• All UDP packets • All TCP packets except those in the Rejected column • OSPF packets • Internet Control Message Protocol (ICMP) packets	• TCP packets addressed to the Telnet port • TCP packets addressed to the input/output (IO) card Telnet ports • TCP packets addressed to the proxy server port • All other packets

If you implement the proxy server, keep the following rules in mind:

1. All DCC-connected ONS 15454 nodes on the same Ethernet segment must have the same Craft Access Only setting. Mixed values produce unpredictable results, and might leave some nodes unreachable through the shared Ethernet segment.
2. All DCC-connected ONS 15454 nodes on the same Ethernet segment must have the same Enable Firewall setting. Mixed values produce unpredictable results. Some nodes might become unreachable.
3. All DCC-connected ONS 15454 nodes in the same SDCC area must have the same Enable Firewall setting. Mixed values produce unpredictable results. Some nodes might become unreachable.
4. If you check Enable Firewall, always check Enable Proxy. If Enable Proxy is not checked, CTC is not able to see nodes on the DCC side of the ONS 15454 SONET.
5. If Craft Access Only is checked, check Enable Proxy. If Enable Proxy is not checked, CTC is not able to see nodes on the DCC side of the ONS 15454 SONET.

If nodes become unreachable in cases 1 and 2, you can correct the setting by performing one of the following:

- Disconnect the craft computer from the unreachable ONS 15454 SONET. Connect to the ONS 15454 through another ONS 15454 in the network that has a DCC connection to the unreachable ONS 15454 SONET.
- Disconnect the Ethernet cable from the unreachable ONS 15454 SONET. Connect a CTC computer directly to the ONS 15454 SONET.

13.7 Viewing the ONS 15454 Routing Table

ONS 15454 routing information is displayed on the **Maintenance > Routing Table** tabs (Figure 13-10). The routing table provides the following information:

- Destination—Displays the IP address of the destination network or host.
- Mask—Displays the subnet mask used to reach the destination host or network.
- Gateway—Displays the IP address of the gateway used to reach the destination network or host.
- Usage—Shows the number of times this route has been used.
- Interface—Shows the ONS 15454 interface used to access the destination. Values are:

- cpm0—The ONS 15454 Ethernet interface, that is, the RJ-45 jack on the TCC and the LAN connectors on the MIC-C/T/P FMEC
- pdcc0—An SDCC interface, that is, an STM-N trunk card identified as the SDCC termination
- lo0—A loopback interface

Figure 13-10 Viewing the ONS 15454 Routing Table

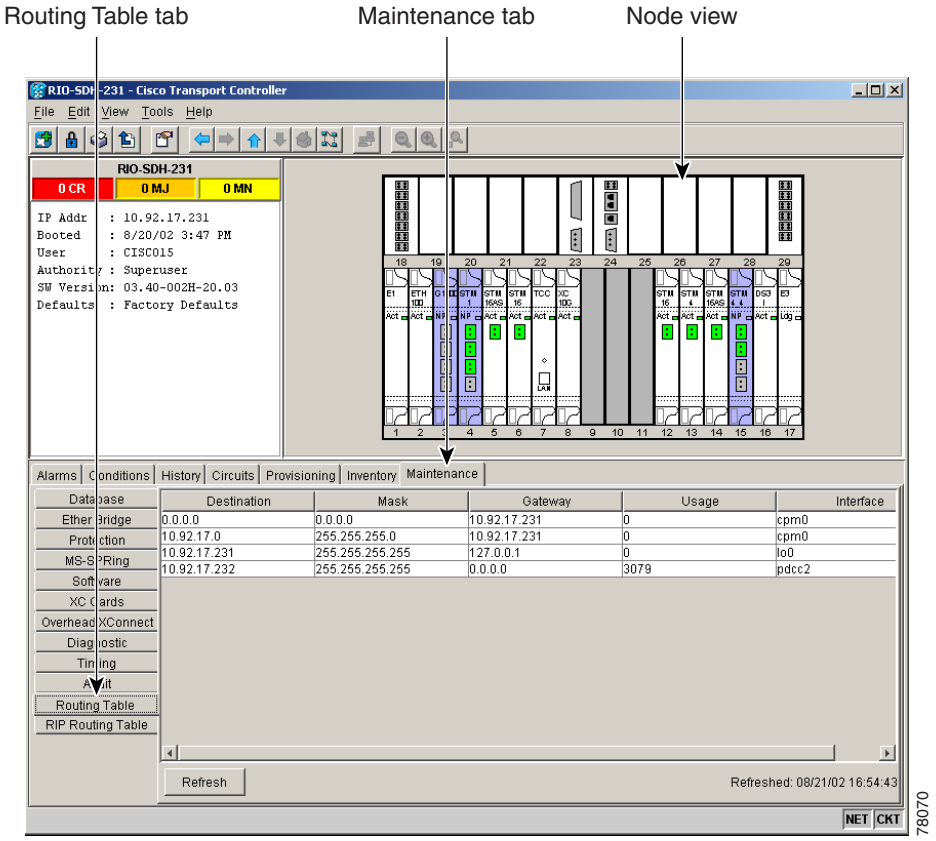


Table 13-5 shows sample routing entries for an ONS 15454 SONET.

Table 13-5 Sample Routing Table Entries

Entry	Destination	Mask	Gateway	Interface
1	0.0.0.0	0.0.0.0	172.20.214.1	cpm0
2	172.20.214.0	255.255.255.0	172.20.214.92	cpm0
3	172.20.214.92	255.255.255.255	127.0.0.1	lo0
4	172.20.214.93	255.255.255.255	0.0.0.0	pdcc0
5	172.20.214.94	255.255.255.255	172.20.214.93	pdcc0

Entry 1 shows the following:

- Destination (0.0.0.0) is the default route entry. All undefined destination network or host entries on this routing table will be mapped to the default route entry.

- Mask (0.0.0.0) is always 0 for the default route.
- Gateway (172.20.214.1) is the default gateway address. All outbound traffic that cannot be found in this routing table or is not on the node's local subnet will be sent to this gateway.
- Interface (cpm0) indicates that the ONS 15454 Ethernet interface is used to reach the gateway.

Entry 2 shows the following:

- Destination (172.20.214.0) is the destination network IP address.
- Mask (255.255.255.0) is a 24-bit mask, meaning that all addresses within the 172.20.214.0 subnet can be a destination.
- Gateway (172.20.214.92) is the gateway address. All outbound traffic belonging to this network is sent to this gateway.
- Interface (cpm0) indicates that the ONS 15454 Ethernet interface is used to reach the gateway.

Entry 3 shows the following:

- Destination (172.20.214.92) is the destination host IP address.
- Mask (255.255.255.255) is a 32-bit mask, meaning that only the 172.20.214.92 address is a destination.
- Gateway (127.0.0.1) is a loopback address. The host directs network traffic to itself using this address.
- Interface (lo0) indicates that the local loopback interface is used to reach the gateway.

Entry 4 shows the following:

- Destination (172.20.214.93) is the destination host IP address.
- Mask (255.255.255.255) is a 32-bit mask, meaning that only the 172.20.214.93 address is a destination.
- Gateway (0.0.0.0) means the destination host is directly attached to the node.
- Interface (pdcc0) indicates that an SDCC interface is used to reach the destination host.

Entry 5 shows a DCC-connected node that is accessible through a node that is not directly connected:

- Destination (172.20.214.94) is the destination host IP address.
- Mask (255.255.255.255) is a 32-bit mask, meaning only the 172.20.214.94 address is a destination.
- Gateway (172.20.214.93) indicates that the destination host is accessed through a node with IP address 172.20.214.93.
- Interface (pdcc0) indicates that an SDCC interface is used to reach the gateway.

Troubleshooting

This chapter contains troubleshooting information to help you to resolve situations that can occur during use of the ONS 15216 EDFA3. Sections in this chapter include:

- 14.1 LED Operation/Troubleshooting, page 14-1
- 14.2 Configuration File, page 14-3
- 14.3 Alarms, page 14-4
- 14.4 Back Up Log File, page 14-4
- 14.5 Upload the Configuration File Using TL1, page 14-5
- 14.6 No Optical Output from Amplifier, page 14-5
- 14.7 No TL1 Alarms Raised as Expected, page 14-6
- 14.8 TL1 Session Cannot be Established, page 14-6
- 14.9 SNMP User Session Cannot be Established, page 14-7
- 14.10 Recover the Default Password, page 14-7
- 14.11 Troubleshooting and Fault Clearing Procedures (Indexed by Alarm Message), page 14-8

14.1 LED Operation/Troubleshooting

The following material describes troubleshooting the ONS 15216 EDFA3 light-emitting diode (LED) display.

14.1.1 Power LED (Green)

The green power indicator LED on the front of the ONS 15216 EDFA3 illuminates constantly when both A and B electrical power feeds are connected and the voltage of each is within the acceptable range. The LED flashes if either of the two electrical power feeds is disconnected or if either feed is outside of the acceptable range.

If the green power indicator LED is flashing, complete the following procedure:

Step 1 Verify that both A and B electrical power feeds are connected to both the ONS 15216 EDFA3 and to a source of –48-VDC electrical power.

Step 2 If both electrical power feeds are connected to both the EDFA3 and to an electrical power source, complete one of the following:

- Use a voltmeter to measure the voltage between the power ("-48VDC") and ground ("return") contacts for both the A and B feeds.
- Issue the RTRV-EQPT command to read the voltage of Power Bus A and B. To verify, issue the RTRV-ALM-EQPT to see PWRBUSA and / or PWRBUSB alarms.

14.1.2 Fail LED (Red)

The red failure indicator LED on the front of the ONS 15216 EDFA3 illuminates if either the laser pump power or the bias current is out of range.

14.1.3 LOS (Loss of Signal) LED (Yellow)

The yellow loss of signal indicator LED on the front of the ONS 15216 EDFA3 illuminates when an optical loss of signal threshold is crossed. Verify loss of signal threshold values by logging into the EDFA3 and using the RTRV-TH-DWDM TL1 command.

Verify optical input power at the input (COM RX) port. If optical input power is below the threshold value, either the value of the threshold needs to be lowered (using the SET-TH-DWDM TL1 command) or the optical input power must be increased.

If optical input power is lower than expected, the cause could be any of the following:

- Dirty optical connectors
- Optical connectors not fully seated
- Worn/abused optical patch cords
- Poorly routed/pinched optical patch cords
- Excessive fiber span loss
- Excessive loss through other wavelength management devices (that is, multiplexer, OADM, etc.).

14.1.4 LED Sequence on Startup

When the ONS 15216 EDFA3 starts up, the following LED sequence occurs:

1. All LEDs illuminate, followed by a pause of approximately thirty seconds.
2. The green power indicator LED illuminates (the other LEDs are off), followed by a pause of approximately ten seconds.
3. All LEDs illuminate, followed by a pause of approximately twenty-five seconds.
4. The LEDs indicate the operational status of the ONS 15216 EDFA3 (for example, if there is a loss of signal, the yellow LOS LED will be illuminated).

14.2 Configuration File

Values in the configuration file are reset to manufacturer default values in the following cases:

- When a STA-LOCL-RST (reset equipment) command is issued by an administrative user
- When the administrative user deletes the configuration file
- When the configuration file is corrupted

Note When the configuration file is corrupted, an alarm DATAFLT is raised. As soon as a proper file has been loaded, the alarm is cleared. A checksum is performed on a replacement file to ensure that it is a valid file. The configuration file is in binary format.

The configuration file consists of two sections:

- Header (Example 14-1)
- configuration parameters (Example 14-2)

Example 14-1 Header Portion of the Configuration File

```
FileType=CISCO ONS 15216 EDFA3 Database File
Description=CISCO ONS 15216
ActiveSoftwareName=ONS 15216EDFA3-1.00.00-003L-12.23
NodeName=Monza
IP-Address=10.51.100.54
```

Example 14-2 Configuration Parameters Portion of the Configuration File

```
CTRLMODE
GAINSP
PWROFFSET
LINE1TXWRSP
LINE1TXWRTHFL
LINE1RXWRTHFL
LINE2RXWRTHFL
TILTSP
TILTOFFSET
OSRI
PWRBUSMODE
NAME
LONGITUDE
LATITUDE
DESCR
PWRBUSMIN
PWRBUSMAX
MAXCTMP
MINCTMP
```

When the configuration file is being backed up or restored, the ONS 15216 EDFA3 prevents any administrative operation that could change the current settings. To prevent attempts at making changes, a BACKUPREST alarm signals that the backup/restore operation is in progress and refuses all attempts to change settings. When the backup/restore is completed, the BACKUPREST alarm clears and configuration changes can be made.

14.3 Alarms

The following parameters are reported with an automatic alarm message:

- <almcde> indicates the severity of the automatic message. Table 14-1 reports the possible values.
- <date> indicates the date. The syntax is yyyy-mm-dd.
- <time> indicates the time. The syntax is hh-mm-ss.
- <ocrdat> Indicates the date (month-day) of the event occurrence. The format is MOY-DOM, where MOY stands for month of year and has a range of 1 to 12 and DOM stands for day of month and has a range of 1 to 31.
- <ocrtm> indicates the time (hour-minute-second) of the event occurrence. The format is HOD-MOH-SOM, where HOD stands for hour of day and has a range of 0 to 23, MOH stands for minute of hour and has a range of 0 to 59, and SOM stands for second of minute and has a range of 0 to 59.

Table 14-1 Alarm Code Descriptions

Alarm Code	Description
*C	Critical Alarm
**	Major Alarm
*^	Minor Alarm
A^	Automatic Message or No Alarm

Note The General Block, unless clearly specified, is not supported and will be denied with an INUP error code.

14.4 Back Up Log File

The following procedure describes how to back up the Log file. Either the TL1 or the SNMP log files can be copied locally as a backup.

Step 1 To start an FTP session, make sure that you have RWA permission and issue the following command:

```
> ftp server_ip_address
```

for example, type:

```
> ftp 100.110.120.100
```

where 100.110.120.100 is the IP address of the host.

Step 2 Type **lcd** command to change to the local path where the log file is located, as follows:

```
> lcd local path
```

Step 3 The **get** command downloads a single file. Type:

```
get log-file-name copy-file-name
```

where the *log-file-name* is the file that you want to retrieve and *copy-file-name* is the name for the copy of the log file on your file system. The **get** command copies the remote file from the remote server to the local machine.

The filenames of the TL1 log files are:

- aologA.txt
- aologB.txt

The filenames of the Simple Network Management Protocol (SNMP) log files are:

- snmpNotifyLogA
- snmpNotifyLogB

Step 4 Log off the FTP session by typing **quit** at the FTP command line. This command disconnects the user from the remote server and exits the FTP shell.

14.5 Upload the Configuration File Using TL1

To replace the current copy of the configuration file, upload the configuration file from the PC to the ONS 15216 EDFA3 using the following procedure:

Step 1 Use the **ACT-USER** command to login as an RWA user.

Step 2 Start an FTP session, and issue the following command:

```
> ftp userid password server_ip_address
```

Step 3 Issue the following command:

```
COPY-RFILE:[<aid>]:<ctag>:TYPE=RFR, SRC=
"ftp://<userid>:<password>@<ftphost-ipaddres>:21/<file-path>/ONS15216DataBase",
DEST="file://fd1/ONS15216DataBase",OVERWRITE=YES
```

For example, if the configuration file ONS15216DataBase is saved in <home directory>:/EDFA3, then you would issue the command:

```
COPY-RFILE::123:TYPE=RFR,SRC="ftp://<userid>:<password>@<ftphost-ipaddres>:21/EDFA3/ONS
15216DataBase", DEST="file://fd1/ONS15216DataBase",OVERWRITE=YES;
```

Step 4 If the configuration file has been corrupted, a DATAFLT alarm is generated. In this case, repeat Step 3 to download a correct configuration file. The DATAFLT alarm will be cleared.

Step 5 Issue the command:

```
INIT-SYS::eqpt:123::1;
```

Step 6 The EDFA3 restarts, using the new configuration file.

14.6 No Optical Output from Amplifier

If there is no optical output from the amplifier, complete the following procedure:

Step 1 Verify that neither the LOS LED nor the Fail LED is illuminated.

If the LOS LED is illuminated, that condition must first be corrected before the amplifier will turn on.

Step 2 Verify that there is an optical path between the DC TX and DC RX ports.

If there is no path, establish one using a Dispersion Compensation Unit (DCU) with an insertion loss value of between 3 and 9 dB or an optical patch cord with a 3- to 9-dB attenuator.

14.7 No TL1 Alarms Raised as Expected

If no TL1 alarms are raised as expected, there are three possible causes:

- Alarms are inhibited.
- Alarms are downgradeable to NA/NR severity.
- Alarm is screened by a root alarm.

Step 1 To resolve inhibited alarms:

a. Verify that a TL1 user session is active.

b. Verify that all alarms are allowed by issuing the ALW-MSG-ALL TL1 command.

c. Issue the RTRV-ALM-ALL command to poll the EDFA3 for all current alarms.

Step 2 To resolve alarms that are downgradeable to NA/NR severity, issue the RTRV-ATTR-ALL command to see if the alarm has been downgraded. Then, upgrade the alarm severity using one of the following steps:

- If the alarm is dense wavelength division multiplexing (DWDM)-related, issue the SET-ATTR-DWDM command.
- If the alarm is equipment-related, issue the SET-ATTR-EQPT command.

Step 3 If the alarm is screened by a root alarm, issue the RTRV-ALM-ALL command to poll the existing alarms.

14.8 TL1 Session Cannot be Established

If a TL1 session cannot be established, complete the following procedure:

Step 1 Verify that the EDFA3 has finished the booting process. User sessions cannot be established until the booting process is complete.

Step 2 If logging in locally through the craft (nine-pin EIA/TIA-232 [RS-232]) port on the EDFA3, verify that the connection between the computer and the EDFA3 is made with a straight-through cable.

Step 3 Verify that the terminal emulation software (for example, HyperTerminal) settings on the user computer are set as follows: 9600 bps, 8 data bits, no parity, 1 stop bit, and no flow control.

Step 4 Verify that the COM port selected by the terminal emulation software is the same one that is physically connected to the EDFA3.

Step 5 Proper connection can be verified by typing a semicolon. If the EDFA3 issues a response message, then connection has been properly established.

Step 6 If logging in remotely via the RJ-45 10/100 Ethernet port, first verify that network connectivity between the client (user) computer and the EDFA3 exists by issuing a ping command to the EDFA3's provisioned IP address.

Step 7 When using Telnet to establish a remote user session, ensure that port 3083 has been specified after the EDFA3's IP address ("Telnet 12.34.56.78 3083").

14.9 SNMP User Session Cannot be Established

If a SNMP user session cannot be established, complete the following procedure:

Step 1 Verify that the EDFA3 has finished the booting process. User sessions cannot be established until the booting process is complete.

Step 2 Verify that network connectivity between the client (user) computer and the EDFA3 exists by issuing a ping command to the EDFA3's provisioned IP address.

Step 3 Before an SNMP user session can be established, the IP address of the client (user) computer must first be entered into the EDFA3 as a trap destination by issuing the ENT-TRAPTABLE TL1 command.

Step 4 After the IP address for the SNMP client (user) computer has been entered, the MIBs for the EDFA3 must be present on that computer in order for an SNMP user session to be established.

14.10 Recover the Default Password

The following procedure can be used to reset the system password if it becomes corrupted or lost.

Note This procedure erases all the users from memory and adds the default CISCO15 user-name with a blank password.

Step 1 Connect to the EIA/TIA-232 (RS-232) port.

Step 2 Open HyperTerminal (see the "5.3 Communicating with the EDFA3 Through a Serial EIA/TIA-232 (RS-232) Interface" section on page 5-4 for further details on the configuration).

Step 3 Power off the EDFA3 and power it back on.

Step 4 While the dots are present in the HyperTerminal window during the reboot process, press the tilde (~) key on the keyboard. You must see the following:

```
...~.......
User Recovery
>
```

Step 5 When the prompt (>) appears, type the command **recover** (in lower case) and press the ENTER key. The EDFA3 must respond with the word 'Completed'.

```
...~.......
User Recovery
>recover
Completed
>
```

Step 6 Type the command **exit** (in lower case) and press the ENTER key to get to the TL1 prompt. The EDFA3 must respond with the word 'start…' followed by the normal warning message for TL1.

```
...~.......
User Recovery
>recover
Completed
>exit
start...
WARNING
This system is restricted to authorized users for business purposes.
Unauthorized access is a violation of the law. This service may be monitored
for administrative and security reasons. By proceeding, you consent to this
monitoring.

>
```

Note If you decide not to recover the password, type **exit** to get to the TL1 prompt.

14.11 Troubleshooting and Fault Clearing Procedures (Indexed by Alarm Message)

This section provides specific maintenance procedures to troubleshoot and clear faults based on the TL1 Autonomous message reported by the ONS 15216 EDFA3.

Alarms reported by the ONS 15216 EDFA3 utilize the TL1 messages REPT-ALM-EQPT and REPT-ALM-DWDM with the 'Condition Type' field indicating the specific fault.

These alarms are summarized in the table below.

Table 14-2 TL1 Autonomous Alarms

TL1 Autonomous Message	Condition Type (condtype)	Condition Descriptor (conddescr)	Access Identifier (aid)	Notification Code (ntfcncde)	Service Effect (sereff)
REPT ALM EQPT	PWRBUSA	Power Bus A Alarm	PWR-A	MN	NSA
REPT ALM EQPT	PWRBUSB	Power Bus B Alarm	PWR-B	MN	NSA
REPT ALM EQPT	MEMLOW	Free Memory on System Very Low	EQPT	MN	NSA
REPT ALM EQPT	FFSSLOW	Flash File System Capacity Very Low	EQPT	MN	NSA
REPT ALM EQPT	DATAFLT	Data Integrity Fault	EQPT	MJ	SA
REPT ALM EQPT	BACKUPREST	BackUp/Restore ConfFile In Progress	EQPT	MN	NSA
REPT ALM EQPT	SFTWDOWN	Software Download In Progress	EQPT	MN	NSA
REPT ALM EQPT	EQPT	Equipment Failure	EQPT	CR	SA
REPT ALM EQPT	COMFAIL	Module Communication Failure	EQPT	MN	NSA
REPT ALM EQPT	CTMP	Case Temperature Out Of Range	EQPT	MN	NSA
REPT ALM EQPT	FTMP	Fiber Temperature Out Of Range	EQPT	MN	NSA
REPT ALM EQPT	L1TMP	Excessive Pump 1 Temperature	EQPT	MN	NSA
REPT ALM EQPT	L1BIASD	Laser 1 Bias Degrade	EQPT	MN	NSA

Table 14-2 TL1 Autonomous Alarms (continued)

TL1 Autonomous Message	Condition Type (condtype)	Condition Descriptor (conddescr)	Access Identifier (aid)	Notification Code (ntfcncde)	Service Effect (sereff)
REPT ALM EQPT	L1BIASF	Laser 1 Bias Fail	EQPT	MJ	NSA
REPT ALM EQPT	L2TMP	Excessive Pump 2 Temperature	EQPT	MN	NSA
REPT ALM EQPT	L2BIASD	Laser 2 Bias Degrade	EQPT	MN	NSA
REPT ALM EQPT	L2BIASF	Laser 2 Bias Fail	EQPT	MJ	NSA
REPT ALM DWDM	LINE1RXPWRFL	Power Fail Low LINE1RX Port	1	CR	SA
REPT ALM DWDM	GAINDH	Gain Degrade High	1	MN	NSA
REPT ALM DWDM	GAINDL	Gain Degrade Low	1	MN	NSA
REPT ALM DWDM	LINE1TXPWRFL	Power Fail Low LINE1TX Port	1	CR	SA
REPT ALM DWDM	LINE1TXPWRDH	Power Degrade High LINE1TX Port	1	MN	NSA
REPT ALM DWDM	LINE1TXPWRDL	Power Degrade Low LINE1TX Port	1	MN	NSA
REPT ALM DWDM	LINE2RXPWRFL	Power Fail Low LINE2RX Port	1	CR	SA
REPT ALM DWDM	VOADH	VOA Degrade High	1	MN	NSA
REPT ALM DWDM	VOADL	VOA Degrade Low	1	MN	NSA
REPT ALM DWDM	VOAFH	VOA Fail High	1	CR	SA

For each of alarm CONDITION TYPES listed in the table above, the following sections provide specific maintenance procedures to troubleshoot and clear the fault indication.

14.11.1 PWRBUSA and PWRBUSB

The ONS15216 EDFA3 performs continuous monitoring on it's DC power source to insure that the input voltage remains within limits. The specific details of how this monitoring is performed depend on the POWER MODE for which the ONS 15216 has been configured.

As indicated in the installation section, the ONS 15216 EDFA3 can be configured for a single input power source from power bus A (**SIMPLEX** power mode) or redundant dual power inputs from both power bus A and power bus B (**DUPLEX** power mode).

In **SIMPLEX** power mode the system continuously monitors the DC input voltage on input power buss "A" and reports any faults (out-of-limits conditions) by generating the TL1 autonomous alarm message **REPT-ALM-EQPT** with the condition type field set to **PWRBUSA**.

In **DUPLEX** power mode, the system monitors buss "A" as noted above, and also continuously monitors the DC input voltage on power buss "B". Fault conditions on buss "B" are reported by generating the TL1 autonomous alarm message **REPT-ALM-EQPT** with the condition type field set to **PWRBUSB**.

In addition to the above autonomous messages, it is always possible to retrieve the current input power alarm state of the ONS 15216 EDFA3 by issuing the TL1 command **RTRV-ALM-EQPT:::123**; and noting the presence or absence of the **PWRBUSA** and **PWRBUSB** alarm conditions. This is useful to confirm that the alarm has been cleared when the problem is found.

The steps listed below can be used to trouble-shoot and clear a **PWRBUSA** or **PWRBUSB** fault indication.

Step (1) includes most common external power bus faults and the remaining steps cover less likely conditions which could also cause a **PWRBUSA** or **PWRBUSB** indication.

Warning **Voltages might be present on the DC-input power supply terminals. Turn off the power source circuit breaker and remove the power supply before accessing the terminals.**

Here is the step-by-step procedure to clear a PWRBUSA or PWRBUSB alarm:

Step 1 **Check input supply voltages**
Normally the presence of a **PWRBUSA** or **PWRBUSB** alarm indicates a fault on the associated external power buss.

Possible causes include:

- Blown External Fuse or Tripped Circuit Breaker in the power distribution feeding the EDFA3 (note that there are no user serviceable fuses in EDFA3 itself)
- Fault or failure in the external AC/DC -48 volt Power Supply
- Discharged or defective battery (where equipped with battery backup)
- Loose screw terminal connection or bad crimped connection at power input
- Chafed or damaged insulation has caused short circuit (often accompanied by a blown fuse, tripped circuit breaker, or over-current shutdown in the external power supply)

Step 2 **Check PWRBUSMODE setting**
It is possible to cause a false **PWRBUSB** power alarm if the PWRBUSMODE parameter has not been set correctly. If the power mode is set incorrectly to **DUPLEX**, when only ONE power supply source is connected to buss "A", then buss "B" will show a constant **PWRBUSB** alarm. To check this, retrieve the current setting of the power mode by issuing the TL1 command **RTRV-EQPT::ALL:123**; and note the value returned for **PWRBUSMODE**. This command will also return the voltage values being measured at power buss "A" and "B" input terminals as **POWERBUSAVAL**, and **POWERBUSBVAL**.

Step 3 **Check the input Power Buss Alarm Threshold set points**
Incorrect setting of the **PWRBUSMIN** or **PWRBUSMAX** alarm threshold set points could cause a false power alarm to be issued. To check for this, retrieve the current upper and lower voltage thresholds which the ONS 15216 EDFA3 is using to test for a DC input power alarm by issuing the TL1 command **RTRV-TH-EQPT::ALL:123**; Check that the values returned for **PWRBUSMIN**, and, **PWRBUSMAX** are reasonable. The actual input voltage can be retrieved by using the **RTRV-EQPT::ALL:123**; TL1 command. If the upper or lower limit values are set incorrectly too close to the normal input voltage, then false power alarms could be triggered. If this is the case, try returning to the default values of 40 for PWRBUSMIN and 57 for PWRBUSMAX using the **SET-TH-EQPT** TL1 command

Step 4 **Check for Alarm Circuit fault**
If all the above causes have been eliminated, it is possible that the internal voltage monitoring circuitry in the ONS 15216 EDFA3 has failed and is issuing a false alarm. To confirm this, compare the voltage values measured at the input power terminals with a known good external voltmeater with the values **POWERBUSAVAL** and **POWERBUSBVAL** retrieved using the **RTRV-EQPT::ALL:123** command in Step 2 above. The internal circuitry which performs voltage monitoring in the ONS 15216 EDFA3 is not field serviceable, so unit must be replaced if this is confirmed as the problem.

14.11.2 MEMLOW

This alarm condition indicates that the processor in the ONS 15216 EDFA3 has detected that it is low on MEMORY resources. Normally the system manages the allocation of memory automatically, so this condition indicates an abnormal condition has occurred in the software.

Here is the step-by-step procedure to clear the MEMLOW alarm condition.

Note As noted in step 2 below, you must log in to the ONS 15216 with full administrative privileges in order to issue the INIT-SYS TL1 command. In an emergency a reset can be forced by power cycling the ONS 15216 EDFA3, but this is service affecting and should not be considered unless service has already been lost due to a secondary failure believed to be related to the MEMLOW condition.

Step 1 Make a note of any unique operational conditions or command sequences that you think may have contributed to, or triggered, the **MEMLOW** memory fault condition (if known). This information should be reported to Cisco so that the root cause of the MEMLOW condition can be properly investigated.

Step 2 Open a TL1 session and log into the ONS 15216 EDFA3 as ADMIN.

Step 3 Attempt to perform a warm restart of the ONS 15216 EDFA3 by issuing the TL1 command INIT-SYS command with the following parameters:

INIT-SYS::EQPT:123::0;

This will reset and restart the ONS 15216 EDFA3 internal software using the current active code image (current default firmware version).

14.11.3 FFSSLOW

This alarm condition indicates that the internal Flash File System is nearly full. The Flash File System (FFS) fulfills the same role as the hard drive on a desktop PC by providing persistent storage that will retain data while the system is rebooted or power is cycled. Under normal conditions the system will not require user intervention to maintain the FFS because the internal logs, configuration data and code images that the system stores are budgeted at specific sizes that are well within the capacity of the FFS. The FFSSLOW condition can arise however when User operations using the CPY-MEM or COPY-RFILE write additional data to the FFS or an FTP operation transfers files to the FFS.

When the flash file system is full, commands which attempt to write data to the FFS will fail and issue a TL1 DENY response.

Caution DELETING THE WRONG FILES WILL LEAVE THE SYSTEM UNBOOTABLE.

DO NOT DELETE the main database file: ONS15216DataBase

DO NOT DELETE the boot image files. The boot image file names are based on the version of the software, but are of the general form:ONS15216Edfa3_01.00.00_003L_12.23 where the numbers to the right of the word 'Edfa3' identify the version information. DO NOT DELETE ANY FILE THAT RESEMBLES THIS FORM WITHOUT CONTACTING CUSTOMER SUPPORT FOR

CLARIFICATION.

If not ABSOLUTLY SURE, do not delete anything.

Here is the step-by-step procedure to clear the FFSSLOW alarm condition.

Step 1 Open a TL1 session and log into the ONS 15216 EDFA3 as ADMIN.

Step 2 Use the TL1 command **RTRV-RFILE:::123;** to retrieve a directory of the flash file system and identify the USER created files which need to be deleted to free up space.

Step 3 If desired, back up the files that are to be deleted to a PC host or other server via FTP using the TL1 command **COPY-RFILE** with the copy TYPE set to **RFBU** and the destination set to the FTP address of the host where the files are to be saved.

Step 4 Using the TL1 command **DLT-RFILE** to delete ONLY the unneeded USER created files.

14.11.4 DATAFLT

This alarm condition indicates that the main configuration file transferred by COPY-RFILE with RFR option has been corrupted. This is not immediately service affecting because the system will continue to use the current working copy of the system configuration data which is resident in memory until power cycled, or reset with the INIT-SYS TL1 command. The DATAFLT alarm will clear when a clean copy of the ONS15216DataBase file is transferred to the EDFA3.

Caution Do not power cycle the ONS15216 EDFA3 or reset the system using an INIT-SYS command while it is in a DATAFLT alarm condition, or the configuration parameters will reset to default values, which will shut down the laser and interrupt service..

Here is the step-by-step procedure to clear the DATAFLT alarm condition.

Step 1 Use the TL1 command **COPY-RFILE** with the **TYPE=RFR** option to transfer a clean copy of the **ONS15216DataBase** file by FTP to replace the corrupted file. The exact format for the COPY-RFILE command is dependant of the location of the backup file which will be copied to the ONS 15216 EDFA3. Specifics on the use of the **COPY-RFILE** command can be found in the TL1 Command Reference section of this manual.

Note If a clean backup copy of the ONS15216DataBase file is not available for transfer via the LAN using the COPY-RFILE command, the EDFA3 can be forced back to factory defaults by issuing an INIT-SYS TL1 command, but, as noted in the caution above, this will cause an interruption in service until proper settings are manually reentered using the TL-1 interface

14.11.5 BACKUPREST

This alarm condition indicates that the system is in the process of transferring the database file using FTP protocol. During this operation the database is locked and this alarm condition is raised to prevent the file from being accessed while it is being updated.

No action necessary, the alarm should clear on its own when the backup/restore operation is completed.

14.11.6 SFTWDOWN

This alarm condition indicates that the system is in the process of transferring the code image file using FTP protocol. During this operation the file is locked and this alarm condition is raised.

No action necessary, the alarm should clear on its own when the backup/restore operation is completed.

14.11.7 EQPT

This alarm condition indicates that a serious internal fault has occurred, such as a complete loss of communications on a critical internal communication buss.

Step 1 Attempt to clear this alarm by using an **INIT-SYS** command to reset the ONS 15216 EDFA3 software.

Step 2 Attempt to clear this alarm by power cycling the ONS 15216 EDFA3.

Step 3 If the above steps fail or if the alarm returns, replace the ONS 15216 EDFA3 with a spare and return the unit for service.

14.11.8 COMFAIL

This alarm condition indicates an intermittent loss of communications on the internal I2C communications buss that links the internal subassemblies in the ONS 15216 EDFA3. If this alarm persists, the ONS 15216 EDFA3 will issue the EQUP alarm described above.

The circuitry associated with internal I2C communications is not user serviceable. If this alarm persists, the ONS 15216 EDFA3 unit which exhibits the alarm must be replaced with a spare and returned for service.

14.11.9 CTMP, FTMP, L1TMP, L2TMP, L2BIASD, L2BIASF, L1BIASD, L1BIASF

These alarm conditions indicate that the main EDFA optical amplifier subassembly is operating under conditions of excessive temperature or excessive laser bias current. As the pump laser temperature rises, the laser current will also rise due to the physical properties of the laser, so these alarms can be caused by environmental factors (ambient temperature out of range) or by the natural degradation of laser performance near the end of the lasers useful operating lifetime.

- CTMP Case Temperature Out Of Range
- FTMP Fiber Temperature Out Of Range
- L1TMP Excessive Pump 1 Temperature
- L1BIASDLaser 1 Bias Degrade
- L1BIASFLaser 1 Bias Fail L2TMP
- L2TMPExcessive Pump 2 Temperature
- L2BIASDLaser 2 Bias Degrade
- L2BIASFLaser 2 Bias Fail

Step 1 Verify that the ambient temperature in the area where the ONS 15216 EDFA3 is mounted is not near the upper or lower limits of the specified temperature range of 32 to 122 degrees F (0 to 50 degrees C). Be sure to take into account local 'hot spots' created by mounting the equipment in a rack or cabinet in proximity with other equipment.

Step 2 Verify that excessive dust or other contamination has not built up on the front or rear heat sink assemblies.

Step 3 Verify that the ONS 15216 EDFA3 has been properly mounted in accordance with the ventilation and rack spacing requirements listed in the installation section of this manual and that cables or other objects are not obstructing ventilation to the front and rear heatsinks of the unit.

Step 4 If the above issues which can effect thermal performance check out ok, and the unit still shows any of the above alarm conditions indicating temperature or operating current above limits, then the pump lasers have degraded and the unit will need to be scheduled for replacement.

14.11.10 LINE1RXPWRFL

This alarm condition indicates that the optical power measured at the main input to the ONS 15216 EDFA3 has fallen below the lower failure threshold. This is a Critical Service Affecting alarm.

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**

To clear the **LINE1RXPWRFL** alarm indication, proceed with the following steps:

Step 1 Verify that the optical input level has fallen below the failure threshold by making an independent measurement at the input to the ONS 15216 EDFA3 using a wavelength selective optical power meter or an optical spectrum analyzer.

Step 2 If the optical input power is confirmed to be below the failure threshold, troubleshoot the upstream fiber path feeding the ONS 15216 EDFA3.

Step 3 If the input optical power is normal, clean the input side optical connectors and recheck the **LINE1RXpwr** level using the **RTRV-DWDM** TL1 command.

Step 4 If the power reported by the ONS 15216 EDFA3 using the **RTRV-DWDM** command still does not agree with the actual optical power measured at the input connector to the ONS 15216 EDFA3, then the ONS15216 EDFA3 has an internal fault and must be replaced.

14.11.11 GAINDH, GAINDL

In CONSTANT GAIN mode, these alarm conditions indicate that the closed loop feedback system that adjusts the EDFA gain is having problems meeting the required gain set point.

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**

To clear any of the above alarm indications proceed with the following steps:

Step 1 Verify that the input side optical signal is nominal using an optical spectrum analyzer or wavelength selective optical power meter (if the input optical signal is not normal correct the upstream fault).

Step 2 If the input optical signal levels are correct, clean the input side and DC port optical connectors

Step 3 If this alarm persists (with a normal optical input signal) after the optical port connectors have been cleaned, then the ONS15216 EDFA3 will have to be swapped for a spare and returned for service.

14.11.12 LINE1TXPWRFL, LINE1TXPWRDH, LINE1TXPWRDL

These alarm conditions indicate out of range optical power at the main optical output port.

- **LINE1TXPWRFL** Power Fail Low LINE1TX Port
- **LINE1TXPWRDH**Power Degrade High LINE1TX Port
- **LINE1TXPWRDL** Power Degrade Low LINE1TX Port

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**

To clear any of the above alarm indications proceed with the following steps:

Step 1 Verify that the input side optical signal is nominal using an optical spectrum analyzer or wavelength selective optical power meter (if the input optical signal is not normal correct the upstream fault).

Step 2 If the input optical signal levels are correct, clean the input side and DC port optical connectors

Step 3 If this alarm persists (with a normal optical input signal) after the optical port connectors have been cleaned, then the ONS15216 EDFA3 will have to be swapped for a spare and returned for service.

14.11.13 LINE2RXPWRFL

The ONS 15216 EDFA3 has an optical input and output port midway between the amplifier stages. This allows a Dispersion Compensation (DC) unit to be inserted into the gain path midway between the two amplifier stages where it can provide optimal performance. This alarm condition indicates that the optical power returning to the EDFA3 from the intermediate Dispersion Compensation port is below the failure threshold. This alarm can be caused by a fault in the external DC unit or bypass attenuator cable.

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**

To clear the **LINE2RXPWRFL** alarm indication proceed with the following steps:

Step 1 Verify that the input side optical signal is nominal using an optical spectrum analyzer or wavelength selective optical power meter (if the input optical signal is not normal correct the upstream fault).

Step 2 If the input optical signal levels are correct, clean the input side and DC port optical connectors

Step 3 Measure input and output optical levels for the optical components in the DC loop between DCTX and DCRX and verify that the insertion loss of the DC unit or bypass attenuator is correct.

Step 4 If this alarm persists (with a normal optical input signal) after the optical port connectors have been cleaned, then the ONS15216 EDFA3 will have to be swapped for a spare and returned for service.

14.11.14 VOADH, VOADL, VOAFH

These alarm conditions indicate that the internal electrically adjustable Variable Optical Attenuator (VOA) is not able to achieve the required attenuation set point. The VOA is used along with adjustable pump laser power to optimize gain, tilt, and noise in the EDFA3. The system measures the input and output side optical signal levels of the VOA to confirm proper operation.

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**

To clear **VOADH**, **VOADL**, or **VOAFH** alarm indications proceed with the following steps:

Step 1 Verify that the input side optical signal is nominal using an optical spectrum analyzer or wavelength selective optical power meter (if the input optical signal is not normal correct the upstream fault).

Step 2 If the input optical signal levels are correct, clean the input side and DC port optical connectors

Step 3 Measure input and output optical levels for the optical components in the DC loop between DCTX and DCRX and verify that the insertion loss of the DC unit or bypass attenuator is correct.

Step 4 If this alarm persists (with a normal optical input signal) after the optical port connectors have been cleaned, then the ONS15216 EDFA3 will have to be swapped for a spare and returned for service.

Regulatory Compliance and Safety Information

A.1 Regulatory Compliance

Table A-1 lists the regulatory compliance standards with which the ONS 15216 EDFA3 complies.

Table A-1 Regulatory Standards Compliance

Discipline	Standard	Description
EMC	ETS 300 132-2: 1996A.2.26 VCCI Compliance for Class A Equipment, page A-27	Power supply interface at the input to telecommunications equipment; Part 2: Operated by direct current (DC)
	ACA AS/NZS3548	Conducted Emissions - Class A Radiated Emissions - Class A
	EN 300 386-2:1997 EN 55022: 1995 Amendments A1 and A2 EN 50082-2:1997 EN 61000-4-2:1995 EN 61000-4-3: 1997 ENV 50204: 1996 EN 61000-4-4: 1995 EN 61000-4-5: 1995 EN 61000-4-6: 1996	
	FCC Title 47 of the CFR, Part 15, Subpart A for a Class A Digital Device	Electromagnetic Compatibility - Radiated Emissions for a Class A Digital Device
	NEBS GR-1089-CORE Issue 2, December 1997, with Revision 1, February 1999 Sections 2 and 3	Conducted Emissions Requirement Radiated Emissions Requirement
	VCCI V-1/93.11, V-2/97.04, V-4/97, R-1225 and C-1287	VCCI Class A ITE, Radiated Emissions

Table A-1 Regulatory Standards Compliance (continued)

Discipline	Standard	Description
Safety	IEC 60950 EN 60950 UL 60950 CSA-C22.2 No. 60950 TS 001 AS/NZS 3260	
Environmental	ETS 300 019-2-1	Storage Temperature Test
	ETS 300 019-2-2	Transportation Test
	ETS 300 019-2-3	Operation Test
	ETS 300 019-2-4 pr A1	Waveform Test - Zone 4 Profile
	Telcordia GR-63-CORE, Issue 1, October 1995 Section 5.1, 5.4 and 5.5	
Telecom	Telcordia NEBS GR-1089-CORE Issue 2, December 1997 with Revision 1, February 1999 Type 2 Equipment	Sections 4.2, 4.5, 4.6, 5.2, 5.3, 5.4, 6.0, 7.2, 7.3, 7.4, 7.5, 7.6, 8.1, 8.2, 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 9.8, 9.10
	Network Equipment Development Standards (NEDS) MLID #9069, September 28, 2001, Version 3.1.1	

A.2 Translated Safety Warnings

This appendix contains the translated warnings that are required for this publication. These warnings are required to comply with the regulatory agency requirements of several countries.

The translated safety warnings are listed in the following order:

1. English
2. Dutch
3. Finnish
4. French
5. German
6. Italian
7. Norwegian
8. Portuguese
9. Spanish
10. Swedish
11. Chinese (not all warnings translated)
12. Japanese (not all warnings translated)

13. Korean (not all warnings translated)

The safety warnings contained in this document are:

- A.2.1 Warning Definition, page A-4
- A.2.2 DC Power Supply Warning, page A-6
- A.2.3 Installation Warning, page A-7
- A.2.4 Power Cord Warning, page A-7
- A.2.5 No On/Off Switch Warning, page A-8
- A.2.6 SELV Circuit Warning, page A-9
- A.2.7 Laser Radiation Warning, page A-10
- A.2.8 Laser Beam Warning, page A-11
- A.2.9 Power Cabling Warning, page A-12
- A.2.10 Grounded Equipment Warning, page A-12
- A.2.11 Ground Connection Warning, page A-13
- A.2.12 Jewelry Removal Warning, page A-14
- A.2.13 Qualified Personnel Warning, page A-15
- A.2.14 Supply Circuit Warning, page A-16
- A.2.16 Invisible Laser Radiation Warning, page A-18
- A.2.17 Incorrect Connection Warning, page A-19
- A.2.18 Ground Conductor Warning, page A-19
- A.2.19 Voltages on DC-input Power Supply Terminals, page A-20
- A.2.20 More Than One Power Supply, page A-21
- A.2.21 Cisco ONS 15216 EDFA3 Rack Installation, page A-22
- A.2.22 Exposed DC Power Wire Warning, page A-23
- A.2.23 48 VDC Power System, page A-24
- A.2.24 Chassis Power Connection, page A-25
- A.2.25 Cisco ONS 15216 EDFA3 Temperature Requirement, page A-26
- A.2.26 VCCI Compliance for Class A Equipment, page A-27
- A.2.27 SELV-IEC 60950 DC Power Supply Warning, page A-27
- A.2.28 Cisco ONS 15216 EDFA3 Power Circuit Overload Warning, page A-28
- A.2.29 Product Disposal Warning, page A-29
- A.2.30 Energy Hazard, page A-30
- A.2.31 Unit Grounding Protection Warning, page A-31
- A.2.32 DC Power Disconnection Warning, page A-32
- A.2.33 Ground Wire Warning, page A-33
- A.2.34 Declaration of Conformity with Regard to the Directives 73/23/EEC and 89/336/EEC as amended by Directive 93/68/EEC, page A-34
- A.2.35 Declaration of Conformity to R&TTE Directive 1999/5/EEC for the European Community, Switzerland, Norway, Iceland, and Liechtenstein, page A-35

- A.2.36 Class A EMC Warning, page A-36
- A.2.37 Safety Requirements Warning, page A-36
- A.2.38 Laser Radiation Warning, page A-37
- A.2.39 Fiber Disconnect Sequence Warning, page A-38
- A.2.40 Optical Connector Warning, page A-39
- A.2.41 Optical Connector Disconnect Warning, page A-39
- A.2.42 Eye Damage Warning, page A-40
- A.2.43 Static Electricity Warning, page A-41
- A.2.44 Connector Cleaning Warning, page A-42
- A.2.45 Cable Connection Sequence Warning, page A-43
- A.2.46 Module Removal Warning, page A-44
- A.2.47 DC Power SELV Requirement Warning, page A-45
- A.2.48 Reinforced Insulation Warning, page A-46
- A.2.49 Power Supply Voltage Warning, page A-47
- A.2.50 DC Power Supply Connection Warning, page A-48

A.2.1 Warning Definition

Warning **This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.**

Waarschuwing **Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.**

Varoitus **Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).**

Attention **Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document *Regulatory Compliance and Safety Information* (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.**

Warnung **Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument *Regulatory Compliance and Safety Information* (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.**

Avvertenza **Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento *Regulatory Compliance and Safety Information* (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.**

Advarsel **Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du vare oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet *Regulatory Compliance and Safety Information* (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.**

Aviso **Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento *Regulatory Compliance and Safety Information* (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.**

¡Advertencia! **Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado *Regulatory Compliance and Safety Information* (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.**

Varning! **Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förkommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.**

A.2.2 DC Power Supply Warning

Warning When stranded wiring is required, use approved wiring terminations, such as closed-loop or spade-type with upturned lugs. These terminations should be the appropriate size for the wires and should clamp both the insulation and conductor.

Waarschuwing Wanneer geslagen bedrading vereist is, dient u bedrading te gebruiken die voorzien is van goedgekeurde aansluitingspunten, zoals het gesloten-lus type of het grijperschop type waarbij de aansluitpunten omhoog wijzen. Deze aansluitpunten dienen de juiste maat voor de draden te hebben en dienen zowel de isolatie als de geleider vast te klemmen.

Varoitus Jos säikeellinen johdin on tarpeen, käytä hyväksyttyä johdinliitäntää, esimerkiksi suljettua silmukkaa tai kourumaista liitäntää, jossa on ylöspäin käännetyt kiinnityskorvat. Tällaisten liitäntöjen tulee olla kooltaan johtimiin sopivia ja niiden tulee puristaa yhteen sekä eristeen että johdinosan.

Attention Quand des fils torsadés sont nécessaires, utiliser des douilles terminales homologuées telles que celles à circuit fermé ou du type à plage ouverte avec cosses rebroussées. Ces douilles terminales doivent être de la taille qui convient aux fils et doivent être refermées sur la gaine isolante et sur le conducteur.

Warnung Wenn Litzenverdrahtung erforderlich ist, sind zugelassene Verdrahtungsabschlüsse, z.B. für einen geschlossenen Regelkreis oder gabelförmig, mit nach oben gerichteten Kabelschuhen zu verwenden. Diese Abschlüsse sollten die angemessene Größe für die Drähte haben und sowohl die Isolierung als auch den Leiter festklemmen.

Avvertenza Quando occorre usare trecce, usare connettori omologati, come quelli a occhiello o a forcella con linguette rivolte verso l'alto. I connettori devono avere la misura adatta per il cablaggio e devono serrare sia l'isolante che il conduttore.

Advarsel Hvis det er nødvendig med flertrådede ledninger, brukes godkjente ledningsavslutninger, som for eksempel lukket sløyfe eller spadetype med oppoverbøyde kabelsko. Disse avslutningene skal ha riktig størrelse i forhold til ledningene, og skal klemme sammen både isolasjonen og lederen.

Aviso Quando forem requeridas montagens de instalação eléctrica de cabo torcido, use terminações de cabo aprovadas, tais como, terminações de cabo em circuito fechado e planas com terminais de orelha voltados para cima. Estas terminações de cabo deverão ser do tamanho apropriado para os respectivos cabos, e deverão prender simultaneamente o isolamento e o fio condutor.

¡Advertencia! Cuando se necesite hilo trenzado, utilizar terminales para cables homologados, tales como las de tipo "bucle cerrado" o "espada", con las lengüetas de conexión vueltas hacia arriba. Estos terminales deberán ser del tamaño apropiado para los cables que se utilicen, y tendrán que sujetar tanto el aislante como el conductor.

Varning! När flertrådiga ledningar krävs måste godkända ledningskontakter användas, t.ex. kabelsko av sluten eller öppen typ med uppåtvänd tapp. Storleken på dessa kontakter måste vara avpassad till ledningarna och måste kunna hålla både isoleringen och ledaren fastklämda.

A.2.3 Installation Warning

Warning **Read the installation instructions before you connect the system to its power source.**

Waarschuwing **Raadpleeg de installatie-aanwijzingen voordat u het systeem met de voeding verbindt.**

Varoitus **Lue asennusohjeet ennen järjestelmän yhdistämistä virtalähteeseen.**

Attention **Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.**

Warnung **Lesen Sie die Installationsanweisungen, bevor Sie das System an die Stromquelle anschließen.**

Avvertenza **Consultare le istruzioni di installazione prima di collegare il sistema all'alimentatore.**

Advarsel **Les installasjonsinstruksjonene før systemet kobles til strømkilden.**

Aviso **Leia as instruções de instalação antes de ligar o sistema à sua fonte de energia.**

¡Advertencia! **Ver las instrucciones de instalación antes de conectar el sistema a la red de alimentación.**

Varning! **Läs installationsanvisningarna innan du kopplar systemet till dess strömförsörjningsenhet.**

警告 システムを電源に接続する前に、インストレーションについての説明書を必ずお読みください。

A.2.4 Power Cord Warning

Warning **This unit might have more than one power cord. To reduce the risk of electric shock, disconnect the two power supply cords before servicing the unit.**

Waarschuwing **Dit toestel kan meer dan één netsnoer hebben. Om het risico van een elektrische schok te verminderen, dient u de stekkers van de twee netsnoeren uit het stopcontact te halen voordat u het toestel een servicebeurt geeft.**

Varoitus **Tässä laitteessa saattaa olla useampi kuin yksi virtajohto. Irrota molemmat virtalähteestä tulevat johtimet ennen laitteen huoltamista, jotta vältät sähköiskun vaaran.**

Attention **Il est possible que cette unité soit munie de plusieurs cordons d'alimentation. Pour éviter les risques d'électrocution, débrancher les deux cordons d'alimentation avant de réparer l'unité.**

Warnung **Diese Einheit hat möglicherweise mehr als ein Netzkabel. Zur Verringerung der Stromschlaggefahr trennen Sie beide Netzgerätekabel ab, bevor Sie die Einheit warten.**

Avvertenza **Questa unità potrebbe essere dotata di più di un cavo di alimentazione. Per ridurre il rischio di scossa elettrica, scollegare i due cavi di alimentazione prima di procedere alla manutenzione dell'unità.**

Advarsel **Denne enheten kan være utstyrt med mer enn én strømledning. Koble fra de to strømledningene før det utføres reparasjonsarbeid på enheten for å redusere faren for elektriske støt.**

Aviso **Esta unidade poderá ter mais do que um cabo de alimentação. Para reduzir o risco de choque eléctrico, desligue os dois cabos de alimentação antes de efectuar reparações na unidade.**

¡Advertencia! **Puede ser que este equipo posea más de un cable de alimentación. Para reducir el riesgo de descarga eléctrica, desenchufar los dos cables antes de proceder al mantenimiento de la unidad.**

Varning! **Denna enhet kan vara försedd med mer än en nätsladd. För att minska risken för elektriska stötar skall båda nätsladdarna dras ur innan du utför underhållsarbete på enheten.**

警告使用者 這台裝置可能有一條以上的電源線。為了減少觸電的危險，修理該裝置之前，請斷開兩條電源線。

警告 この装置には2本以上の電源コードが付いていることがあります。感電などの事故
防止のため、装置を扱う前に２本の電源コードを切り離してください。

주의 이 장치는 한 개 이상의 전력코드를 가진 것도 있습니다. 이 장치를 수리나 점검할 때는,감전을 방지하기 위해
사전에 두 개의 전원코드를 절연시키십시오.

A.2.5 No On/Off Switch Warning

Warning **Unplug the power cord before you work on a system that does not have an on/off switch.**

Waarschuwing **Voordat u aan een systeem werkt dat geen aan/uit schakelaar heeft, dient u de stekker van het netsnoer uit het stopcontact te halen.**

Varoitus **Ennen kuin teet mitään sellaiselle järjestelmälle, jossa ei ole kaksiasentokytkintä, kytke irti virtajohto.**

Attention **Avant de travailler sur un système non équipé d'un commutateur marche-arrêt, débrancher le cordon d'alimentation.**

Warnung **Bevor Sie an einem System ohne Ein/Aus-Schalter arbeiten, ziehen Sie das Netzkabel heraus.**

Avvertenza **Prima di lavorare su un sistema che non è dotato di un interruttore on/off, scollegare il cavo di alimentazione.**

Advarsel **Før det skal utføres arbeid på et system som ikke har en av/på-bryter, skal strømledningen trekkes ut.**

Aviso **Antes de começar a trabalhar num sistema que não possua um interruptor ON/OFF, desligue o cabo de alimentação.**

¡Advertencia! **Antes de trabajar sobre cualquier sistema que carezca de interruptor de Encendido/Apagado (ON/OFF), desenchufar el cable de alimentación.**

Varning! **Dra ur nätsladden innan du utför arbete på ett system utan strömbrytare.**

警告 オン/オフスイッチのない装置を扱う前には、必ず電源コードを抜いてください。

A.2.6 SELV Circuit Warning

Warning **The port labeled “Ethernet,” “10BaseT,” “Token Ring,” “Console,” and “AUX” are Safety Extra-Low Voltage (SELV) circuits. SELV circuits should only be connected to other SELV circuits. Because the BRI circuits are treated like telephone-network voltage, avoid connecting the SELV circuit to the telephone network voltage (TNV) circuits.**

Waarschuwing **De poorten die "Ethernet", "10BaseT", "Token Ring", "Console" en "AUX" zijn gelabeld, zijn veiligheidscircuits met extra lage spanning (genaamd SELV = Safety Extra-Low Voltage). SELV-circuits mogen alleen met andere SELV-circuits verbonden worden. Omdat de BRI-circuits op dezelfde manier als telefoonnetwerkspanning behandeld worden, mag u het SELV-circuit niet verbinden met de telefoonnetwerkspanning (TNV) circuits.**

Varoitus **Portit, joissa on nimet "Ethernet", "10BaseT", "Token Ring", "Console" ja "AUX", ovat erityisen pienen jännityksen omaavia turvallisuuspiirejä (SELV-piirejä). Tällaiset SELV-piirit tulee yhdistää ainoastaan muihin SELV-piireihin. Koska perusluokan liitäntöjen (Basic Rate Interface- eli BRI-liitännät) jännite vastaa puhelinverkoston jännitettä, vältä SELV-piirin yhdistämistä puhelinverkoston jännitepiireihin (TNV-piireihin).**

Attention **Les ports étiquetés « Ethernet », « 10BaseT », « Token Ring », « Console » et « AUX » sont des circuits de sécurité basse tension (Safety Extra-Low Voltage ou SELV). Les circuits SELV ne doivent être interconnectés qu'avec d'autres circuits SELV. Comme les circuits BRI sont considérés comme des sources de tension de réseau téléphonique, éviter de connecter un circuit SELV à un circuit de tension de réseau téléphonique (telephone network voltage ou TNV).**

Warnung **Die mit "Ethernet", "10BaseT", "Token Ring", "Console" und "AUX" beschrifteten Buchsen sind Sicherheitskreise mit Sicherheitskleinspannung (Safety Extra-Low Voltage, SELV). SELV-Kreise sollten ausschließlich an andere SELV-Kreise angeschlossen werden. Da die BRI-Kreise wie Telefonnetzspannungen behandelt werden, ist der SELV-Kreis nicht an Telefonnetzspannungskreise (TNV) anzuschließen.**

Avvertenza **Le porte contrassegnate da "Ethernet", "10BaseT", "TokenRing", "Console" e "AUX" sono circuiti di sicurezza con tensione molto bassa (SELV). I circuiti SELV devono essere collegati solo ad altri circuiti SELV. Dato che i circuiti BRI vengono trattati come tensioni di rete telefonica, evitare di collegare il circuito SELV ai circuiti in cui è presente le tensione di rete telefonica (TNV).**

Advarsel **Utgangene merket "Ethernet", "10BaseT", "Token Ring", "Console" og "AUX" er lavspentkretser (SELV) for ekstra sikkerhet. SELV-kretser skal kun kobles til andre SELV-kretser. Fordi BRI-kretsene håndteres som telenettspenning, unngå å koble SELV-kretsen til kretser for telenettspenning (TNV).**

Aviso **As portas "Ethernet", "10BaseT", "Token Ring", "Console", and "AUX" são circuitos de segurança de baixa tensão (SELV). Estes circuitos deverão ser apenas ligados a outros circuitos SELV. Devido ao facto de os circuitos BRI (Interface de Ritmo Básico) serem tratados como sendo de tensão equivalente à da rede telefónica, evite ligar o circuito SELV aos circuitos TNV (tensão de rede telefónica).**

¡Advertencia! **Los puertos "Ethernet", "10BaseT", "Token Ring", "Console" y "AUX" son circuitos de muy baja señal que garantizan ausencia de peligro (Safety Extra-Low Voltage = SELV). Estos circuitos SELV deben ser conectados exclusivamente con otros también de tipo SELV. Puesto que los circuitos tipo BRI se comportan como aquéllos con voltajes de red telefónica, debe evitarse conectar circuitos SELV con circuitos de voltaje de red telefónica (TNV).**

Varning! **De portar som är märkta "Ethernet", "10BaseT", "Token Ring", "Console" och "AUX" är SELV-kretsar, d.v.s. skyddskretsar med extra låg spänning (SELV: Safety Extra-Low Voltage = skyddsklenspänning). SELV-kretsar får endast anslutas till andra SELV-kretsar. Eftersom BRI-kretsar behandlas liksom telefonnätsspänning bör SELV-kretsen inte anslutas till telefonnätsspänningskretsar (TNV-kretsar).**

A.2.7 Laser Radiation Warning

Warning **Laser radiation is present when the system is open.**

Waarschuwing **Laserstraling is aanwezig wanneer het systeem open is.**

Varoitus **Lasersäteitä järjestelmän ollessa avoinna.**

Attention **Production d'un rayonnement laser en position ouverte.**

Warnung **Laserstrahlung in geöffnetem Zustand.**

Avvertenza **Emissione di radiazioni laser quando il sistema è aperto.**

Advarsel **Laserstråling er til stede når enheten er åpen.**

Aviso **Radiação laser presente quando aberto.**

¡Advertencia! **Radiación láser presente cuando el sistema está abierto.**

Varning! **Laserstrålning pågår när enheten är öppen.**

A.2.8 Laser Beam Warning

Warning **Do not stare into the beam or view it directly with optical instruments.**

Waarschuwing **Niet in de straal staren of hem rechtstreeks bekijken met optische instrumenten.**

Varoitus **Älä katso säteeseen äläkä tarkastele sitä suoraan optisen laitteen avulla.**

Attention **Ne pas fixer le faisceau des yeux, ni l'observer directement à l'aide d'instruments optiques.**

Warnung **Nicht direkt in den Strahl blicken und ihn nicht direkt mit optischen Geräten prüfen.**

Avvertenza **Non fissare il raggio con gli occhi né usare strumenti ottici per osservarlo direttamente.**

Advarsel **Stirr eller se ikke direkte på strålen med optiske instrumenter.**

Aviso **Não olhe fixamente para o raio, nem olhe para ele directamente com instrumentos ópticos.**

¡Advertencia! **No mirar fijamente el haz ni observarlo directamente con instrumentos ópticos.**

Varning! **Rikta inte blicken in mot strålen och titta inte direkt på den genom optiska instrument.**

警告 ビームを直視したり、レンズを通して覗き込むことは避けてください。

A.2.9 Power Cabling Warning

Warning Secure all power cabling when installing this unit to avoid disturbing field-wiring connections.

Waarschuwing Zet alle stroomkabels vast wanneer dit toestel wordt geïnstalleerd om te voorkomen dat de verbindingen van de veldbedrading worden verstoord.

Varoitus Kiinnitä kaikki voimakaapelit tiukkaan tätä laitetta asentaessasi, jotta vältät kentän johdinkytkentöjen vioittumista.

Attention Lors de l'installation de cet appareil, fixer tous les câbles d'alimentation pour éviter de provoquer des perturbations aux raccordements des câblages propres au site.

Warnung Bei der Installation dieser Einheit die Netzverkabelung befestigen, um die Störung von Feldkabelanschlüssen zu vermeiden.

Avvertenza In fase di installazione dell'unità, assicurare tutti i cablaggi di alimentazione per evitare di alterare i collegamenti degli avvolgimenti di campo.

Advarsel Når denne enheten installeres, må alle kraftledninger sikres for å unngå at feltkabelkoblingene forstyrres.

Aviso Para evitar problemas com as ligações de rede de campanha, prenda todos os cabos de corrente quando instalar esta unidade.

¡Advertencia! Sujetar todo el cableado de alimentación cuando se instale este equipo para evitar que se mezcle con las conexiones del cableado "in situ".

Varning! Fäst allt starkströmskablage vid installation av denna enhet så att fältkopplingen inte rubbas.

A.2.10 Grounded Equipment Warning

Warning This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.

Waarschuwing Deze apparatuur hoort geaard te worden Zorg dat de host-computer tijdens normaal gebruik met aarde is verbonden.

Varoitus Tämä laitteisto on tarkoitettu maadoitettavaksi. Varmista, että isäntälaite on yhdistetty maahan normaalikäytön aikana.

Attention **Cet équipement doit être relié à la terre. S'assurer que l'appareil hôte est relié à la terre lors de l'utilisation normale.**

Warnung **Dieses Gerät muß geerdet werden. Stellen Sie sicher, daß das Host-Gerät während des normalen Betriebs an Erde gelegt ist.**

Avvertenza **Questa apparecchiatura deve essere collegata a massa. Accertarsi che il dispositivo host sia collegato alla massa di terra durante il normale utilizzo.**

Advarsel **Dette utstyret skal jordes. Forviss deg om vertsterminalen er jordet ved normalt bruk.**

Aviso **Este equipamento deverá estar ligado à terra. Certifique-se que o host se encontra ligado à terra durante a sua utilização normal.**

¡Advertencia! **Este equipo debe conectarse a tierra. Asegurarse de que el equipo principal esté conectado a tierra durante el uso normal.**

Varning! **Denna utrustning är avsedd att jordas. Se till att värdenheten är jordad vid normal användning.**

警告 この装置はアースを必要とするものです。通常動作時は、ホストがアースされてい
ることを確認してください。

A.2.11 Ground Connection Warning

Warning **When installing the unit, always make the ground connection first and disconnect it last.**

Waarschuwing **Bij de installatie van het toestel moet de aardverbinding altijd het eerste worden gemaakt en het laatste worden losgemaakt.**

Varoitus **Laitetta asennettaessa on maahan yhdistäminen aina tehtävä ensiksi ja maadoituksen irti kytkeminen viimeiseksi.**

Attention **Lors de l'installation de l'appareil, la mise à la terre doit toujours être connectée en premier et déconnectée en dernier.**

Warnung **Der Erdanschluß muß bei der Installation der Einheit immer zuerst hergestellt und zuletzt abgetrennt werden.**

Avvertenza **In fase di installazione dell'unità, eseguire sempre per primo il collegamento a massa e disconnetterlo per ultimo.**

Advarsel **Når enheten installeres, må jordledningen alltid tilkobles først og frakobles sist.**

Aviso **Ao instalar a unidade, a ligação à terra deverá ser sempre a primeira a ser ligada, e a última a ser desligada.**

¡Advertencia! **Al instalar el equipo, conectar la tierra la primera y desconectarla la última.**

Varning! **Vid installation av enheten måste jordledningen alltid anslutas först och kopplas bort sist.**

A.2.12 Jewelry Removal Warning

Warning **Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals.**

Waarschuwing **Alvorens aan apparatuur te werken die met elektrische leidingen is verbonden, sieraden (inclusief ringen, kettingen en horloges) verwijderen. Metalen voorwerpen worden warm wanneer ze met stroom en aarde zijn verbonden, en kunnen ernstige brandwonden veroorzaken of het metalen voorwerp aan de aansluitklemmen lassen.**

Varoitus **Ennen kuin työskentelet voimavirtajohtoihin kytkettyjen laitteiden parissa, ota pois kaikki korut (sormukset, kaulakorut ja kellot mukaan lukien). Metalliesineet kuumenevat, kun ne ovat yhteydessä sähkövirran ja maan kanssa, ja ne voivat aiheuttaa vakavia palovammoja tai hitsata metalliesineet kiinni liitäntänapoihin.**

Attention **Avant d'accéder à cet équipement connecté aux lignes électriques, ôter tout bijou (anneaux, colliers et montres compris). Lorsqu'ils sont branchés à l'alimentation et reliés à la terre, les objets métalliques chauffent, ce qui peut provoquer des blessures graves ou souder l'objet métallique aux bornes.**

Warnung **Vor der Arbeit an Geräten, die an das Netz angeschlossen sind, jeglichen Schmuck (einschließlich Ringe, Ketten und Uhren) abnehmen. Metallgegenstände erhitzen sich, wenn sie an das Netz und die Erde angeschlossen werden, und können schwere Verbrennungen verursachen oder an die Anschlußklemmen angeschweißt werden.**

Avvertenza **Prima di intervenire su apparecchiature collegate alle linee di alimentazione, togliersi qualsiasi monile (inclusi anelli, collane, braccialetti ed orologi). Gli oggetti metallici si riscaldano quando sono collegati tra punti di alimentazione e massa: possono causare ustioni gravi oppure il metallo può saldarsi ai terminali.**

Advarsel **Fjern alle smykker (inkludert ringer, halskjeder og klokker) før du skal arbeide på utstyr som er koblet til kraftledninger. Metallgjenstander som er koblet til kraftledninger og jord blir svært varme og kan forårsake alvorlige brannskader eller smelte fast til polene.**

Aviso **Antes de trabalhar em equipamento que esteja ligado a linhas de corrente, retire todas as jóias que estiver a usar (incluindo anéis, fios e relógios). Os objectos metálicos aquecerão em contacto com a corrente e em contacto com a ligação à terra, podendo causar queimaduras graves ou ficarem soldados aos terminais.**

¡Advertencia! **Antes de operar sobre equipos conectados a líneas de alimentación, quitarse las joyas (incluidos anillos, collares y relojes). Los objetos de metal se calientan cuando se conectan a la alimentación y a tierra, lo que puede ocasionar quemaduras graves o que los objetos metálicos queden soldados a los bornes.**

Varning! **Tag av alla smycken (inklusive ringar, halsband och armbandsur) innan du arbetar på utrustning som är kopplad till kraftledningar. Metallobjekt hettas upp när de kopplas ihop med ström och jord och kan förorsaka allvarliga brännskador; metallobjekt kan också sammansvetsas med kontakterna.**

A.2.13 Qualified Personnel Warning

Warning **Only trained and qualified personnel should be allowed to install or replace this equipment.**

Waarschuwing **Installatie en reparaties mogen uitsluitend door getraind en bevoegd personeel uitgevoerd worden.**

Varoitus **Ainoastaan koulutettu ja pätevä henkilökunta saa asentaa tai vaihtaa tämän laitteen.**

Avertissement **Tout installation ou remplacement de l'appareil doit être réalisé par du personnel qualifié et compétent.**

Achtung **Gerät nur von geschultem, qualifiziertem Personal installieren oder auswechseln lassen.**

Avvertenza **Solo personale addestrato e qualificato deve essere autorizzato ad installare o sostituire questo apparecchio.**

Advarsel **Kun kvalifisert personell med riktig opplæring bør montere eller bytte ut dette utstyret.**

Aviso **Este equipamento deverá ser instalado ou substituído apenas por pessoal devidamente treinado e qualificado.**

¡Atención! **Estos equipos deben ser instalados y reemplazados exclusivamente por personal técnico adecuadamente preparado y capacitado.**

Varning **Denna utrustning ska endast installeras och bytas ut av utbildad och kvalificerad personal.**

A.2.14 Supply Circuit Warning

Warning Care must be given to connecting units to the supply circuit so that wiring is not overloaded.

Waarschuwing Let erop dat de toestellen op voedingscircuits worden aangesloten zonder het vermogen van de bedrading te overschrijden.

Varoitus Laiteyksiköt on yhdistettävä huolellisesti syöttöpiiriin niin, että johdot eivät ole ylikuormitettuja.

Avertissement Veillez à bien connecter les unités au circuit d'alimentation afin de ne pas surcharger les connections.

Achtung Beim Anschließen der Geräte an das Stromnetz ist darauf zu achten, daß die Schaltverbindungen nicht überlastet werden.

Avvertenza Fare attenzione quando si collegano le unità al circuito di alimentazione, per non sovraccaricare i cablaggi.

Advarsel Vær nøye med å koble enheter til strømforsyningskretsen slik at ledningene ikke overbelastes.

Aviso Deverá ter precaução ao ligar unidades ao circuito de fornecimento de energia, para não sobrecarregar a instalação.

¡Atención! Poner mucho cuidado al conectar los equipos al circuito de alimentación a fin de no sobrecargar el cableado.

Varning Var noga vid anslutning av enheter till matarströmkretsen så att ledningarna inte överbelastas.

A.2.15 Power Supply Wiring Warning

Warning The illustration shows the DC power supply terminal block. Wire the DC power supply using the appropriate wire terminations at the wiring end, as illustrated. The proper wiring sequence is ground to ground, positive to positive (line to L), and negative to negative (neutral to N). Note that the ground wire should always be connected first and disconnected last.

Waarschuwing De figuur toont de aansluitstrip van de gelijkstroomvoeding. Breng de bedrading aan voor de gelijkstroomvoeding met behulp van de juiste draadaansluitingen aan het draadeinde zoals aangegeven. De juiste bedradingsvolgorde is aarde naar aarde, positief naar positief (lijn naar L) en negatief naar negatief (neutraal naar N). Let op dat de aarddraad altijd het eerst verbonden en het laatst losgemaakt wordt.

Varoitus **Kuva esittää tasavirran pääterasiaa. Liitä tasavirtalähde johdon avulla käyttäen sopivia johdinliitäntöjä johdon päässä kuvan esittämällä tavalla. Oikea kytkentäjärjestys on maajohto maajohtoon, positiivinen positiiviseen (johto L:ään) ja negatiivinen negatiiviseen (nollajohto N:ään). Ota huomioon, että maajohto on aina yhdistettävä ensin ja irrotettava viimeisenä.**

Attention **La figure illustre le bloc de connexion de l'alimentation en courant continu. Câbler l'alimentation en courant continu en fixant les extrémités de fil qui conviennent aux extrémités câblées conformément au schéma. La séquence de câblage à suivre est terre-terre, positif-positif (ligne sur L), et négatif-négatif (neutre sur N). Noter que le fil de masse doit toujours être connecté en premier et déconnecté en dernier.**

Warnung **Die Abbildung zeigt den Terminalblock des Gleichstrom-Netzgeräts. Verdrahten Sie das Gleichstrom-Netzgerät unter Verwendung von geeigneten Kabelschuhen am Verdrahtungsende (siehe Abbildung). Die richtige Verdrahtungsfolge ist Erde an Erde, positiv an positiv (Leitung an L) und negativ an negativ (neutral an N). Beachten Sie bitte, daß der Erdungsdraht immer als erster verbunden und als letzter abgetrennt werden sollte.**

Avvertenza **L'illustrazione mostra la morsettiera dell alimentatore CC. Cablare l'alimentatore CC usando i connettori adatti all'estremità del cablaggio, come illustrato. La corretta sequenza di cablaggio è da massa a massa, da positivo a positivo (da linea ad L) e da negativo a negativo (da neutro a N). Tenere presente che il filo di massa deve sempre venire collegato per primo e scollegato per ultimo.**

Advarsel **Figuren viser likestrømforsyningsenhetens tilkoplingsterminal. Likestrømforsyningsenheten tilkoples ved hjelp av ledningsavslutningene, slik som vist i figuren. Riktig tilkoplingssekvens er jord til jord, positiv til positv (linje til L), og negativ til negativ (nøytral til N). Husk at jordingsledningen alltid bør tilkoples først og frakoples sist.**

Aviso **A figura mostra o bloco do terminal de fornecimento de corrente contínua. Ligue o fornecimento de corrente contínua recorrendo aos terminadores localizados na extremidade do cabo, conforme ilustrado. A sequência correcta de instalação é terra-a-terra, positivo-positivo (linha para L), e negativo-negativo (neutro para N). Note que o fio de terra deverá ser sempre o primeiro a ser ligado, e o último a ser desligado.**

¡Atención! **La figura muestra la caja de bornes de la fuente de alimentación de corriente continua. Cablear la fuente de alimentación de corriente continua, usando los terminales apropiados, en el extremo del cable tal como se muestra. Las conexiones deben realizarse en el siguiente orden: tierra con tierra, positivo con positivo (la línea con la L) y negativo con negativo (el neutro con la N). Tenga en cuenta que el conductor de tierra siempre tiene que conectarse el primero y desconectarse el último.**

Varning! **Illustrationen visar anslutningsplinten för likströmförsörjningsenheten. Koppla ledningarna till strömförsörjningsenheten med lämpliga ledningsavslutningar som bilden visar. Korrekt kopplingssekvens är jord till jord, positiv till positiv (linje till L) och negativ till negativ (neutral till N). Observera att jordledningen alltid skall anslutas först och kopplas bort sist.**

A.2.16 Invisible Laser Radiation Warning

Warning	**Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**
Waarschuwing	**Omdat er onzichtbare laserstraling uit de opening van de poort geëmitteerd kan worden wanneer er geen kabel aangesloten is, dient men om blootstelling aan laserstraling te vermijden niet in de open openingen te kijken.**
Varoitus	**Kun porttiin ei ole kytketty kaapelia, portin aukosta voi vuotaa näkymätöntä lasersäteilyä. Älä katso avoimiin aukkoihin, jotta et altistu säteilylle.**
Attention	**Etant donné qu'un rayonnement laser invisible peut être émis par l'ouverture du port quand aucun câble n'est connecté, ne pas regarder dans les ouvertures béantes afin d'éviter tout risque d'exposition au rayonnement laser.**
Warnung	**Aus der Öffnung des Ports kann unsichtbare Laserstrahlung austreten, wenn kein Kabel angeschlossen ist. Kontakt mit Laserstrahlung vermeiden und nicht in offene Öffnungen blicken.**
Avvertenza	**Poiché quando nessun cavo è collegato alla porta, da quest'ultima potrebbe essere emessa radiazione laser invisibile, evitare l'esposizione a tale radiazione e non fissare con gli occhi porte a cui non siano collegati cavi.**
Advarsel	**Usynlige laserstråler kan sendes ut fra åpningen på utgangen når ingen kabel er tilkoblet. Unngå utsettelse for laserstråling og se ikke inn i åpninger som ikke er tildekket.**
Aviso	**Evite uma exposição à radiação laser e não olhe através de aberturas expostas, porque poderá ocorrer emissão de radiação laser invisível a partir da abertura da porta, quando não estiver qualquer cabo conectado.**
¡Advertencia!	**Cuando no esté conectado ningún cable, pueden emitirse radiaciones láser invisibles por el orificio del puerto. Evitar la exposición a radiaciones láser y no mirar fijamente los orificios abiertos.**
Varning!	**Osynliga laserstrålar kan sändas ut från öppningen i porten när ingen kabel är ansluten. Undvik exponering för laserstrålning och titta inte in i ej täckta öppningar.**

A.2.17 Incorrect Connection Warning

Warning **Incorrect connection of this or connected equipment to a general purpose outlet could result in a hazardous situation.**

Waarschuwing **Incorrecte aansluiting van deze of aangesloten apparatuur op een stopcontact voor algemene doeleinden kan een gevaarlijke situatie tot gevolg hebben.**

Varoitus **Tämän laitteen tai siihen liitettyjen laitteiden virheellinen kytkentä yleispistorasiaan voi aiheuttaa vaaratilanteen.**

Attention **Un branchement incorrect de cet équipement ou de l'équipement branché à une prise d'usage général peut créer une situation dangereuse.**

Warnung **Inkorrektes Anschließen von diesem oder damit verbundenen Geräten an einer Allzwecksteckdose kann eine Gefahrensituation verursachen.**

Avvertenza **Un collegamento errato di questo apparecchio, o dell'apparecchiatura a esso collegato, a una presa di uso generale può causare una situazione pericolosa.**

Advarsel **Feil kobling av dette utstyret eller tilhørende utstyr til et vanlig uttak kan føre til farlige situasjoner.**

Aviso **Uma conexão incorrecta a uma ficha de alimentação eléctrica normal, deste ou de qualquer equipamento a este conectado, poderá resultar numa situação potencialmente perigosa.**

¡Advertencia! **La conexión incorrecta de este equipo, o del equipo conectado, a una toma o receptáculo de tipo general podría resultar en una situación peligrosa.**

Varning! **Felaktig koppling av denna eller ansluten utrustning till ett universaluttag kan orsaka riskfylld situation.**

A.2.18 Ground Conductor Warning

Warning **Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

Waarschuwing **De aardingsleiding mag nooit buiten werking gesteld worden en de apparatuur mag nooit bediend worden zonder dat er een op de juiste wijze geïnstalleerde aardingsleiding aanwezig is. Neem contact op met de bevoegde instantie voor elektrische inspecties of met een elektricien als u niet zeker weet of voor passende aarding gezorgd is.**

Varoitus **Älä koskaan ohita maajohdinta tai käytä laitteita ilman oikein asennettua maajohdinta. Ota yhteyttä asianmukaiseen sähkötarkastusviranomaiseen tai sähköasentajaan, jos olet epävarma maadoituksen sopivuudesta.**

Attention **Ne jamais rendre inopérant le conducteur de masse ni utiliser l'équipement sans un conducteur de masse adéquatement installé. En cas de doute sur la mise à la masse appropriée disponible, s'adresser à l'organisme responsable de la sécurité électrique ou à un électricien.**

Warnung **Umgehen Sie auf keinen Fall den Erdungsleiter und nehmen Sie die Geräte nicht in Betrieb, wenn der Erdungsleiter nicht sachgemäß installiert ist. Wenden Sie sich an die entsprechende Behörde, die für die Inspektion elektrischer Anlagen zuständig ist, oder an einen Elektriker, wenn Sie nicht sicher sind, ob der Anschluß ordnungsgemäß geerdet ist.**

Avvertenza **Non escludere mai il conduttore di protezione né usare l'apparecchiatura in assenza di un conduttore di protezione installato in modo corretto. Se non si sa con certezza che è disponibile un collegamento di messa a terra adeguato, esaminare le Norme CEI pertinenti o rivolgersi a un elettricista qualificato.**

Advarsel **Jordingslederen må aldri hindres, og utstyret må aldri brukes uten at en forsvarlig jordingsleder er installert. Kontakt elektrisitetstilsynet eller en elektriker dersom du er usikker på om riktig jording er tilgjengelig.**

Aviso **Nunca anule o condutor à terra nem opere o equipamento sem ter um condutor à terra adequadamente instalado. Em caso de dúvida em relação ao sistema de ligação à terra, contacte os serviços locais de inspecção eléctrica ou um electricista qualificado.**

¡Advertencia! **No desactive nunca el conductor de tierra ni opere el equipo sin un conductor de tierra instalado correctamente. Póngase en contacto con las autoridades de inspección eléctrica pertinentes o con un electricista, si no está seguro de contar con una toma de tierra adecuada.**

Varning! **Koppla aldrig från jordledningen och använd aldrig utrustningen utan en på lämpligt sätt installerad jordledning. Om det föreligger osäkerhet huruvida lämplig jordning finns skall elektrisk besiktningsauktoritet eller elektriker kontaktas.**

A.2.19 Voltages on DC-input Power Supply Terminals

Warning **Voltages might be present on the DC-input power supply terminals. Turn off the power source circuit breaker and remove the power supply before accessing the terminals.**

Waarschuwing **Er kan stroom aanwezig zijn op de voedingspolen van de gelijkstroomingang. Schakel de stroomonderbreker van de stroombon uit en verwijder de voedingsbron voordat u toegang tot de polen zoekt.**

Varoitus **Tasavirran lähteen jakorasiassa voi olla jännitettä. Katkaise virta virtalähteen kytkimestä ja irrota virtalähde ennen jakorasiaan koskemista.**

Attention **Il est possible que des courants électriques subsistent dans les terminaux à bloc d'alimentation CC. Mettez le disjoncteur de l'alimentation principale hors tension et retirez le bloc d'alimentation avant d'accéder aux terminaux.**

Warnung **Auf den Gleichstrom-Eingangs-Stromversorgungs-Terminals können Spannungen auftreten. Schalten Sie den Leistungsschutzschalter der Stromversorgung ab, und entfernen Sie die Stromversorgung, bevor Sie auf die Terminals zugreifen.**

Avvertenza **I voltaggi possono essere presenti sui terminali degli alimentatori elettrici DC di immissione. Spegnete l'interruttore per l'interruzione del circuito dell'alimentatore e togliete l'alimentatore elettrico prima di accedere i terminali.**

Advarsel **Spenning kan forekomme på likestrømsforsyningsenhetens inngangsterminaler. Slå av strømbryteren til strømkilden, og fjern strømtilførselsenheten før aksessering av terminalene.**

Aviso **Os terminais de alimentação de energia de CC de entrada podem conter voltajem. Desconecte o disjuntor da fonte de alimentação e remova a fonte de alimentação de energia antes de aceder aos respectivos terminais.**

¡Advertencia! **Los terminales de suministro de alimentación CC de entrada pueden contener voltaje. Desconecte el cortacircuito de la fuente de alimentación y extraiga el suministro de alimentación antes de acceder a los terminales.**

Varning! **Spänningar kan förekomma på likströmsförsörjningsenhetens ingångspoler. Innan du skaffar dig tillträde till polerna, stäng av strömbrytaren till strömkällan och avlägsna strömförsörjningsenheten.**

A.2.20 More Than One Power Supply

Warning **This unit has more than one power supply connection; all connections must be removed completely to completely remove power from the unit.**

Waarschuwing **Deze eenheid heeft meer dan één stroomtoevoerverbinding; alle verbindingen moeten volledig worden verwijderd om de stroom van deze eenheid volledig te verwijderen.**

Varoitus **Tässä laitteessa on useampia virtalähdekytkentöjä. Kaikki kytkennät on irrotettava kokonaan, jotta virta poistettaisiin täysin laitteesta.**

Attention **Cette unité est équipée de plusieurs raccordements d'alimentation. Pour supprimer tout courant électrique de l'unité, tous les cordons d'alimentation doivent être débranchés.**

Warnung **Diese Einheit verfügt über mehr als einen Stromanschluß; um Strom gänzlich von der Einheit fernzuhalten, müssen alle Stromzufuhren abgetrennt sein.**

Avvertenza **Questa unità ha più di una connessione per alimentatore elettrico; tutte le connessioni devono essere completamente rimosse per togliere l'elettricità dall'unità.**

Advarsel **Denne enheten har mer enn én strømtilkobling. Alle tilkoblinger må kobles helt fra for å eliminere strøm fra enheten.**

Aviso **Este dispositivo possui mais do que uma conexão de fonte de alimentação de energia; para poder remover a fonte de alimentação de energia, deverão ser desconectadas todas as conexões existentes.**

¡Advertencia! **Esta unidad tiene más de una conexión de suministros de alimentación; para eliminar la alimentación por completo, deben desconectarse completamente todas las conexiones.**

Varning! **Denna enhet har mer än en strömförsörjningsanslutning; alla anslutningar måste vara helt avlägsnade innan strömtillförseln till enheten är fullständigt bruten.**

A.2.21 Cisco ONS 15216 EDFA3 Rack Installation

Warning **The Cisco ONS 15216 EDFA3 must be installed in a rack that is secured to the building structure.**

Waarschuwing **De Cisco ONS 15216 EDFA3 moet in een stellage worden geïnstalleerd die aan een bouwsel is verankerd.**

Varoitus **Cisco ONS 15216 EDFA3 on asennettava telineeseen, joka on kiinnitetty rakennukseen.**

Attention **Le rack sur lequel est monté le Cisco ONS 15216 EDFA3 doit être fixé à la structure du bâtiment.**

Warnung **Der Cisco ONS 15216 EDFA3 muß in einem Gestell installiert werden, das in der Gebäudestruktur verankert ist.**

Avvertenza **Il Cisco ONS 15216 EDFA3 deve essere installato in un telaio, il quale deve essere fissato alla struttura dell'edificio.**

Advarsel **Cisco ONS 15216 EDFA3 må installeres i et stativ som er forankret til bygningsstrukturen.**

Aviso **O Cisco ONS 15216 EDFA3 deverá ser instalado numa prateleira fixa à estrutura do edificio.**

¡Advertencia! **El Cisco ONS 15216 EDFA3 debe instalarse en un bastidor fijado a la estructura del edificio.**

Varning! **Cisco ONS 15216 EDFA3 måste installeras i en ställning som är förankrad i byggnadens struktur.**

A.2.22 Exposed DC Power Wire Warning

Warning **An exposed wire lead from a DC-input power source can conduct harmful levels of electricity. Be sure that no exposed portion of the DC-input power source wire extends from the terminal block plug.**

Waarschuwing **Een blootgestelde verbindingsdraad van een ingangsgelijkstroombron kan gevaarlijke elektriciteitsniveaus geleiden. Zorg ervoor dat geen blootgesteld deel van het draad van de ingangsgelijkstroombron zich uitstrekt vanuit het aansluitblok van de terminal.**

Varoitus **Tasavirtalähteestä tuleva avoin johto voi johtaa vaarallisen määrän sähköä. Varmista, ettei kaapelikengän pistokkeesta tule esille lainkaan tasavirtajohdon avointa osaa.**

Attention **Pour éviter tout risque de choc électrique, vérifiez que les câbles d'alimentation secteur sont protégés par une gaine. Aucun fil dénudé ne doit apparaître hors du bloc d'alimentation du terminal.**

Warnung **Eine ungeschützte Kabelleitung von einer Gleichstrom-Eingangsspannungsquelle kann schädliche Elektrizitätslevel führen. Achten Sie darauf, daß von dem Klemmleistenstecker aus kein ungeschütztes Eingangsgleichstromkabel freiliegt.**

Avvertenza **Un cavo elettrico scoperto proveniente da un alimentatore DC-INPUT può trasmettere scariche elettriche ad elevata tensione. Assicuratevi che i cavi in uscita dall'alimentatore DC-input non presentino punti scoperti.**

Advarsel **En avdekket ledning fra en likestrømskilde kan lede farlig elektrisitet. Kontroller at ingen avdekkede deler av ledningen til likestrømskilden stikker ut av terminalens koblingsblokk.**

Aviso **Um fio condutor exposto de uma unidade de entrada de DC (corrente contínua) pode transportar níveis perigosos de electricidade. Certifique-se de que nenhuma secção exposta de um fio condutor da fonte de energia de entrada de DC se extende a partir da ficha da placa de terminais.**

¡Advertencia! **Un cable desnudo de una fuente de entrada de alimentación de corriente directa (DC) puede conducir niveles de electricidad peligrosos. Asegúrese de que ninguna parte del cable de la fuente de alimentación de DC de entrada sale del enchufe del bloque de terminal.**

Varning! **En blottad trådledning från en likströmsförsörjningsenhet kan utgöra en ledare för skadliga elektricitetsnivåer. Se till att inte någon blottad ledningsdel från likströmsförsörjningsenheten sticker ut från stiftplinten.**

A.2.23 48 VDC Power System

Warning **The customer 48 volt power system must provide reinforced insulation between the primary AC power and the 48 VDC output.**

Waarschuwing **Het 48 volt stroomsysteem van de klant dient versterkte isolatie tussen de primaire wisselstroom en de 48 VDC-uitgang te verschaffen.**

Varoitus **Asiakkaan 48 voltin virtajärjestelmän on tarjottava vahvistettu eriste ensisijaisen vaihtovirtalähteen ja 48 voltin tasavirtaliitännän välille.**

Attention **Le bloc d'alimentation 48 volts du client doit assurer une isolation renforcée entre l'alimentation CA principale et la sortie 48 V CC.**

Warnung **Das 48-Volt-Stromsystem des Kunden muß eine verstärkte Isolierung zwischen dem primären Wechselstrom und dem 48 VDC-Output aufweisen.**

Avvertenza **Il sistema elettrico di 48 volt del cliente deve avere un isolamento fra l'alimentatore elettrico AC e il VDC 48 di output.**

Advarsel **Kundens eget 48 volts strømopplegg må ha forsterket isolasjon mellom den primære vekselstrømskilden og den 48 volts likestrømsutgangen.**

Aviso **O sistema habitual de corrente de 48 volts deverá fornecer isolamento reforçado entre a corrente alternada (AC) principal e a saída de 48 VDC (tensão em corrente contínua).**

¡Advertencia! **Aviso: El sistema del cliente de 48 voltios debe proporcionar aislamiento reforzado entre la energía principal AC y la potencia de salida de 48 VDC.**

Varning! **Kundens 48-volt strömsystem måste vara försett med förstärkt isolering mellan den primära växelströmmen och utmatningen av 48 V likström.**

A.2.24 Chassis Power Connection

Warning **Before connecting or disconnecting ground or power wires to the chassis, ensure that power is removed from the DC circuit. To ensure that all power is OFF, locate the circuit breaker on the panel board that services the DC circuit, switch the circuit breaker to the OFF position, and tape the switch handle of the circuit breaker in the OFF position.**

Waarschuwing **Voordat u aarddraden of elektriciteitsdraden op het frame aansluit of van het frame neemt, dient u te controleren of de stroom naar het gelijkstroomcircuit uitgeschakeld is. Om u ervan te verzekeren dat alle stroom UIT is geschakeld, kiest u op het schakelbord de stroomverbreker die het gelijkstroomcircuit bedient, draait de stroomverbreker naar de UIT positie en plakt de schakelaarhendel van de stroomverbreker met plakband in de UIT positie vast.**

Varoitus **Varmista, että tasavirtapiirissä ei ole virtaa ennen maadoitus- tai virtajohtojen kytkemistä asennuspohjaan tai ennen niiden irrottamista. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin, käännä suojakytkin KATKAISTU-asentoon ja teippaa suojakytkimen varsi niin, että se pysyy KATKAISTU-asennossa.**

Attention **Avant de connecter ou de déconnecter les câbles d'alimentation (pôles et terre) du châssis, vérifiez que le circuit de courant continu est hors tension : localisez le disjoncteur sur le panneau de commande du circuit de courant continu, poussez-le sur la position fermée (OFF) et, à l'aide d'un ruban adhésif, bloquez sa poignée sur cette position.**

Warnung **Gleichstrom-Unterbrechung Bevor Sie Erdungs- oder Stromkabel an das Chassis anschließen oder von ihm abtrennen, ist sicherzustellen, daß der Gleichstrom-Stromkreis unterbrochen ist. Um sicherzustellen, daß sämtlicher Strom AUS ist, machen Sie auf der Schalttafel den Unterbrecher für die Gleichstromschaltung ausfindig, stellen Sie den Unterbrecher auf OFF, und kleben Sie den Schaltergriff des Unterbrechers mit Klebeband in der AUS-Stellung fest.**

Avvertenza **Prima di collegare o distaccare i cavi elettrici o di messa a terra dallo chassis, assicuratevi che il circuito DC non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.**

Advarsel **Før til- eller frakobling av jord- og strømledninger til kabinettet, kontroller at strømmen er frakoblet likestrømkretsen. Sørg for at all strøm er slått AV. Dette gjøres ved å lokalisere strømbryteren på brytertavlen som betjener likestrømkretsen, slå strømbryteren AV og teipe bryterhåndtaket på strømbryteren i AV-stilling.**

Aviso **Antes de conectar ou desconectar a ligação à terra ou a alimentação do chassis, certifique-se de que desligou a fonte de alimentação de energia do circuito de corrente contínua. Para se assegurar que toda a corrente foi DESLIGADA, localize o disjuntor no painel que serve o circuito de corrente contínua e coloque-o na posição OFF (Desligado), segurando nessa posição a manivela do interruptor do disjuntor com fita isoladora.**

¡Advertencia! **Antes de conectar o desconectar el circuito de tierra o de alimentación del chasis, asegúrese que la alimentación del circuito CC esté cortada (OFF). Para asegurarse de que toda la alimentación esté cortada (OFF), localice el interruptor automático en el panel que alimenta el circuito de corriente continua, cambie el interruptor automático a la posición de apagado (OFF) y sujete con cinta la palanca del interruptor automático en posición de apagado (OFF).**

Varning! **Innan du kopplar jord- eller elledningar till eller från chassit måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.**

A.2.25 Cisco ONS 15216 EDFA3 Temperature Requirement

Warning **To prevent a Cisco ONS 15216 EDFA3 system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 122 degrees F (50 degrees C).**

Waarschuwing **Om te voorkomen dat een Cisco ONS 15216 EDFA3 systeem oververhit raakt, dient u het niet te bedienen op een plaats waar de maximale aanbevolen omgevingstemperatuur van 50°C wordt overschreden.**

Varoitus **Ettei Cisco ONS 15216 EDFA3 -järjestelmä ylikuumentuisi, sitä ei saa käyttää tilassa, jonka lämpötila ylittää korkeimman suositellun ympäristölämpötilan 50°C.**

Attention **Pour éviter toute surchauffe du système Cisco ONS 15216 EDFA3, ne l'utilisez pas dans une zone où la température ambiante est supérieure à 50°C.**

Warnung **Um ein Cisco ONS 15216 EDFA3-System vor Überhitzung zu schützen, darf dieser nicht in einer Gegend betrieben werden, in der die Umgebungstemperatur das empfohlene Maximum von 50°C überschreitet.**

Avvertenza **Per evitare il surriscaldamento dei sistemi Cisco ONS 15216 EDFA3, non adoperateli contain in un locale che ecceda la temperatura ambientale massima di 122°F (50°C).**

Advarsel **Unngå overoppheting av et Cisco ONS 15216 EDFA3-system. Skal ikke brukes på steder der den anbefalte maksimale omgivelsestemperaturen overstiger 50°C (122°F).**

Aviso **Para evitar o sobreaquecimento do sistema Cisco ONS 15216 EDFA3, não utilize este equipamento numa área que exceda a temperatura máxima recomendada de 50°C.**

¡Advertencia! **Para impedir que un encaminador de la serie Cisco ONS 15216 EDFA3 se recaliente, no lo haga funcionar en un área en la que se supere la temperatura ambiente máxima recomendada de 122°F (50°C).**

Varning! **Förhindra att ett Cisco ONS 15216 EDFA3-system överhettas genom att inte använda det i ett område där den maximalt rekommenderade omgivningstemperaturen på 50°C överskrids.**

A.2.26 VCCI Compliance for Class A Equipment

Warning **This is a Class A product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.**

警告 この装置は、クラスＡ機器です。この装置を住宅環境で使用すると電波妨害を引き 起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求される ことがあります。

VCCI-A

A.2.27 SELV-IEC 60950 DC Power Supply Warning

Warning **Connect the unit only to DC power source that complies with the Safety Extra-Low Voltage (SELV) requirements in IEC 60950 based safety standards.**

Waarschuwing **Sluit de eenheid alleen maar aan op een gelijkstroombron die voldoet aan de veiligheidsvereisten voor extra-laag voltage (SELV) in de op IEC 60950 gebaseerde veiligheidsnormen.**

Varoitus **Liitä laite ainoastaan tasavirtalähteesen, joka on yhdenmukainen IEC 60950:n suojattujen erittäisen alhaisen jännitteen (SELV) turvavaatimusten kanssa.**

Attention **Connectez l'unité uniquement à une alimentation CC compatible avec les recommandations SELV (Safety Extra-Low Voltage) des normes de sécurité IEC 60950.**

Warnung **Schließen Sie die Einheit nur an eine Gleichstrom-Stromquelle an, die mit den Safety Extra-Low Voltage (SELV)-Anforderungen in den auf IEC 60950 basierenden Sicherheitsstandards übereinstimmen.**

Avvertenza **Collegare l'unità esclusivamente a una presa di corrente continua rispondente ai requisiti SELV (Safety Extra-Low Voltage) in base alle norme di sicurezza IEC 60950.**

Advarsel **Koble bare enheten til en likestrømsforsyning som er i henhold til kravene for lavspenning (SELV) i IEC 60950-baserte sikkerhetsstandarder.**

Aviso **Conecte a unidade apenas à fonte da energia de CC que se encontra em conformidade com os requisitos dos circuitos de segurança de baixa tensão (SELV) constantes dos padrões de segurança baseados no IEC 60950.**

¡Advertencia! **Conecte la unidad sólo en una fuente de energía DC que cumpla con los requisitos de voltaje extra bajo (SELV - Extra-Low Voltage) en los estándares de seguridad IEC 60950.**

Varning! **Anslut enheten endast till en likströmsförsörjningsenhet som uppfyller kraven för SELV (skyddskretsar för mycket låg spänning) i IEC 60950-baserade säkerhetsstandarder.**

A.2.28 Cisco ONS 15216 EDFA3 Power Circuit Overload Warning

Warning **To prevent dangerous overloading of the power circuit, read the label on the rear of the Cisco ONS 15216 EDFA3 that indicates maximum power load ratings. Failure to follow these rating guidelines could result in a dangerous situation.**

Waarschuwing **Om gevaarlijke overbelasting van het stroomcircuit te vermijden, dient u het label op de achterkant van de Cisco ONS 15216 EDFA3 te lezen waarop de maximale stroombelasting wordt aangegeven. Het niet nakomen van deze richtlijnen kan leiden tot een gevaarlijke situatie.**

Varoitus **Päävirtapiirin vaarallisen ylikuormittumisen estämiseksi on tarkistettava suurin sallittu tehokuormitus Cisco ONS 15216 EDFA3:n takaosassa olevasta kyltistä. Ohjearvojen huomiotta jättämisestä voi aiheutua vaaratilanne.**

Attention **Pour éviter tout risque d'accident dangereux provoqué par une surcharge du circuit d'alimentation, il est vivement recommandé de tenir compte des mesures maximales de charge mentionnées sur l'étiquette à l'arrière du Cisco ONS 15216 EDFA3.**

Warnung **Um eine gefährliche Überlastung des Stromkreislaufs zu verhindern, muß das Label auf der Rückseite des Cisco ONS 15216 EDFA3 gelesen werden, auf dem die maximale Strombelastung angegeben wird. Nichtbefolgen der dort befindlichen Angaben kann zu Sicherheitsrisiken führen.**

Avvertenza **Per evitare sovraccarichi del circuito elettrico, leggete le indicazioni sul retro del Cisco ONS 15216 EDFA3 per le cariche massime di alimentazione elettriche. Rispettando queste indicazioni eviterete situazioni pericolose.**

Advarsel **Kontroller verdiene for maksimal strømbelastning på merket bak på Cisco ONS 15216 EDFA3-apparatet for å unngå faren for overbelastning av strømkretsen. Hvis retningslinjene for maksimal belastning ikke blir fulgt, kan det oppstå farlige situasjoner.**

Aviso **A fim de evitar sobrecarga perigosa do circuito de fornecimento de energia, é favor ler a etiqueta na parte de trás do Cisco ONS 15216 EDFA3, onde se encontram indicados os níveis máximos de carga de energia. O não cumprimento dessas indicações pode dar origem a uma situação de perigo.**

¡Advertencia! **Para prevenir una sobrecarga eléctrica , lea las instrucciones de la etiqueta que aparece en la parte posterior del Cisco ONS 15216 EDFA3 que indica la carga máxima de potencia. Si no sigue estas indicaciones podría correr riesgos de sobrecarga.**

Varning! **För att förhindra att elkretsen överbelastas genomläses etiketten bakpå Cisco ONS 15216 EDFA3 där märkdata om högsta tillåtna elbelastning anges. Följs ej märkdatans rekommendationer kan fara uppstå.**

A.2.29 Product Disposal Warning

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.**

Waarschuwing **Het uiteindelijke wegruimen van dit product dient te geschieden in overeenstemming met alle nationale wetten en reglementen.**

Varoitus **Tämä tuote on hävitettävä kansallisten lakien ja määräysten mukaisesti.**

Attention **La mise au rebut ou le recyclage de ce produit sont généralement soumis à des lois et/ou directives de respect de l'environnement. Renseignez-vous auprès de l'organisme compétent.**

Warnung **Die Entsorgung dieses Produkts sollte gemäß allen Bestimmungen und Gesetzen des Landes erfolgen.**

Avvertenza **Lo smaltimento di questo prodotto deve essere eseguito secondo le leggi e regolazioni locali.**

Advarsel **Endelig kassering av dette produktet skal være i henhold til alle relevante nasjonale lover og bestemmelser.**

Aviso **Deitar fora este produto em conformidade com todas as leis e regulamentos nacionais.**

¡Advertencia! **Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.**

Varning! **Vid deponering hanteras produkten enligt gällande lagar och bestämmelser.**

A.2.30 Energy Hazard

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment. This equipment contains an energy hazard. Disconnect the system before servicing.**

Waarschuwing **Alleen getraind en gekwalificeerd personeel mag deze uitrusting installeren, vervangen of onderhouden. Deze uitrusting bevat energierisico's. Ontkoppel het systeem voordat u het onderhoudt.**

Varoitus **Tämän laitteen asennuksen, vaihdon tai huollon saa suorittaa ainoastaan koulutettu ja pätevä henkilökunta. Laitteessa on sähköiskuvaara. Irrota järjestelmä ennen huoltoa.**

Attention **Cet équipement ne doit être installé, remplacé ou entretenu que par du personnel d'entretien qualifié et formé. Cet équipement contient de l'énergie électrique potentiellement dangereuse. Débrancher le système avant tout entretien/révision.**

Warnung **Gerät nur von geschultem, qualifiziertem Personal installieren, auswechseln oder warten lassen. Im Gerät liegt gefährliche Spannung an. Vor allen Wartungsarbeiten Gerät vom Netz trennen.**

Avvertenza **Questo apparato può essere installato, sostituito o revisionato solo da personale qualificato e competente. Questo apparecchio presenta pericolo di scosse elettriche. Scollegare il sistema prima di procedere alla revisione.**

Advarsel **Dette utstyret skal bare monteres, skiftes ut eller vedlikeholdes av kvalifisert personell som har gjennomgått opplæring. Det kan være fare for elektrisk støt forbundet med dette utstyret. Kople fra systemet før igangsetting av vedlikeholdsarbeid.**

Aviso **Apenas pessoal treinado e qualificado deve ser autorizado a instalar, substituir ou fazer a revisão deste equipamento. Este equipamento constitui risco de choque eléctrico. Desligar o sistema antes de efectuar qualquer serviço de revisão.**

¡Advertencia! **Solamente el personal calificado debe instalar, reemplazar o reparar este equipo, ya que existe riesgo de descarga eléctrica. Desenchufe el sistema antes de proceder al mantenimiento del mismo.**

Varning! **Endast utbildad och behörig personal får utföra installation, utbyte eller service av denna utrustning. Denna utrustning kan medföra fara för elstöt. Koppla ifrån systemet innan service utförs.**

A.2.31 Unit Grounding Protection Warning

Warning **Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

Waarschuwing **De aardingsleiding mag nooit buiten werking gesteld worden en de apparatuur mag nooit bediend worden zonder dat er een op de juiste wijze geïnstalleerde aardingsleiding aanwezig is. Neem contact op met de bevoegde instantie voor elektrische inspecties of met een elektricien als u niet zeker weet of voor passende aarding gezorgd is.**

Varoitus **Älä koskaan ohita maajohdinta tai käytä laitteita ilman oikein asennettua maajohdinta. Ota yhteyttä asianmukaiseen sähkötarkastusviranomaiseen tai sähköasentajaan, jos olet epävarma maadoituksen sopivuudesta.**

Attention **Ne jamais rendre inopérant le conducteur de masse ni utiliser l'équipement sans un conducteur de masse adéquatement installé. En cas de doute sur la mise à la masse appropriée disponible, s'adresser à l'organisme responsable de la sécurité électrique ou à un électricien.**

Warnung **Umgehen Sie auf keinen Fall den Erdungsleiter und nehmen Sie die Geräte nicht in Betrieb, wenn der Erdungsleiter nicht sachgemäß installiert ist. Wenden Sie sich an die entsprechende Behörde, die für die Inspektion elektrischer Anlagen zuständig ist, oder an einen Elektriker, wenn Sie nicht sicher sind, ob der Anschluß ordnungsgemäß geerdet ist.**

Avvertenza **Non escludere mai il conduttore di protezione né usare l'apparecchiatura in assenza di un conduttore di protezione installato in modo corretto. Se non si sa con certezza che è disponibile un collegamento di messa a terra adeguato, esaminare le Norme CEI pertinenti o rivolgersi a un elettricista qualificato.**

Advarsel **Jordingslederen må aldri hindres, og utstyret må aldri brukes uten at en forsvarlig jordingsleder er installert. Kontakt elektrisitetstilsynet eller en elektriker dersom du er usikker på om riktig jording er tilgjengelig.**

Aviso **Nunca anule o condutor à terra nem opere o equipamento sem ter um condutor à terra adequadamente instalado. Em caso de dúvida em relação ao sistema de ligação à terra, contacte os serviços locais de inspecção eléctrica ou um electricista qualificado.**

¡Advertencia! **No desactive nunca el conductor de tierra ni opere el equipo sin un conductor de tierra instalado correctamente. Póngase en contacto con las autoridades de inspección eléctrica pertinentes o con un electricista, si no está seguro de contar con una toma de tierra adecuada.**

Varning! **Koppla aldrig från jordledningen och använd aldrig utrustningen utan en på lämpligt sätt installerad jordledning. Om det föreligger osäkerhet huruvida lämplig jordning finns skall elektrisk besiktningsauktoritet eller elektriker kontaktas.**

A.2.32 DC Power Disconnection Warning

Warning **Before performing any of the following procedures, ensure that DC power to the transverter you will be working on is turned OFF. To ensure that the power to the specific transverter is OFF, locate the power/breaker switch on the front of power feed panel that services that transverter, push the switch into the OFF position, then tape the switch in the OFF position.**

Waarschuwing **Voordat u een van de onderstaande procedures uitvoert, dient u te controleren of de stroom op het gelijkstroomcircuit is uitgeschakeld. Om u ervan te verzekeren dat alle stroom is UITgeschakeld, kiest u op het schakelbord de stroomverbreker die het gelijkstroom circuit bedient, draait u de stroomverbreker naar de UIT positie en plakt u de schakelaarhendel van de stroomverbreker met plakband in de UIT positie vast.**

Varoitus **Varmista ennen seuraavien toimenpiteiden suorittamista, että tasavirtapiirin virta on KATKAISTU. Varmistaaksesi, että virta on KATKAISTU täysin, paikanna tasavirrasta huolehtivassa kojetaulussa sijaitseva suojakytkin. Käännä suojakytkin KATKAISTU-asentoon. Teippaa suojakytkimen varsi niin, että kytkin pysyy KATKAISTU-asennossa.**

Attention **Avant d'effectuer l'une des procédures décrites ci-dessous, vérifiez que le circuit alimenté en courant continu n'est plus sous tension. Pour vous en assurer, localisez le disjoncteur situé sur le panneau de service du circuit en courant continu, désactivez-le (OFF) et, à l'aide d'un ruban adhésif, bloquez la poignée du disjoncteur en position OFF.**

Warnung **Vor Ausführung der folgenden Vorgänge ist sicherzustellen, daß der Transverter, mit dem Sie arbeiten, nicht mit Strom versorgt wird. Um sicherzustellen, daß der Strom abgestellt ist, machen Sie auf der Vorderseite der Schalttafel den Stromschalter für den Transverter ausfindig, stellen Sie den Schalter auf AUS, und kleben Sie den Schaltergriff mit Klebeband in der AUS-Stellung fest.**

Avvertenza **Prima di svolgere una qualsiasi delle procedure seguenti, verificare che il circuito in corrente continua non sia alimentato. Per verificare che tutta l'alimentazione sia scollegata (OFF), individuare l'interruttore automatico sul quadro strumenti che alimenta il circuito CC, mettere l'interruttore in posizione OFF e fissarlo con nastro adesivo in tale posizione.**

Advarsel **Før du utfører noen av disse prosedyrene, må du kontrollere at strømtilførselen til transformatoren du skal bruke, er slått AV. Dette gjøres ved å lokalisere strømbryteren foran på brytertavlen som betjener transformatoren, deretter trykker du bryteren inn i AV-stilling og fester bryteren med teip i AV-stilling.**

Aviso **Antes de executar qualquer um dos seguintes procedimentos, certifique-se de que a fonte de alimentação de corrente contínua para o transversor em que irá trabalhar está DESLIGADA. Para se certificar de que toda a alimentação para esse transversor foi DESLIGADA, localize o disjuntor no painel que alimenta esse transversor e coloque-o na posição OFF (Desligado) e, em seguida, segure o disjuntor nessa posição com fita isoladora.**

¡Advertencia! **Antes de proceder con los siguientes pasos, comprobar que la alimentación del circuito de corriente continua (CC) con el que se va a trabajar esté cortada (OFF). Para ello, localizar el interruptor de corriente en la parte frontal del panel que alimenta al circuito, cambiar el interruptor automático a la posición de Apagado (OFF) y sujetar con cinta adhesiva la palanca del interruptor automático en posición de Apagado (OFF).**

Varning! **Innan du utför någon av följande procedurer måste du kontrollera att strömförsörjningen till likströmskretsen är bruten. Kontrollera att all strömförsörjning är BRUTEN genom att slå AV det överspänningsskydd som skyddar likströmskretsen och tejpa fast överspänningsskyddets omkopplare i FRÅN-läget.**

A.2.33 Ground Wire Warning

Warning **A ground wire must always be a single piece of wire. Never splice two wires together for a ground. Corrosion and weathering can lead to a poor connection at the splice, making the ground ineffective and dangerous.**

Waarschuwing **Een aardedraad moet altijd over de hele lengte uit een enkel stuk draad bestaan. Voor een aardedraad mogen nooit twee aparte draden aan elkaar verbonden worden. Invloed van het weer en roest kunnen de verbinding tussen de twee draden belemmeren waardoor de aardeverbinding minder goed werkt en zelfs gevaarlijk kan worden.**

Varoitus **Maajohtimen on oltava aina yksittäinen johdin. Maajohdinta ei saa koskaan tehdä liittämällä kahta johdinta yhteen. Syöpyminen ja sään vaikutus voivat heikentää liitoksen kytkentää, mikä tekee maadoituksesta tehottoman ja vaarallisen.**

Attention **Le fil de mise à la terre doit toujours être d'une seule pièce. Ne raccordez jamais deux fils ensemble pour fabriquer un fil de mise à la terre. La corrosion et les dommages provoqués par les intempéries risquent d'entraîner une connexion médiocre à l'endroit du raccord, diminuant ainsi l'efficacité de la mise à la terre et la rendant dangereuse.**

Warnung **Ein Erdungsdraht darf nur aus einem einzigen Draht bestehen. Verbinden Sie nie zwei Drähte zum Erden. Korrosion und Verwitterung können zu einer schlechten Übertragung an der Verbindungsstelle führen, wodurch die Erdung ineffizient und gefährlich wird.**

Avvertenza **I cavi di terra devono sempre essere costituiti da conduttori ininterrotti: non congiungere mai due cavi per realizzare un collegamento di terra. La corrosione e l'usura possono ridurre la conduttività della giunzione, rendendo così inefficace e pericoloso il collegamento a terra.**

Advarsel **En jordingsledning må alltid bestå av en enkel ledning. Skjøt aldri to ledninger sammen for jording. Korrosjon og værslitasje kan føre til dårlig kobling i skjøtet, slik at jordingen blir ueffektiv og farlig.**

Aviso **Um fio terra deve ser composto de um fio único. Nunca emende dois fios para fazer um fio terra. A corrosão e a ferrugem podem afetar a emenda e tornar o aterramento inefetivo ou perigoso.**

¡Advertencia! **El cable que se utilice para la conexión a tierra siempre deberá ser de una sola pieza. Nunca empalme dos cables para hacer vconexión a tierra. La corrosión y el deterioro debido a los agentes atmosféricos pueden debilitar la conexión del empalme, lo cual puede hacer que la conexión a tierra no funcione adecuadamente y sea peligrosa.**

Varning! **En jordad tråd måste alltid bestå av en enda tråd. Splitsa aldrig ihop två trådar för jord. Korrosion och exponering för väder och vind kan leda till dålig anslutning vid splitsningen, med det resultatet att jordningen blir ineffektiv och farlig.**

A.2.34 Declaration of Conformity with Regard to the Directives 73/23/EEC and 89/336/EEC as amended by Directive 93/68/EEC

The Declaration of Conformity related to this product can be found at the following URL:

http://www.ciscofax.com/

Deutsch: **Dieses Gerät entspricht den wesentlichen Anforderungen und weiteren Bestimmungen der Richtlinien 73/23/EWG und 89/336/EWG mit der Ergänzung durch Richtlinie 93/68/EWG.**

Dansk: **Dette udstyr er i overensstemmelse med de ufravigelige hensyn og andre bestemmelser i direktiv 73/23/EEC og 89/336/EEC som ændred i direktiv 93/68/EEC.**

English: **This equipment is in compliance with the essential requirements and other provisions of Directives 73/23/EEC and 89/336/EEC as amended by Directive 93/68/EEC.**

Español: **Este equipo cumple con los requisitos esenciales y otras disposiciones de las Directrices 73/23/EEC y 89/336/EEC de acuerdo a las modificaciones de la Directriz 93/68/EEC.**

Français: **Cet appareil remplit les principales conditions requises et autres dispositions des Directives 73/23/EEC et 89/336/EEC, modifiées par la Directive 93/68/EEC.**

Íslenska: **Þessir búnaður samrýmist lögboðnum kröfum og öðrum ákvæðum tilskipana 73/23/EBE og 89/336/EBE, með breytingum skv. tilskipun 93/68/EBE.**

Italiano: **Questa apparecchiatura è conforme ai requisiti essenziali e altre disposizioni delle Direttive 73/23/EEC e 89/336/EEC modificate con la Direttiva 93/68/EEC.**

Nederlands: **Deze apparatuur voldoet aan de belangrijkste eisen en andere voorzieningen van richtlijnen 73/23/EEC en 89/336/EEC zoals gewijzigd door richtlijn 93/68/EEC.**

Norsk: **Dette utstyret samsvarer med de vesentligste kravene og andre regler i direktivene 73/23/EEC og 89/336/EEC samt i tilleggsdirektiv 93/68/EEC.**

Português: **Este equipamento satisfaz os requisitos essenciais e outras provisões das Directivas 73/23/EEC e 89/336/EEC, conforme amendados pela Directiva 93/68/EEC.**

Suomalainen: **Tämä laite on direktiivien 73/23/ETY ja 89/336/ETY (kuten muutettu direktiivissä 93/68/ETY) keskeisten vaatimusten ja määräysten mukainen.**

Svenska: **Denna utrustning uppfyller de väsentliga kraven och andra villkor i direktiven 73/23/EEC och 89/336/EEC enligt ändringarna i direktiv 93/68/EEC.**

A.2.35 Declaration of Conformity to R&TTE Directive 1999/5/EEC for the European Community, Switzerland, Norway, Iceland, and Liechtenstein

English: **This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.**

Nederlands: **Deze apparatuur voldoet aan de essentiële vereisten en andere relevante voorzieningen van EU-richtlijn 1999/5/EC.**

Suomalainen: **Tämä laite noudattaa direktiivin 1999/5/EC keskeisiä vaatimuksia ja sen muita olennaisia määräyksiä.**

Français: **Cet équipement répond aux exigences et provisions de la Directive 1999/5/EC.**

Deutsch: **Diese Geräte entsprechen den Anforderungen und anderen relevanten Bestimmungen der Richtlinie 1999/5/EC.**

Italiano: **Questa apparecchiatura rispetta i requisiti essenziali e le altre clausole rilevanti della Direttiva 1999/5/CE.**

Dansk: **Dette utstyret er i samsvar med de grunnleggende kravene og andre relevante forskrifter i 1999/5/EC-direktivet.**

Português: **Este equipamento está de acordo com os requisitos essenciais e outras provisões relevantes da Diretiva 1999/5/EC.**

Español: **Este equipo cumple con los requisitos esenciales y otras provisiones relevantes de la Directiva 1999/5/EC.**

Svenska: **Denna utrustning uppfyller de väsentliga kraven och andra relevanta förordningar i Direktiv 1999/5/EC.**

A.2.36 Class A EMC Warning

Warning **This is a Class A Device and is registered for EMC requirements for residential use. This device can be used not only in residential areas but in all other areas.**

주의 B급 기기 이 기기는 가정용으로 전자파 적합 등록을 한 기기로서 주거지역 내에서는 물론 모든 지역에서 사용할 수 있습니다.

A.2.37 Safety Requirements Warning

Warning **All safety requirements and recommendations must be read by all personnel prior to working on the system. Failure to follow the safety requirements and recommendations could result in injury.**

Waarschuwing **Alle veiligheidsvereisten en -aanbevelingen dienen door het personeel gelezen te worden voordat er aan het systeem wordt gewerkt. Het niet nakomen van de veiligheidsvereisten en aanbevelingen kan leiden tot letsel.**

Varoitus **Kaikkien henkilökuntaan kuuluvien on luettava kaikki turvallisuusvaatimukset ja -suositukset ennen järjestelmän parissa työskentelyä. Näiden turvallisuusvaatimusten ja -suositusten laiminlyönti voi aiheuttaa tapaturman.**

Attention **Il est essentiel que chaque membre du personnel lise toutes les consignes et conditions d'utilisation avant d'exploiter le système. Le moindre manquement aux consignes et mesures de sécurité risque de provoquer des blessures.**

Warnung **Alle Sicherheitshinweise und Empfehlungen müssen vom gesamten Personal gelesen werden, bevor mit der Arbeit am System begonnen wird. Das Nichtbefolgen der Sicherheitshinweise und der Empfehlungen kann Verletzungen zur Folge haben.**

Avvertenza **Prima di intervenire sul sistema è necessario leggere tutti i requisiti e i suggerimenti relativi alla sicurezza. Se si ignorano i requisiti e i suggerimenti relativi alla sicurezza esiste il rischio di lesioni.**

Advarsel **Alle sikkerhetskrav og -anbefalinger skal leses av alt personell før arbeidet på systemet begynner. Hvis sikkerhetskrav og -anbefalinger ikke følges, er det fare for at skade kan oppstå.**

Aviso **Todos os requisitos e recomendações de segurança devem ser lidos por todo o pessoal antes de trabalhar no sistema. Podem ocorrer ferimentos se os requisitos e recomendações de segurança não forem seguidos.**

¡Advertencia! **El personal debe leer todos los requerimientos y recomendaciones de seguridad antes de trabajar en el sistema. El incumplimiento de tales requerimientos y recomendaciones podría provocar lesiones o daños.**

Varning! **Alla säkerhetskrav och rekommendationer måste läsas av all personal innan arbete på systemet påbörjas. Om säkerhetskraven och rekommendationerna inte följs kan detta leda till skador.**

A.2.38 Laser Radiation Warning

Warning **Laser radiation presents an invisible hazard, so personnel should avoid exposure to the laser beam. Personnel must be qualified in laser safety procedures and must use proper eye protection before working on this equipment.**

Waarschuwing **Laserstraling levert een onzichtbaar gevaar op, zodat personeel blootstelling aan de laserstraal dient te vermijden. Het personeel dient gekwalificeerd te zijn in veiligheidsprocedures m.b.t. lasers en dient de juiste oogbescherming te dragen voordat er aan deze apparatuur wordt gewerkt.**

Varoitus **Lasersäteily muodostaa näkymättömän vaaran, joten henkilökunnan tulisi välttää altistumista lasersäteelle. Henkilökunnan on tunnettava laserin turvalliset käyttötoimet ja käytettävä asianmukaisia silmiensuojaimia ennen tämän laitteiston parissa työskentelyä.**

Attention **Les rayonnements laser constituent un risque grave invisible ; il est donc essentiel que le personnel évite toute exposition au rayon laser. Tout membre personnel doit avoir reçu une formation qualifiée en matière de procédures de sécurité laser et doit revêtir un équipement de protection optique adéquat avant d'exploiter l'équipement.**

Warnung **Da Laserstrahlung eine unsichtbare Gefahr darstellt, sollte das Personal nicht mit dem Laserstrahl in Berührung kommen. Das Personal muss mit den Laser-Sicherheitsvorkehrungen vertraut sein und zulässige Schutzbrillen tragen, bevor die Arbeit an diesen Geräten aufgenommen wird.**

Avvertenza **Evitare l'esposizione ai raggi laser, in quanto rappresentano un rischio invisibile. Prima di intervenire su questa apparecchiatura, occorre essere a conoscenza delle procedure di sicurezza relative ai laser e indossare protezioni adeguate per gli occhi.**

Advarsel **Laserstråling representerer en usynlig fare. Personellet må derfor unngå eksponering til laserstrålen. Personellet må være vel kjent med lasersikkerhetsprosedyrer og må bruke passende øyenvern før de begynner å jobbe med dette utstyret.**

Aviso **A radiação de laser representa um risco invisível, portanto deve-se evitar exposição pessoal ao feixe do laser. O pessoal deve estar qualificado em procedimentos de segurança de laser e deve usar proteção adequada para os olhos antes de trabalhar neste equipamento.**

¡Advertencia! **La radiación láser constituye un peligro invisible; por consiguiente, el personal debe evitar exponerse al haz láser. Los miembros del personal deben estar debidamente capacitados respecto de los procedimientos de seguridad cuando se trabaja con equipos láser y deben utilizar dispositivos adecuados de protección ocular antes de trabajar en este equipo.**

Varning! **Laserstrålning är en osynlig fara, så personal bör undvika att exponeras för laserstrålen. Personalen måste vara kvalificerad inom säkerhetsåtgärder för laser och måste använda korrekt ögonskydd innan arbete på denna utrustning påbörjas.**

A.2.39 Fiber Disconnect Sequence Warning

Warning **To ensure personal safety when disconnecting fiber cable, always disconnect the input connector first and then the output connector.**

Waarschuwing **De ingangsconnector dient altijd vóór de uitgangsconnector ontkoppeld te worden om de veiligheid van het personeel te garanderen bij het ontkoppelen van vezelkabels.**

Varoitus **Kuitukaapelia irrotettaessa on henkilökunnan turvallisuuden vuoksi tuloliitin irrotettava aina ensin ja sitten vasta lähtöliitin.**

Attention **Pour assurer la sécurité de votre personne lors de la déconnexion d'un câble à fibers, commencez toujours par débrancher le connecteur d'entrée puis celui de sortie.**

Warnung **Lösen Sie bei Glasfaserkabeln immer zuerst die Eingangssteckverbinder und danach die Ausgangssteckverbinder, um die persönliche Sicherheit zu gewährleisten.**

Avvertenza **Per tutelare la sicurezza personale, quando si scollega un cavo a fiber ottiche rimuovere per primo il connettore di ingresso e quindi quello di uscita.**

Advarsel **For å sikre personvern under frakopling av fiberkabler, skal inngangskoplingen frakoples først, deretter frakoples utgangskoplingen.**

Aviso **Para garantir a segurança pessoal ao desconectar o cabo de fibra, sempre desconecte o conector de entrada primeiro e depois o conector de saída.**

¡Advertencia! **A los efectos de garantizar la seguridad personal durante la desconexión de cables de fibra, desconecte primero el conector de entrada y luego el de salida.**

Varning! **För att garantera personlig säkerhet vid frånkoppling av fiberkablar ska alltid in-anslutningen kopplas ifrån först och sedan utanslutningen.**

A.2.40 Optical Connector Warning

Warning **Do not look directly at the optical connector output beams during connector removal and replacement. The beams can cause permanent eye damage.**

Waarschuwing **Kijk niet rechtstreeks in de uitgangsstralen van de optische connector tijdens het verwijderen en vervangen van de connector. De stralen kunnen permanente oogschade veroorzaken.**

Varoitus **Älä katso suoraan optisesta liittimestä tuleviin säteisiin liittimen irrotuksen ja vaihdon aikana. Säteet voivat aiheuttaa pysyviä silmävaurioita.**

Attention **Ne regardez jamais directement les faisceaux de sortie d'un connecteur optique lors du retrait et du remplacement de ce dernier. Les rayonnements risquent d'endommager irrémédiablement votre vue.**

Warnung **Sehen Sie nicht direkt in die Strahlen am Ausgang des optischen Steckverbinders, während Sie den Steckverbinder entfernen oder ersetzen. Die Strahlen können bleibende Augenschäden hervorrufen.**

Avvertenza **Durante la rimozione e la sostituzione dei connettori ottici, evitare di guardare direttamente i raggi laser in uscita dal connettore stesso. I raggi laser possono provocare lesioni permanenti agli occhi.**

Advarsel **Ikke se direkte på utgangsstrålene i den optiske koplingen ved fjerning og utskifting av koplinger. Strålene kan forårsake varige øyenskader.**

Aviso **Não olhe diretamente para os feixes de saída do conector óptico durante a remoção e a substituição do conector. Os feixes podem causar danos permanentes aos olhos.**

¡Advertencia! **No mire directamente hacia los haces de salida del conector óptico durante la remoción y reemplazo del conector. Los haces pueden causar daños oculares irreversibles.**

Varning! **Titta aldrig rakt in i den optiska kontaktens strålar vid borttagning och byte av kontakt. Strålarna kan orsaka permanenta ögonskador.**

A.2.41 Optical Connector Disconnect Warning

Warning **Cap the end of a disconnected output connector immediately to disable the live laser signal to avoid possible eye damage and protect the connector from contamination.**

Waarschuwing **Dek het uiteinde van de ontkoppelde uitgangsconnector onmiddellijk af om het onder spanning staande lasersignaal te inactiveren om mogelijke schade aan de ogen te vermijden en om de connector te beschermen tegen contaminatie.**

Varoitus **Estä lasersignaalin kulku sulkemalla irrotetun tuloliittimen pää välittömästi silmävaurioiden estämiseksi ja liittimen suojaamiseksi lialta.**

Attention **Couvrez immédiatement l'extrémité d'un connecteur de sortie débranché pour désactiver le signal laser actif, afin d'éviter tout risque d'endommagement de la vue et de protéger le connecteur de toute contamination.**

Warnung **Verschließen Sie das Ende eines gelösten Ausgangssteckverbinders sofort mit einer Kappe, um das vorhandene Lasersignal zu deaktivieren und möglichen Augenschäden vorzubeugen und um den Steckverbinder vor Verunreinigung zu schützen.**

Avvertenza **Per evitare lesioni agli occhi e proteggere il connettore da contaminazione, coprire immediatamente i connettori di uscita scollegati in modo da bloccare il segnale laser attivo.**

Advarsel **En frakoplet utgangskopling skal øyeblikkelig forsynes med hette for å deaktivere det aktive lasersignalet for derved å unngå eventuell øyenskade og beskytte koplingen mot kontaminering.**

Aviso **Tampe imediatamente a extremidade de um conector de saída desconectado para desativar o sinal de laser ativo e evitar possíveis danos aos olhos e proteger o conector contra contaminação.**

¡Advertencia! **Cubra inmediatamente el extremo de los conectores de salida que estén desconectados para así desactivar la señal activa de láser, evitar la posibilidad de daños oculares y proteger el conector contra la contaminación.**

Varning! **Täck änden på en frånkopplad kontakt omedelbart för att sätta lasersignalen ur stånd så att eventuella ögonskador förhindras, och för att skydda kontakten så att den inte blir smutsig.**

A.2.42 Eye Damage Warning

Warning **Protective glasses such as the Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle, LGW Wraparound, or LGF Full-View) or an equivalent type of covering equipment with optical density greater than 2 should be used. See your laser safety officer.**

Waarschuwing **Beschermingsbrillen zoals de Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle, LGW wraparound of LGF Full-View) of soortgelijke oogbescherming met een optische dichtheid van meer dan 2 dient te worden gebruikt. Neem contact op met uw veiligheidsexpert.**

Varoitus **Suojalaseja, kuten Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle, LGW Wraparound tai LGF Full-View) tai vastaavantyyppistä peittävää välinettä, jonka optinen tiheys yli 2, on käytettävä. Ota yhteys laserturvallisuudesta vastaavaan henkilöön.**

Attention **Il convient de porter des lunettes de protection des modèles suivants : Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle, LGW Wraparound ou LGF Full-View) ou un équipement de protection équivalent caractérisé par une densité optique supérieure à 2. Consultez le spécialiste en sécurité laser de votre site.**

Warnung **Verwenden Sie Schutzbrillen wie die Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle, LGW Wraparound oder LGF Full-View) oder einen entsprechenden Augenschutz mit einer optischen Dichte größer als 2. Wenden Sie sich an den Beauftragten für Lasersicherheit.**

Avvertenza **È necessario utilizzare occhiali protettivi quali Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle. LGW Wraparound o LGF Full-View) o un dispositivo di protezione di tipo equivalente con densità ottica superiore a 2. Consultare il responsabile per la sicurezza laser.**

Advarsel **Det bør brukes vernebriller av typen Laser-Gard Green CO2 (LGE-briller, LGS vernebriller, LGW buede briller eller LGF full synsvinkel) eller tilsvarende type verneutstyr med optisk tetthet høyere enn 2. Ta kontakt med representanten for lasersikkerhet.**

Aviso **Deve-se usar óculos protetores como o Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle, LGW Wraparound ou LGF Full-View) ou um tipo equivalente de equipamento de cobertura com densidade óptica maior que 2. Consulte seu agente de segurança de laser.**

¡Advertencia! **Se deben utilizar anteojos de protección ocular tales como el Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle, LGW Wraparound o LGF Full-View) o un tipo equivalente de equipo de cobertura con una densidad óptica mayor que 2. Consulte al encargado de seguridad.**

Varning! **Skyddsglasögon av typen Laser-Gard Green CO2 (LGE Spectacle, LGS Goggle. LGW Wraparound eller LGF Full-View) eller motsvarande typ av täckande utrustning med en optisk densitet högre än 2 bör användas. Kontakta ansvarig för lasersäkerheten.**

A.2.43 Static Electricity Warning

Warning **Static electricity can damage electro-optical modules. While handling electro-optical module, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.**

Waarschuwing **Statische elektriciteit kan elektro-optische modules beschadigen. Bij het hanteren van een electro-optische module dient u een geaarde polsband te dragen om de statische opeenhoping te ontladen. Polsbanden zijn ontworpen om schade van statische elektriciteit aan de apparatuur te voorkomen.**

Varoitus **Staattinen sähkö voi vahingoittaa sähköoptisia moduuleja. Sähköoptista moduulia käsiteltäessä on käytettävä maadoitusranneketta, joka purkaa kertyneen staattisen sähkön. Rannekkeet on tehty estämään staattisen sähkön aiheuttama laitteiden vahingoittuminen.**

Attention **Les décharges électrostatiques risquent d'endommager les modules électro-optiques. Lors de toute manipulation d'un module électro-optique, portez toujours un bracelet de protection antistatique pour décharger l'énergie statique accumulée. Ces bracelets antistatiques sont conçus pour empêcher tout dommage matériel dû aux décharges électrostatiques.**

Warnung **Statische Elektrizität kann zu Schäden an elektro-optischen Modulen führen. Tragen Sie ein Erdungsarmband, wenn Sie statische Energie entladen, während Sie mit elektro-optischen Modulen hantieren. Erdungsarmbänder schützen das Gerät vor Schäden durch statische Elektrizität.**

Avvertenza **L'elettricità statica può danneggiare i moduli elettro-ottici. Per evitare l'accumulo di elettricità statica durante la manipolazione di un modulo elettro-ottico, indossare una fascia da polso per il collegamento a massa. Le fasce da polso sono progettate appositamente per prevenire i danni alle apparecchiature causati dall'elettricità statica.**

Advarsel **Statisk elektrisitet kan skade elektro-optiske moduler. Bruk jordet håndleddstropp ved håndtering av elektro-optiske moduler for å lade ut statisk opplading. Håndleddsstropper er framstilt for å forhindre skader på utstyret forårsaket av statisk elektrisitet.**

Aviso **A eletricidade estática pode danificar módulos eletro-ópticos. Ao manusear um módulo eletro-óptico, use uma pulseira de aterramento para descarregar o acúmulo de estática. As pulseiras são projetadas para evitar danos ao equipamento por eletricidade estática.**

¡Advertencia! **La electricidad estática puede dañar los módulos electro-ópticos. Al manipular módulos electro-ópticos, lleve puesta una pulsera de conexión a tierra para descargar la acumulación de electricidad estática. Las pulseras de descarga a tierra están diseñadas para prevenir daños a los equipos a causa de la electricidad estática.**

Varning! **Statisk elektricitet kan skada elektro-optiska moduler. Vid hantering av elektro-optiska moduler, använd ett jordande armband för att ladda ur statisk elektricitet som byggs upp. Armbanden är utformade för att förhindra skador på utrustning orsakade av statisk elektricitet.**

A.2.44 Connector Cleaning Warning

Warning **Be sure that the module is off and the laser is powered down before attempting to clean a connector. If you do not turn off and protect the module, you create a permanent health risk for yourself and others, and a risk of permanent connector damage.**

Waarschuwing **Zorg dat de module uit is en de laser uitgeschakeld is voordat u een connector probeert schoon te maken. Als u de module niet uitschakelt en beschermt, kan dit leiden tot een permanent gezondheidsrisico voor uzelf en anderen en kans op permanente schade aan de connector.**

Varoitus **Varmista, että moduuli on pois päältä ja ettei laseriin tule virtaa, ennen kuin yrität puhdistaa liitintä. Jos et kytke moduulia pois päältä ja suojaa sitä, voit altistaa itsesi ja muut pysyville terveyteen kohdistuville haittavaikutuksille sekä aiheuttaa pysyviä vaurioita liittimelle.**

Attention **Assurez-vous que le module est désactivé et que le laser est mis hors tension avant d'essayer de nettoyer un connecteur. Si vous omettez de protéger le module en le mettant hors tension, vous créez un risque de sécurité physique permanent pour vos collègues et vous-même, tout en risquant d'endommager irrémédiablement le connecteur.**

Warnung **Vergewissern Sie sich, dass das Modul ausgeschaltet und der Laser deaktiviert ist, bevor Sie versuchen, einen Steckverbinder zu reinigen. Wenn Sie das Modul nicht ausschalten und abschirmen, erzeugen Sie ein dauerhaftes Gesundheitsrisiko für sich und andere und riskieren eine permanente Schädigung des Steckverbinders.**

Avvertenza **Prima di pulire un connettore assicurarsi che il modulo sia spento e che il laser non sia alimentato. Se non si spegne e non si protegge il modulo esistono rischi relativi all'incolumità personale e di altri, nonché il pericolo di danni permanenti al connettore.**

Advarsel **Påse at modulen er slått av og at laseren også er slått av før rengjøring av en kopling. Hvis du ikke slår av og beskytter modulen, utgjør du en permanent helserisiko for deg selv og andre, i tillegg til permanent skade på koplingen.**

Aviso **Verifique se o módulo e o laser estão desligados antes de tentar limpar um conector. Se você não desligar e proteger o módulo, irá criar um risco permanente à saúde para você e para outros, e um risco de dano permanente no conector.**

¡Advertencia! **Asegúrese de que el módulo y el láser estén apagados antes de intentar limpiar los conectores. Si no apaga y protege el módulo, corre el riesgo de dañar irreversiblemente no sólo los conectores, sino también su salud y la de los demás.**

Varning! **Se till att modulen är avstängd och att lasern har en lägre effekt före rengöring av kontakter. Om man inte stänger av och skyddar modulen skapar man en permanent hälsorisk för sig själv och andra, samt en risk för permanenta skador på kontakten.**

A.2.45 Cable Connection Sequence Warning

Warning **To ensure personal safety when reconnecting fiber cables, always reconnect the output connectors first before the input connectors.**

Waarschuwing **De uitgangsconnectors dienen altijd vóór de ingangsconnectors opnieuw aangesloten te worden, om de veiligheid van het personeel te garanderen bij het opnieuw aansluiten van vezelkabels.**

Varoitus **Kuitukaapeleita kytkettäessä on henkilökunnan turvallisuuden vuoksi lähtöliittimet kytkettävä aina ensin ennen tuloliittimiä.**

Attention **Pour assurer la sécurité de votre personne lors de la reconnexion de câbles à fibers, commencez toujours par reconnecter les connecteurs de sortie avant ceux d'entrée.**

Warnung **Verbinden Sie immer zuerst die Ausgangssteckverbinder und erst danach die Eingangssteckverbinder, um die persönliche Sicherheit beim erneuten Verbinden von Glasfaserkabeln zu gewährleisten.**

Avvertenza **Per tutelare la sicurezza personale quando si collega un cavo a fiber ottiche, collegare per primo il connettore di uscita e quindi quello di ingresso.**

Advarsel **For å sikre personvernet under gjeninnkopling av fiberkabler, må du alltid gjeninnkople utgangskoplingene før inngangskoplingene.**

Aviso **Para garantir a segurança pessoal ao reconectar cabos de fibra, sempre reconecte os conectores de saída primeiro, antes dos conectores de entrada.**

¡Advertencia! **A los efectos de garantizar la seguridad personal al volver a conectar cables de fibra, reconecte primero los conectores de salida y luego los de entrada.**

Varning! **För att garantera personlig säkerhet vid återanslutning av fiberkablar ska man alltid koppla tillbaka ut-anslutningen först och sedan in-anslutningen.**

A.2.46 Module Removal Warning

Warning **Removal of common modules causes traffic failure. Obtain proper authorization prior to any maintenance work.**

Waarschuwing **Het verwijderen van gemeenschappelijke modules leidt tot verkeersstoring. Zorg dat u de juiste autorisatie hebt alvorens onderhoud te verrichten.**

Varoitus **Yhteismoduulien poistaminen aiheuttaa liikennehäiriöitä. Hanki asianmukainen lupa ennen kunnossapitoa.**

Attention **Le retrait de modules communs risque de provoquer un arrêt accidentel du trafic. Veillez à obtenir les autorisations appropriées avant de procéder à tout travail de maintenance.**

Warnung **Durch das Entfernen von gemeinsamen Modulen wird der Verkehr unterbrochen. Holen Sie eine offizielle Genehmigung ein, bevor Sie irgendwelche Wartungsarbeiten durchführen.**

Avvertenza **La rimozione dei moduli comuni provoca l'interruzione del traffico. Prima di qualsiasi intervento di manutenzione, è necessario disporre della relativa autorizzazione.**

Advarsel **Fjerning av fellesmoduler forårsaker trafikksvikt. Du må innhente autorisasjon før du foretar vedlikeholdsarbeider.**

Aviso **A remoção dos módulos comuns causa falha de tráfego. Obtenha a autorização adequada antes de qualquer trabalho de manutenção.**

¡Advertencia! **La remoción de módulos comunes conlleva a fallas de tráfico. Obtenga la debida autorización antes de realizar tareas de mantenimiento.**

Varning! **Borttagning av gemensamma moduler orsakar trafikstopp. Skaffa korrekt behörighet före eventuellt underhållsarbete.**

A.2.47 DC Power SELV Requirement Warning

Warning **The DC power supply systems (main, redundant, and service battery power supply systems) must be compliant with Safety Extra-Low Voltage (SELV) requirements in accordance with IEC 60950 and UL 60950.**

Waarschuwing **De toevoersystemen van de gelijkstroom (hoofdtoevoersystemen, redundante en toevoersystemen voor de servicebatterij) dienen te voldoen aan de SELV (Safety Extra-Low Voltage) vereisten in overeenstemming met IEC 60950 en UL 60950.**

Varoitus **Tasavirtavoimaverkkojen (pää-, varmennus- ja käyttöakkuvirtajärjestelmät) on noudatettava suojattuja erittäin alhaisia jännitteitä (SELV) koskevia vaatimuksia standardien IEC 60950 ja UL 60950 mukaisesti.**

Attention **Les systèmes d'alimentation en courant continu (systèmes principal, de secours et d'alimentation électrique d'entretien sur piles) doivent être conformes aux critères SELV (Safety Extra Low Voltage) tels qu'ils sont définis dans les normes IEC 60950 et UL 60950.**

Warnung **Die Systeme für die Gleichstromversorgung (Haupt-, redundante und Wartungsbatterie-Stromversorgungssysteme) müssen den Anforderungen für besonders niedrige Spannungen (SELV) nach den Richtlinien IEC 60950 und UL 60950 entsprechen.**

Avvertenza **I sistemi di alimentazione CC (sistema principale, di riserva e di alimentazione della batteria di servizio) devono essere conformi ai requisiti delle tensioni di sicurezza a basso voltaggio (SELV, Safety Extra Low Voltage) in conformità alle norme IEC 60950 e UL 60950.**

Advarsel **Likestrømsystemet (hovedledning, redundant og strøm fra servicebatterisystemet) må samsvare med sikkerhets-lavspenning (SELV)-kravene i henhold til IEC 60950 og UL 60950.**

Aviso **Os sistemas de fonte de alimentação CC (sistemas de fontes de alimentação principal, redundante e de bateria de serviço) devem ser compatíveis com os requisitos SELV (Safety Extra-Low Voltage, tensão de segurança extra baixa) de acordo com as normas IEC 60950 e UL 60950.**

¡Advertencia! **Los sistemas de suministro de alimentación de CC (sistemas de alimentación principal, redundante y de batería de servicio) deben cumplir los requerimientos de voltaje de seguridad extra bajo (SELV) de conformidad con IEC 60950 y UL 60950.**

Varning! **Matarsystemen för likström (huvud-, tilläggs- och servicebatterisystem) måste följa kraven för SELV (Safety Extra-Low Voltage) i enlighet med IEC 60950 och UL 60950.**

A.2.48 Reinforced Insulation Warning

Warning **The customer site 48 VDC power supply systems (main, redundant, and service battery power supply systems) must provide reinforced insulation (RI) between the primary AC power supply and the 48 VDC output in accordance with IEC 60950 and UL 60950.**

Waarschuwing **De toevoersystemen van 48 VDC op de locatie van de klant (hoofdtoevoersystemen, redundante en toevoersystemen voor de servicebatterij) dienen versterkte isolatie (RI) te verschaffen tussen de primaire wisselstroomtoevoer en de 48 VDC uitgang in overeenstemming met IEC 60950 en UL 60950.**

Varoitus **Asiakkaan puolen 48 V:n tasavirtavoimaverkoissa (pää-, varmennus- ja käyttöakkuvirtajärjestelmät) on oltava vahvistettu eristys (RI) ensisijaisen vaihtovirtalähteen ja 48 V:n tasavirtaulostulon välillä standardien IEC 60950 ja UL 60950 mukaisesti.**

Attention **Les systèmes d'alimentation en courant continu de 48 V cc du site client (systèmes principal, de secours et d'alimentation électrique d'entretien sur piles) doivent fournir une isolation renforcée (RI, de l'anglais Reinforced Insulation) entre la principale source d'alimentation en ca et la sortie de 48 V cc, conformément aux normes IEC 60950 et UL 60950.**

Warnung **Die 48-Volt-Gleichstromsysteme am Kundenstandort (Haupt-, redundante und Wartungsbatterie-Stromversorgungssysteme) müssen über eine verstärkte Isolierung (Reinforced Insulation, RI) zwischen der Haupt-Wechselstromquelle und dem 48-Volt-Ausgang entsprechend den Richtlinien IEC 60950 und UL 60950 verfügen.**

Avvertenza **I sistemi di alimentazione a 48 V CC nella sede del cliente devono disporre di dispositivi di isolamento supplementare (RI, Reinforced Insulation) tra l'alimentazione CA principale e l'uscita a 48 V CC, in conformità a quanto previsto dalle norme IEC 60950 e UL 60950.**

Advarsel **Kundestedets 48 V likestrøms forsyningssystem (hovedledning, redundant og strøm fra servicebatterisystemet) må gi forsterket isolasjon mellom den primære vekselstrømforsyningen og 48 V likestrøm utgangseffekt i henhold til IEC 60950 og UL 60950.**

Aviso **Os sistemas de fonte de alimentação de 48 VCC das instalações do cliente (sistemas de fontes de alimentação principal, redundante e de bateria de serviço) devem oferecer isolamento reforçado (RI) entre a fonte de alimentação CA primária e a saída de 48 VCC de acordo com as normas IEC 60950 e UL 60950.**

¡Advertencia! **Los sistemas de suministro de alimentación de 48 VCC del sitio del cliente (sistemas de alimentación principal, redundante y de batería de servicio) deben contar con aislamiento reforzado (RI) entre la fuente principal de alimentación de CA y la salida de 48 VCC, de conformidad con IEC 60950 y UL 60950.**

Varning! **Kundens 48 VDC matarsystem (huvud-, tilläggs- och servicebatterisystem) måste ha förstärkt isolering (RI) mellan huvudväxelströmskällan och 48 VDC-uteffekten i enlighet med IEC 60950 och UL 60950.**

A.2.49 Power Supply Voltage Warning

Warning **Abnormal power supply voltage must not exceed –60.0 VDC.**

Waarschuwing **Abnormale stroomtoevoerspanning mag –60,0 VDC niet overschrijden.**

Varoitus **Poikkeava syöttöjännite ei saa olla yli –60,0 VDC.**

Attention **La tension d'alimentation électrique anormale ne peut dépasser –60 V cc.**

Warnung **Spannungsabweichungen bei der Stromversorgung dürfen maximal 60,0 Volt Gleichspannung nicht überschreiten.**

Avvertenza **L'ampiezza delle anomalie nella tensione di alimentazione non deve superare –60 V CC.**

Advarsel **Abnormal strømforsyningsspenning må ikke overstige –60,0 V likestrøm.**

Aviso **A tensão anormal da fonte de alimentação não deve exceder –60.0 VCC.**

¡Advertencia! **El voltaje anormal de la fuente de alimentación no debe ser mayor que –60 VCC.**

Varning! **Avvikande matarspänning får inte överstiga –60,0 VDC.**

A.2.50 DC Power Supply Connection Warning

Warning **Wire the DC power supply using the appropriate lugs at the wiring end, or with no lugs, as indicated in the Power Distribution Panel Cabling section.**

Waarschuwing **Bedraad de wisselstroomtoevoer met de juiste aansluitingen aan het draaduiteinde of zonder aansluitingen, zoals aangegeven in de sectie Power Distribution Panel Cabling (Bekabeling van het stroomdistributiepaneel).**

Varoitus **Kytke johdot tasavirtalähteeseen käyttämällä sopivia korvakkeita johtojen päässä tai ilman korvakkeita voimavirtapaneelin kaapelointia käsittelevän osan ohjeiden mukaisesti.**

Attention **Câblez l'alimentation en courant continu (cc) à l'aide des écrous de câblage appropriés à l'extrémité de câblage, voire sans écrous, comme l'indique la section consacrée au câblage du panneau de distribution de l'alimentation (Power Distribution Panel Cabling).**

Warnung **Verkabeln Sie die Gleichstromversorgung mit den erforderlichen Kabelschuhen an den Drahtenden bzw. ohne Kabelschuhe, wie im Abschnitt zur Stromverteilerverkabelung beschrieben.**

Avvertenza **Collegare l'alimentatore CC utilizzando i capicorda appropriati all'estremità o senza capicorda, secondo quanto indicato nella sezione relativa al cablaggio del pannello di distribuzione dell'alimentazione (Power Distribution Panel).**

Advarsel **Legg opp kablene for likestrømforsyningen med egnede kabelsko på kabelenden, eller uten kabelsko, som angitt i seksjonen Strømdistribusjon - Tavlekabling.**

Aviso **Ligue a fonte de alimentação CC utilizando os terminais apropriados na extremidade de fiação ou sem terminais, conforme indicado na seção de Cabeamento do painel de distribuição de energia.**

¡Advertencia! **Conecte la fuente de alimentación de CC utilizando los conectores adecuados en el extremo del cableado, o sin utilizar conector alguno como se indica en la sección Cableado del panel de distribución de alimentación.**

Varning! **Koppla likströmsförsörjningen med lämpliga kabelskor i kopplingsänden, eller utan kabelskor, så som visas i sektionen Power Distribution Panel Cabling strömkablar för panelen.**