

LambdaXtreme[®] Transport

Release 8.0

User Operations Guide

365-575-799R8.0
Issue 1
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Alcatel-Lucent - Proprietary

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NOTE: This equipment is designed to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause interference to radio communications. Operation of this equipment in a residence is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

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In rare instances, unauthorized individuals make connections to the telecommunications network. In such an event, applicable tariffs require that the customer pay all network charges for traffic. Alcatel-Lucent and its predecessors cannot be responsible for such charges and will not make any allowance or give any credit for charges that result from unauthorized access.

Limited Warranty

For terms and conditions of sale, contact your Alcatel-Lucent Account Team.

Ordering information

The ordering number for this information product is 365-575-799R8.0. For ordering information, refer to the "About this information product" chapter.

Technical support

The Alcatel-Lucent Customer Technical Assistance Management (CTAM) provides a technical assistance telephone number that is monitored 24 hours a day. For technical assistance in the continental U.S., call 1-866-582-3688 and select the appropriate prompt. Outside the continental U.S., please call 1-630-224-4672.

Information product support

Alcatel-Lucent provides a referral telephone number for support. Use this number to report errors or to ask questions about the information product. This is a non-technical number. The telephone number is 1-866-582-3688.

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About this information product

Purpose

The *LambdaXtreme® Transport User Operations Guide, Release 8.0* provides information a user needs to operate the LambdaXtreme® Transport system including provisioning equipment, establishing optical channel connections, and using the LambdaXtreme® Transport Craft Interface Terminal (CIT).

Reason for reissue

This document is reissued to support LambdaXtreme® Transport Release 8.0. The following new features are supported in Release 8.0:

- UPOP 1+1 Protection, support for all OT types (40G packs and 10G packs)
- Software support for OTN client for OT(40G XFP MUX Tunable) and OT(40G ADD-DROP Tunable)
- New OT pack, WWCL03 appcode version of the OT(10G XFP ADD-DROP Tunable) that supports everything that the current OT(10G XFP ADD-DROP Tunable) pack supports, plus overclocking for 10GbE LAN PHY signals and standard GFP and other mappings.
- Two new client signal types, 11.049 and 11.096
- Two new provisionable OT port parameters, TRANSMAPMODE and EX_PTI. Provisionable Payload type field to support proprietary mappings for OT(10G XFP OC ADD-DROP Tunable) packs (Interworking requirement)
- Security Enhancements and Password Rule Enhancement
- Support a string parameter value for PM Baselineing “reason” parameter
- Dangling CRS
- TL1 Split for Security, ENCRYPTION parameter value changes
- Deny Optimum High Power XFP in 40G MUX OT and deny XFP pluggable module that cannot support overclocked modes
- Alcatel-Lucent logo changes
- New B coded appcode Line out OAs (with VOAs at SUPRX port)
- Additional Debug Commands using TL1

- 40G: ENT-TRAILTRC is denied for OUT_DROP port
- OT: ODUkP TX SAPI to the same value as the OTUK SAPI in error
- Alarm condition to indicate TDC tuning in Progress for 40G OTs
- New Failed Backup database Alarm (alarmID=BKUPCOMFD)
- Remove obsolete alarms
- Increased History Log buffer
- Operational Consistency for OM (50G Offset) extraction
- Power Boost
-
- In-service upgrades from R7.0.1 to R8.0, and from R6.0.7 to R8.0

Software-only and SCOT features:

- Change Ripple Algorithm to handle low OT Input Power
- Mini-WXC Transient improvements
- Retrieve BLKR HW settings through FACT-UTIL
- FACT-UTIL timeout
- Retrieve OM VMUX/BLKR settings through FACT-UTIL

CIT features:

- CIT OMON analysis
- CIT ODUkP Trail Trace Change

Safety information

This information product contains hazard statements for your safety. Hazard statements are given at points where safety consequences to personnel, equipment, and operation may exist. Failure to follow these statements may result in serious consequences.

Intended audience

This manual is intended primarily for individuals in the field of telecommunications and for communications network providers.

Descriptive material in this document may be used by anyone desiring specific information or knowledge on the operational functions and features of LambdaXtreme® Transport.

Procedural tasks in this document are written primarily for personnel responsible for the operation and maintenance of LambdaXtreme® Transport.

How to use this information product

The chapters in this document provide the following information:

[Chapter 2, “Introduction”](#), presents a summary description of LambdaXtreme® Transport.

[Chapter 3, “Operations”](#), describes the interfaces and software support of operations for LambdaXtreme® Transport.

[Chapter 4, “Security Administration”](#), details the security administration features in LambdaXtreme® Transport.

[Chapter 5, “Equipment Provisioning”](#), provides information for provisioning LambdaXtreme® Transport equipment.

[Chapter 6, “Establishing Connections”](#), describes the autodiscovery and autoprovisioning features of LambdaXtreme® Transport and provides information for provisioning optical channel connections.

[Chapter 7, “System Maintenance”](#), provides detailed “how to” instructions for performing basic maintenance activities on LambdaXtreme® Transport.

[Chapter 8, “Craft Interface Terminal”](#), presents a description of the LambdaXtreme® Transport Craft Interface Terminal (CIT).

[Appendix A, “Using the CIT”](#), describes step-by-step procedures for performing tasks using the LambdaXtreme® Transport CIT.

[Appendix B, “TL1 Commands”](#), provides a list of available TL1 commands and their associated procedures described in Appendix A.

The “Glossary” provides a list of common terms and acronyms.

The “Index” provides page numbers for key words and subject names.

Conventions used

The following typographical conventions are used throughout this document:

- **Bold** is used to identify CIT menu selections and button selections.
- *Italic* is used to identify NE messages
- Computer voice is used to identify system message text displayed by the CIT

Related documentation

The *LambdaXtreme® Transport User Operations Guide* is part of a set of documents that support the LambdaXtreme® Transport System. The following items are available:

Document Number	Document Title
365-575-798R8.0	<i>LambdaXtreme® Transport Applications and Planning Guide, Release 8.0</i>

Document Number	Document Title
365-575-799R8.0	<i>LambdaXtreme® Transport User Operations Guide, Release 8.0</i>
365-575-801R8.0	<i>LambdaXtreme® Transport Alarms, Messages, and Trouble Clearing Guide, Release 8.0</i>
365-575-800R8.0	<i>LambdaXtreme® Transport Installation Manual and System Turn-up Services, Release 8.0</i>
Comcode 109651059	<i>LambdaXtreme® Transport Software Release Description, Release 8.0 (on paper)</i>
Comcode 109651067	<i>LambdaXtreme® Transport Software Release Description, Release 8.0 (on CD-ROM)</i>
Comcode 109649665	Complete set of LambdaXtreme® Transport customer documentation (on paper), Release 8.0
Comcode 109651075	<i>LambdaXtreme® Transport Documentation, Release 8.0 (on CD-ROM)</i>

Related training

The Customer Training and Information Products (CTIP) Organization provides management courses for system planning, engineering, and ordering, and courses to train telecommunications technicians in installation, operations, and maintenance. Suitcasing of these courses is also available. Contact the CTIP Organization at 1-888-582-3688 to enroll in training classes or arrange suitcase sessions.

The available LambdaXtreme® Transport courses are listed in the following table.

Course Number	Course Title
LW2471	LambdaXtreme® Transport Installation and Testing
LW2071	LambdaXtreme® Transport Applications and Planning CBT
LW2671	LambdaXtreme® Transport Operations and Maintenance

Schedule and Registration

For more information or to register for any of these courses, call:

1-866-582-3688 (1-888-582-3688) and select option 2

Fax: 1-407-767-2677

Or write to:

Alcatel-Lucent

Customer Training and Information Products

240 E. Central Parkway

Altamonte Springs, FL 32701

Important! Note: Suitcasing of these courses is also available. To arrange suitcase sessions (within USA), call the Product Training Manager at 1-888-582-3688, Prompt 2 - Prompt 1.

The International registration number is: 1-407-767-2798.

Technical support telephone number

The Alcatel-Lucent Global TSS Contact Center provides a technical assistance telephone number that is monitored 24 hours a day. For technical assistance, call 1-866-582-3688 and select the appropriate prompt. Outside the continental United States, call 1-630-224-4672.

How to order

The LambdaXtreme® Transport customer documents can be ordered as individual paper or copies or as a set on a CD-ROM (see “Related Documentation”). One-time orders include a binder (if applicable) and the document contents for the current issue in effect at the time of the order. Also, placement on the standing order list for all later reissues of the document may be requested. The standing order list for each document provides automatic distribution of all reissues of the document.

Important! For commercial customers, a credit card is required for orders totaling \$1000 or less. Visa, Mastercard, and American Express are accepted. Prepayment by check is also acceptable. Orders totaling over \$1000 may be paid for using credit card, check, or invoice upon receipt of a purchase order. Orders placed by Lucent Associates are billed using the cost center.

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1 Safety

Overview

Purpose

This chapter describes the LambdaXtreme® Transport safety features.

Contents

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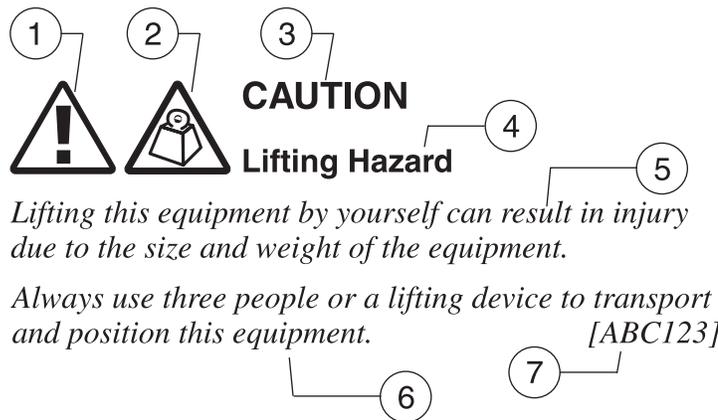
Structure of hazard statements

Overview

Hazard statements describe the safety risks relevant while performing tasks on Alcatel-Lucent products during deployment and/or use. Failure to avoid the hazards may have serious consequences.

General structure

Hazard statements include the following structural elements:



Item	Structure element	Purpose
1	Personal-injury symbol	Indicates the potential for personal injury (optional)
2	Hazard-type symbol	Indicates hazard type (optional)
3	Signal word	Indicates the severity of the hazard
4	Hazard type	Describes the source of the risk of damage or injury
5	Damage statement	Consequences if protective measures fail
6	Avoidance message	Protective measures to take to avoid the hazard
7	Identifier	The reference ID of the hazard statement (optional)

Signal words

The signal words identify the hazard severity levels as follows:

Signal word	Meaning
DANGER	Indicates an imminently hazardous situation (high risk) which, if not avoided, will result in death or serious injury.
WARNING	Indicates a potentially hazardous situation (medium risk) which, if not avoided, could result in death or serious injury.
CAUTION	<i>When used with the personal injury symbol:</i> Indicates a potentially hazardous situation (low risk) which, if not avoided, may result in personal injury. <i>When used without the personal injury symbol:</i> Indicates a potentially hazardous situation (low risk) which, if not avoided, may result in property damage, such as service interruption or damage to equipment or other materials.



Lightwave Safety Guidelines

General Laser Information

The LambdaXtreme® Transport uses semiconductor laser transmitters that emit light at wavelengths between approximately 1300 nanometers (nm) and 1608 nm. The emitted light is above the red end of the visible spectrum, which is normally not visible to the human eye. Although radiant energy at near-infrared wavelengths is officially designated invisible, some people can see the shorter wavelength energy even at power levels several orders of magnitude below any that have been shown to cause injury to the eye.

Conventional lasers can produce an intense beam of monochromatic light. Monochromatic light is a single wavelength output of pure color that may be visible or invisible to the eye. A conventional laser produces a small-size beam of light, and because the beam size is small the power density (also called irradiance) is very high. Consequently, lasers and laser products are subject to federal and applicable state regulations as well as international standards for their safe operation.

A conventional laser beam expands very little over distance or is said to be very well collimated. Thus, conventional laser irradiance remains relatively constant over distance. However, lasers used in lightwave systems have a large beam divergence, typically 10 to 20 degrees. Here, irradiance obeys the inverse square law, which states that doubling the distance reduces the irradiance by a factor of 4 and rapidly decreases over distance.

Lasers and Eye Damage

Light energy emitted by laser and high-radiance light-emitting diodes (LEDs) in the 400 to 1400 nm range may cause eye damage if absorbed by the retina. When a beam of light enters the eye, the eye focuses the energy, magnifying the irradiance. The irradiance of the energy that reaches the retina is approximately 10^5 or 100,000 times that at the cornea, and if sufficiently intense, may cause a retinal burn.

The damage mechanism at the wavelengths used in telecommunications is thermal in origin (for example, damage caused by heating). Therefore, a specific amount of energy is required for a definite time to heat an area of retinal tissue. Damage is not instantaneous. It occurs only when one looks at the light sufficiently long enough that the product of the retinal irradiance and the viewing time exceeds the damage threshold. Light energies above 1400 nm would cause surface and skin burns and do not affect the retina. The thresholds for injury at wavelengths greater than 1400 nm are significantly higher than for wavelengths in the retinal hazard region.

Classification of Lasers

Manufacturers of lasers and laser products in the United States are regulated by the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) under 21 CFR 1040. These regulations require manufacturers to certify each laser or laser product as belonging to one of six Classes: I, II, IIa, IIIa, IIIb, and IV. The International Electro-technical Commission (IEC) is an international standards body that writes laser safety standards under IEC-60825. Classification schemes are similar with Classes divided into Classes 1, 1M, 2, 2M 3R, 3B, and 4. Lasers are classified according to the accessible emission limits and their potential for causing injury. Lightwave systems are generally classified as Class I / 1, because, under normal operating conditions, all energized laser transmitting circuit packs are terminated on optical fibers, which enclose the laser energy with the fiber sheath forming a protective housing. Also, covers are in place over the circuit pack shelves. The circuit packs themselves, however, may be FDA/CDRH Class I, IIIb, or IV; or IEC Class 1, 1M, 3R, 3B or 4. The use of state of the art optical amplification technologies has now extended into the Class IV / 4 designations for some of the circuit packs.

Lightwave Safety Precautions

Under normal operating conditions, LambdaXtreme® Transport is totally enclosed and presents no risk of eye injury. It is a Class I system under the FDA/CDRH regulations and is a Laser Class 1M laser product according to the IEC-60825 safety standard equipment classification.

The lightguide cables that interconnect various components of a lightwave system can disconnect or break and may expose people to lightwave emission. Also, certain measures and maintenance procedures may expose the technician to emission from the semiconductor laser during installation and servicing. Unlike more familiar laser devices, such as solid-state and gas lasers, the emission pattern of a semiconductor laser results in a highly divergent beam. In a divergent beam, the irradiance (power density) decreases rapidly with distance. The greater the distance, the less energy will enter the eye and the less potential risk for eye injury.

Inadvertently viewing an unterminated fiber or damaged fiber in LambdaXtreme® Transport with the unaided eye at distances greater than 10 inches (25 centimeters) will not cause eye injury. However, damage may occur if an optical instrument such as a microscope, magnifying glass, or eye loupe is used to stare at the energized fiber end.



Use of controls, or adjustments, or performance of procedures other than those specified herein may result in hazardous laser radiation exposure.

Make sure to adhere to all the precautions indicated in this chapter.

Under normal operating conditions, LambdaXtreme® Transport is completely enclosed; nonetheless, the following precautions should be observed:

- Technicians should neither disconnect any lightwave cable nor splice or stare into the optical connectors terminating the cables because of the potential for eye damage.
- Under no circumstance should lightwave/lightguide operations be performed by a technician before satisfactorily completing an approved training course.
- Since viewing lightwave emissions directly in excess of Class I / 1M with an optical instrument such as an eye loupe greatly increases the risk of eye damage, an appropriate laser safety label must appear in plain view on the front of the main frame or lightguide termination/interconnection equipment.

Automatic Power Reductions

An Automatic Power Reduction (APR) feature brings the optical amplifier output power and Raman pump output power to safe levels in the event of a fiber cut, removed connector or equipment failure. The main concerns with respect to time to reduce power are human safety and prevention of optical surges. Once the system has been repaired or links have been re-established, the feature also ensures restoration to normal operation.



Automatic Power Reduction (APR) is provided by the software in the LambdaXtreme® Transport system and requires coordination across circuit packs in some instances. APR functionality will not be available for a limited duration during the reboot of specific key controllers in the system. Once the reboot is complete, APR will again be available. Therefore, activities that may result in opening of fibers should wait until the reboot is complete before proceeding. Consult Chapter 4 of this guide for a detailed description of the APR feature.

For scenarios in which APR is not available, see “Situations when APR is not Available” later in this section. See also “Protection Against Unintended Disconnect of Optical Connectors” later in this section. Become familiar with the two to avoid injury.

During service, maintenance, or restoration, observe the following precautions:

- Only authorized, trained personnel should be permitted to service, maintain, and restore the system.
- Follow all product safety warnings and instructions on labels and in equipment manuals.
- Avoid exposing the eye to emissions from unterminated, energized optical connectors at distances less than 10 inches (25 centimeters).

- De-energize fibers before removing them from equipment bays, circuit packs, cross-connects.
- Cover ends of unterminated fibers/connectors with splice protectors, or end caps.
- Inform other personnel working on the system of any circumstance of reboot.
- Laser modules associated with the optical ports of laser circuit packs are typically recessed, which limits the exposure distance. Optical port shutters and APR are engineering controls that are also used to limit the emissions. Avoid looking directly at the end of a fiber or connector. View fibers only with indirect image converting devices (for example, camera view), or with properly filtered optical instructors (for example, fiber scopes containing filter material). (Normal eyewear or indirect viewing instruments, such as Find-R-Scope's infrared optical viewers, are not considered magnifying lenses or optical instruments.)
- Only authorized, trained personnel should use the lightwave test equipment during installation or servicing, since this equipment contains semiconductor lasers. Some examples of lightguide test equipment are Optical Time Domain Reflectometers (OTDRs), Hand-Held Loss Test Sets, and Feature Finders.
- Treat optical test set equipment [loss test sets, Optical Time Domain Reflectometer (OTDR)] in the same way as a component of the system.
- Under no circumstances should any personnel scan a fiber with an optical test set without verifying that all lightwave sources on the fiber are turned off.
- All unauthorized personnel should be excluded from the immediate area of lightwave transmission systems during installation and service.

Consult *ANSI Z136.1, American National Standard for Safe Use of Lasers* in the U.S., or outside the U.S., *IEC-60825, Part 2*, for additional guidance on the safe use of optical fiber optic communication systems in the workplace.

Protection Against Unintended Disconnect of Optical Connectors

Switch protected connectors prevent the user from being exposed to high optical power in case the connector is detached. The mechanical switch that is part of the connector assembly triggers Automatic Power Reduction (APR).

Latch protected connectors prevent the user from being exposed to high optical power by blocking access to the connector before the power is reduced to acceptable levels. The presence of the latch in front of the connector forces the user to unseat the circuit pack (that is, power it down) before disconnecting the fiber jumper.

APR Laser Safety

Certain laser circuit packs internal to LambdaXtreme® Transport are capable of producing laser emissions at Class IV/4 levels. During normal operation, the system is software-controlled. Automatic Power Reduction (APR) powers-down the system during fiber disconnect or break. The optical power of the system is reduced to levels

that are not hazardous to the unaided eye. APR is a safety feature of the system which is available during normal operation. However, during certain system assembly, test, installation, service or maintenance procedures, APR software may be absent or disabled. Personnel performing these types of procedures could be exposed to laser emissions at Class IV/4 levels.

APR	Laser Wavelength	Max. Optical Power	IEC Hazard Level	Hazard Distance	Shutdown Time
Available	1435 - 1608 nm	118.8 mW*	ANSI 3a-3b/IEC IM	< 4 inches (10 centimeters)	Less than 350 milliseconds
Not Available	1435 - 1608 nm	1.32 - 1.45 W	ANSI 4 IV/IEC 4	< 10 inches (25 centimeters)	None

* This is the maximum optical power allowable in the LambdaXtreme® Transport system, as determined using the shortest wavelength of the system, corresponding to Laser Class 1M classification.

Skin Hazards: When APR is **available**, there is potential hazard to the skin if the fiber is held within 4 inches (10 centimeters) of the skin for extended period of time (injury precluded by natural aversion response to heat stimuli). When APR is **not available** there is potential hazard to the skin if the fiber is held within 10 inches (25 centimeters) of the skin for extended period of time (injury precluded by natural aversion response to heat stimuli).

Eye Hazard: When APR is **available**, there is potential hazard to the external structures of the eye (for example, cornea) if fiber held within 4 inches (10 centimeters) of the eye for extended periods of time (it is not a "vision hazard" since the eye cannot focus these wavelengths onto the retina). When APR is **not available** there is potential hazard to the external structures of the eye (for example, cornea) if fiber held within 10 inches (25 centimeters) of the eye for extended periods of time (it is not a "vision hazard" since the eye cannot focus these wavelengths onto the retina).

Non-Beam Hazard: When APR is **available**, there is no potential for fire hazard. When APR is **not available**, there is potential for fire hazard.

Additional Safety Precautions when APR is not Available

- Laser Safety Eyewear is required when working directly with unterminated, energized fibers/connectors/optical ports.
- Place energized fibers into power meters/ports to minimize the possibility of fire.
- Remove flammable materials from areas around energized fibers.

- Post DANGER signs around systems to control access.
- All personnel working directly with energized fibers must receive a baseline laser eye exam.

Situations When APR is not Available

The capability to trigger APR is not available when certain high-power circuit packs are in the process of booting, or when the SCTL that manages those circuit packs is booting, or when the RCTL / NCTL for the system is booting (the booting of these SCTL packs and the RCTL / NCTL automatically triggers a booting of the high-power circuit packs).

The following user-initiated events will cause a system reboot, thereby causing APR to be not available for a short period of time:

- Issuing the ENT-SYS and INIT-SYS TLI commands
- Pushing the restart button on the Office Alarms Display Assembly.

Note that to improve product safety and eliminate the window of time for which APR is not available (when the SCTL or RCTL is out of service due to failure or removal), APR establishes an alternative means of communications through DSPs on the RP, RPG, and OA circuit packs.

APR not available at OADM Terminal

APR is not available in an OADM Terminal under the following conditions:

- Booting of the SCTL in A1-1-15
- Booting of the SCTL in A2-1-15
- Booting of the SCTL in A1-3-15
- Booting of the SCTL in A2-3-15.
- Booting of the NCTL in A1-3-4.
- Booting of the SCTL in B1-1-15
- Booting of the SCTL in B1-3-15
- Booting of the SCTL in G1-1-15
- Booting of the SCTL in G2-1-15
- Booting of the SCTL in G1-3-15
- Booting of the SCTL in G2-3-15.
- Booting of the NCTL in G1-3-4.
- Booting of the SCTL in H1-1-15
- Booting of the SCTL in H1-3-15

APR not available at Repeater

APR is not available in a Repeater when the RCTL is booting.

APR for MINI NE Equipped as a MINILA

APR is limited or not available in a MINI NE equipped as a MINILA when the RCTL is booting. APR is also limited or not available when the SCTL in slot A1-1-15 is booting.

APR for MINI NE Equipped as a 4D_MINI_WXC

In a MINI NE equipped as a 4D_MINI-WXC, APR is limited or not available when the RCTL in slot A1-3-2 or G1-3-2 is booting. APR is also limited or not available when the SCTL in slot A1-1-15 or G1-1-5 is booting.

Laser Safety and Lucent Products

Alcatel-Lucent is committed to designing optical fiber transmission equipment that minimizes operator and service personnel exposure to potentially hazardous levels of optical energy during service and operation. However, the continued safe use of optical transmission, optical cables and passive optical connection equipment requires partnership with customers to ensure that these systems are deployed and maintained in a safe manner. While automatic laser power reduction systems in Alcatel-Lucent's higher power transmission equipment respond quickly to reduce laser emissions to safe levels in the event of fiber disconnection or break, network operators must take proper action in the event of an alarm.

In a typical network, our optical cables and passive optical connection equipment can carry signals from various vendor sources that may have different degrees of safety controls. Alcatel-Lucent recommends that you properly assess the power of these sources to ensure that their safety controls are adequate.

To strengthen our partnership and to assure the continued safe deployment and use of optical networks, Alcatel-Lucent recommend that you use the following standards as your guides for laser safety for your customers and employees:

In the U.S.:

- *ANSI Z136.1 – American National Standard for Safe Use of Lasers.*
- *ANSI Z136.2 – American National Standard for Safe Use of Optical Fiber Communication Systems Utilizing Laser Diode and LED Sources.*

Elsewhere:

- *IEC 60825 Safety of Laser Products Part 1: Equipment classification, requirements and user's guide.*
- *IEC 60825 Safety of Laser Products Part 2: Safety of optical fibre communication systems.*

Ignition Hazards

Recent studies in Europe¹ have suggested that power as low as 50 mW can ignite certain hazardous (classified) gaseous/vapor/mist/dust environments under worst-case, dusty conditions. Standards are being written, both in the U.S. and the International Electrotechnical Commission (IEC), to address optical installations in hazardous (classified) environments. If you must deploy high power systems in such environments, you should assess the impact.

¹ Carleton, F.B., Bothe, H., Proust, Ch., Hawksworth, S., Prenormative research on the use of optics in potentially explosive atmospheres – PROPEX - EUR 19617 EN. European Commission, 2000 (Brussels, Belgium), November 1999.

Warning and Compliance Labels

This section describes LambdaXtreme® Transport label information regarding laser safety.

Warning Label

A warning label is provided on the front of each shelf assembly. The warning label shows the word “DANGER” in white lettering on a safety red background, and the text of the warning label in black lettering on a white background. See [“Warning Label” \(p. 1-11\)](#).



The label states:

DANGER

INVISIBLE LASER RADIATION WHEN OPEN

AND FIBER DISCONNECTED

Avoid direct exposure to beam.

Do not view beam directly with optical instruments.

IEC Caution Label

An IEC “CAUTION” label is provided on the front of each shelf assembly. See [“IEC Caution Label” \(p. 1-12\)](#).



This label uses black lettering on a safety yellow background, and states in both English and French:

CAUTION

**INVISIBLE CLASS 1M LASER RADIATION WHEN
OPEN AND FIBER DISCONNECTED**

Do not stare into beam or view directly with optical instruments.

IEC Hazard Level Label

An IEC “HAZARD LEVEL” label is provided on the faceplate of all circuit packs with optical connectors that could permit access to IEC 1M emissions. This includes all OA, RP, RPG, and OD Circuit Packs. See [“IEC Hazard Level Label” \(p. 1-12\)](#).



For additional information on laser output power measurements, see the *Applications and Planning Guide*.

Rear Cover Warning Label

A warning label is provided on the rear cover of each equipment bay, cabinet, and miscellaneous mounted shelf that states:

NOTICE: UNTERMINATED OPTICAL CONNECTORS MAY EMIT LASER RADIATION. AVOID DIRECT EXPOSURE TO THE BEAM. DO NOT VIEW BEAM WITH OPTICAL INSTRUMENTS.

Laser Diode Compliance Label

A Laser Diode Compliance Label is attached to the non-component side of each circuit pack containing a laser diode. This includes all OA, OT, RP, RPG, and SUPVY circuit packs. See [“Laser Diode Compliance Label” \(p. 1-13\)](#).



**Lucent Technologies
North Andover, MA U.S.A.
Complies with 21 CFR
1040.10 and 1040.11**

System Compliance Label

A compliance label stating that the system has been certified, along with the manufacturer's name and place of manufacture, is attached to the rear of each equipment bay, cabinet, and miscellaneous mounted shelf. "[System Compliance Label](#)" (p. 1-14) shows an example of a compliance label. The compliance label is located on the rear of the equipment cabinet (at eye level) and miscellaneous mounted shelves.

<p>Lucent</p> <p>LambdaXtreme™ Transport LIGHTWAVE TERMINAL BAY</p> <ul style="list-style-type: none"> <input type="radio"/> SYSTEM BAY (Seismic): Model 109083055 <input type="radio"/> SYSTEM BAY (ETSI): Model 109083105 <input type="radio"/> LINE BAY (Seismic): Model 109083063 <input type="radio"/> LINE BAY (ETSI): Model 109083113 <input type="radio"/> EXTENSION BAY (Seismic): Model 109083089 <input type="radio"/> EXTENSION BAY (ETSI): Model 109083121 <p>Teradyne, Inc. 15 Hudson Park Drive Hudson, NH 03051 U.S.A.</p> <p>Date Of Manufacture And Bay Orderable Code Number May Be Viewed Behind the Designation Label Bracket at the Top of the Bay.</p> <p>POWER REQUIREMENTS: FOUR (4) INPUT Power Feeders Per Bay, (Two Feeders Per Double Shelf). Each Bay is Potted as Follows: System Bay: Each Rated -48-60V DC, 35A. Line Bay: Each Rated -48-60V DC, 35A. Extension Bay: Each Rated -48-60V DC, 45A.</p> <p>To Be Powered Only By Safety Extra Low Voltage (SELV) /Telecommunication Network Voltage-2 (TNV-2) -48-60V \approx Source.</p> <p>Complies With 21 CFR 1040.10 And 1040.11.</p>  <p>This Digital Apparatus Does Not Exceed The Class A Limits For Radio Noise Emissions Set Out In The Radio Interference Regulations Of The Canadian Department of Communications. Cet appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Classe A spécifiées dans le règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada. This Device Complies With Part 15 Of The FCC Rules. Operation Is Subject To The Following Two Conditions: (1) This Device May Not Cause Harmful Interference And (2) This Device Must Accept Any Interference Received, Including Interference That May Cause Undesired Operation.</p>	<p style="text-align: center;">⚠ CAUTION</p> <p>THIS BAY UNIT HAS FOUR (4) -48-60V \approx INPUT POWER FEEDERS. DISCONNECTING LESS THAN THE MAXIMUM WILL NOT DE-ENERGIZE THE SYSTEM. To Reduce The Risk Of Injury, Disconnect All Four(4) Power Feeders When Removing Power To The System.</p> <p>THE -48-60V \approx INPUT POWER FEEDERS MUST BE CONNECTED TO THE PRESSURE-WIRE TERMINAL OF THE POWER CONNECTOR ASSEMBLY. USE A TORQUE WRENCH TO TIGHTEN THE PRESSURE-WIRE TERMINAL SCREW TO 275 IN-LBS (31 NEWTON-METERS). FOR PROPER STRAIN RELIEF AND TO COMPLY WITH REQUIREMENTS OF THE LISTING AGENCIES, TRAY CABLE MUST BE USED FOR WIRE SIZES 6 GA (16MM²) TO 1 GA (60MM²) AND CABLE TRAY RATED CABLE MUST BE USED FOR WIRE SIZES 1/0 (55MM²) TO 4/0 (100MM²).</p> <p>METAL TELECOMMUNICATION INTERFACES SHOULD NOT LEAVE THE BUILDING PREMISES UNLESS CONNECTED TO TELECOMMUNICATION DEVICES PROVIDING PRIMARY AND SECONDARY PROTECTION, AS APPLICABLE.</p> <p>Use Only Lucent Manufactured Circuit Packs Designated For Use With This Equipment. Refer To Lucent Drawing ED-8C861-10. Use Of Other Circuit Packs May Result In Improper Connections Of Circuitry Leading To Fire Or Injury To Persons.</p>
<p>INVISIBLE LASER RADIATION WHEN OPEN AND FIBER OPTIC CABLE DISCONNECTED. Avoid Direct Exposure To Beam.</p> <p>Rayonnement laser invisible si le couvercle est retiré et si la fibre optique est débranchée. Ne pas s'exposer aux rayons directs.</p>	<p style="text-align: center;">⚠ ATTENTION</p> <p>Cette baie contient jusqu'à quatre (4) câbles de transport d'arrivée de -48-60V \approx. Le débranchement partiel des câbles n'entraîne pas la désactivation du système.</p> <p>Pour réduire le risque de blessures, débrancher ensemble les quatre (2) câbles de transport d'arrivée lors de la mise hors tension du système.</p> <p>LES ARTÈRES D'ALIMENTATION -48/60V DOIVENT ÊTRE RELIÉES À LA BORNE À VIS DU CONNECTEUR D'ALIMENTATION. UTILISER UNE CLÉ DYNAMOMÉTRIQUE POUR SERRER LA VIS DE LA BORNE À UN COUPLE DE 31 NEWTONS-MÈTRES (275 IN.-LBS). POUR RESPECTER LA RÉGLEMENTATION EN VIGUEUR ET POUR OBTENIR UNE TENSION CORRECTE, LE CÂBLE UTILISÉ DOIT ÊTRE D'UN TYPE AVEC SUPPORT SI LES CONDUCTEURS SONT DE CALIBRE COMPRIS ENTRE 16 MM² (6 GA) ET 40 MM² (1 GA), ET D'UN TYPE SPECIAL POUR CHEMIN DE CÂBLES SI LES CONDUCTEURS SONT DE CALIBRE COMPRIS ENTRE 55 MM² (1/0) ET 100 MM² (4/0).</p> <p>Les interfaces métalliques de télécommunications doivent être confinées au bâtiment à moins d'être reliées à des appareils de télécommunications qui assurent la protection au primaire et au secondaire, selon le cas.</p> <p>Utiliser uniquement des ensembles de circuit fabriqués par Lucent et conçus pour ce matériel. Voir le dessin ED-8C861-10 de Lucent. L'utilisation d'autres types de circuit peut entraîner un mauvais raccordement du circuit et un risque d'incendie ou de blessure.</p>
<p style="text-align: center;">⚠ WARNING</p> <p>INSTALLATION MUST INCLUDE AN INDEPENDENT FRAME GROUND DROP TO BUILDING GROUND. See Lucent LambdaXtreme™ Transport Installation Manual Document.</p>	<p style="text-align: center;">NOTICE</p> <p>This Equipment Is To Be Installed Only In Restricted Access Areas In Business And Customer Premises Applications In Accordance With Articles 110-16, 110-17, And 110-18 Of The National Electrical Code, ANS/NFPA No. 70. Other Installations Exempt From The Enforcement Of The National Electrical Code May Be Engineered According To The Accepted Practices Of The Local Telecommunication Utility.</p>
<p style="text-align: center;">⚠ AVERTISSEMENT</p> <p>À l'installation, ce matériel doit être mis à la terre au moyen d'un conducteur de continuité des masses indépendant. Voir le document Lucent LambdaXtreme™ Transport Installation Manual.</p>	<p>REPLACE ALL COVERS AFTER INSTALLATION AND MAINTENANCE. Required For Compliance With UL, CSA, CE Standards.</p> <p>UNTERMINATED OPTICAL CONNECTIONS MAY EMIT LASER RADIATION. Do Not View With Optical Instruments.</p>
<p style="text-align: center;">⚠ CAUTION</p> <p>HIGH CURRENT/ELECTRICAL ENERGY PRESENT WHICH MAY CAUSE INJURY OR FIRE. Avoid Contact With Electrically Energized, Non-Insulated Components. REFER SERVICING TO QUALIFIED PERSONNEL.</p>	<p style="text-align: center;">⚠ ATTENTION</p> <p>Lorsqu'il est exploité dans un bureau ou chez l'abonné, cet appareil doit être installé dans un local à accès limité.</p> <p>Reposer tous les couvercles après l'installation ou l'entretien. Obligatoire pour assurer la conformité aux normes UL, CSA et CE.</p>
<p style="text-align: center;">⚠ ATTENTION</p> <p>Cet appareil présente des courants et des charges électriques élevés pouvant causer des blessures ou un incendie. Ne pas toucher les pièces sous tension non isolées. Confier l'entretien à un technicien qualifié.</p>	<p>Les connecteurs optiques non obturés peuvent émettre un rayonnement laser. Ne pas observer le rayon au moyen d'instruments optiques.</p>

Electrostatic Discharge (ESD)

This section describes the precautions that should be taken in order to prevent damage to LambdaXtreme® Transport hardware due to electrostatic discharge.

Introduction

The following information must be considered whenever working on LambdaXtreme® Transport components.



Industry experience has shown that all integrated circuit packs can be damaged by static electricity that builds up on work surfaces and personnel. The static charges are produced by various charging effects of movement and contact with other objects. Dry air allows greater static charges to accumulate. Higher potentials are measured in areas with low relative humidity, but potentials high enough to cause damage can occur anywhere.

To avoid damage to the circuit packs, make sure you are grounded.

Precautions

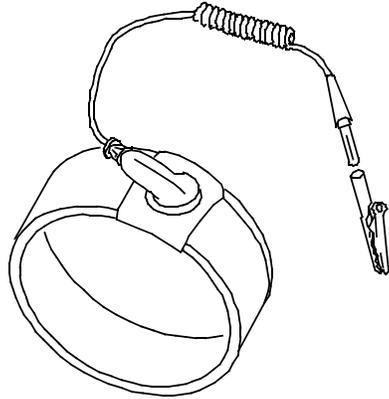
The following precautions must be observed when handling circuit packs/units to prevent damage by electrostatic discharge:

- Assume all circuit packs contain solid-state electronic components that can be damaged by electrostatic discharge (ESD).
- When handling circuit packs/units (storing, installing, removing, and so forth) or when working on the backplane, always wear a grounded wrist strap or wear a heel strap and stand on a grounded, static-dissipating floor mat.
- Handle all circuit packs/units by the faceplate or latch and by the top and bottom outermost edges. Never touch the components, conductors, or connector pins.
- Observe all warning labels on bags and cartons. Whenever possible, do not remove circuit packs/units from antistatic packaging until ready to insert them into slots.
- If possible, open all circuit packs/units at a static-safe work position, using properly grounded wrist straps and static-dissipating table mats.
- Always store and transport circuit packs/units in static-safe packaging. Shielding is not required unless specified.
- Keep all static-generating materials such as food wrappers, plastics, and styrofoam containers away from all circuit packs/units. When removing circuit packs/units from a cabinet, immediately place the circuit packs/units in static-safe packages.
- Whenever possible, maintain relative humidity above 20 percent.
- Always keep the front covers on the shelves except during an upgrade or maintenance procedure. Be sure to put blanks in slots that are not used. Once a circuit pack/unit is replaced in the shelf, immediately close the front cover.

Grounding Wrist Straps

Any connectors on the shelf interconnection panel that are not cabled should be fitted with a plastic dust cap to provide ESD protection. To reduce the possibility of ESD damage, shelves are equipped with grounding jacks to enable personnel to ground

themselves using wrist straps while handling circuit packs/units or working on a shelf (see “[Grounding Wrist Straps](#)” (p. 1-16)). The wrist straps should be checked periodically with a wrist strap tester to ensure that they are working properly.



Important! The grounding jacks for connection of wrist straps are located at the front of the bay on the right side, just below the hinge for each shelf cover.

Safety Instructions

Save These Instructions

READ AND UNDERSTAND ALL INSTRUCTIONS

When using this telecommunication equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including the following:

- Follow all warnings and instructions marked on the product.
- Slots and openings in this product at the front and top are provided for ventilation. To protect it from overheating, these openings must not be blocked or covered.
- Opening or removing rear covers or sheet-metal parts may present exposure to high current or electrical energy levels, or to other risks.
- Never push objects of any kind into this product through slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electrical shock. Never spill liquid of any kind on the product.
- Refer servicing to qualified service personnel.
- Use caution when installing and modifying telecommunications lines.
- Never install telecommunication wiring during a lightning storm.
- Never install telecommunication jacks in wet locations unless the jack is specifically designed for wet locations.

- Never touch uninsulated telecommunication wires or terminals unless the telecommunication line has been disconnected at the network interface.
- Installation must include an independent frame ground conductor to building ground. Grounding/bonding circuit continuity is vital for safe operation of this equipment. Never operate with grounding/bonding conductor disconnected.
- This product has four -48Vdc input power feeders per bay. Disconnecting one power feeder will not de-energize the product. To reduce the risk of injury, disconnect the four power supply cables when removing power from the system.
- Metallic telecommunication interfaces should not leave the building premises unless connected to telecommunication devices providing primary and secondary protection, as applicable.
- For continued protection against risk of fire, replace only with same type and rating of fuse.
- Use only Alcatel-Lucent manufactured, recognized circuit packs/units/modules. Refer to the *Applications and Planning Guide*.
- This equipment is intended for installation in Restricted Access Locations where access is controlled or where access can only be gained by service personnel with a key or tool. Access to this equipment is restricted to qualified service personnel only.
- Power the unit only from -48Vdc (-60Vdc for ETSI and similar applications) sources providing Safety Extra Low Voltage (SELV) outputs.
- This equipment must be provided with a readily accessible input power disconnect device as part of the building installation (such as a main power disconnect switch or external circuit breaker).

SAVE THESE INSTRUCTIONS.

Recycling / Take-Back / Disposal of Product

Electronic products bearing or referencing the symbol shown below when put on the market within the European Union, shall be collected and treated at the end of their useful life, in compliance with applicable European Union and local legislation. They shall not be disposed of as part of unsorted municipal waste. Due to materials that may be contained in the product, such as heavy metals or batteries, the environment and human health may be negatively impacted as a result of inappropriate disposal.



Note: In the European Union, a solid bar under the crossed-out wheeled bin indicates that the product was put on the market after 13 August 2005.

Moreover, in compliance with legal requirements and contractual agreements, where applicable, Alcatel-Lucent will offer to provide for the collection and treatment of Alcatel-Lucent products at the end of their useful life, or products displaced by Alcatel-Lucent equipment offers.

For information regarding take-back of equipment by Alcatel-Lucent, or for more information regarding the requirements for recycling/disposal of product, please contact your Alcatel-Lucent Account Manager or Alcatel-Lucent Takeback Support at takeback@alcatel-lucent.com.



2 Introduction

Overview

Purpose

This chapter provides a brief description of Alcatel-Lucent LambdaXtreme® Transport optical networking product.

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System Overview

Introduction

LambdaXtreme® Transport is Alcatel-Lucent next-generation Dense Wavelength Division Multiplexing (DWDM) optical networking solution that uniquely offers one common platform for both ultra high capacity (up to 2.56 Tbps) and long reach (up to 4000 km without electrical regeneration).

In combination with Alcatel-Lucent's LambdaUnite® MultiService Switch (MSS) and a compatible optical cross-connect product, the LambdaXtreme® Transport system provides a comprehensive set of wavelength-level control and management solutions that provides customers with unprecedented flexibility in their network.

The LambdaXtreme® Transport system uses a platform of common amplifiers, common element and network management systems, common controller packs, and common physical design for LambdaXtreme® Transport Long Haul and LambdaXtreme® Transport Ultra High Capacity applications. Using a single platform across multiple applications means lower operational cost and faster time-to-market for service providers.

The LambdaXtreme® Transport system operates in a single band of the optical spectrum. Because bandsplitters and combiners are not employed, the system features a smaller footprint, enhanced system margins, simpler system growth, and easier operations management, all of which lead to lower overall system costs.

The LambdaXtreme® Transport 10G channel rate supports 10 Gbps channels for transmission of 128 channels, giving a maximum capacity of 1.28 Tbps. This system can yield up to 4000 km reach. Payload (per channel) can be:

- OC-192/STM-64
- 10 GbE WAN PHY
- 10 GbE LAN PHY
- OTM-0.2
- 40G signal consisting of four multiplexed OC-192/STM-64, 10GbE WAN/LAN or OTM-0.2 signals

The LambdaXtreme® Transport 40G channel rate supports 40Gbps channels for transmission of 64 channels, giving a maximum capacity of 2.56 Tbps and a reach of up to 2000+ km (depending on configuration). Payload (per channel) can be:

- OC-768/STM-256
- CBR-40G
- OTU-3
- OC-192/STM-64
- 10 GbE WAN PHY

- 10 GbE LAN PHY
- OTM-0.2
- 10G signal consisting of four multiplexed OC-48/STM-16 or OTM-0.1 signals.

The LambdaXtreme® Transport 40G channel rate supports 40Gbps channels for transmission of 64 channels, giving a maximum capacity of 2.56 Tbps and a reach of up to 2000+ km (depending on configuration). Payload (per channel) is OC-768/STM-256.

Application Architectures

LambdaXtreme® Transport is suited to the following service environments:

- Point to point systems
- Linear add/drop chains
- Ring systems
- Mesh systems.

Benefits that LambdaXtreme® Transport brings to these service environments include increased component density and reduced footprint (compared to previous Alcatel-Lucent products and competitor products).

For a complete detailed product overview including system components and specifications, see the *LambdaXtreme® Transport Applications and Planning Guide*.



3 Operations

Overview

Purpose

This chapter explains the external physical interfaces, external NE communication links, link protocols, and link establishment mechanisms that are utilized to support LambdaXtreme® Transport operations. It also provides an overview of Fault and Performance Management. Finally, it describes the software support of operations including the functionality that is provided and the data that is processed.

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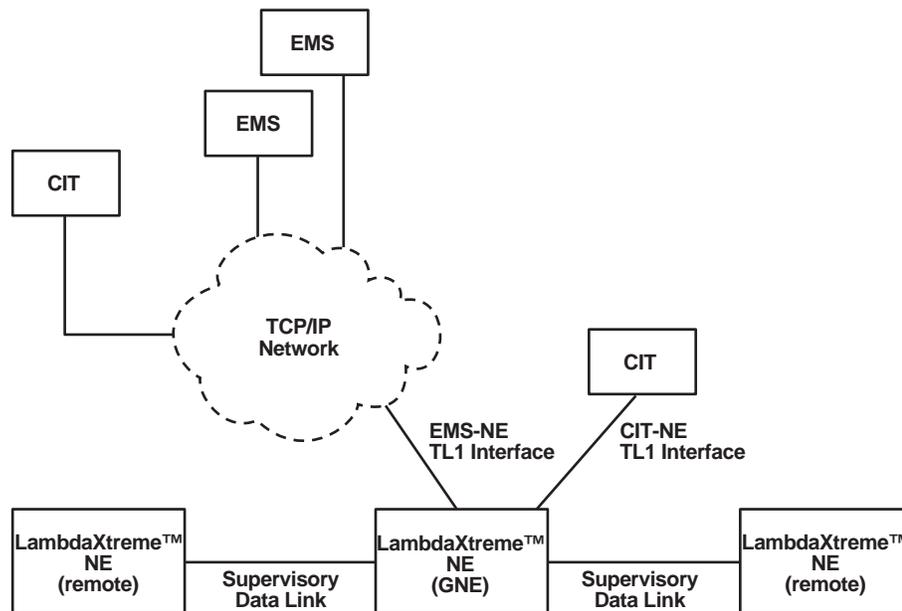


Introduction

Overview

The LambdaXtreme® Transport NE external communications are the EMS-NE TL1 interface and the CIT-NE TL1 interface, and the Supervisory Data Link is used as a data communication channel from a gateway NE to a remote NE (see [Figure 3-1, “LambdaXtreme® Transport External Communication Links”](#) (p. 3-2)).

Figure 3-1 LambdaXtreme® Transport External Communication Links

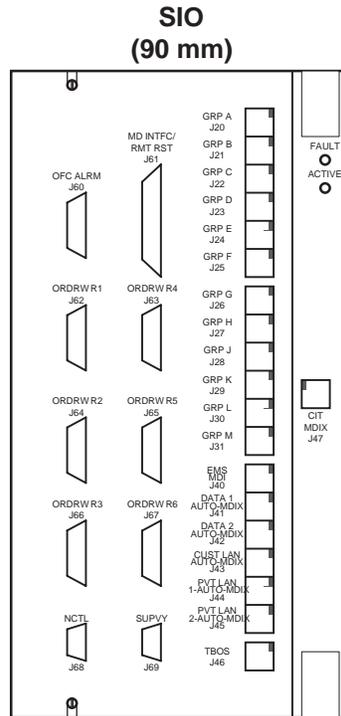


The Element Management System (EMS) interface and the Craft Interface Terminal (CIT) interface are both used for NE management. The NE supports system and security administration functions over the EMS and CIT using TL1 messages carried over TCP/IP connections. Users typically perform their maintenance functions using an EMS such as Alcatel-Lucent Navis® Optical Management System (OMS).

Important! In a mesh node, the EMS port of the Peer (Line-2) is not used. After the upgrade/merger of a mesh node, the Line-2 EMS port will not work.

The System Input/Output Panel (SIO) circuit pack is the main user interface to the LambdaXtreme® Transport system in OADMs. The SIO faceplate includes various ports including one for an EMS connection and one for the CIT (see [Figure 3-2, “SIO Panel”](#) (p. 3-3)).

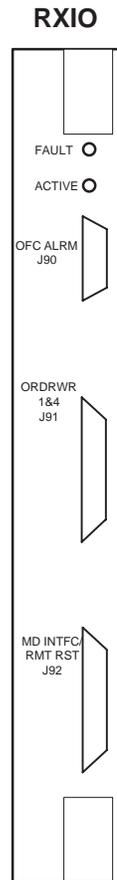
Figure 3-2 SIO Panel



In LambdaXtreme® Transport Repeaters, the Repeater System Input/Output (RXIO) circuit pack is the main user interface. The RXIO faceplate contains an Orderwire interface and interfaces for Office Alarms, Miscellaneous Discretes, and Remote Restart (see [Figure 3-3, “RXIO Circuit Pack” \(p. 3-4\)](#)).

The Repeater Controller Input/Output (RCIO) pack, also used in Repeaters and MINI NEs (see [“MINI NE” \(p. 3-4\)](#)), contains eight RJ-45 jacks including one for the CIT interface (see [Figure 3-4, “RCIO Circuit Pack” \(p. 3-5\)](#)).

For more information on controller circuit packs, see the *LambdaXtreme® Transport Applications and Planning Guide*.

Figure 3-3 RXIO Circuit Pack**MINI NE**

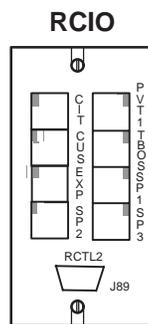
The MINI NE is a class of LambdaXtreme® NEs with special functions that have a common base of equipment. At present there are two equipages supported for a MINI NE: MINILA and 4D_MINI_WXC.

MINILA architecture provides a minimum configuration, in-service upgradable, in line amplifier. When equipped as a MINILA, the MINI NE contains the functionality of a Repeater with the ability to upgrade, in service, to a mini wavelength cross connect and MINI_ROADM (future enhancement). This configuration supports 2 DWDM directions with no add/drop access. A 2F_MINI NE equipped as a MINILA consists of a Repeater Line Bay which contains one RXDS double shelf with the RCTL pack, and one HXDS double shelf with the SCTL pack.

The 4D_MINI_WXC network element supports four bidirectional optical lines (lines 1E/1W/2E/2W), and is comprised of two co-joined fully equipped MINILA nodes with additional hardware to support optical channel mesh connections from one optical line to the other.

The MINI NE uses the RXIO2 and RCIO packs as the main user interfaces. The RXIO2 pack (similar to RXIO pack shown previously) adds OSC control pass through for MINILA terminals. For Repeaters and MINI NEs the CIT-NE link connects to a port on the RCIO circuit pack (see [Figure 3-4, “RCIO Circuit Pack”](#) (p. 3-5)) using an RJ-45 cable.

Figure 3-4 RCIO Circuit Pack



Maintenance Subnetwork

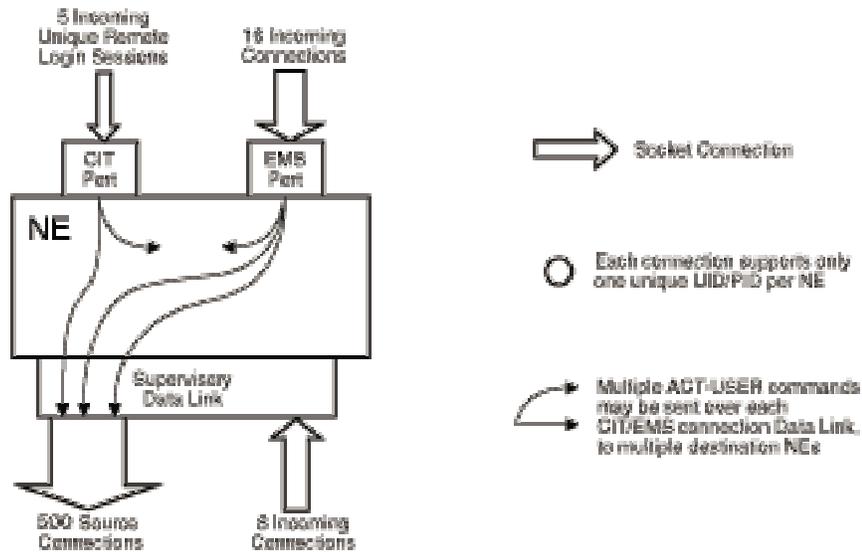
A maintenance subnetwork comprises all the NEs that can communicate through the Data Communications Network (DCN). Connectivity for all CIT/EMS messages between NEs is through the DCN. The following applies:

- All LambdaXtreme® Transport NEs within a maintenance subnetwork are accessible from any EMS/CIT (EMS-NE/CIT-NE) interface within the subnetwork. This enables all operations, administration, maintenance, and provisioning (OAM&P) functions to be performed on any NE within a maintenance subnetwork from any NE within the same subnetwork.
- The EMS/CIT NE interface behaves as an End System (ES) in an IP network. There is no routing performed at those ports.

Gateway Network Element

A Gateway Network Element (GNE) is defined as an NE that provides user access to all NEs within the maintenance subnetwork. The GNE routes the messages between members of the maintenance subnetwork. All NEs (except Repeaters and MINI NEs equipped as MINILA) are capable of being GNEs. [Figure 3-5, “GNE Connectivity/Login Capabilities”](#) (p. 3-6) shows LambdaXtreme® Transport GNE connectivity/login capabilities.

Figure 3-5 GNE Connectivity/Login Capabilities



Remote Maintenance

The LambdaXtreme® Transport system includes remote maintenance capabilities that allow the CIT/EMS to access all NEs in a maintenance subnetwork. NE communication is performed over the Supervisory Data Link.

□

EMS-NE Interface

Overview

The EMS-NE TL1 interface provides a link between the LambdaXtreme® Transport NE and an EMS such as Alcatel-Lucent Navis® Optical Management System (OMS). The application data exchangeable over this interface is the set of LambdaXtreme® Transport TL1 messages, which are transported over a TCP/IP network. These messages include both input commands and responses, and autonomous outputs (alarms and events).

Navis® Optical Management System (OMS)

Navis® Optical OMS, a separate Alcatel-Lucent product, can be employed as an end-user management system. When used as such, Navis® Optical OMS provides a Graphical User Interface (GUI) to access and manage the LambdaXtreme® Transport system, with visibility down to the circuit pack, port, and tributary levels. Navis® Optical OMS provides a complete suite of element management functionality including fault, configuration, and security management. For more information, see the *Navis® Optical Management System (OMS) Applications and Planning Guide*.

EMS Link Establishment

The EMS interface connection on the SIO provides a link to the connected Gateway NE (GNE). An EMS accesses a GNE and all remote NEs by using the IP Address of the GNE EMS port. Although GNE provisioning is not required, the user must provision the IP address of the EMS port of an NE that will be used as a GNE. The CIT GUI allows the user to change the GNE assignments used by the CIT. Specific step-by-step instructions for creating a Gateway Node are covered in [Appendix A, “Using the CIT”](#).

The following capabilities apply to TL1 application sessions over an EMS-to-NE link (see [Figure 3-5, “GNE Connectivity/Login Capabilities”](#) (p. 3-6)):

- Establishes up to 16 EMS-NE data links to the GNE.
- Establishes and administers more than one functional data channel between an EMS and a particular NE. An EMS may log in to a maximum of 176 remote NEs through a GNE.
- Allows functional data channels to any NE for command and response, autonomous output, and maintenance.
- Allows more than one EMS-NE TL1 link to a given LambdaXtreme® Transport NE; that is, application sessions between the NE and more than one EMS can exist.

Session Administration

For an EMS login session, it is possible to suppress/allow NE autonomous outputs (notification messages are enabled by default).

The date format for all solicited and autonomous outputs depends on the provisionable parameter that distinguishes between the SONET and SDH environments and whether the year format for the login session is provisioned as a two- or four-digit number.

The date format for solicited and autonomous outputs is shown in [Table 3-1, “Date Formats for Autonomous and Solicited Outputs”](#) (p. 3-8).

Table 3-1 Date Formats for Autonomous and Solicited Outputs

State of Provisionable Parameter	Date Format
SONET	YY-MM-DD (year-month-day) or YYYY-MM-DD (year-month-day)
SDH	DD-MM-YY (day-month-year) or DD-MM-YYYY (day-month-year)

Trouble Reporting Mechanisms

A LambdaXtreme® Transport NE displays fault conditions (EMS Link Failure) for an EMS interface that experiences equipment/signal failures. The EMS Link Failure will only be alarmed if the EMS port state has been provisioned to MON (monitor) using the ENT-SYS command.

The RJ-45 connector on the SIO circuit pack that terminates the EMS interface has a green Link Integrity LED. When an attached link is operating normally, the green LED is lit. If the attached link is not operating normally the green LED is turned off. The green LED is also not lit if there is no attached link. When an EMS-NE link external fault has been detected, NE software declares an EMS Link Failure alarmed condition (severity MJ).

An EMS Link Failure alarmed condition results in an autonomous TL1 output message and blinking of the red FAULT LED on the SIO circuit pack.

For a complete description of LambdaXtreme® Transport fault conditions, see the *LambdaXtreme® Transport Alarms, Messages, and Trouble Clearing Guide*.

□

CIT-NE Interface

Overview

The LambdaXtreme® Transport Craft Interface Terminal (CIT) is a desktop or laptop computer that contains the LambdaXtreme® Transport CIT software. The CIT (as well as the Navis® Optical OMS) provides a user-friendly GUI that allows customers to interact with LambdaXtreme® Transport NEs locally through a physical connection, or to remotely located NEs that are appropriately connected to the NE that has a physical connection to the CIT. The CIT provides a fully functional GUI with pull-down menus and context-sensitive, on-line help. The CIT provides a unified set of features for provisioning, testing, and reporting.

User input-output capabilities on the CIT-NE interface are identical to those of the EMS-NE interface and all TL1 commands and autonomous messages are applicable over both interfaces.

Important! The CIT-NE connection is intended for a direct connection from a PC to the NE using a straight-wired RJ-45 cable and not for a network connection. For a CIT network type connection, the CIT should be connected through a network that terminates to the EMS-NE interface.

CIT Link Establishment

The CIT-NE Link connects to a port on the SIO circuit pack for OADMs and on the RCIO circuit pack for Repeaters and MINI NEs using an RJ-45 cable. This jack has a green Link Integrity LED that is lit when the connected link is good (see [Figure 3-2, “SIO Panel”](#) (p. 3-3) and [Figure 3-4, “RCIO Circuit Pack”](#) (p. 3-5)).

Important! For mesh nodes, the CIT port on the Peer (Line-2) is unused, although it could be used for trouble shooting problems when the communication link between Line-1 and Line-2 is down.

The CIT-NE interface is a 10/100 BaseT LAN interface running TCP/IP. Because its IP address is dynamically determined using a CIT-resident non-standard DHCP server, no provisioning is required to connect to the CIT interface.

Important! The PC network interface card (NIC) parameters must be properly provisioned because this is independent of the CIT software.

The following capabilities apply to TL1 application sessions over a CIT-to-NE link (see [Figure 3-5, “GNE Connectivity/Login Capabilities”](#) (p. 3-6)):

- Establishes up to 5 CIT-to-NE data links to the GNE.
- Establishes and administers more than one functional data channel between a CIT and any particular NE. A CIT may log in to a maximum of 176 remote NEs through a GNE (using the TL1 cut-through interface).

- Allows functional data channels to an NE for command and response, autonomous output, and maintenance (a combination of the two).
- Allows more than one CIT-to-NE TL1 link to a given LambdaXtreme® Transport NE; that is, application sessions between the CIT and more than one NE can exist.

Dynamic Host Control Protocol (DHCP) Server

When a CIT user directly connects the CIT PC (from the CIT port) to the NE, the CIT-resident DHCP server and the NE will communicate to configure the NE's CIT port IP address to be a part of the CIT PC's subnet. The CIT user will not have to provide any CIT port IP administration.

Session Administration

A CIT user can establish a CIT-NE application session with the local NE (the NE to which the CIT is physically connected) or with a remote NE. Communication between the local or gateway NE and the remote NE is over the LambdaXtreme® Transport Inter-Node DCN. In GUI mode, CIT users can maintain up to four CIT-NE application sessions (logins) with several different NEs. In CIT Cut Through mode, a user can log in to 176 simultaneous sessions.

Trouble Reporting Mechanisms

The CIT-to-NE Interface Link Integrity LEDs located on the SIO/RCIO circuit packs are used to determine if there is a signal failure.



Orderwire

Description

The Orderwire channel is used to establish voice communication between LambdaXtreme® Transport nodes. The Orderwire channels are derived from the supervisory signal traversing between the LambdaXtreme® Transport nodes.

Each Orderwire interface comprises clock, sync, and data signals in the transmit direction (external Orderwire equipment to Optical Supervisory Channel (OSC)) and clock, sync, and data signals in the receive direction (OSC to external Orderwire equipment). The clock and sync signals are outputs of the SUPVY for both transmit and receive. The transmit data signal is an input of the SUPVY (see “[Supervisory Channel Provisioning](#)” (p. 5-16)).

The LambdaXtreme® Transport system uses a packetized Orderwire transmission scheme that automatically adjusts the play-out data rate at the receiving end of an Orderwire connection to the transmission data rate at the transmitting end. The benefits of this are:

- The customer does not need to provision the timing mode for basic Orderwire to work. (There may be customer applications such as digital bridging between Orderwire ports, that may require clock synchronization of the NEs.)
- Greater flexibility is possible in the Orderwire connections. Instead of only local or express Orderwire options, it is possible for any of the six Orderwire interfaces in an NE to connect to Orderwire interfaces at any other NE.

Orderwire Implementation

There are six DB-15S connectors located on the SIO panel for Orderwire interfaces. The drivers, receivers, and terminations are on the SUPVY pack. The SUPVY supports three Orderwire circuits from each direction. Three Orderwire channels are carried in the East OSC and three in the West OSC. The three channels can be independently provisioned by the user as either local (dropped to the Orderwire connectors on the SIO) or express. The default is local.

The RXIO circuit pack which replaces the SIO pack in LambdaXtreme® Transport Repeaters and MINI NEs, also provides Orderwire interfaces. The RXIO has one DB-25S connector which provides access to both Channel 1 Orderwire circuits (OW1 West and OW1 East). (A “Y” cable should be ordered to access the two circuits.)

Important! Mesh nodes have two SIO packs. There is an SIO pack for each line (Line-1 and Line-2).



History Logs

Overview

To help users track their command activities and the events autonomously output by the system, each LambdaXtreme® Transport NE keeps and maintains the following logs:

- Event History Log
- History Detail Event Log (Autonomous Output Log)
- Security History Log

Event History Log

The LambdaXtreme® Transport system uses a single log to store and retrieve events. This log provides a complete history of the 500 most recent events that have occurred in the system. Events include the start and end of alarm and status conditions, and all input activities that affect or would affect the state on the NE, successfully completed or denied. These events are listed in order of occurrence. This log is available using the CIT, TL1 cut-through interface (RTRV-LOG command), or EMS.

The following events are displayed in the Event History Log:

- User transactions that affect or would affect the state of the network element.
- Events identifying the start and end of alarm and status conditions.
- Transient events.

Important! Security-related events are excluded from the NE Event History Log. See [“Security History Log”](#) (p. 4-5) for details on viewing security-related events.

Specific step-by-step instructions for viewing the Event History Log are covered in [Appendix A, “Using the CIT”](#).

History Detail Event Log (Autonomous Output Log)

Each NE keeps a log of the 4,000 most recent autonomous outputs. Users are able to retrieve this log and to filter the messages that are displayed. The log exists not only for user convenience, but because events are displayed in the log even if they do not show up elsewhere (possible reasons being EMS-NE link or network failure or user inhibiting of autonomous TL1 message reporting).

The History Detail Event Log is retrievable by using the RTRV-AO TL1 command. The log is not available through the CIT.



Office Alarm Display

Description

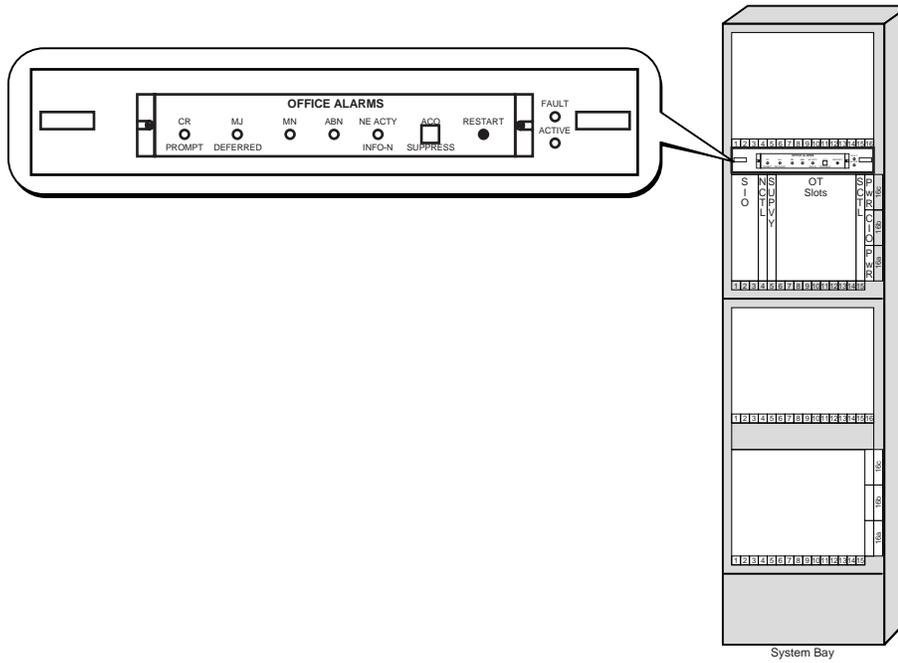
The Office Alarm Display has two control buttons/switches, three alarm indicators, and three status indicators. One control button turns off local audible office alarms and the other restarts the system software. Alarm indicators display the highest severity level of the current alarm conditions. Status indicators display the status of the Alarm Cut-Off (ACO), the presence of abnormal conditions on the NE, and the presence of any alarm or status conditions on the NE.

Important! For a mesh node, Line-2 office alarm indicator displays alarm status for Line-2 only, while Line-1 office alarm indicator displays alarm status for the combination of Line-1 and Line-2. For ACO status indication, the Line-1 and Line-2 will be in sync under normal operation condition (that is, both Line-1 and Line-2 controller up and running).

The reset switch (labeled RESTART) restarts system software using the provisionable parameter values that were defined prior to the reset. Pushing this button effects a power cycle of the Network Element Controller (NCTL)/Repeater Controller (RCTL). The result is a hard reset of the NCTL/RCTL and a soft reset of the rest of the circuit packs (transmission is not interrupted). (Note: For a mesh node, the RESTART switch will only reset either the Line-1 or Line-2 NCTL depending on which the office alarm display is associated with.)

[Figure 3-6, “Office Alarm Display” \(p. 3-14\)](#) shows the Office Alarm Display and its location in the System Bay.

Figure 3-6 Office Alarm Display



Fault Management

Overview

The main focus in Fault Management is to present the user with the current alarms of a LambdaXtreme® Transport NE in summaries and different views, so that the user gets a quick overview of the state of the NE. These views also support the user in analyzing fault conditions and quickly finding a solution for the problem.

An alarm is a notification of a failure and also an external visible indication of a failure by enabling the contact closure on the alarm grid. An autonomous message is generated to report the alarm and the Fault light-emitting diode (LED) on the circuit pack or user panel may be turned on or made to blink depending on the severity and type of alarm.

When multiple conditions with two or more different alarm attributes are active, only the highest level alarm will be active (both audible and visual). When the highest severity alarm has been cleared, the next highest alarm, if any, will be activated (both audible and visual).

Note: For detailed procedures on clearing alarms, see the *LambdaXtreme® Transport Alarms, Messages, and Trouble Clearing Guide*.

Active Condition/Alarm Log

The NE keeps a log of active (outstanding) conditions, which are the result of both alarmed and non-alarmed events. Users can retrieve an Alarm List Report that displays all active alarms. This alarm log summarizes the total number of alarms retrieved as well as the informational messages.

Each alarm is represented as a line in a table. The table comprises the following columns of information:

- Level - This is the Notification Code (ntfncde) of the alarm being reported in REPT ALM. The possible values are Critical, Major, and Minor for the SONET environment, and Prompt or Deferred for the SDH environment.
- Category - This indicates the category of the component where the alarm or condition occurred.
- AID - This indicates the access identifier (AID) of the component on which the alarm or condition occurred.
- Occurred On- This indicates the date and time at which the alarm or reported condition began.
- Description - This contains the text description of the reported condition.
- Type - This displays the alarm or condition type.

- Service - This indicates the effect the reported alarm has on service. Possible values are Service affecting (SA) or Non-Service affecting (NSA).
- Cleared On - This indicates the date and time when the alarm was cleared. This column is displayed only if the option is selected to update alarm entries in the report with cleared date/time (see [“Set Options and Generate Alarm List for Selected Equipment”](#) (p. A-189)).

Specific step-by-step instructions for viewing the Alarm List Report are covered in [Appendix A, “Using the CIT”](#).

Alarm Definitions

The provisionable parameter called STD (standard) determines the set of supported alarm severities. The value of this parameter can be set to “SONET” or “SDH”.

The mapping and the set of supported alarm severities for the SONET and SDH environments are shown in the following table:

SONET	SDH
CRITICAL (CR)	PROMPT
MAJOR (MJ)	PROMPT
MINOR (MN)	DEFERRED
NOT ALARMED (NA)	NO ALARM
NOT REPORTED (NR)	NO REPORT

Alarm Severity Levels

In order to tailor a customer’s operations plans to specific operations environments, the LambdaXtreme® Transport system allows customers to provision (customize) alarm levels and the inhibiting of the generation/reporting of specific alarms.

An Alarm Severity Assignment (ASA) allows the user to set the severity of any individual alarm. The basic outline of the feature is as follows:

- The NE’s alarms are uniquely categorized into groups, with each alarm residing in only one group.
Note: The alarm groups are not controllable by the user.
- A default (original value) of alarm severity is given to each alarm in each group. There is thus a default set of Alarm Group severities.
- The user has the capability to change any individual alarm severity.
- Changes of alarm severities do not affect outstanding (current) alarms.

Alarm severity levels can be set using the CIT, TL1 cut-through (ED-SEV command), or the EMS.

- Specific step-by-step instructions for setting alarm severity levels using the CIT are covered in [Appendix A, “Using the CIT”](#).
- For provisioning procedures using the EMS, see the *Navis® Optical Management System (OMS) Maintenance Guide*.

Alarm Groups

The LambdaXtreme® Transport Alarm Groups are as follows:

- Slot – Slot, Circuit Pack, and Equipment alarms
- PortOT – Signal alarms detected at OT ports
- PortOther – Signal alarms detected at SUPVY or OMON circuit pack ports
- OCHAN – Optical Channel
- PortOA_RP– Signal alarms detected at OA or Raman Pump circuit pack ports
- PortOM_OD – Signal alarms detected at Optical Multiplexer or Demultiplexer ports
- Line - Optical Line
- Shelf
- Fan – Fan Assembly alarms
- System
- Group – Alarm for unexpected control group.

Note: Alarm groups are not controllable by the user.

Alarm Displays and Status Indicators

The Office Alarms interface is a set of discrete relays that control audible and visual office alarms including the following:

- Equipment LEDs
- NE Level Alarm LEDs
- Power-On LED
- Abnormal Condition LED
- Activity-Near End/Info-N LED

Equipment LEDs

Each circuit pack contains two LEDs. The FAULT LED is red and is illuminated steadily when there is a failure of the circuit pack or when the circuit pack is booting. This red LED flashes (at a rate of one second on and one second off) to indicate the failure of an input to the circuit pack.

The ACTIVE LED is green and is illuminated steadily when the circuit pack is booted and flashes when the circuit is booting. The LEDs are off when the pack is not powered up.

Important! The OT (10G XFP ADD-DROP Tunable) pack has two additional bi-color LEDs (Client and Line) on the faceplate to indicate port status. For information on the behavior of these LEDs, see the *LambdaXtreme® Transport Applications and Planning Guide*.

NE Level Alarm LEDs

NE Level Alarms are displayed on the Fan Assembly User Panel (Office Alarm Display). For details of the Fan Assembly, see the *LambdaXtreme® Transport Applications and Planning Guide*. Separate LEDs display the severity level of the received alarm as follows:

- The alarm indicator for alarm conditions that are consistent with the definitions for Critical (SONET environment) or Prompt (SDH environment) is Critical/Prompt. The indicator is labeled CR/Prompt and is a red LED.
- The alarm indicator for alarm conditions that are consistent with the definitions for Major (SONET environment) or Deferred (SDH environment) is Major/Deferred. The indicator is labeled MJ/Deferred and is a red LED.
- The alarm indicator for alarm conditions that are consistent with the definition for Minor (SONET environment) is Minor. The indicator is labeled MN and is a yellow LED.

Both audible and visual alarms are activated during an alarm condition. User provisioning and control of setting (changing) severities of individual alarm events is possible with the LambdaXtreme® Transport system, making it adaptable to various operations environments.

- Step-by-step instructions for alarm provisioning using the CIT are covered in [Appendix A, “Using the CIT”](#).
- For provisioning procedures using the EMS, see the *Navis® Optical Management System (OMS) Maintenance Guide*.

Power-On LED

A green LED labeled PWR OUTPUT is associated with and located on each power filter on each shelf within an NE. The LED is illuminated when the filter is powered, and is extinguished when the filter is not powered. The PWR OUTPUT LED is extinguished if the low-voltage shutdown feature located on the power filter is activated.

Abnormal Condition LED

This LED labeled ABN/Abnormal is not utilized for the current release.

Activity-Near End/Info-N LED

A yellow LED on the Fan Assembly User Panel is labeled NE-ACTY/ INFO-N and is illuminated whenever an alarm or status condition is active on the local NE. This includes any condition identified regardless of the alarm level. An alarm condition is one with a severity attribute of Critical (CR), Major (MJ), Minor (MN), Prompt, or Deferred. A status condition is one with an alarm attribute of NA, NR, NO, or No_Alarm. The NE-ACTY/ INFO-N LED is illuminated for both types of conditions.

Alarm Cut-Off and Alarm Cut-Off Clearing Capabilities

The Alarm Cut-Off (ACO/Suppress) button located on the Office Alarm Display turns off any local audible office alarms. Once the ACO/Suppress button has been pressed, any subsequent alarmable conditions will activate the audible alarm again.

The NE sends an autonomous message over both the CIT-NE and EMS-NE interfaces whenever the ACO condition is raised (audible alarms silenced) or cleared (audible alarms activated again).

LED Functional Testing

LambdaXtreme® Transport software supports the testing of circuit pack LEDs (single or multiple) or user panel LEDs simultaneously. The testing of circuit pack and user panel LED functionality does not have any impact on LambdaXtreme® Transport office alarms.

LED and Alarm Behavior During Circuit Pack Reboots and System Restart

This subsection describes LED and Alarm behavior during circuit pack reboots and system restarts.

Circuit Pack Reboots

During a circuit pack reboot the following applies:

- In the alarm condition: “XXX booting in progress” (“XXX booting in progress - APR limited” for OA, RP, RPG, and SCTL packs), “XXX” represents a particular circuit pack type. The values for “XXX” are the full set of LambdaXtreme® Transport circuit pack types that have a FAULT LED and an ACTIVE LED with the exception of the SIO, CIO, XIO, RXIO, RXIO2, RCIO, PWR and FAN. Note: This applies only to an individual circuit pack reboot. During a system reboot, there is no “XXX booting in progress” for every circuit pack in the NE.
- The circuit pack LEDs are illuminated as follows: FAULT (red) LED lit continuously; ACTIVE (green LED) flashing.

When the boot cycle is completed:

- There is an appropriate “Clear” of the “XXX booting in progress” alarm.
- The ACTIVE (green) LED ceases flashing and remains lit.

- If the circuit pack is determined to be good, the FAULT (red) LED is extinguished.
- If the Fault software determines that the circuit pack failed, the FAULT (red) LED remains lit and an appropriate FAILED condition for the circuit pack is declared.
- If the Fault software determines that the circuit pack is of an unexpected type, the FAULT (red) LED remains lit and an “Unexpected circuit pack type” alarm condition is declared.
- If the Fault software determines that a transmission circuit pack is good but has an incoming signal fault, the FAULT (red) LED begins to flash and the appropriate alarm condition is declared.

System Restart

During system restart the following applies:

- On the NCTL circuit pack, on each SCTL circuit pack, and on each of the remaining circuit packs (in sequence) the following occurs:
 - The FAULT (red) LED turns on following pack reset.
 - The ACTIVE (green) LED begins to flash following pack reset. It remains flashing until the network element completes booting.
- The FAULT (red) LED on each circuit pack remains on while the NE software is being loaded; it is extinguished when the system software determines that the circuit pack is good.
- If the system software determines that the circuit pack failed, the FAULT (red) LED remains lit and an appropriate FAILED condition for the circuit pack is declared.

When the NE completes booting the following applies:

- The “NCTL/RCTL Reset in progress - APR is not available” condition clears.
- The ACTIVE (green) LEDs on all the circuit packs cease flashing and remain lit.
- The ACTIVE (green) LEDs remain lit until the NE software starts again, or until the double shelf loses power.
- Circuit pack fault conditions are handled on an individual circuit pack basis.

□

Miscellaneous Discretes Management

Description

Miscellaneous Discretes are provided as a mechanism for controlling and monitoring NEs through remotely activated relay closures. The electronics are located within the NCTL/RCTL circuit pack. LambdaXtreme® Transport NEs contain Miscellaneous Discrete Interfaces (MDIs) for provisioning two types of miscellaneous discretes: Environmental points (inputs) and control points (outputs). For LambdaXtreme® Transport, each NE contains sixteen environmental points and four control points.

Important! For a mesh node, only the miscellaneous discretes interfaces associated with the master (Line-1) NCTL are available for use.

Environmental points provide a way to monitor the environment around the bay. There are sixteen discrete points that can be provisioned to send a message to the CIT (such as alarms for smoke, intruders, flood, or fire).

Control points provide a way to activate/deactivate various equipment external to the NE through the use of NE control relays that are commanded by NE messages.

Environmental and Control Points Functionality

Environmental Points allow the user to define the alarm severity and alarm message for the miscellaneous discrete alarms. Control Points allow the user to define (describe) the condition name for the controls. These descriptions are used for information purposes when a user seeks to operate or release external miscellaneous discrete controls. For example, the user may want to verify that aid=CONT-1 is associated with a fan (and not a sprinkler) before operating it. The following applies to internal and external environmental and control points:

- The LambdaXtreme® Transport system provides 16 internal miscellaneous discrete environmental input points and four internal miscellaneous discrete control output points.
- Each LambdaXtreme® Transport NE is capable of sensing any individual contact closure for the environmental input points and generating an appropriate autonomous message over the EMS-to-NE and CIT-to-NE interfaces.
- Each point can be uniquely labeled for EMS/CIT requests, responses, and notifications.
- The EMS/CIT is capable of activating/releasing any control output point.
- Users can test any discrete interface output (control) point. It is possible to test all the control points on an NE or just on a per-output basis.

Environmental Points Parameters

The Environmental Points provisioning window in the CIT contains the following fields:

- AID – This identifies the miscellaneous discrete environmental point.
- Alarm Message – This is the condition description to be associated with the environmental point. The description may be a string of up to 26 characters consisting of uppercase and lowercase alphanumeric, spaces, and periods.
- Alarm Severity – This parameter defines the level of the alarm to be associated with the environmental point if a failure occurs.

Control Points Parameters

The Control Points provisioning window in the CIT contains the following fields:

- AID – This identifies the miscellaneous discrete control point.
- Control Point Name – This is a text string associated with the selected miscellaneous discrete control. The text string is case-sensitive, alphanumeric, uppercase and lowercase, spaces and periods allowed, up to 26 characters. A Control Point Name entry is required.
- Status – Displays the current status of the control point. Possible values are Open or Closed.
- Action – This field allows you to operate the control point. If the current status is Open, then possible values are Close, Pulse, and None. If the current status is Closed, then possible values are Open and None.



Performance Management

Description

Performance Management (PM) refers to the in-service, non-intrusive monitoring of transmission quality and equipment health. The LambdaXtreme® Transport system tracks the signal quality and equipment health through continuous collection and analysis of performance data. The user can retrieve current and past values of the system to get an overview of the health of the system. The Performance Management capability exists for optical lines, channels (both data traffic and supervisory), and equipment monitoring. Users have the ability to provision threshold parameters to levels that might be indicative of impending performance degradation.

Responding to a performance degradation before there is a failure and system alarms are raised is termed proactive maintenance. Responding to system alarms is termed reactive maintenance. Crossing of a performance parameter threshold indicates a potential network quality or performance degradation while the services being transported have not been impacted. If a condition continues to deteriorate, then alarms are raised and immediate attention may be required to resolve or repair the problem.

Additional information on performance management can be found in *LambdaXtreme® Transport Alarms, Messages, and Trouble Clearing Guide*. Step-by-step instructions for performance management provisioning using the CIT can be found in [Appendix A, “Using the CIT”](#). For provisioning procedures using the EMS, see the *Navis® Optical Management System (OMS) Maintenance Guide*.

Thresholds

A threshold is the mechanism for generating a defined notification resulting from changes in PM parameter values. The LambdaXtreme® Transport system allows provisioning of performance parameter thresholds, which can be set by the user to show degraded performance.

PM Event Reporting

By definition, a Threshold Crossing Alert (TCA) or Quality of Service (QOS) event means that a threshold associated with a performance parameter has been exceeded. The QOS notification message is reported to the TL1 interface where threshold crossings associated with a particular path can be correlated, and the likely source of the degradation can be identified. The EMS receiving the QOS message should interpret the QOS as an early warning regarding the health of the signal.

The TCA or QOS notification flag is used to turn on or turn off the TCA or QOS autonomous message notification of any parameter. All TCAs are retrievable either locally or remotely using the CIT or EMS and can be provisioned to send autonomous messages.

Software and Database Administration

Overview

This section describes the software management features of the LambdaXtreme® Transport system. Software management involves copying and moving executable code and provisioned data between volatile and non-volatile memory within the NE and between the NE and CIT or EMS. Software management activities occur during initial installation, when power is restored to an NE, when circuit packs are inserted, and in response to user commands from the EMS or CIT.

The LambdaXtreme® Transport system supports the following user capabilities:

- Installing initial NE software generic
- Downloading software
- Copying NE software to remote NEs
- Database backup and restore
- Rebooting the system (new software activation)

Step-by-step instructions for software administration using the CIT are covered in [Appendix A, “Using the CIT”](#). For software administration procedures using the EMS, see the *Navis® Optical Management System (OMS) Provisioning Guide*.

Installing Initial NE Software Generic

For OADMs, the NCTL provides control and user interfaces at the NE level. The NCTL has a removable PCMCIA FlashDisk Memory Module (FMM) for non-volatile memory storage of executable code and provisioned data. The CIT PC contains a PCMCIA Type II card slot in which to insert the FMM to copy the NE software from the PC hard drive to the FMM. The FMM contains two directories (Active and Inactive) for storing the active and inactive NE software. During an initial installation startup, a copy of the software to be run on the NE is stored in the active directory of the FMM.

In Repeaters and MINI NEs, the RCTL provides the same functionality as the NCTL, SCTL, and SUPVY packs on OADMs. The RCTL uses a CompactFlash for memory storage. This flash card is smaller than the NCTL FMM and requires the use of an adaptor before being inserted into the CIT PC to copy software.

Important! This document refers to both the NCTL FMM and the RCTL CompactFlash as the FMM. Alcatel-Lucent recommends and supports the FAT16 (or FAT) FMM file format for the LambdaXtreme® Transport system.

The process for installing the initial software generic on an NE includes the following steps:

- Insert the FMM into the PCMCIA card slot on the CIT PC.
Note: A CompactFlash requires the use of an adaptor.
- Install the NE software on the FMM (see [Appendix A, "Using the CIT"](#)).
- Remove the FMM from the CIT.
- Insert the FMM into the slot on the NCTL/RCTL and the software will automatically be used on the NE.

An FMM can be placed into a powered or unpowered NCTL/RCTL. The NCTL/RCTL will not boot without a PCMCIA flash card present. If the NCTL/RCTL circuit pack attempts to boot without a flash card, the boot process is halted, the FAULT LED is turned on, and the MJ audible and visual Office Alarms are activated. If a valid FMM is inserted at a later time, the NCTL/RCTL will automatically start booting with the new flash card and will not have to be reset.

Important! The 256 MB and 512 MB sized FMMs are equivalent alternatives for all R8.0 network element (NE) types. New NE installations should include the 512 MB FMM(s), while existing NEs may use either size. New orders of FMMs, for spares or replacement, should be for the 512 MB size. (Note: The RTRV-EQPT TL1 command includes a parameter (FMMSIZE) for slots containing NCTL/RCTL packs, so that existing FMM size can be determined remotely. Output values are 256, 512, or NA.)

For downloading/copying software, the following process applies:

- A download software TL1 command to a Repeater with a 256 MB FMM will download only the Repeater software. A download software TL1 command to any NE with a 512 MB FMM, or to any MINI NE or OADM with a 256 MB FMM will download the entire software generic.
- A Repeater cannot be used as the source in a COPY-PROGRAM TL1 command. The command will be denied with a generated error. In all other cases, an NE FMM can be used as the source of the CPY-PRGRM.
- There is an impact to the CIT download software generic tool to support the special download requirements for a Repeater with a 256 MB FMM. (A reduced number of files are copied.)

Removing an FMM

Important! Synchronization between the FMM active directory database and the RAM database is done on FMM removal and before reboots initiated by the ENT-SYS or INIT-SYS commands. The following occurs when the REMOVE FLASH button is pressed:

- The LED blinks until the active database on the FMM has been synchronized with the database in RAM. (The LED may blink only once or numerous times depending on the type of FMM.) Do not press the REMOVE FLASH button twice and then remove the flash card. Pressing this button a second time cancels the request to remove the flash card. If removed at this point, the database will become out of sync and damage to the flash card can occur.
- The system disables mirroring.
- The LED remains lit when the synchronization is complete.
- A non-alarmed “Flash ready for removal” standing condition is created.

Inserting an FMM into a Running System (Hot Insert)

When an FMM is inserted into a running system, the following occurs:

- The “FMM removed” alarm is cleared and replaced with a “FMM synchronization in progress”.
- The LED flashes while the synchronization is in progress.
- When the synchronization is complete, the LED is turned off and the “FMM synchronization in progress” is cleared.
- When an FMM is removed and then reinserted, DBBACKUPTIME is reset to the default date and time. Responses to TL1 commands that are executed immediately following FMM insertion are delayed up to 40 seconds.

Updating an FMM from a 256 MB to a 512 MB Card

The following procedure is used to update (replace) an FMM:

1. Format the 512 MB FMM using a PC.
2. Download the software on the 512 MB FMM using the CIT PC Card Loader.
3. Remove the FMM from the PCMCIA slot after properly stopping the device.
4. Press the “REMOVE FLASH” button on the NCTL/RCTL pack and wait for the light on the button to stop blinking and become solid.
5. Remove the 256 MB FMM from the NE without pulling the NCTL/RCTL pack out.
6. Insert the 512 MB FMM into the NCTL/RCTL and wait for the database to synchronize onto the new FMM.

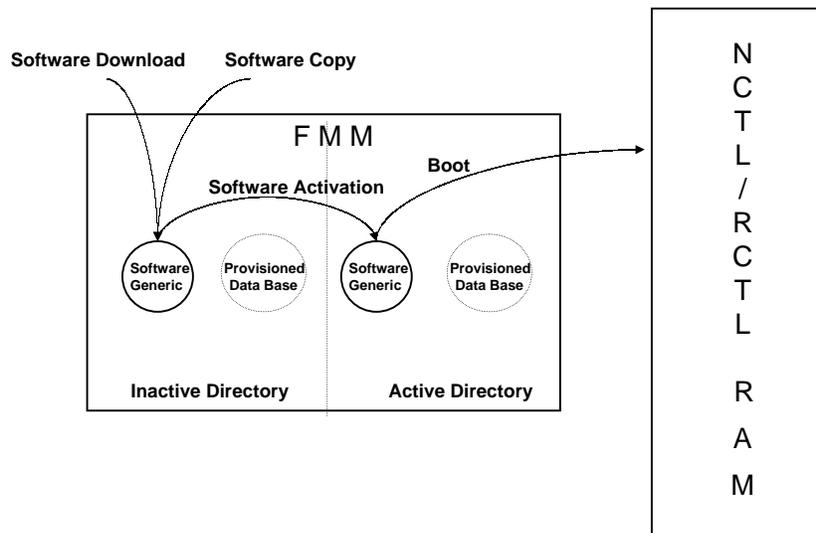
Downloading Software

Important! The 3D_WXC equipped OADM's have two NCTL packs and therefore two FMM cards. An exact copy of the software generic will be stored on each NCTL's FMM and each FMM will contain the database for the equipment that the NCTL has control over. Database backup to OMS or CIT will back up all database files from both FMMs and software generic download will download to both FMMs with a single command.

The LambdaXtreme® Transport system supports the capability to download NE generic software from the CIT or EMS to the backup (inactive) directory of the GNE NE's FMM. Also supported are remote copies from the GNE and backup/restores through the GNE. The download is done by the File Transfer Protocol (FTP) or Secure File Transfer Protocol (SSH or sftp) depending on whether ENCRYPTION is enabled or disabled respectively.

Figure 3-7, "Software Download/Copy from FMM" (p. 3-27) shows the respective software generic used for download/copy operations.

Figure 3-7 Software Download/Copy from FMM



Important! To perform a software download using the CIT cut-through interface, the user must launch an FTP server (or SSH server for sftp task). The DWNLD-SW command can only be issued on the physical port on which the participating FTP or SSH server IP address provided in this command is reachable. If the software download is done from the CIT GUI, there is no need to turn the FTP server on. This will be done automatically by the GUI software.

Important! When a user requests an operation through the CIT GUI which requires the FTP or SSH (in support of sftp) server on the CIT to become active, or when a CIT cut-through user requests that the server be started, the server is started with a software generated User ID and a password that is unique each time the server is started. The password consists of printable and reproducible characters that a user may need to type into a TL1 command when using the CIT cut-through.

Copying NE Software to Remote NEs

Important! Only OADM or MINI NEs can be used as the source of remote copies, not Repeaters.

The LambdaXtreme® Transport system supports the capability to copy NE software from the NE to which the user is logged into, to the inactive directory of the FMM of an NE anywhere within the maintenance subnetwork. The software copy (from one network element to another) occurs in the background. Once the software transfer is initiated, there is no mechanism to cancel the operation. The command completion and various events/conditions during the copy are reported on the TL1 interface.

Important! The software copy operation cannot be executed at a source NE while a backup, restore, or download operation is occurring at the same NE, because each of these operations locks the FMM.

New Software Activation

The user can issue a command (INIT-SYS) that swaps the active and inactive software on the FMM and then reboots the system. This capability allows users to reboot the NE and also provides the option of swapping the NE software between the FMM active and inactive directories and/or swapping the active and inactive versions of the database.

Important! Before executing this command, be aware of the following:

- Execution of this command may affect service.
- Execution of this command at any NE will affect EMS communication with that NE; all EMS users logged into that NE will be logged out.
- Rebooting the NE will delete the History Log.

Viewing Software Release Information

The user can view software release information about the various copies and releases of the NE software as it resides in the NE. When the user requests software release information, the user will see the following for the NE:

- The software release version for the active and inactive directory of the FMM
- The current status of the software release in the active and inactive directory.

Network Software Upgrade

For the procedure and details on upgrading network software, see the *LambdaXtreme® Transport Software Release Description (SRD)*.

Customers should upgrade all NEs in a network as quickly as possible when upgrading to a different software release. Having different software releases running on different nodes at the same time may cause supervisory communications to fail, which may impact functionality including (but not limited to):

- APR recovery
- Transient response
- Remote commands.

Database Backup and Restore

Important! To perform database backup and restore from the CIT-to-NE interface, the user must first create the proper directory structure on the CIT-to-PC and launch an FTP server task. A BACKUP-DB or RESTORE-DB command can only be issued on the physical port on which the participating FTP server IP address, provided in the command, is reachable. For example, a RESTORE-DB command cannot be issued from the CIT-to-NE interface to perform a database restore to a server reachable from the EMS-NE interface.

There are essentially three steps to a database backup and restore: 1) Backup, 2) Restore, and 3) Activate. The Backup takes the active database on the NE FMM and copies it to a PC server. The Restore takes the database that was previously backed-up and writes it to the inactive directory on the NE FMM. The final Activate step swaps the active and inactive directories and reboots the NE.

All three steps can be executed from either the CIT Cut Through interface or the OMS GUI (for backup/restore functionality using Navis® Optical OMS, see the *Navis® Optical Management System (OMS) Network Element Management Guide*). However the Backup and Restore must both be done through the same interface. In other words, if the backup is done through CIT Cut-Through the restore must be done through CIT Cut Through using the same PC (containing the backed-up database). Also, if using the CIT Cut Through, the PC must be directly connected to either a GNE or NE being backed up.

The Backup/Restore feature allows a user to either backup or restore NE database files that contain provisioning data. The LambdaXtreme® Transport system supports an FTP protocol for the purpose of NE database backup to and restoral from a remote system.

The Backup command causes a transfer of an NE's FMM mirror database to the backup database and to a specified remote system (EMS or CIT). The Restore command causes a transfer of a copy of a LambdaXtreme® Transport database from a remote system to a specified NE with the intention of having the NE restart using the values in the transferred database as the working database.

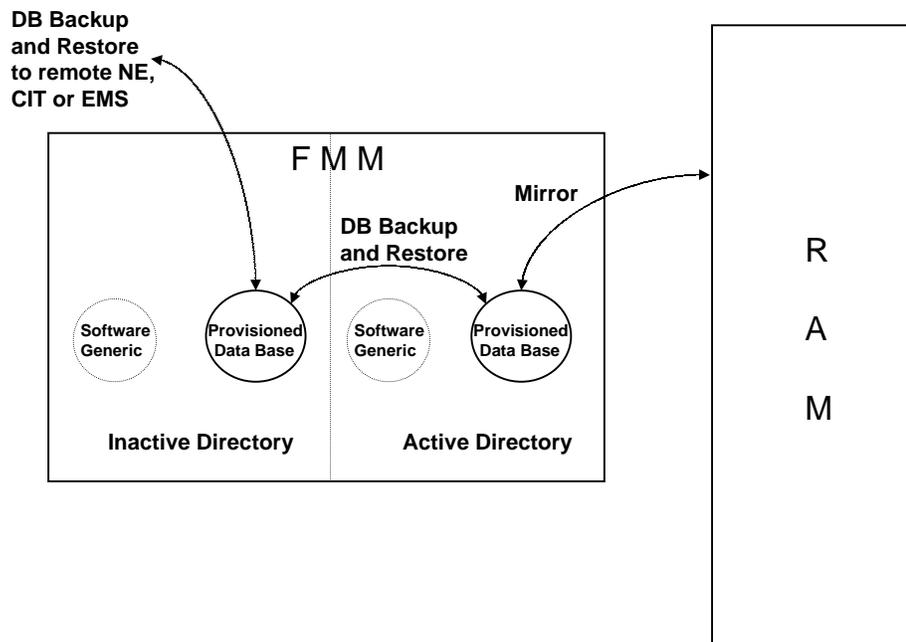
Important! If the NE is in the middle of an operation where a reboot would cause the NE software or database to be corrupted, the reboot is denied and an error message is returned.

The following applies to the provisioned database:

- There is one copy in RAM that is the “working copy” with the most up-to-date information.
- One copy is stored in the Active Directory of the FMM. The mirror is kept in sync with the working copy and is used during a reboot.
- One copy is stored in the Inactive Directory of the FMM to be used when a backup is performed.

Figure 3-8, “Database Backup/Restore from FMM” (p. 3-30) shows the respective database used for backup/restore operations.

Figure 3-8 Database Backup/Restore from FMM



The database backup and restore features are not available from the CIT PC GUI. This functionality is available only through the TL1 cut-through interface commands BACKUP-DB and RESTORE-DB. The backup/restore commands are executed at the

GNE. The target NE for the backup/restore is specified as a command parameter. Only one backup or restore can take place on a node at any given time. However, the GNE can execute up to 16 simultaneous database backups or restores to remote nodes at any given time.

For details of the TL1 cut-through interface, see [Chapter 8, “Craft Interface Terminal”](#) and [“Execute Commands Interactively Using TL1 Cut Through” \(p. A-42\)](#). For backup/restore functionality using Navis® Optical OMS, see the *Navis® Optical Management System (OMS) Network Element Management Guide*.

Database Backup

Important! The 3D_WXC equipped OADMs have two NCTL packs and therefore two FMM cards. An exact copy of the software generic will be stored on each NCTL's FMM, and each FMM will contain the database for the equipment that the NCTL has control over. Database backup to OMS or CIT will back up all database files from both FMMs and software generic download will download to both FMMs with a single command.

The following principles apply during an NE database backup:

1. Upon receipt of a backup request from an EMS user that includes a server address, user id, password, TID, and a pathname, the NE initiates an FTP session with the remote system for the purpose of making a backup copy of the database.
2. Upon receipt of a backup request from an EMS user that includes a server address, user id, password, TID, and a pathname, the NE initiates an FTP session with the remote system for the purpose of making a backup copy of the database.
3. The NE makes a snapshot copy of the memory database and stores it in the backup FMM database.
4. After successful initiation of the FTP session, the NE issues FTP write request(s) to copy all of the backup FMM database file(s) to the supplied remote system and pathname.
5. In the case of a backup from a remote NE, the database files to be backed up are remotely copied from the remote NE through the GNE to the CIT or EMS.
6. Through an autonomous message of the outcome (success or failure), the NE notifies the command initiator (EMS or CIT), of every invocation of the backup function. This notification is generated at both the GNE and the destination NE.

Important! An NE backup is uninterruptible (that is, user-initiated actions will be delayed until the backup is completed).

Important! Responses to TL1 commands that are executed immediately following a database Backup command or FMM insertion are delayed up to 40 seconds.

Following is the procedure for Backup using the CIT Cut Through:

1. Connect PC to CIT port on a GNE or the NE being backed up. (The PC should contain the appropriate CIT software for the NE.)
2. From My Computer, open the C:\lx_xportcit folder; create a new subfolder; and rename it with the TID of the NE being backed-up.
3. Open up a Cut Through window.
4. On the far upper right select the FTP Server tab.
5. Click **Start**.
6. This action will open up a pop-up window. Write down the IP address, User ID, and Password that is displayed.
7. Click **OK**.
8. Log in to local NE using the Cut Through mode.
9. Type in the following command filling in the appropriate information.
`BACKUP-DB:<TID of the NE you are logged into>::<ctag>::DEST_TID=<TID of the NE to be backed up>,FTP_IP_ADDRESS=<IP address recorded earlier>,PATHNAME="C:\LX_XPORTCIT\<<Name of the folder created earlier>",FTP_USER_ID="<User ID recorded earlier>",PASSWORD="<Password recorded earlier>"`
10. Click **Send**.
11. This will take several minutes to complete. After completing it will store the NEs backup database on to your PC in the folder you created.
12. Check the PC folder to verify the files were copied successfully.

Database Restore and Activate

The following principles apply during an NE database Restore:

- Upon receipt of a restore request from a user using the remote system that includes a server address, user id, password, TID, and a pathname, the NE initiates an FTP session with the supplied address for the purpose of restoring the database from a remote system.
- After successful initiation of the FTP session, the NE issues a read request to get a listing of all of the file(s) in the remote system directory pointed to by the supplied pathname.
- Using this directory listing, the NE copies all of the database file(s) to the backup FMM copy of the database.
- In the case of a restore to a remote NE, the backup database file(s) are remotely copied from the CIT/EMS through the GNE to the remote NE.
- Database restore is a two step process: RESTORE-DB is used to get the database into the backup area; an INIT-SYS is used to verify, swap, and reset (activate).

- The NE notifies the remote system user of the outcome (success or failure) of every invocation of the restore function.
- An autonomous notification is issued before the system executes any Reset function.

Following is the procedure for Restore and Activate using the CIT Cut-Through:

- Connect PC to CIT port on a GNE or the NE being restored. (The PC should contain the appropriate CIT software for the NE)
- In “My Computer”, open the C:\lx_xportcit folder; verify there is a subfolder for the NE being restored; verify database files are saved in this folder with the expected date stamp.
- Open up a Cut Through window.
- Select the FTP Server tab.
- Click **Start**.
- This will open up a pop-up screen that shows the IP Address. Write down the IP Address.
- Click **OK**.
- Log in to local NE using CutThrough.
- Type in the following command filling in the appropriate information.
RESTORE-DB:<TID of the NE you are logged into>::- Press “Send”.
- Allow 10 minutes for the command to complete. You should see an autonomous message indicating the restore completed successfully.

The following steps will activate the restored database:

- An INIT-SYS with DB_SWAP will activate the restored database. Type in the following command filling in the appropriate information. (Note: DB_SWAP parameter MUST be entered exactly as shown)
INIT-SYS:<TID of the NE to be restored>::- Allow at least 10 minutes for the NE to complete booting.
- Log in to NE using CIT GUI and verify that all database provisioning was successfully activated.
- Look at map view in CIT and check for any unexpected alarms in the entire system. Log in to other NEs as necessary.

Important! Be sure to log into the NE being restored before issuing the INIT-SYS command to activate the restored database.

Important! The FTP server supports secure file transfer over SSH for software download, backup database, and restore database operations. This feature can be configured using the ENT-CID-SECU TL1 command or the CIT cut-through interface (see [“Execute Commands Interactively Using TL1 Cut Through”](#) (p. A-42)).



4 Security Administration

Overview

Purpose

This chapter provides information on security administration for the LambdaXtreme® Transport system. The LambdaXtreme® Transport NE security functions handle NE access and control capabilities that occur over the CIT-to-NE and EMS-to-NE TL1 interfaces.

Step-by-step instructions for security administration provisioning using the CIT are covered in [Appendix A, “Using the CIT”](#). For provisioning procedures using the EMS, see the *Navis® Optical Management System (OMS) Administration Guide*.

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Security Levels/Functions

Description

The purpose of security administration is to manage user accounts (logins, passwords, authorization levels, external links) and to monitor system security so that only valid users can perform permitted actions and receive authorized information from the system.

The CIT GUI provides the user the capability of security administration for the NE(s). The NE does not provide an “unsecure” user external port. That is, all user external LambdaXtreme® Transport ports require a login/password to gain access.

The NE provides security administration mechanisms that allow an administrator to control the usage and management of user logins, security features, and database of the NE, and to generate security audit trails when necessary through the corresponding network management interfaces. The following security administration functions are offered:

- Administration of NE user logins that are used on both the EMS-to-NE and CIT-to-NE interfaces
- Administration of the NE command permissions (User Access Privileges) for each NE user login
- Administration of NE-wide security characteristics such as login aging, password aging, user ID lockout thresholds, and inactivity timeout periods (on a per-port basis with the ports being the EMS-to-NE and CIT-to-NE interfaces and per-channel (DCN) inactivity timeout between GNE and remote NE).

The following material explains the basis of the LambdaXtreme® Transport command permissions structure including Functional Categories, Authorization Levels, User Privilege Codes, and User Access Privilege Assignments.

Functional Categories

All LambdaXtreme® Transport TL1 commands supported by NEs are grouped into the following five functional categories (FCs):

- Security Administration (S)
- Provisioning (P)
- Performance Monitoring (PM)
- Maintenance (M)
- Test Access (T).

Authorization Levels

Authorization Levels (AL) are used to add a measure of fine granularity to access control within each functional category by tailoring a user's access to commands within the functional category.

The LambdaXtreme® Transport system supports six command authorization levels. These are listed below in order of descending privilege.

- Level 5 (Super User) – Full authorization access (controls user security functions)
- Level 4 (Privileged User) – Authorized for potentially service-affecting actions
- Level 3 (General User) – Authorized for not service-affecting actions
- Level 2 (not used)
- Level 1 (Reports Only) – No access to user login security information (Default)
- Level 0 – No command access or authorization.

User Privilege Code

User Privilege Codes (UPC) determine the tasks a user is permitted to perform. The UPC is the mechanism whereby a user's NE TL1 command permissions profile is tailored. Each NE supports the use of a UPC determining the set of commands that any given user is authorized to execute.

The UPC is a composite of two attributes: the Functional Category plus the Authorization Level as described above. The UPC is a one/two-letter and one-digit number associated with functional job categories. The letters represent the functional job category. The one-digit number represents the user's authorization level. The UPC is assigned when a login is created or modified.

User Access Privilege

The User Access Privilege (UAP) is a collection of UPCs that are assigned to a user based on the user's work/functional responsibility. A UAP is specified for each newly created user ID. A user with Security Administration privileges (UPC of S5) has the ability to assign a UAP to each new user ID added to the NEs local database according to the TL1 commands the new user is authorized to execute. A minimum UAP level of S1 must be assigned to each user login so that the user can log into the NE.

A non-super-user has the following assigned authorization levels in each of the following categories:

- S[1, 4, 5] – For System Administration, Authorization Level 1, 4, 5
- T[0, 4] – For Test Access, Authorization Level 0, 4
- PM[0, 1, 3] – For Performance Monitoring, Authorization Level 0, 1, 3
- P[0, 1, 3, 4] – For Provisioning, Authorization Level 0, 1, 3, 4
- M[0, 1, 3, 4] – For Maintenance, Authorization Level 0, 1, 3, 4.

An authorization level of “0” indicates that the user has no privileges in the functional category.

Super-users have an authorization level of “5” in all the categories; non-super-users will not be allowed to have an authorization level of “5” in any of the areas.

If the user has some other authorization level other than those listed here, because it was provisioned by some mechanism other than the CIT GUI (for example, an NE provisioned by an EMS and then linked to the maintenance subnetwork) then the next most restrictive authorization level is assigned (for example, T3 becomes T0, and S3 becomes S1).

Because many CIT screens require at least retrieve privileges (authorization level of 1) in several functional categories, setting an authorization level to “No Authorization” for a functional category may restrict a user’s access to screens for which they would need to have authorization. Thus, if the privilege level is set to “No Authorization” in the Maintenance, Provisioning, or Performance Management categories, a warning message is displayed indicating “No Authorization” when the user attempts to access the screen.

UAP Provisioning Example

A user ID that requires a high provisioning privilege can be provisioned using the CIT as follows where each functional category is assigned the following Authorization Level:

- Provisioning – Level 3
- Test Access – Level 4
- Performance Monitoring – Level 1
- System Administration – Level 1
- Maintenance – Level 0 (no authorization).



Logins

Introduction

Login security controls access to the NE(s) by individual users. User identity is specified using a user ID that is a unique identifier used by an NE for security management. The user ID comprises of a string of case-sensitive alphabetic and/or numeric characters containing a minimum of three characters and a maximum of ten characters from the defined character set (see Tables 3-1 and 3-2). The NE authenticates the user ID against the NE's local security database. Based on this, the NE either accepts or denies login access to the NE.

Security administration enabled the system to deny a user access to the NE. Access may be denied during one of the following points in time:

- When the user first attempts to log in and the login attempt is denied.
- During an active session and the user is disconnected by the NE.

After the user logs into an NE with a valid user ID (and Password), user functions can be performed based on the assigned User Access Privilege (UAP).

[Table 4-1, "Alphabetic Character Set" \(p. 4-5\)](#) shows the set of alphabetic characters for use in User Login ID and Password applications.

Table 4-1 Alphabetic Character Set

A	B	C	D	E	F	G	H	I	J	K	L	M
N	O	P	Q	R	S	T	U	V	W	X	Y	Z
a	b	c	d	e	f	g	h	i	j	k	l	m
n	o	p	q	r	s	t	u	v	w	x	y	z

[Table 4-2, "Numeric Character Set" \(p. 4-5\)](#) shows the set of numeric characters for use in User Login ID and Password applications.

Table 4-2 Numeric Character Set

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

Security History Log

The Security History Log chronologically stores up to 500 of the most recent security-related events. These security-related events are excluded (kept separately) from the Event History Log (see ["Event History Log" \(p. 3-12\)](#)). The Security History Log events can be viewed using the CIT or the TL1 cut-through interface (RTRV-LOG-SECU command).

The following events are displayed in the Security History log:

- Per-user events: User ID creation, password expiration/modification, login, logout, etc.
- Global (NE-wide) events: User ID lockout, login/password aging, etc.
- Global controls: Non-super user logins inhibited/enabled.

Step-by-step instructions for viewing the Security History Log are covered in [Appendix A, “Using the CIT”](#).

Important! After two NEs are merged into one, the security log for the peer ROADM is lost (records logged before meshing are not forwarded to the master and are not accessible). For details on saving this security log before merging, see Chapter 4 of the WXC upgrade procedure (Document #365-575-807).

Super User Logins

The LambdaXtreme® Transport NE supports three Super User logins. When shipped from the factory, the three original Super User IDs are:

- “LUC01” (luc-zero-one)
- “LUC02” (luc-zero-two)
- “LUC03” (luc-zero-three).

The Super User login IDs cannot be removed and no additional Super User logins can be created. The Super User logins have full privileges (UAP of M5, P5, PM5, S5, T5) in all functional categories including those affecting security, access to the NE, system initialization, NE testing, software installation, and database and software management. It is not possible to modify a Super User’s access or permissions capabilities.

The three default Super User logins are supported over the CIT-to-NE, EMS-to-NE, and DCN remote login interfaces. The NE allows any Super User to be simultaneously logged in using the CIT-to-NE and EMS-to-NE TL1 interfaces (multiple Super User login sessions are permitted). The NE manages each login session independently and allows the user to obtain information regarding who is currently active on which channel for each of the NE’s interfaces.

Non-Super User Logins

The LambdaXtreme® Transport NE supports up to 153 Non-Super User logins. A Non-Super User is able to have only one login session to a given NE at any given instance (multiple Non-Super User login sessions are not permitted). If a Non-Super User is logged into the NE over the EMS-to-NE, CIT-to-NE, DCN interface, or debug port on the NE, and then attempts to log in over any of the other interfaces, the login attempt will be rejected. An error message will be shown stating that a Non-Super User cannot be simultaneously logged into the NE over more than one external interface.

Temporary (Visitor) Logins

The NE allows a user with Security Administration privileges to create temporary logins with expiration dates that can be provisioned. These temporary logins are automatically deleted on the specified date regardless of the frequency of use of the login.

A login can be changed from regular (Non-Super User) to temporary. A temporary login cannot be changed to a regular login, but a temporary login can be deleted and the same login ID used to create a regular login.

User Login Aging

The NE allows a user with appropriate security administration privileges (UPC of S4 or higher) to globally set a login lifetime (aging) parameter. When the User Login Aging feature is enabled, as long as a Non-Super User logs in more frequently than the login lifetime parameter, the user's login is retained. If a user does not login to the NE within the specified period, the login is deleted and the condition recorded in the Security Log. When a login expires, a *Login expired:user-id* message is recorded in the Security Log.

Important! Login aging applies only to Non-Super User logins. Super User logins never expire and cannot be deleted.

The login lifetime parameter can be globally set within the range of 1 to 999 days. The default is 60 days. A value of 0 disables login aging.

Non-Super User/Temporary Login Expiration

User logins are checked for expiration every hour on the hour. Therefore, a user login will be deleted within one hour of its expiration. If the login has expired but has not yet been deleted and the user attempts to log in, the login will not be permitted. Once a user login has expired, it is not possible to create a new login with the same user ID until the old login has been deleted.

□

Passwords

Introduction

All external LambdaXtreme® Transport ports require a password in addition to a user ID in order to gain access. Passwords are used along with user IDs to verify the identity of users. A password comprises a string of alphanumeric and symbolic characters (minimum of six and maximum of ten). Each password contains at least one alphabetic character (see [Table 4-1, “Alphabetic Character Set” \(p. 4-5\)](#)), one numeric character (see [Table 4-2, “Numeric Character Set” \(p. 4-5\)](#)), and one symbolic character (see [Table 4-3, “Symbolic Character Set” \(p. 4-8\)](#)). Passwords are case-sensitive.

Passwords are stored or retained in encrypted form using strong industry standard encryption although they are not encrypted when transmitted from the CIT or EMS to the NEs. Passwords are never transmitted from the NE to the CIT or EMS.

For security purposes, when a password is entered, the actual password is not displayed on the GUI interface. Instead, an asterisk (*) appears as the user enters each character of the password.

[Table 4-3, “Symbolic Character Set” \(p. 4-8\)](#) shows the set of symbolic characters for use in Password applications.

Table 4-3 Symbolic Character Set

!	*	/	[]		'	+	<	>
^	()	-	{	}	~	.	_	'

Super User Passwords

The original Super User default passwords as shipped from the factory are:

- “LUONG+01”
- “LUONG+02”
- “LUONG+03”.

Each Super User has the capability to change their own password or the password of any of the other Super Users. Alcatel-Lucent highly recommends that you change passwords after the first use.

Important! Do not forget your password. Make sure to back up your database.

Password Administration

The NE provides users the ability to change their own password on demand or based on password aging requirements. Passwords may be changed using either the CIT or EMS interface. The NE keeps track of the date when each user password was last changed. When a user logs in, this date is compared with the current date. If the current date is more than the provisioned number of days after the last changed date, then the NE considers the password expired.

A Non-Super User's password is also considered expired the first time the user logs in successfully. This feature is intended to force users to select a password different from the original password provided by the security administrator. This does not apply to Super Users.

To change a password, the user must enter the current password, the new password, and the confirmed new password. The LambdaXtreme® Transport NE checks the password for proper length and syntax in accordance with established password requirements. Before updating the NE's database, the NE ensures that the current password is different from the new password and that the new password and confirmed new password are the same. An error message is generated to notify the user if any of the password requirements are not met. (See [Table 4-1, "Alphabetic Character Set" \(p. 4-5\)](#), [Table 4-2, "Numeric Character Set" \(p. 4-5\)](#), and [Table 4-3, "Symbolic Character Set" \(p. 4-8\)](#) for proper password syntax.)

Password Aging

The NE maintains a provisionable Password Aging interval that is applicable system-wide to all Non-Super User login IDs. This parameter can be globally set by a user possessing the appropriate system administration privilege (UPC of S4 or greater). With the Password Aging feature, a user's password expires if it is not changed within the provisioned period of time. Once the password expires, the user cannot login until the password is changed.

The range of allowed values for the Password Aging interval is 1 to 999 days. The default is 30 days.

When Password Aging is enabled, a user is not able to change their password again until at least n calendar days have passed since the last time the password was successfully changed. If fewer than n calendar days have passed, any attempt to change the password will be denied.

Important! n is value between the minimum of seven (7) and the value of the Password Aging interval.

If the Password Aging interval is set to 0, then the feature is disabled, and passwords may be changed without any elapsed time restrictions.

□

Login Sessions

Introduction

The NE supports the simultaneous existence of 29 login sessions, which can be any combination of Super-User and Non-Super User login IDs.

A login session (channel) can be in one of the following three possible channel states:

- Login Active
- Login Inactive
- Password Expired

Login Active State

A channel enters the Login Active state when a valid login command without an expired password is received by the NE. Only one login session is allowed per channel. A login request received on a channel that is already in the Login Active state will be denied with an explanation. A user who attempts to log in to a channel that they are already logged into will receive an appropriate message.

A channel exits the Login Active state (reverts to Login Inactive state) when any one of the following occurs:

- A valid logoff command is received by the NE on that channel
- A condition occurs in the NE or local NE that requires a cancellation of a login session
- The TCP/IP connection is lost.

Login Inactive State

All channels are, by default, in the Login Inactive state. A channel transitions out of this state only when a valid login command is received by the NE. When a channel is in the Login Inactive state, the NE does not respond to any requests other than valid login requests. In addition, no notification messages appear on a channel in the Login Inactive state. A login session transitions to the Login Inactive state when a user logs off and terminates a login session.

Password Expired State

A login session enters the Password Expired state when the NE receives a valid login command on a channel that is in the Login Inactive state, but the password for the user ID has expired. The NE rejects the login command and displays text explaining that the user's password has expired.

In this state, the NE only accepts a valid logout command or a *Modify Password* command to change the expired password for the user ID. Using either of these options, the login proceeds normally with the channel entering the Login Active state. Otherwise, the login session returns to the Login Inactive state.

Login Procedure

A login attempt is considered successful if all the following conditions are met:

- A provisioned user ID and correct password is entered.
- The user login and NE login security is enabled (Non-Super Users are permitted to log onto the NE).
- The user ID lockout threshold has not been exceeded.

If the login attempt is successful, it is recorded in the Security Log.

If any of the above conditions are not met, the security feature denies access to a user attempting to log in, or may disconnect a user during an active session.

When a login attempt fails due to user ID lockout threshold, the following occurs:

- The login is denied until the lockout period has expired.
- Each unsuccessful login attempt is recorded in the Security Log.
- The login ID entered on the last attempt and reasons the login failed are recorded in the Security Log.
- Error return text to the user reads *Login Failed* but reasons the login failed are not reported.

If the user login attempt is unsuccessful because the user ID has been disabled, the following occurs:

- A *Login: user-id: deny* message is recorded in the Security Log.
- Each unsuccessful login attempt is recorded in the Security Log.
- Error return text to the user reads *Login inhibited*.

Login Session Disconnect

If a login session is active on a particular channel and the NE or remote NE must disconnect the session for some reason, the following occurs:

- Any commands that originated on the channel currently executing on the NE are dropped.
- A *logout:user-id* message is recorded in the Security Log.
- Before disconnecting the session, the NE sends notification of the impending disconnect.

Important! The NE sends events (or messages) to all other login sessions but may not send to CIT or EMS. For example, if a User ID is changed or disabled by a Super User, the login session will be disconnected but they will not be notified. However, other login sessions will receive “Logout”, “Timeout”, or “Forced Disconnect” message.

Login Session Denied

A login session is denied for any one of the following reasons:

- The user fails to enter a valid ID and password.
- The login ID of the individual user has been administratively disabled.
- Another user is already logged into the same NE using the same CIT-to-NE, EMS-to-NE, or DCN data link.
- A Non-Super User is already logged in over a different CIT-to-NE, EMS-to-NE, or DCN data link.
- NE logins are disabled (Non-Super Users).
- Login attempts exceed the user ID lockout threshold.
- The user ID lockout period has not expired.

When a login attempt on a channel is denied, the following occurs:

- A *Login: user-id: deny* message is recorded in the Security Log.
- A login denied message is sent on all other active login sessions.

User ID Lockout

The NE allows a user possessing the appropriate system administration privilege (UPC of S4 or higher) to provision the following user ID lockout parameters:

- User ID Lockout Threshold – the number of sequential invalid login attempts permitted after which the user ID is locked out and an Intruder Alert Alarm is raised and recorded in the Security Log. The range of values is 2 to 99. The default value is 5.
- User ID Lockout Period – the number of minutes that a user is locked out once the User ID Lockout Threshold is reached. The range of values is 1 to 99.

Important! The user will automatically be re-enabled once the elapsed time since lockout exceeds the provisioned value of the User ID Lockout Period. The user cannot be manually re-enabled by anyone during this waiting period. Once re-enabled, the NE resets the User ID Lockout Threshold and the User ID Lockout Period to the default values.

Inhibiting Individual User IDs

The NE allows a user with the appropriate privilege (UPC of S5) to disable an existing Non-Super User ID. Disabling a user ID prevents the user from establishing a session. If the user ID is actively logged into a session, the login session is automatically terminated and any attempt by the user to log back into the NE is denied.

Globally Inhibiting User Login Activity

The NE allows a user with the appropriate privilege (UPC of S4 or higher) to control login access on a per network element basis by temporarily inhibiting all Non-Super Users from logging into the NE. This capability might be used during routine maintenance or upgrade activities. The three Super Users are not affected by this security measure and are always allowed to log in.

When the command is issued to disable logins, all Non-Super Users currently logged in are disconnected, and any attempt to log into the NE is denied. A “Logins Inhibited” condition is raised by the NE and recorded in the Security Log. The NE-ACTY user panel LED is activated when logins are inhibited.

When logins are once again enabled, the “Logins Inhibited” condition is cleared and recorded in the Security Log. The NE-ACTY user panel LED is deactivated (turned off) when logins are enabled.

Inactivity Timeout

For each NE, an inactivity timeout period can be globally provisioned for all user sessions (logins) on a per-port basis (the GNE enforces the timeout). All the user sessions associated with an NE’s particular point of attachment port and channel combination have the same Inactivity Timeout period (the value provisioned for the port). If a user does not interact with an NE during the provisioned period of time over the given port and channel combination, the user is automatically logged off from *all* login sessions to NEs maintained over the given port and channel combination, and a *Logout:user-id-timeout* message is recorded in the Security Log.

The Inactivity Timeout Period range is 1 to 999 minutes. The default is 60 minutes (for CIT and EMS ports). If the Inactivity Timer is enabled, it applies to all user sessions (logins) maintained on the given port and channel combination. Each channel on a given port maintains a separate timer.

The Inactivity Timer is active only when there is an active login session on the channel and the NE is expecting the user to input data. If the NE is busy processing a request, the inactivity timer is disabled. It is activated when, at the completion of a user-generated command, there is no pending message being processed by the NE.

Important! The number of available logical channels (five (5) on CIT port, and 16 on EMS port) is limited. Disabling the timeout mechanism not only can lead to all available logical channels being consumed unintentionally, but also can pose the threat of security breakdown with unattended connections. The user should be cautious in provisioning the timeout period. Disabling the timeout mechanism is not recommended.

Important! The current inactivity timeout for connections to remote NEs is hard-coded to eight hours. Even if the inactivity timer at the EMS/CIT port is set to zero (no inactivity timer), a remote connection will be terminated after eight hours of remote inactivity (on the DCN port). To control this remote NE inactivity timer, use DCN as AID in the ENT-CID-SECU TL1 command.

Security Notification Management

The NE sends appropriate notification whenever any of the following attributes change for an existing login in the NE database:

- User ID
- User Access Privilege
- User ID Lockout Threshold
- User ID Lockout Period
- Temporary Login Aging
- User Login Aging
- Password Aging
- Inactivity Timeout Period
- Non-Super User enabled/disabled.

The NE sends a notification whenever the following security events occur:

- Login Creation
- Login Modification
- Login Deletion
- Login
- Logout
- Logout – Remote Link Down
- Logout – Forced Disconnect
- Logout – Timeout
- Password Expiration
- Intrusion Alert
- Logins Inhibited
- Logins Inhibited Cleared.

Security Data Storage

All security data related to the NE or individual user logins is stored in non-volatile memory (NVM). This ensures that data is retained in the event of a system failure or shutdown. All security information, except passwords, can be printed, viewed, and accessed as read-only by users possessing the appropriate system administration privilege.

Audit Trail Record

The NE maintains a record in the Security Log of all login attempts, user logouts, and provisioning commands. The following information is logged for all commands, except retrieve (RTRV) and test (TST) commands:

- User ID
- Time Stamp (start and end for each event occurrence)
- User login attempts (success and failure)
- Reason for denial.

Encryption (SSL/TLS)

The LambdaXtreme® Transport system supports the option to connect using encrypted secure socket protocol. The CIT and OMS applications, when connected through the Data Communications Network physically into the EMS port have the option of a secure channel running the SSL/TLS protocol. This feature enforces a higher level of security on connections made to the NE. Programs that communicate with the NE using the secure socket protocol must support either Secure Socket Layer (SSL) Version 3.0 or Transport Layer Security (TLS) Version 1.0. For details on provisioning this feature, see [Appendix A, "Using the CIT"](#).

The SSL and TLS protocols allow for:

- Server authorization
- Confidentiality (data encryption)
- Message integrity (detects when a message has been tampered with).

TLS authenticates the Server using server certificates. The Server certificate and the Server private key are held in non-volatile memory (FMM). They survive resets and power cycles of the NE. They are not required to be backed up with the BACKUP-DB TL1 command nor restored with the RESTORE-DB TL1 command.

Important! Because the Server certificate is not backed up, for cases where a new/reformatted/etc. FMM is used during a RESTORE-DB command and followed an NE reset, the Server certificate is auto-regenerated.

The following applies:

- The LambdaXtreme® Server certificate can be generated/regenerated by the SET-CERT TL1 command. SET-CERT can only be executed through a direct TL1 interface (for example, CIT Cut-through). This command is only accepted by OADMs (NE with EMS port interface). This command is denied by other NE types (Repeater and MINILA).
- A REPT-EVT notification is output after the NE Server certificate is generated as a result of a TL1 command or auto-generated by the NE.
- The REPT-EVT notification with alarmID=CERTGENERATE (output as a result of a SET-CERT TL1 command initiated change or an auto-regeneration of the certificate) is logged to the security log.
- There is a one day grace period on Server certificate expiration and regeneration. An NE will regenerate the Server certificate automatically when an SSL/TLS connection request is received or the ENT-CID-SECU TL1 command is received with the ENCRYPTION=ENABLED or the NE rebooted and the existing certificate is within one day before expiration.
- An NE will regenerate the Server certificate automatically if it contains an initialized Server certificate and the NEs Target Identifier (TID) is modified.
- Secure connections through the LambdaXtreme® Transport EMS physical port using SSL/TLS are supported on port 3083. Non-secure connections are supported on port 3082.

Important! Server certificate expiration and subsequent regeneration will cause a connection establishment delay of approximately 20 seconds while the NE creates a new certificate. A TL1 response during this regeneration process will experience a delay of more than 20 seconds.

Secure Command Line Interface (SSH)

A secure Command Line Interface (CLI) is supported using SSH version 2.0. The CLI is accessible through a the Data Communications Network (DCN) interface from the EMS port, at a user provisionable IP address, port 22 (together the IP address and port number combine to form one end of a socket specification). This interface, on which SSH is supported, uses plain TL1 without the need for a CIT or EMS application running on the client side.

Important! The NE server supports secure file transfer over SSH for software download, backup database, and restore database operations. This feature can be configured using the ENT-CID-SECU TL1 command or the CIT cut-through interface (see [“Execute Commands Interactively Using TL1 Cut Through”](#) (p. A-42)).

The following applies:

- A user has the option of enabling or disabling Secure Shell (SSH) on the EMS port for all TL1 messages between the SSH client and the LambdaXtreme® Transport NE. (The default is disabled.) This feature is provisioned using the ENT-CID-SECU TL1 command “ENCRYPTION” parameter with values ENABLE_TL1_ONLY, ENABLE_TL1_FTP, and DISABLED. The SSL/TLS server (see “[Encryption \(SSL/TLS\)](#)” (p. 4-15)) is enabled/disabled at the same time with this command.
- Established SSH connections are dropped when ENCRYPTION is modified to DISABLED from ENABLE_TL1_ONLY or from ENABLE_TL1_FTP. from the CIT.
- SSH users are strongly encouraged to use the HostKeys map feature of the SSH client. This adds additional security by outputting a warning when connecting to a server that presents a new/different key than previously, thus protecting against man-in-the-middle attacks. The Known Hosts file resides on an SSH client host and server hosts get added to it when the initial connection is made.

Important! Users cannot make SSH connections if the ENCRYPTION parameter value is modified to ENABLE_TL1_ONLY or ENABLE_TL1_FTP from DISABLED.



5 Equipment Provisioning

Overview

Purpose

This chapter provides information for provisioning the LambdaXtreme® Transport equipment.

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Introduction

Description

Provisioning is the process of assigning values to parameters that determine the operating characteristics of the system. The values of the provisioned parameters determine how you interface with an NE and how the NE functions with various installed entities. Each provisionable parameter has a factory-supplied original value when software is first loaded onto an NE. These values become the current value upon launching the software and are the values used by the system. All provisioned parameters and values are preserved in the system's non-volatile memory and are protected and can be retrieved on demand in the event of a power failure. Copies of these parameter settings can also be used by other identical NEs.

All externally user provisionable parameters can be set using the CIT, TL1 cut-through, or EMS (for remote provisioning).

- For detailed equipment provisioning procedures using the CIT, see [Appendix A, "Using the CIT"](#).
- To provision using the TL1 cut-through, see [Chapter 8, "Craft Interface Terminal"](#).
- For provisioning procedures using the EMS, see the *Navis® Optical Management System (OMS) Provisioning Guide*.

□

Provisioning System Level Attributes for the NE

Overview

The system administration capabilities of the LambdaXtreme® Transport system enable the user to retrieve and provision system-level NE attributes. Changing some system-level attributes causes the NE to reboot, while changing other system-level attributes does not cause any reboot.

In the following sections, all the parameters that cause a reboot of the system are set from within a single CIT screen. The CIT warns the user that the provisioning will cause the NE to reboot.

The NE resets (reboots while powered) if a user changes the value of one or more of the following parameters:

- NE Type
- Node Equipage
- Line Equipage
- Mesh Merge
- NE Number
- Optical Standard
- KEEP_PUMPS_ON flag.
- OFFICE_ALMS
- OT_CLIENT_XMIT

Important! The LambdaXtreme® Transport system supports both 10G and 40G channel rates with no provisioning required.

NE Node Type (NETYPE)

There are three LambdaXtreme® Transport 2-fiber NE terminal configurations (NETYPES): Repeater Shelf (RPT), Optical Add-Drop Multiplexer (OADM), and MINI Network Element (MINI NE). The OADM allows add/drop access to 64 channels. The RPT and the MINI NE equipped as a MINILA have no add/drop capability.

Note: A MINI NE equipped as a 4D_MINI_WXC adds mesh functionality to the MINILA to support lateral cross-connections.

The NE allows the user to provision one of the following NE node types for the NE:

Table 5-1 NE Node Types

NE Node Types	Node Type Identifier
2-Fiber Repeater	2F_RPT_2

Table 5-1 NE Node Types (continued)

NE Node Types	Node Type Identifier
2-Fiber OADM	2F_OADM
2-Fiber MINI NE	2F_MINI_NE

When a node having an NCTL circuit pack is installed, it will have an original (default) Node Type value of 2F_OADM. When a node having an RCTL circuit pack is installed, the original (default) Node Type value depends on the pack type in slot A1-3-1. If an RXIO pack is present in slot A1-3-1, then the default Node Type is a Repeater (2F_RPT_2). If an RXIO2 pack is present in slot A1-3-1, then the default Node Type is a MINI NE (2F_MINI_NE).

If the node is not of the default equipage type, various “Unexpected circuit pack” and “Circuit pack removed” alarm conditions may be reported when the node is first booted. The user must then provision the correct equipage. The node will automatically reboot when the equipage is changed.

Node Equipage

For Optical Add/Drop Multiplexers and Mini Network Elements, various configurations may be equipped in the node. The current configuration is displayed, and the allowable changes are offered as choices based on the current configuration. Changing Node Equipage will result in a network element reboot.

OADMs can be configured with one of the following equipages:

1. U_1D_ROADM
2. U_2D_ROADM
3. 3D_WXC
4. 4D_WXC

A MINI_NE can be configured with the following equipages:

1. MINILA
2. 4D_MINI_WXC

Line Equipage

This attribute is required to be provisioned with OADM Equipage as Mesh 3-Degree X-Connect and with MINI NE equipage as Mesh 4-Degree X-Connect. When the Line Equipage is changed, the system may automatically reboot.

Lateral Line

This attribute is applicable only for Upgradable 2-Degree OADMs to provision which of its DWDM Optical line(s) are connected to Line 2 of a neighboring Mini Wavelength Cross-Connect network element.

Mesh Merge

This attribute is used only when two non-mesh OADMs are merged or upgraded to one mesh network element. The Mesh Merge should be changed with the Line Equipage and OADM Equipage or MINI NE Equipage. Note: This value is not returned by RTRV-SYS TL1 command.

NE Number (NENUM)

The user is required to provision an NE Number, which is used to generate a set of unique internal NE-specific IP addresses for each NE in the control network. The range for this parameter is 2 to 800. Changing this parameter causes the NE to reboot.

For 3D_WXC, 4D_WXC, and 4D_MINI_WXC equipped OADMs, there is only one TID. The user has to provision the NENUM and TID on both Line-1 and Line-2 to the same value in order for the communication link between the two lines to come up.

Important! It is strongly recommended that NENUM not be provisioned with a value of 1 (which is the original value for NENUM) because this may cause a duplicate NENUM condition to occur. NENUM should be changed from the original (default) value to a number between 2-800. The NE checks to see if the NE Number already exists in the current network at the time of provisioning. If node-to-node communication is down and the user provisions an NE to a number used by one of the unreachable NEs, the command will complete and there will be problems when the node-to-node link is restored. No alarms are reported for “Duplicate NENUM provisioned” on non-neighboring NEs, only neighboring NEs.

Optical Standard

The Optical Standard is the standard environment in which the NE is provisioned to operate. The NE allows the user to provision the NE's synchronous signal format and reporting standard to be either SONET or SDH. The original value is SONET. Changing this parameter causes the NE to reboot.

The reporting standard specifies whether SONET or SDH alarm severity notification codes, Performance Monitoring parameter data formats, and date formats are used.

Maintain Transmission Upon Raman Pump Failure

This determines whether transmission should be maintained in the event of a single Raman Pump failure. A provisionable field in the CIT displays yes or no according to the retrieved value for the KEEP_PUMPS_ON parameter. The original value is yes. Changing this parameter will cause the NE to reboot.

NE Target Identifier (TID)

The TID is the unique NE identifier that is used to address the NE. It is the highest level “object” of the TL1 command. The user is required to provision a unique TID for each NE in the LambdaXtreme® Transport control network. The user must ensure the TID is unique across the maintenance subnetwork. For a new NE, the default is *TID=LT_XTREME*. Changing the TID will terminate the NE session.

The TID must adhere to the following specifications:

- The TID is a string of 17 or fewer characters from the set: [A-Z] [a-z] [0-9] . + - % # / _
- The first character of the TID need not be alphabetic.
- The NE is insensitive to the case of a TID (uppercase and lowercase letters are treated the same).

Important! The TID cannot be named “LINE-1” or “LINE-2”, nor can it contain the suffix “_L2”. These are used internally to support mesh nodes and are restricted.

When provisioning a TID, the following applies:

- If a new TID is entered and the NE knows that the TID already exists, the command fails.
- If the NE does not know that the TID already exists and then later learns that a duplicate TID exists (because nodes get hooked together), then the NE yields an alarmed response for duplicate TID.

Note: For 3D_WXC, 4D_WXC, and 4D_MINI_WXC equipped OADMs, there is only one TID. The user has to provision the NENUM and TID on both Line-1 and Line-2 to the same value in order for the communication link between the two lines to come up.

Date/Time

The LambdaXtreme® Transport system maintains a Date and Time-of-Day clock. The clock is used to time stamp events such as reporting and clearing of alarm conditions and interactions with the operations system. The NE Date and Time can be set using the CIT, TL1 cut through, or EMS interfaces.

Important! Mesh nodes have two clocks that are kept synchronized. If the user sets the date and time, these are set at both NCTL packs in a mesh node and RCTL packs for the MINI_WXC.

System Settings

The System Settings feature allows the user to provision settings on the NE that do not require a reboot. These include the following settings:

- Orderwire Type - may be set to either Local or Express
- Pack Timing Source - may be set to synchronize with either the East or West Lines, or may be set to an internal independent clock

EMS Port IP Address; EMS Default Router IP Address; Subnet Mask

The EMS-NE data link communications protocol stack is a TCP/IP stack. The NE's EMS-NE data link IP address is initially provisionable using the CIT, and subsequently through EMS.

The only NEs that should be provisioned with EMS IP parameters are those that may serve as EMS Gateway NEs. Potential Gateway NEs are defined by the overlay management network topology. (Note: An EMS IP address cannot be provisioned for Repeaters and MINI NEs.)

An EMS accesses a GNE and all remote NEs by using the IP Address of the GNE EMS Port. While it is true that provisioning of a GNE is not required, the user must provision the IP address of the EMS port of an NE that is going to be used as a GNE.

Provisioning these parameters will not cause a reboot, but will bring the EMS-NE link down. If the user is connected to the NE using the EMS port of the NE, and the user attempts to modify these parameters, the CIT displays the following message to the user:

```
Modifying these parameters will result in losing the EMS-NE link.  
Therefore this login session will terminate and you will be required  
to login again.
```

If the user is connected to this NE using the CIT port or supervisory channel of the NE, and the user attempts to modify the EMS Port IP Address, the CIT displays the following message to the user:

```
Modifying these parameters will result in losing the EMS-NE link. Any  
communications via EMS link of this NE will be lost.
```

After the appropriate message is displayed, the user can confirm the change of the parameter values or cancel.

Important! The EMS port on Line-2 of a Mesh node is not operational and any attempts to provision the EMS port parameters will be denied. The CIT port on Line-2 of a Mesh node allows only four TL1 commands (ACT-USER, CANCEL-USER, ENT-SYS, RTRV-SYS) so that if a user accidentally provisions a stand-alone U_1D_ROADM or U_2D_ROADM as a 3D_WXC with MESH_MERGE=LINE-2, this provides a way to undo the mistake.

In a Mesh OADM, if the neighbor is a Line-2 side and it fails to communicate with the Mesh NE's Line-1 side, then the RTRV_MAP_NEIGHBOR data (when retrieved from the immediate Line-2 neighbor) is set to the value of zero (0) for the following: EMS_IPADDRESS, and EMS_ETHERNET_ADDRESS. The ALM_SEV is set to the last known alarm severity level, or zero (0) if the alarm severity level is not available.

Office Alarms (OFFICE_ALMS OT_CLIENT_XMIT)

This parameter allows or inhibits audible alarm reporting (the office alarms) at the NE. The values for OFFICE_ALMS are "ALW" (Allowed) and "INH" (Inhibited). If office alarms are inhibited, they will remain inhibited until they are again allowed using the ENT-SYS command with a value of "ALW" for OFFICE_ALMS. The default value for OFFICE_ALMS is "ALW". Changing the value of OFFICE_ALMS does not cause the NE to reboot.

OT Client Transmit (OT_CLIENT_XMIT)

Client Signal for Non-connected OTs may be set to Off ("OFF"), Unframed AIS ("AIS"), or Framed AIS ("FAIS"). If an installed OT is not part a connection, the OT_CLIENT_XMIT parameter determines what signal, if any, is transmitted at the OT client side OUT DROP port (or, for a MUX OT, at the OUT TRIBn [n=1..4] ports that are not part of connections).

- If the value of OT_CLIENT_XMIT is "AIS", then each OT client side port that is not part of a connection transmits an unframed alarm indication signal.
- If the value of OT_CLIENT_XMIT is "FAIS", then each OT client side port that is not part of a connection transmits a framed alarm indication signal (AIS-L/MS-AIS).
- If the value of OT_CLIENT_XMIT is "OFF", then each OT client side port that is not part of a connection the transmitter is shut off; no signal is transmitted.

□

Port Provisioning

Overview

This section describes the requirements for setting Optical Translator (OT) port states as they relate to channel connections. OT ports can be provisioned using the CIT, the TL1 cut-through (ENT-OTPS command), or EMS.

- For port provisioning procedures using the CIT, see [Appendix A, “Using the CIT”](#).
- For port provisioning procedures using the TL1 cut-through, see [Chapter 8, “Craft Interface Terminal”](#).
- For port provisioning procedures using the EMS, see the *Navis® Optical Management System (OMS) Provisioning Guide*.

Methods of Provisioning

There are two distinguishable methods of provisioning a connection associated with an OT port: autoprovisioning and manual provisioning. The LambdaXtreme® Transport NE supports autoprovisioning of connections (see below). Manual provisioning is using the ENT-CONN TL1 command or CIT/OMS TL1 cut-through.

Autoprovisioning

To enable autodiscovery and autoprovisioning for new optical connections in the LambdaXtreme® Transport NE, the user installs the appropriate circuit packs and physically connects ports between the packs (such as an OT port to an OM port). Then, given a valid signal to the client-side of an add/drop OT, the NE software automatically discovers and provisions the corresponding optical connections made by the user. The NE software provisions the discovered connections in its database.

Autoprovisioning is enabled only when the client-side port is in the Automatic state (see [Figure 5-1, “OT Port State Diagram”](#) (p. 5-10)).

Note: When an OT port is provisioned as “service ready” by the ENT-OTPS TL1 command or through the CIT (see [“Provision Mode for OT Client Side Input Port”](#) (p. A-128)), and the OT port is in the OOS-MA-AS state, autoprovisioning of the connection to/from this OT port will trigger even without a valid input signal. After successful autoprovisioning with this trigger, if no valid client signal exists, unframed AIS will be transmitted internally on this wavelength/channel.

Manual Provisioning

Autodiscovery and autoprovisioning do not apply to all optical channel connections. For these exceptions the user provisions the NE optical channel connections using the CIT, TL1 commands, or the EMS. Manual provisioning is the process by which system parameters are set (provisioned) using a series of user-entered commands using the CIT, TL1 cut-through, or EMS.

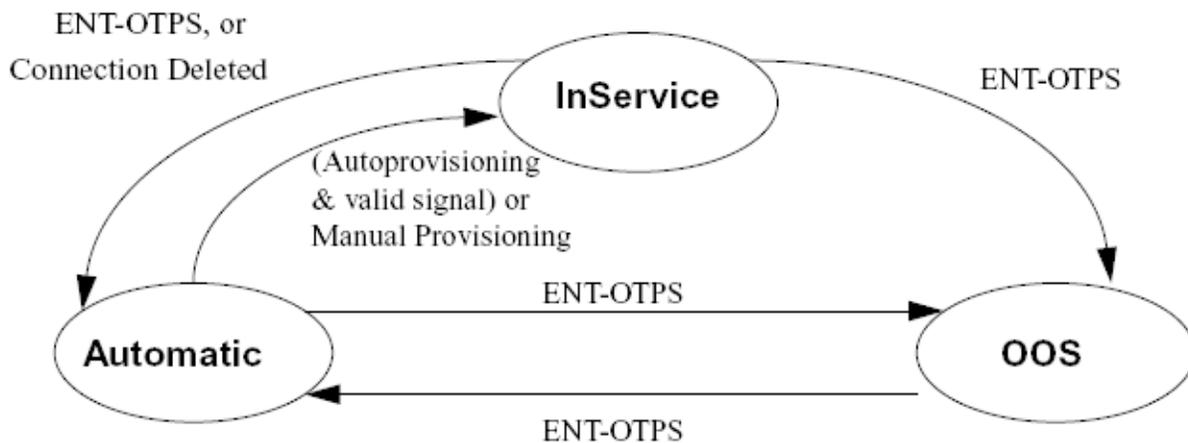
Compatible optics channels must be manually provisioned by the user. For these connections, the client-side signal connects directly to OM and OD ports bypassing OT circuit packs. These connections must be provisioned by the user as external connection types.

All TL1 port provisioning commands, parameters, original values, and allowed values can be viewed using the CIT TL1 cut-through (see [Chapter 8, “Craft Interface Terminal”](#)).

Provisioning Port State

This section describes the requirements for setting Optical Translator (OT) port states as they relate to channel connections. [Figure 5-1, “OT Port State Diagram”](#) (p. 5-10) shows the port states that are supported and the transitions between these states.

Figure 5-1 OT Port State Diagram



For any OT type, the user can provision the following OT Port parameters:

- Port Mode – This field displays the current port mode setting and allows the user to specify the port mode of the OT Client In Port. The LambdaXtreme® Transport NE supports the following states for the OT client-side input port:
 - Automatic (OOS-MA-AS) - At installation time, the default state (original value) that the OT port assumes is Automatic and the OT laser is off.
 - Monitored (IS) - This is the state that the OT port assumes for monitoring. The user cannot set the OT port state to In Service.
 - Not Monitored (OOS) - This is the state that can be set in case the fault monitoring on this port needs to stop. (If the port mode is set to Not Monitored (OOS), it cannot be autodiscovered/autoprovisioned).
- Error Response – These fields allow the user to provision various OT Line In Error Response parameters related to OT ports.
 - Optical Channel Signal Defect Response - This field determines how an OT sending output to external equipment responds when there is a defect in the received WaveWrapper signal. Three possible responses can be provisioned - “Shut Off Client Side OT Laser”, “Insert Unframed AIS to Client Signal”, or “Insert Framed AIS to Client Signal”.
 - Optical Channel Path Trace Mismatch Response - This field indicates whether the OT takes action when the system detects Optical Channel Path Trace Mismatch. The allowed values are: “Apply Optical Channel Signal Defect Response” or “Pass Signal to Client Side”.
 - Optical Channel Payload Type Mismatch Response - This field indicates whether the OT takes action when the system detects Optical Channel Payload Type Mismatch. The allowed values are: “Apply Optical Channel Signal Defect Response” or “Pass Signal to Client Side”.

After the parameter values are chosen for the port, the user can apply the settings to just the Client/Line In Port being provisioned, all Client/Line In Ports on this pack, all Client/Line In Ports on this shelf, all Client/Line In Ports on this bay, or all Client/Line In Ports on this bay and selected bays. To provision the OT Client Side Input Port using the CIT, see [“Provision Mode for OT Client Side Input Port” \(p. A-128\)](#). To provision the OT Line In Error Response using the CIT, see [“Provision OT Line In Error Response” \(p. A-137\)](#). The TL1 command to provision these parameters is ENT-OTPS.

Provisioning Port Monitoring

Port monitoring is used for reporting or not reporting link failure alarms. Using the CIT, the user can provision the monitoring status of various ports by selecting one of the values presented (“Monitored” or “Not Monitored”). For the SIO pack ports, “Monitored” indicates monitoring for LAN failure (link integrity failure). The TL1 commands to provision the monitoring status of these ports are ENT-SUPR and ENT-SYS.

The following ports (located on the SIO pack) can be provisioned for port monitoring. (Note: Customer LAN port and Private LAN 1 port are also located on the RCIO pack used in Repeaters and MINI NEs). The TL1 command parameter follows each:

- EMS Port
 - EMS_PORT_STATE
- Data Port 1
 - PORT_DATA_1
- Data Port 2
 - PORT_DATA_2
- Customer LAN Port
 - PORT_CUSTLAN
- Private LAN Port 1
 - PORT_PVTLAN_1
- Private LAN Port 2
 - PORT_PVTLAN_2.

Note 1: Only one private LAN connection is allowed between any two given NEs.

Note 2: Mesh nodes have two SUPVY packs and port monitoring can be provisioned on both Line-1 and Line-2.

Note 3: On MINI_WXC, only PVTLAN1_PVTLAN1 can be used and MINI_WXC will not have any other private LAN port available.

Note 4: For a full description of OSC Customer LAN communication, see *LambdaXtreme® Transport Applications and Planning Guide*.

Important! In mesh nodes (3D_WXC and 4D_WXC) a Private LAN connection must be used to exchange node-to-node (intra-node IPC) messages between peers of the mesh node. That is, the PVTLAN1 or PVTLAN2 port associated with Line-1 of the mesh node must be connected to its peer (Line-2) PVTLAN1 or PVTLAN2. For this connection, the mesh node supports PVTLAN1_PVTLAN1, PVTLAN1_PVTLAN2, PVTLAN2_PVTLAN1, and PVTLAN2_PVTLAN2 connection types.

□

Optical Line Provisioning

Overview

Optical Line Provisioning allows the user to provision all parameters associated with an optical line. The user is required to provision the outside plant fiber type for each line AID with which an NE interfaces. This information is used to optimize performance. Optical lines can be provisioned using the CIT, the TL1 cut-through (ENT-OLPP command), or EMS.

Optical Line Settings

Line AIDs are selected as follows:

- On Repeaters, MINI NE nodes equipped as MINILA, and OADM nodes equipped as U_2D_ROADM, the allowable choices for line AID are 1E and 1W.
- On OADM nodes equipped as U_1D_ROADM, the only allowable choice for line AID is 1E.
- On OADM nodes equipped as 3D_WXC, the allowable choices for line AID are 1E, 2E, and either 1W or 2W depending on the configuration
- On OADMs equipped as 4D_WXC and MINI NEs equipped as 4D_MINI_WXC, the allowable choices for line AID are 1E, 1W, 2E, and 2W.

The user selects an optical line AID and then provisions the following Optical Line parameters:

- Optical Line Fiber Type – This parameter denotes the optical fiber type in this span (transmit and receive direction can be provisioned separately). Possible values are:
 - Standard Single Mode (SSMF)
 - TrueWave-Classic (TW-Classic)
 - TrueWave-Plus (TW+)
 - TrueWave Reduced Slope (TWRS)
 - LEAF
 - SMF-LS
 - MIX 1A
 - MIX 1B

- MIX 2A
- MIX 2B

Note: MIX 1A, MIX 1B, MIX 2A, and MIX 2B values are for spans that use a mix of fiber types and require special engineering. Please contact Alcatel-Lucent Technical Support.

- Tx Outside Plant Span Loss – In this field the user can set the value for SPAN_LOSS. The allowable values are floating point values in tenths of dBs between 0.0 and 75.0 dB.
Note: This is the “S-NE to R-NE” loss between two NEs and therefore includes all office patch panels, office connections, and the office to outside plant splice losses as well as the actual outside plant loss.
- Tx Outside Plant Connector – In this field the user can set the value for the type of connector that terminates the outside plant (OSP) transmit fiber at the NE. The options for type of connector are “ST” (Straight Tip) or “NOT_ST”.
- Comment – This field displays a comment field of up to 128 characters. The user has the option to populate this field with a description of line characteristics.

DCM Settings

The Dispersion Compensation Module (DCM) is used to overcome chromatic dispersion limits of the transmission fiber. Used in conjunction with OAs, the DCM is a module containing lengths of dispersion compensation fiber that offsets the dispersion of the outside plant fiber type.

The value setting of a DCM is dependent on the type and length of outside plant fiber that is being compensated. DCM settings include the type, serial number (Sln), length (in kilometers), and loss (in dB) for each dispersion compensation module installed on the line as indicated on the module’s housing. Depending on NE type, there may be one, two, or three DCMs that can be provisioned for each line. (Note: For additional details on DCMs, see *LambdaXtreme® Transport Installation Manual and System Turn-up Services*.)

Note: The DCM length and loss values should be “rounded” by the user to an xx.x format.

For OADMs, the provisionable DCM Settings are:

- Line: Type, Sln, Length, Loss
- Add: Type, Sln, Length, Loss
- Drop: Type, Sln, Length, Loss

For Repeaters, the provisionable DCM Settings are:

- DCM Settings: Type, Sln, Length, Loss

For MINI NEs, the provisionable DCM Settings are:

- Line: Type, Sln, Length, Loss

Note: The DCM serial number (Sln) is used to check provisioning correctness and to help access the individual data sheet for the DCM for network planning purposes. The Sln parameter value has at most twelve characters in the following format:

- YY - Year of Manufacture
- SS - Supplier Code (assigned by Merrimack Valley Manufacturing)
- M - Month of Manufacture 1-9 O, N, D, (1=January, 2=February, O=October, N=November, D=December)
- C - Part Identifier or Code (assigned by Merrimack Valley Manufacturing)
- V - Version A-Z (initially "A" but if the component undergoes changes, Merrimack Valley Manufacturing may upgrade this field)
- T - Type (assigned by Merrimack Valley Manufacturing and used to identify a subset of the Part Identifier C)
- 1234 - Device Serial Number (extracted from supplier's original serial number).



Supervisory Channel Provisioning

Overview

The Supervisory Circuit Pack (SUPVY) is a low-speed transmission pack that facilitates communication between LambdaXtreme® Transport NEs. The SUPVY is the termination point of the supervisory channels. In node-to-node communication, the controller core in the SUPVY pack communicates with the SUPVY controller core in other NEs using the Optical Supervisory Channel (OSC). All such internode communication flows through the SUPVY controller core before transmission on the OSC. SUPVY packs allow the user to provide remote system operations such as performance maintenance and provisioning using the CIT and EMS. The Supervisory Channel can be provisioned using the CIT, the TL1 cut-through (ENT-SUPR command), or EMS.

Important! In Repeaters and MINI NEs, there is no SUPVY pack. The SUPVY functionality is included in the RCTL controller pack.

Orderwire

In Orderwire communication, connections are established across NEs using external Orderwire equipment. The Orderwire channels which are used to establish voice communication between LambdaXtreme® Transport nodes, are derived from the supervisory signal traversing between the LambdaXtreme® Transport nodes. The user is able to provision up to three Orderwire links (1 for a Repeater and MINI NE) at each SUPVY interface of the LambdaXtreme® Transport node.

There are three Orderwire channels. Each channel has an East and West interface. For OADMs, there are a total of six Orderwire interfaces (1-6) and for a Repeater and MINI NE, there are a total of two Orderwire interfaces (1 and 4). The mapping is as follows: 1=OW1 west, 2=OW2 west, 3=OW3 west, 4=OW1 east, 5=OW2 east, 6=OW3 east.

Note: A mesh node has two SUPVY packs and thus it has two sets of Orderwire channels, one for each line (Line-1 and Line-2).

The orderwire interface has the following characteristics:

- Each Orderwire interface consists of clock, sync, and data signals in the transmit direction and in the receive direction. The clock and sync signals are outputs of the SUPVY for both transmit and receive. The transmit data signal is an input and the receive data signal is an output of the SUPVY.
- Orderwire signals are RS-485. The drivers, receivers, and terminations are on the SUPVY pack.

- On the SIO panel, there are six Orderwire interfaces. One DB-15S connector is used per Orderwire interface. The RXIO circuit pack for Repeaters and the RXIO2 circuit pack for MINI NEs, provides one DB-25S connector for access to two Orderwire circuits (Orderwire interface 1 and 4).
- The transmit clock is derived from the local SUPVY common clock. The receive clock automatically tracks the local SUPVY common clock of the transmitting NE.

For additional details of the SUPVY pack and Orderwire interface, see the *LambdaXtreme® Transport Applications and Planning Guide*.

Important! Mesh nodes contain two independent supervisory channels with two independent SUPVY timing sources. Thus, for mesh nodes, two supervisory signal timing sources (one for Line-1 and one for Line-2) must be provisioned. It is possible, at a mesh node, to use two different timing sources for each supervisory signal. For example, it is possible to set the Line-1 supervisory timing source to internal, and set the Line-2 supervisory timing source to line_east. Another example would be to set the Line-1 timing source to line_east, and the Line-2 timing source to line_west. There are no restrictions.

Note: Orderwire communication is not bridged over the Private LAN connection between Line-1 and Line-2.

Provisioning Orderwire Channels

Each Orderwire channel is provisioned by the user to be local (terminating on the node) or express (non-terminating on the node). It is also important that the timing source at each node be provisioned such that synchronous operation is attained, so that slips do not occur. While slips have no apparent adverse effect on the node-to-node transmission, slips do cause clipping of speech or data errors on the Orderwire channels.

Note: In Repeaters and MINI NEs, only OW1 can be provisioned by the user as local or express. When OW1 is provisioned at the Repeater or MINI NE, both interface 1 and 4 will be set to the provisioned value.

□

Miscellaneous Discretes Provisioning

Overview

This feature allows the user to provision miscellaneous discrete alarms (inputs) and controls (outputs). The user defines the alarm severity and alarm message for the miscellaneous discrete alarms and also defines the condition name for the controls. The user can specify the desired control action to produce a continuous output to an external device or produce output momentarily to test the control points.

Miscellaneous Discretes can be provisioned using the CIT, the TL1 cut-through (SET-ATTR-CONT and SET-ATTR-ENV command), or EMS.

Provisioning Environmental and Control Points

The alarm severity level for each of the miscellaneous discrete environmental points is provisionable using the CIT or EMS. The following capabilities are available:

- The state of the environmental points is available as message-based EMS messages and is reported on demand at the CIT and EMS interfaces.
- Users can operate and release the control points using either the CIT or EMS interface.
- If the network element experiences a RESET, the states of the environmental and control points remain unaffected.
- All discretes are provisioned with their values upon initialization. Alarms are given an original value of MN.

To define the miscellaneous discrete alarms and controls, the CIT user defines the alarm severity and alarm message for the miscellaneous discrete alarms and defines the condition name for the controls. For control points, the user can produce a continuous output to an external device or produce output momentarily to test the control points.

The following fields are displayed to the user on the CIT Miscellaneous Discrete Alarms Provisioning screen.

- **Environmental Alarm AID**
This field displays the selected Environmental Alarm AID. This is ENV-(1-16) for the internal Environmental Alarms. The CIT displays the value that is currently stored in the NE for this field.
- **Environmental Alarm Message**
In this field, the user enters the alarm message (up to 26 characters) for this AID.

- **Environmental Alarm Severity**
In this field, the user enters the alarm severity for this AID. The user can modify this field with values that are based on the operations standard (SONET or SDH) provisioned on the NE. If the NE is provisioned for the SONET standard, then the allowed values for this field are: Critical (CR), Major (MJ), Minor (MN), Not Alarmed (NA), Not Reported (NR). If the NE is provisioned for the SDH standard then the allowed values are: Prompt, Deferred, No Alarm, No Report.
- **Control Point AID**
This field displays the selected Control Point AID. This is CONT (1-4) for internal Miscellaneous Discrete Controls.
- **Control Point Name**
In this field, the user enters the name of the Control Point (up to 26 characters) for this AID.
- **Control Point Status**
This field displays the current status of the control point (“Open” or “Closed”).
- **Control Point Action**
This is selectable by the user to produce a continuous output to an external device or just produce output momentarily to test the control points. The possible values are: None, Pulse, Closed, or Open (depending upon the current Control Point Status).

Important! In mesh networks, if Control Points and Environmental Points are being used on both NEs which are being merged into a single WXC node, the user must move the Control Points and Environmental Points from the peer side (line-2) to the master side, because the peer side (line-2) points are not supported in the WXC.

□

6 Establishing Connections

Overview

Purpose

This chapter describes the connection features of the LambdaXtreme® Transport system. [Appendix A, “Using the CIT”](#) includes procedures for provisioning connections using the CIT. Users can also provision connections at an NE using the ENT-CONN TL1 command (see [Chapter 8, “Craft Interface Terminal”](#)). See also the *Alcatel-Lucent Optical Management System (OMS) Provisioning Guide*.

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Introduction

Overview

The LambdaXtreme® Transport system supports three types of connections:

- Mesh Cross-Connection (ENT-CRS): A connection of a frequency between two optical lines at an NE.
- ADD-DROP Connection (ENT-CONN): A connection between an OT (or compatible optics source directly into the OM/OD) and a frequency on one optical line of an NE.
- MUX OT Cross-Connection: A connection between the client side port and the line side within an OT (10G SFP MUX Tunable), or between the line side of one OT and the line side of its associated OT.



ADD-DROP Connections

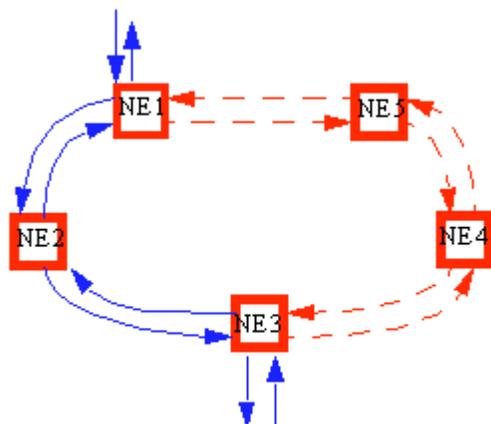
Overview

An ADD-DROP connection at a single NE is defined as two connectivity paths within the LambdaXtreme® Transport NE traveling in opposite directions. These two paths are the input and output of the same customer signal and have the same grid frequency. The signal connects one customer source/destination point (for example, an OT), through a single NE, to the appropriate port at the exit point of the NE (the DWDM Line). This is one end of a bidirectional end-to-end connection through the LambdaXtreme® Transport system.

ADD-DROP connections can be provisioned on OADMs, but not on Repeaters, MINILA or MINI_WXC equipped MINI NE nodes.

An end-to-end connection from A to Z through a LambdaXtreme® Transport system consists of an ADD-DROP connection at Network Element A, an ADD-DROP connection at Network Element Z, and may traverse several intermediate Repeaters, MINI NEs, and OADMs between A and Z. These end-to-end connections are always bi-directional in the LambdaXtreme® Transport system. Configuration of a mesh cross-connection at the intermediate 2 degree nodes is automatic (if the channel is free to be connected, that is, not already involved in another connection), and will trigger after both the ADD-DROP connection at Network Element A and the ADD-DROP connection at Network Element Z is completed. Mesh cross-connection configuration at intermediate 3 degree nodes must be done using commands. An end-to-end connection begins and ends on an OADM node. It may traverse OADM, Repeater, and MINI NE nodes between the endpoints.

Figure 6-1, “Example of End-To-End Connection” (p. 6-4) shows an end-to-end connection between NE1 and NE3, represented in solid lines. NE2 is an intermediate node.

Figure 6-1 Example of End-To-End Connection

Autoprovisioning and Autodiscovery

The approach taken with the LambdaXtreme® Transport system is to reduce the need for manual provisioning of ADD-DROP connections and mesh cross-connections at an NE. (Compatible optics connections at an NE and connections at 3 degree OADMs are exceptions). Whenever OT packs are used, the LambdaXtreme® Transport NE supports autonomous discovery and provisioning of the ADD-DROP connection at the NE, without the user having to enter any provisioning commands. When the NE detects a newly added client signal at an OT, this is referred to as autodiscovery of an optical channel (note that the frequency is determined by the OM/OD port to which the OT pack is fibered). When the NE autonomously provisions the ADD-DROP connection at an NE, this is referred to as ADD-DROP connection autoprovisioning at an NE.

There are two triggers for ADD-DROP connection autoprovisioning after the OT pack and all necessary fiber connections are in place. The first trigger is a valid client signal applied to the OT - the NE automatically detects the presence of the valid signal (autodiscovery of an optical channel). The second trigger is the manual provisioning of the OT port as “Service Ready” (this does not require a valid client signal and is useful for testing and for network configurations requiring paths which are service ready but may carry no valid signal). In both instances, the NE will verify the connectivity between the OT and OM packs automatically, verify that all packs needed for the connection are present, and will turn on the OT line side signal laser. Successful discovery of the new connection leads to creation of the connection record in the database, which triggers Fault and Performance Monitoring of the newly created channel. For the LambdaXtreme® Transport system, autodiscovery of mesh cross-connections is supported on all NE types that support OT packs, but is not supported on all OT apparatus codes. It is not applicable for Repeater nodes.

Compatible optics connections (also known as external connections) do not require the use of OTs and are the only type of connections that cannot be autoprovisioned and autoprovioned at an NE. The user provisions ADD-DROP connections at a single NE for compatible optics using the CIT, TL1 commands, or the EMS. The automatic provisioning of intermediate nodes through which the end-to-end connection traverses is supported with compatible optics connections.

Important! The following circuit pack apparatus codes do not support the autoprovioning feature: WWCL03, WWCL02, WWCL10, WWCL11, WWCK10, WWCK11, WWBP03, WWBP04.

A LambdaXtreme® Transport NE rejects the provisioning of an ADD-DROP connection that attempts to place a new connection on a line having a grid frequency with the same value as one previously provisioned on that line.

Important! The autodiscovery/autoprovioning of an ADD-DROP connection at an NE will take up to two minutes. The LambdaXtreme® Transport NEs provision connection autodiscovery/autoprovioning requests one at a time. Although users may initiate multiple autodiscovery/autoprovioning requests at the same time, the requests are provisioned sequentially.

ADD-DROP Connection Types

Within the connection types, the LambdaXtreme® Transport system supports the following types of bidirectional connections, referred to by their client signal rate or type, please also refer to the ent-conn TL1 Manual Page for more details.

- 10G, which uses a 10G ADD-DROP OT
- 40G, which uses an OT (40G ADD-DROP Tunable) pack
- EXT10G, External Connections for 10G Compatible Optics
- EXT40G, External Connections for 40G Compatible Optics
- 2.5GTRIB, which uses a 4 x 2.5G MUX OT
- 10GOCH, used to indicate ADD-DROP connection between the line port of an OT (10G SFP MUX Tunable) pack and an OM/OD port
- 40GOCH, used to indicate ADD-DROP connection between the line port of an OT (40G SFP MUX Tunable) pack and an OM/OD port

10G ADD-DROP Connections

10G client signal rate ADD-DROP connections are supported on OADM NEs. These ADD-DROP connections are supported by the following type of OTs:

- OT (10G Add-Drop Tunable) - Client signals: STM-64 / OC-192 / 10GE WAN PHY
- OT (10G XFP ADD-DROP Tunable) client-side signals:
 - 10G Ethernet LAN PHY [IEEE 802.3ae]
 - 10G Ethernet WAN PHY [IEEE 802.3ae]
 - OC-192/STM-64 [SONET/SDH]
 - OTM-0.2 [G.709]
 - 11.049
 - 11.096

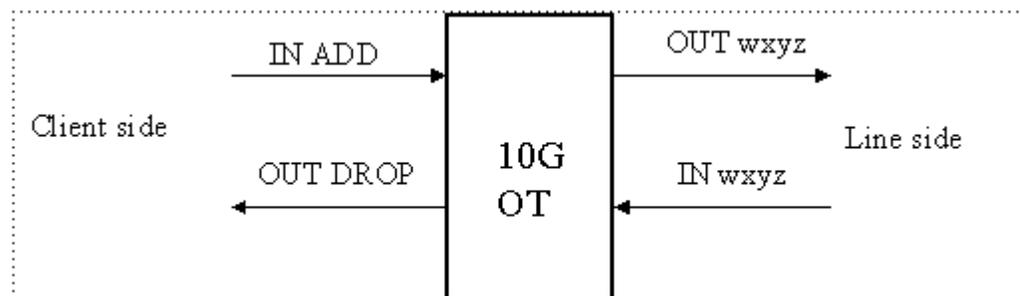
Important! The G.709 transponder must be deployed at both ends of a given optical channel connection segment bounded by OTs, because the G.709 wrapper on the line side is not compatible with the WaveWrapper™ used on Alcatel-Lucent's other 10G OTs (different FEC and bit-rate).

NOTES:

- The 11.049 and 11.096 signal types were added in Release 8.0.
- The user can replace an OT pack with a 10G OT pack with different client-side characteristics without having to delete the connection and recreate it.
- If an incompatible type of OT is plugged into the slot, then an alarm will be raised for an “Unexpected CP type”.

Each LambdaXtreme® Transport 10G OT supports a bidirectional client signal using client-side ports (IN ADD, OUT DROP) and line side ports (IN wxyz, OUT wxyz). The OT (10G XFP Add-Drop Tunable) circuit pack ports are shown in [Figure 6-2, “OT \(10G XFP Add-Drop Tunable\) Ports”](#) (p. 6-6).

Figure 6-2 OT (10G XFP Add-Drop Tunable) Ports



Important! The ADD-DROP connection type is called a “10GOCH” if this is an ADD-DROP connection between the line port of an OT (10G SFP MUX Tunable) pack and an OM/OD port. Please refer to the ent-conn TL1 Manual page for more details.

40G ADD-DROP Connections

40G client signal rate ADD-DROP connections are supported on OADM NEs.

These ADD-DROP connections are supported by the following type of OTs:

- 40G ADD/DROP Tunable: OC-768/STM-256
- OTM-0.3

Important! The ADD-DROP connection type is called a “40GOCH” if this is an ADD-DROP connection between the line port of an OT (40G XFP MUX Tunable) pack and an OM/OD port. Please refer to the ent-conn TL1 Manual page for more details.

EXT10G and EXT40G ADD-DROP Connections (External ADD-DROP Connections for Compatible Optics)

A compatible optics signal for the LambdaXtreme® Transport system is defined as a digitally-wrapped optical signal that is an equivalent signal to that produced or accepted by the LambdaXtreme® Transport OT line side. Compatible optics connections are supported on OADM Terminals. These connections bypass the use of OTs. The OT function is moved out of the LambdaXtreme® Transport NE to an external NE. This external NE must be able to accept standard output from an OD and produce standard input to an OM on the LambdaXtreme® Transport NE. Compatible optics signals have the same grid frequencies, digitally-wrapped optical signals, and transmit power levels as the LambdaXtreme® Transport system. The compatible optics signals to a LambdaXtreme® Transport NE may originate from another Alcatel-Lucent optical product with compatible DWDM signals (for example, Alcatel-Lucent LambdaUnite® MultiService Switch (MSS)).

Important! The LambdaXtreme® Transport system accepts Alcatel-Lucent® LambdaUnite® OP10XTT enhanced compatible optics pack which supports G.709 and a longer reach. With this, the LambdaXtreme® Transport system can support regeneration within and/or a G.709 OT at the opposite end of the connection.

Provisioning External ADD-DROP Connections for Compatible Optics

A LambdaXtreme® Transport NE can not autodiscover/autoprovision compatible optics ADD-DROP connections because the OT, which would sense the input signal or be provisioned as “Service Ready”, is bypassed. Connections for compatible optics must be manually provisioned. This can be done using the CIT, TL1 cut-through (ENT-CONN command), or the EMS.

The following parameters must be specified for a compatible optics connection:

- “EXT10G / EXT40G” (external) for type of connection
- Connection grid frequency
- Line AID

Important! When adding a compatible optics ADD-DROP connection to a LambdaXtreme® Transport NE, always ensure that the external source is transmitting a stable signal (non-fluctuating) before applying the signal to the LambdaXtreme Transport NE to preserve stable transmission and avoid a power transient. Follow the procedure for adding Compatible Optics circuit connections given in Chapter 16 of the *LambdaXtreme® Transport Release 8.0 Installation Manual and System Turn-up Services.*, 365-575-800R8.0.

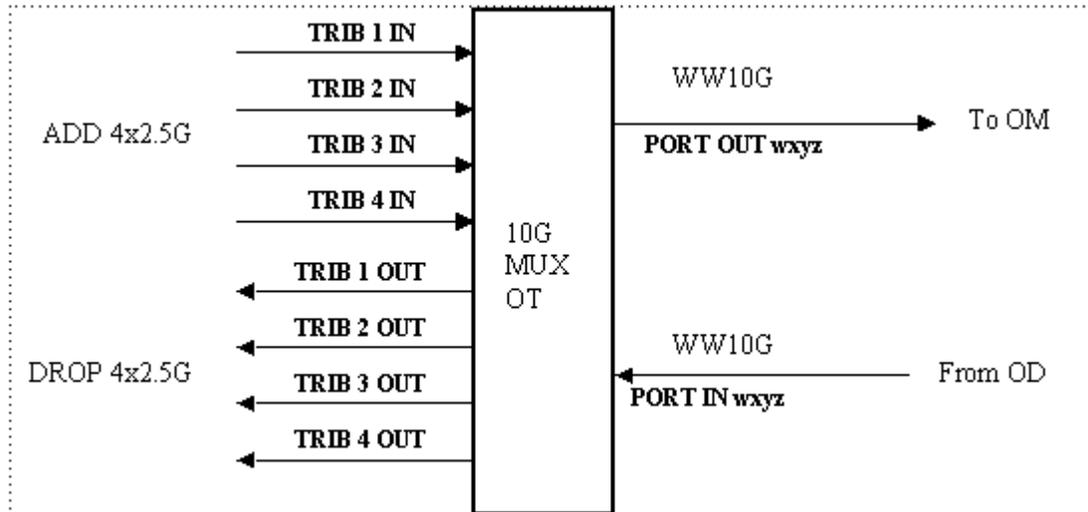
Important! If a LambdaUnite® MultiService Switch (MSS) compatible optics pack is reseated/replaced, the fiber jumper to the LambdaXtreme® OM input port must also be disconnected. After the compatible optics pack is re-inserted, and the optical power level has been verified as within range, then the fiber jumper can be re-connected to the OM input port.

2.5G ADD-DROP Connections

2.5G client signal rate ADD-DROP connections are supported on OADM NEs. These ADD-DROP connections are supported by the following type of OTs:

- OT (10G MUX Tunable) - Client signals: STM-16 / OC-48
- OT (10G SFP MUX Tunable) - Client signals: STM-16 / OC-48 / OTM-0.1

Four 2.5G bidirectional client signals can be connected to this OT using ports TRIB 1 IN & OUT, TRIB 2 IN & OUT, TRIB 3 IN & OUT, and TRIB 4 IN & OUT. One bidirectional line side WW10G signal is supported by this OT using ports IN wxyz and OUT wxyz. The OT (10G MUX Tunable) circuit pack ports are shown in [Figure 6-3, “2.5G Tributaries on an OT \(10G MUX Tunable\) pack”](#) (p. 6-9).

Figure 6-3 2.5G Tributaries on an OT (10G MUX Tunable) pack

Autodiscovery and Auto provisioning of 2.5G ADD-DROP Connections

When a new OT (10G MUX Tunable) pack is properly connected by the user, and all the fibering is in place for the connection, and the OT port is in the OOS-MA-AS state, and one to four 2.5G/10G valid signals are sent to the client-side ports of the OT, the following occurs:

- The LambdaXtreme® Transport NE detects each tributary client signal independently. On the customer side, there may be up to four 2.5G/10G customer channels.
- If a mesh cross-connection has not previously been provisioned on this OT (for example using the “Service Ready” feature), then the LambdaXtreme® Transport NE will automatically discover and verify the underlying internal connections at this NE and automatically provision the corresponding two-way paths for the 2.5G/10G Tributary mesh cross-connection at this NE. These connections are bidirectional and include both the add and the corresponding drop.
- The LambdaXtreme® Transport NE supports provisioning one connection per 2.5G/10G Trib customer input. Since there may be one through four 2.5G/10G customer inputs, there may be one through four 2.5G/10G Trib connections provisioned.

Important! The four 2.5G/10G Trib connections may be connected to the MUX OT at different times.

When provisioned, the parameters for this type of connection are stored as follows:

- The connection type parameter has the value of “2.5G Trib” or “10G Trib”.
- The tributary identifier has the value of the tributary being used in this connection. The values are: Trib1, Trib2, Trib3, or Trib4.

10GOCH ADD-DROP Connections

10GOCH ADD-DROP connections are used to indicate ADD-DROP connection between the line port of an OT (10G SFP MUX Tunable) pack and an OM/OD port

40GOCH ADD-DROP Connections

40GOCH ADD-DROP connections are used to indicate ADD-DROP connection between the line port of an OT (40G SFP MUX Tunable) pack and an OM/OD port.



MUX OT Cross-Connections

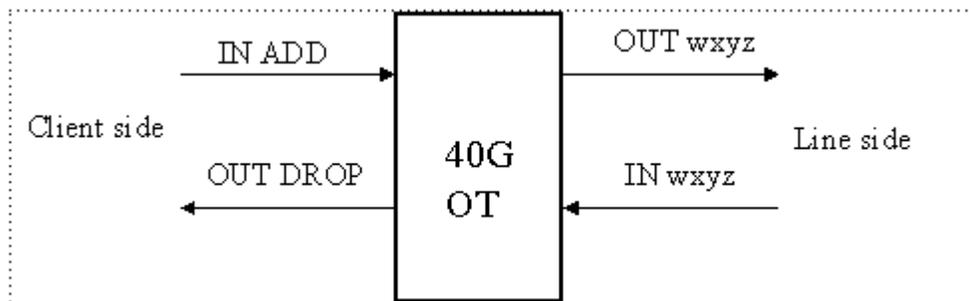
Overview

A MUX OT cross-connection is a connection established from a client side tributary to a line side tributary within the same OT (10G SFP MUX Tunable) or OT (40G XFP MUX Tunable) pack with the ENT-CONN-OT TL1 command. A MUX OT Thru Cross-Connection, in the context of the OT (10G SFP MUX Tunable) pack only, is an OT MUX cross-connection from the line side tributary of one OT (10G SFP MUX Tunable) to the line side tributary of the associated OT (10G SFP MUX Tunable), established with the ENT-CONN-OT TL1 command.

OT (40G XFP MUX Tunable)

Each LambdaXtreme® Transport OT (40G XFP MUX Tunable) supports a bidirectional mesh OT cross-connection using client side ports (IN ADD, OUT DROP) and 40G line side ports (IN wxyz, OUT wxyz). The OT (40G XFP MUX Tunable) ports are shown in [Figure 6-4, “OT \(40G ADD-DROP Tunable\) Ports”](#) (p. 6-11)

Figure 6-4 OT (40G ADD-DROP Tunable) Ports



Important! The OT (40G XFP MUX Tunable) packs support MUX OT cross-connections, but cannot do associations as shown in [Figure 6-5, “OT \(10G SFP MUX Tunable\) Packs Connected as Subrate ADM Pair”](#) (p. 6-12).

OT (10G SFP MUX Tunable) Connections

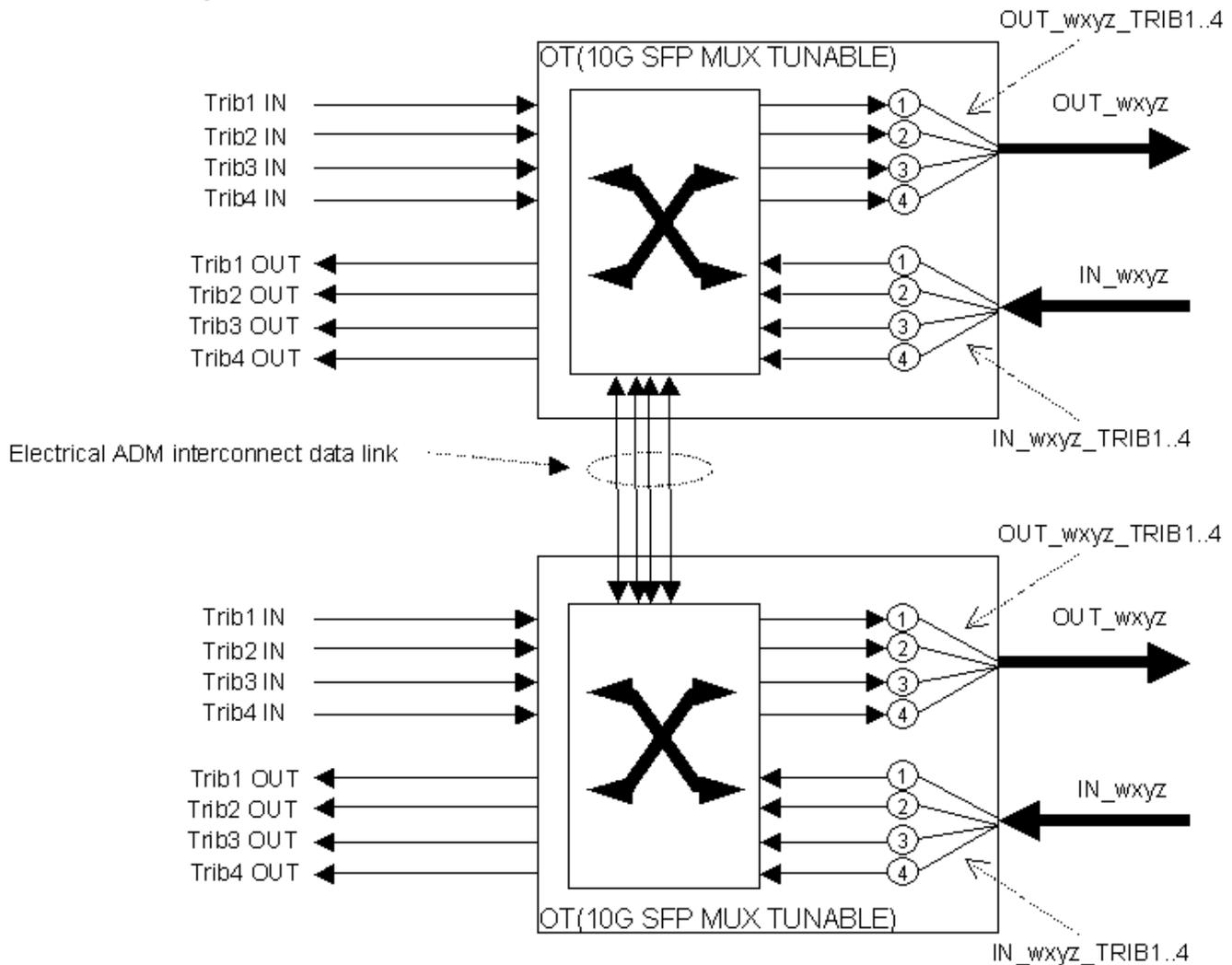
A G.709-compliant 4:1 MUX Optical Transponder OT (10G SFP MUX Tunable) is supported. This OT provides a standards-based multiplexing solution for OC-48/STM16/OTM-0.1 signal transport. This circuit pack includes an imbedded ADD/DROP/Thru functionality for more efficient utilization of DWDM wavelengths.

The OT (10G SFP MUX Tunable) pack contains optical connectors to multiplex up to four client signals into one high-speed line signal. In addition, the OT (10G SFP MUX Tunable) pack contains an electrical interface to allow cross-connecting individual signal tributaries to a companion OT (10G SFP MUX Tunable) pack located in the

same LambdaXtreme® bay to form a subrate ADM pair. These pairs of OT (10G SFP MUX Tunable) packs are provisioned using the ENT-ASSOC-OT TL1 command or the CIT (see “Add OT Association” (p. A-87)). These subrate ADM pairs support, for a single pair of Optical Line wavelengths, the ADD/DROP or THRU configuration of any 2.5G rate tributary carried within the 10G wavelengths.

Figure 6-5, “OT (10G SFP MUX Tunable) Packs Connected as Subrate ADM Pair” (p. 6-12) shows two OT (10G SFP MUX Tunable) packs physically connected as a subrate ADM pair to create an ADM function.

Figure 6-5 OT (10G SFP MUX Tunable) Packs Connected as Subrate ADM Pair



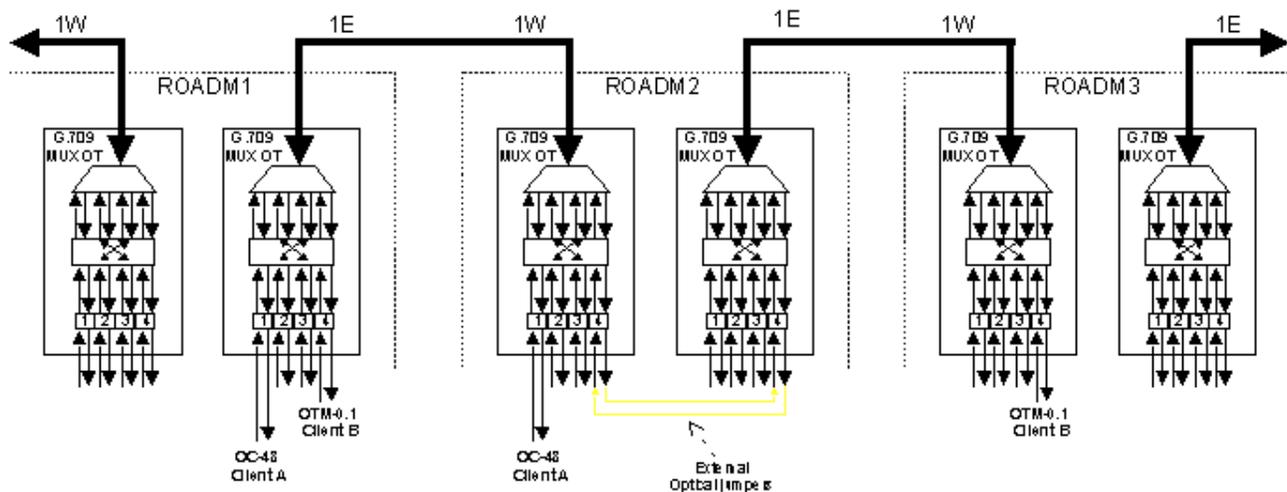
OT (10G SFP MUX Tunable) Circuit Pack Applications

The OT (10G SFP MUX Tunable) circuit pack supports two operational modes:

- Point-to-Point mode
- ADD/DROP Multiplexer mode

Point-to-point mode is functionally equivalent to the operation of legacy 10G MUX transponders, and provides a solution for 2.5G/2.7G transport of up to four client signals. Figure 6-6, “Signal Transported in Point-to-Point Connection” (p. 6-13) shows a segment of a network carrying traffic using the OT (10G SFP MUX Tunable) circuit packs. As shown, an OC-48 client A signal is transported from ROADM1 to ROADM2 in a point-to-point connection. To transport the OTM-0.1 Client B signal from ROADM1 to ROADM3, optical jumpers are needed on the Trib4 client interfaces at ROADM2 to connect the West transmitting OT (10G SFP MUX Tunable) to the East transmitting OT (10G SFP MUX Tunable).

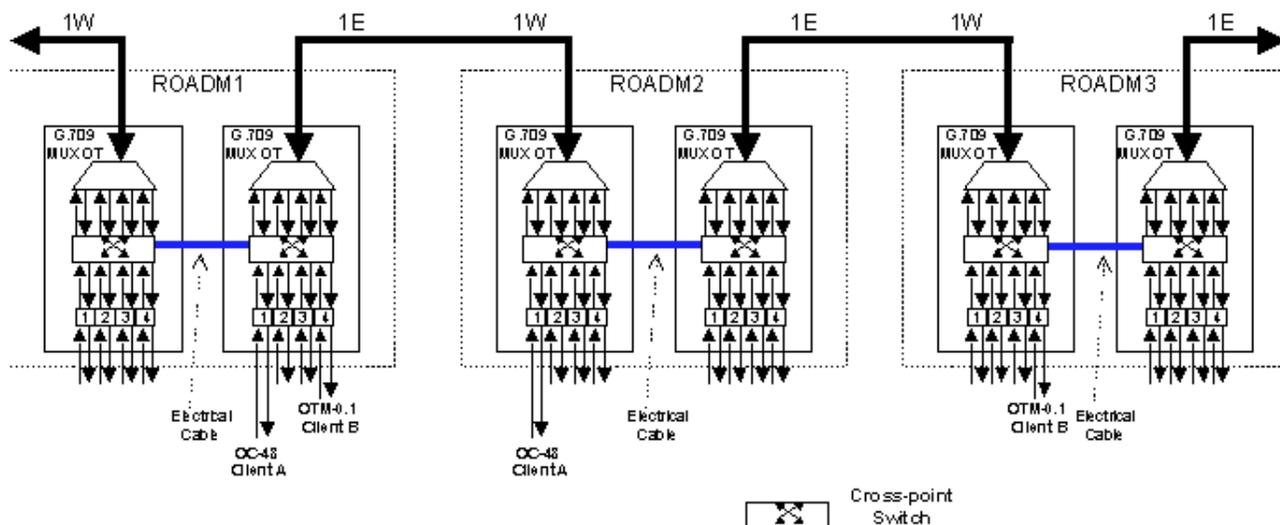
Figure 6-6 Signal Transported in Point-to-Point Connection



ADD-DROP Multiplexer mode eliminates the need for external optical jumpers on through connections, and enables more efficient utilization of DWDM wavelengths within the LambdaXtreme® network. The ADD-DROP Multiplexer configuration is accomplished by creating an ADM association between a pair of OT (10G SFP MUX Tunable) circuit packs (that is, a subrate ADM pair). Each OT (10G SFP MUX Tunable) circuit pack contains a cross-point switch. The cross-point switch allows flexible and configurable connection between the client bit stream and the line port tributary (on either the local MUX OT or a companion MUX OT). A physical electrical cable provides an interface between the two MUX OT circuit packs. This creates the ability for the user to either add or drop individual 2.5G/2.7G signals or to pass them out on another DWDM line.

In Figure 6-7, “Signal Transported in ADD-DROP Multiplexer Mode” (p. 6-14), the OTM-0.1 Client B signal is transported from ROADM1 to ROADM3. At ROADM2, a cross-connection in the electrical domain is set up to route the Client B signal from the line input of one MUX OT circuit pack directly to the line output of another MUX OT circuit pack.

Figure 6-7 Signal Transported in ADD-DROP Multiplexer Mode



Thus, a pair of OT (10G SFP MUX Tunable) circuit packs provisioned for ADD-DROP Multiplexer mode can provide through cross-connections or local ADD-DROP cross-connections using the TL1 commands in the following sequence: ENT-CONN, ENT-ASSOC-OT, ENT-CRS-OT.

Cross-Connection Provisioning

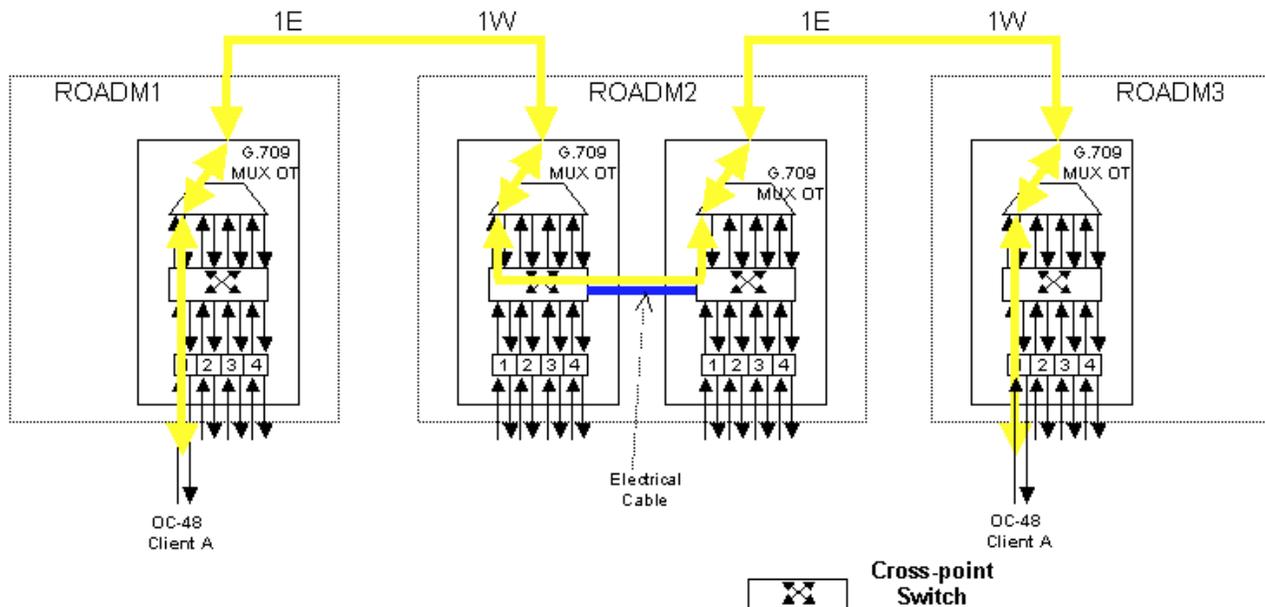
The following cross-connection provisioning is supported with the OT (10G SFP MUX Tunable) circuit packs.

- Client port N on a MUX OT can be cross-connected to a constituent tributary N within the wxyz port on the same MUX OT (N=1,2,3,4).
Example: in_trib_N to out_wxyz_trib_N.
- Constituent tributary M in a MUX OT slot X can be cross-connected to constituent tributary M in a substrate ADM pair MUX OT in slot Y, provided that both OTs are OT (10G SFP MUX Tunable) packs and an ADM association has been established between the packs.
Example: slot x in_wxyz_tribM, slot y out_wxyz_tribM.

OT (10G SFP MUX Tunable) Connection Provisioning Example

Figure 6-8, “OT (10G SFP MUX Tunable) Connection Provisioning Example” (p. 6-15) depicts an example of how to provision the OT (10G SFP MUX Tunable) circuit packs to carry an OC-48 client signal from ROADM1 to ROADM 3, with a through connection (that is, through a subrate ADM pair) at ROADM2.

Figure 6-8 OT (10G SFP MUX Tunable) Connection Provisioning Example



To add this connection:

1. All OT (10G SFP MUX Tunable) packs are plugged in and a channel is provisioned (either by autoprovisioning or manually using ENT-CONN TL1 command (or GUI equivalent)).
2. An ENT-ASSOC-OT TL1 command (or GUI equivalent) is executed to establish a subrate ADM pair between two OT (10G SFP MUX Tunable) circuit packs at location ROADM2.
3. An ENT-CRS-OT command (or GUI equivalent) is executed at the OT (10G SFP MUX Tunable) pack in ROADM1 to establish a cross connection between its client port (Trib1 IN) and its constituent tributary line port (OUT_wxyz_Trib1). Similarly, an ENT-CRS-OT command (or GUI equivalent) is executed at the OT (10G SFP MUX Tunable) pack in ROADM3 to establish a cross connection between its client port (Trib1 IN) and its constituent tributary line port (OUT_wxyz_Trib1).
4. An ENT-CRS-OT command (or GUI equivalent) is executed at the OT (10G SFP MUX Tunable) pack in ROADM2 to establish a through cross connection between its IN_wxyz_Trib1 tributary and its companion OT pack OUT_wxyz_Trib1 tributary.

To delete this connection:

1. At ROADM1 and ROADM3 nodes, make client port states for Trib1 to be out-of-service (OOS) using ENT-OTPS (or GUI equivalent) command.
2. A DLT-CRS-OT command (or GUI equivalent) is executed at ROADM1 to delete the cross connection between the client port (Trib1 IN) and its constituent tributary line port (OUT_wxyz_Trib1). Similarly, a DLT-CRS-OT command (or GUI equivalent) is executed at ROADM3 to delete the cross connection between the client port (Trib1 IN) and its constituent tributary line port (OUT_wxyz_Trib1).
3. A DLT-CRS-OT command (or GUI equivalent) is executed at ROADM2 to delete the through cross-connection between the companion OT(10G SFP MUX Tunable) packs.
4. A DLT-ASSOC-OT command (or GUI equivalent) is executed to delete the association between the two OT (10G SFP MUX Tunable) packs at ROADM2.
5. The DLT-CONN command (or GUI equivalent) can then be executed to delete the connection.

□

Mesh Cross-Connections

Overview

A mesh cross-connection is a bidirectional optical transmission path within a single LambdaXtreme NE between a wavelength on one Optical Line to the same wavelength on a different optical line.

Mesh cross-connections are provisionable on the following NEs:

- U_2D_ROADM-equipped OADM
- 3D_WXC equipped OADM
- 4D_WXC equipped OADM
- 4D_MINI_WXC equipped MINI NE

Important! U_2D_ROADM-equipped OADMs are provisioned autonomously and should not be manually provisioned.

Mesh cross-connections are set up between optical channels of the same frequency on two different DWDM lines. A DWDM line is defined as LINE-1E, LINE-1W, LINE-2E, or LINE-2W.

Rules for Provisioning Mesh Cross-Connections

On OADMs, mesh cross-connections are supported between any two optical lines that the NE supports. Mesh cross-connections are only allowed between optical channels with the same frequency. Cross-connecting to switch frequency is not supported.

Mesh cross-connections are only allowed between optical channels on different optical lines or sides (for example: 1 East to 1 West, or 1 East to 2 East, but not 1 East to 1 East). Cross-connecting to loop an optical channel to itself is not allowed or supported.

A mesh cross-connection cannot be provisioned if it would cause a collision of the optical channel with another provisioned ADD-DROP connection, MUX OT or mesh cross-connection on a DWDM line. For example, a mesh or MUX OT cross-connection using 8650 between LINE-1E and LINE-2E cannot coexist with a mesh or MUX OT cross-connection of 8650 between LINE-1E and LINE_1W.

Optical lines must be provisioned and available (that is, the optical lines must not be used in an existing connection) before they can be used to provision a mesh cross-connection.

□

Connection Network Element Types and Testing

Degree 1 OADMs

The LambdaXtreme® Transport system supports 10G/40G DWDM line rate OADMs. The Upgradeable 1 Degree ROADM equipped OADM supports 10G/40G line rates. This node type supports 1 DWDM line interface (transmit and receive), up to 128 channels with the capability to add or drop 100% of the channels supported, no pass through capability and the ability to grow, in-service to a U_2D_ROADM equipped OADM.

End-to-end connections may only ADD-DROP connections on these nodes (they cannot pass through). These Degree 1 nodes support one mesh cross-connection per frequency, for the one DWDM line supported.

Degree 2 OADMs

The OADM NE supports 10G/40G DWDM line rates. Upgradeable 2 Degree ROADM equipped OADMs support 128 channels in this release, with the capability to add or drop 100% of the total channels supported.

A Degree 2 OADM has two DWDM lines and thus can support up to two optical channel connections on a single frequency (one per DWDM line).

For the first reboot of the OM and OD packs or the OADM node, all channels are blocked from passing through the node. For any subsequent reboots of the OM or OD packs or the OADM node, the channels remain in their provisioned position.

For intermediate OADM nodes (between the endpoints of an end-to-end connection), the node-to-node communication between NEs is used to distribute information to automatically configure the OADM to pass the connected frequency through the node. No user intervention is required.

Degree 3 OADMs (3D_WXC)

A Mesh 3 Degree Wavelength Cross-connect (3D_WXC) supports full cross-connection of channels between DWDM optical lines. Similar to Degree 2 OADM NEs, the 3D_WXC provides ADD/DROP access to 100% of the 128 channels on each DWDM line. This NE supports the following DWDM lines: Line-1E, LINE-2E and one of either LINE-1W or LINE-2W.

On each DWDM line of the 3D_WXC NE, optical channels can be added, dropped, or cross-connected from one DWDM line to another DWDM line (for example, cross-connection of a bi-directional mesh cross-connection routed between LINE-1E and LINE-2E). Cross-connects are provisioned by the user. A 3D_WXC has three DWDM lines, and thus can support up to three mesh cross-connections on a single frequency (one per DWDM line).

Degree 4 OADMs (4D_WXC)

Similar to the 3D_WXC NE, a 4D_WXC NE supports the “East” and “West” directions of both LINE-1 and LINE-2. An in-service (traffic in the existing configurations is not be affected) merge of an existing U_2D_ROADM and a co-located U_2D_ROADM to make a 4-degree mesh node is supported.

Repeaters

End-to-end connections within the LambdaXtreme® Transport system always pass through repeaters, there is no provisioning or configuration needed at these nodes.

MINI NEs

The MINI NE is a class of LambdaXtreme® Transport NEs with special functions that have a common base of equipment. Two equipages are supported for a MINI NE: MINILA and 4D_MINI_WXC.

MINILA architecture provides a minimum configuration, in-service upgradable, in line amplifier. When equipped as a MINILA, the MINI NE contains the functionality of a Repeater with the ability to upgrade, in service, to a mini wavelength cross connect and MINI_ROADM (future enhancement). This configuration supports 2 DWDM directions without add or drop access.

The 4D_MINI_WXC NE supports four bidirectional optical lines (lines 1E/1W/2E/2W), and is comprised of two co-joined fully equipped MINILA nodes with additional hardware to support mesh cross-connections from one optical line to the other.

On a 4D_MINI_WXC, mesh cross-connections shall only be allowed between the following optical lines, if provisioned:

- 1 East and 1 West
- 1 East and 2 East
- 1 West and 2 West (on a MINI_WXC equipped MINI NE)

If an optical channel is involved in a cross-connection between any two optical lines on a MINI_WXC equipped MINI NE, it is not allowed to be used in a cross-connection on any other optical lines supported by the MINI_WXC.

Important! For a channel going through a MINI_WXC, as the channel is added or deleted, all the cross-connections associated with that channel must also be created and/or deleted.

Important! MINILAs cannot be the endpoint of a linear network.

U_1D_ROADM-Equipped OADMs

U_1D_ROADM-Equipped OADMs cannot be used in mesh cross-connections.

U_2D_ROADM-Equipped OADMs

On U_2D_ROADM-equipped OADMs, mesh cross-connections are autoprovisioned.

Testing Connections

There are several features provided to help in testing the connectivity and signal quality of a connection within a LambdaXtreme® Transport NE or end-to-end within the system across multiple NEs.

- The VERIFY-CONN TL1 command or GUI equivalent (see [“Verify Fiber Connectivity” \(p. A-169\)](#)) is available to test the fiber connectivity from the OT to the OM pack for a frequency.
- When an OT port is provisioned as “Service Ready”, the bi-directional connection from the OT to the DWDM line is established and monitored. If both ends of the end-to-end connection within the system are provisioned as “Service Ready”, then the intermediate NEs will autoprovision to the correct configuration (pass through), and the end-to-end connection signal quality will be monitored and DWDM line side performance data is available (see the Performance Monitoring/Management section in the *LambdaXtreme® Transport Alarms, Messages, and Trouble Clearing Guide*).
- A test signal can be applied to both ends of an end-to-end connection within the LambdaXtreme® Transport system and the signal quality can be monitored through the features of the test set.

If a test signal has been applied and removed during testing and before a valid client signal is applied, the OT port state should be provisioned to the state OOS-MA-AS. In this state, the OT will monitor continuously for a valid client signal at the OT.

□

7 System Maintenance

Overview

Purpose

This chapter provides detailed “how to” instructions for performing basic maintenance activities on the LambdaXtreme® Transport optical networking product.

Contents

Remove Front Cover	7-2
Inspect/Replace Air Filter	7-4
Install Front Cover	7-7



Remove Front Cover

Purpose

This procedure describes how to remove a front cover, thereby allowing access to the air filter.

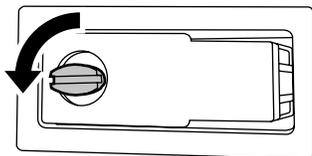


Use a static ground wrist strap whenever handling circuit packs or working on a LambdaXtreme® Transport network element to prevent electrostatic discharge damage to sensitive components.

Procedure

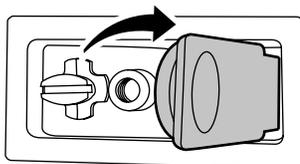
- 1 Each front cover is secured by a pair of latches located in the top-right and top-left corners of the front cover. Rotate the locking screws 90 degrees counter-clockwise to release the latch handles (see [Figure 7-1, “Front Cover Latch - Rotate”](#) (p. 7-2)).

Figure 7-1 Front Cover Latch - Rotate



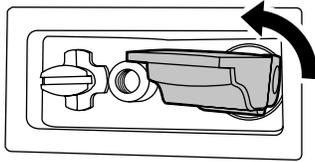
- 2 Push on the outside edge of each latch handle so that the inside edge lifts up (see [Figure 7-2, “Front Cover Latch - Up”](#) (p. 7-2)).

Figure 7-2 Front Cover Latch - Up



- 3 While pushing the top of the cover closed, rotate the open handles 90 degrees counter-clockwise to release the latches (see [Figure 7-3, “Front Cover Latch - Release”](#) (p. 7-3)).

Figure 7-3 Front Cover Latch - Release



-
- 4 Pull the top of the cover several inches toward you, while supporting it so that it does not fall.
-
- 5 Remove the front cover by lifting it straight up to free it from the two hinge brackets located at the bottom of the shelf.

END OF STEPS



Inspect/Replace Air Filter

Purpose

This procedure is used to remove the air filter in the bay for inspection, and when necessary, to replace the air filter.

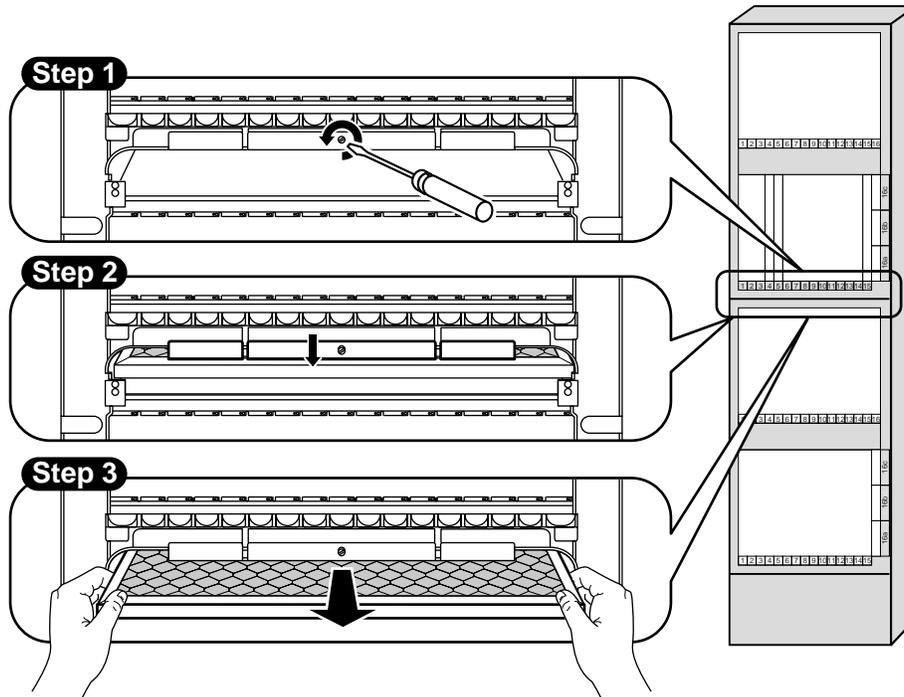
Note: An appropriate screwdriver is needed for this procedure.

Important! A dirty filter causes a substantial reduction in the amount of available cooling air to the bay. The air filter should be inspected periodically and changed every six months.

Procedure

- 1 Identify the location of the plastic cover on the shelf in the bay that contains the air filter. See [Figure 7-4, “Air Filter Removal Process” \(p. 7-5\)](#).
 - 2 Remove the front cover (see [“Remove Front Cover” \(p. 7-2\)](#)) to expose the air filter slide holder assembly. [Figure 7-4, “Air Filter Removal Process” \(p. 7-5\)](#) shows the steps to remove the air filter.
-

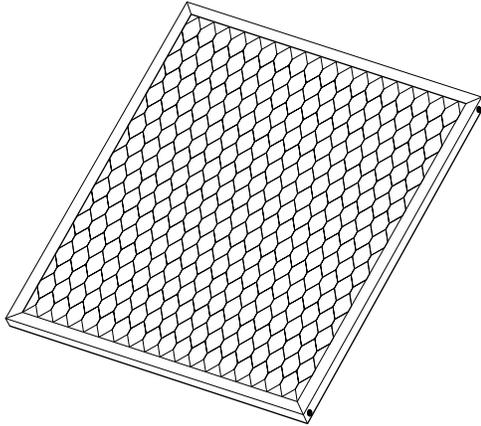
Figure 7-4 Air Filter Removal Process



-
- 3 Turn the screw (counterclockwise) on the air filter slide holder to free it and then pull it toward you.

Result: The air filter which was held in place by the slide holder is released.

-
- 4 Remove the air filter and inspect it for any dirt or dust accumulation that may clog it. [Figure 7-5, “Air Filter”](#) (p. 7-6) shows the air filter.

Figure 7-5 Air Filter

-
- 5** The filter can be reused if in good condition, but must be replaced if dirt or dust has accumulated.
-
- 6** Insert a filter back into the shelf. While holding it up into position, push the air filter slide holder back into position (make sure the back lip of the assembly slides under the filter to secure it).
- Important!** When inserting a filter into the shelf, make sure the air flow arrows (located on the filter's edge) are pointing up.
-
- 7** Turn the screw (clockwise) on the air filter slide holder to secure it.
-
- 8** Replace the front cover (see [“Install Front Cover”](#) (p. 7-7)).

END OF STEPS

.....



Install Front Cover

Purpose

This procedure describes how to install a front cover.

Procedure

-
- 1 Replace the front cover, inserting the bottom corners of the cover into the two hinge brackets located at the bottom of the shelf, and pressing the top of the front cover into place, flush with the shelf.

 - 2 Rotate the open latch handles 90 degrees clockwise to close the latches.

 - 3 Push on the raised edge of each latch handle to close it, so it is flush with the latch mechanism.

 - 4 Rotate the locking screws 90 degrees clockwise to secure the latch handles.

END OF STEPS



8 Craft Interface Terminal

Overview

Purpose

This chapter provides a description of the LambdaXtreme® Transport Craft Interface Terminal (CIT).

Note: Specific task-oriented procedures performed using the CIT are covered in [Appendix A, “Using the CIT”](#).

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CIT Functionality

Description

The CIT provides a GUI that allows users to interact with LambdaXtreme® Transport NEs from a PC using a 10/100BaseT physical connection. The CIT may be connected to the NE either locally through a physical connection to the CIT port located on the SIO, or remotely through a Data Communications Network (DCN) connection or dial-up connection to the NE's EMS port.

Important! When using dial-up to access a node using the CIT, the dial-up connection to the network must be established before the Craft Interface Launcher is launched.

The LambdaXtreme® Transport CIT GUI is a common interface to all LambdaXtreme® Transport NEs regardless of type, and provides a powerful, flexible, and user-friendly interface to execute the most frequently used actions. The GUI also supports numerous customization options so that users may tailor the displays in accordance with their own preferences. The CIT operates as an enhanced graphical tool and as a general provisioning aid that enables the user to specify performance monitoring and fault management settings. It is designed to take advantage of the capabilities of the LambdaXtreme® Transport NEs, and optimize the role of the NEs in management functions to create an intelligent operations environment. The CIT provides the user with access to command functions that are required to install and operate LambdaXtreme® Transport NEs and to maintain the LambdaXtreme® Transport Network System.

Important! Typically, for an established network system, the users perform their maintenance functions by using an Element Management System such as Alcatel-Lucent *Navis® Optical Management System (OMS)* to operate the NE on an ongoing basis.

The CIT user interface is divided into three primary windows:

- Craft Interface Launcher – This window appears when the user starts the CIT. The Craft Interface Launcher displays network topology and provides the user with the facilities to launch login connections to any accessible network element. The Craft Interface Launcher provides initial access to the Node Manager (from Login) and to the Cut-Through Interface (from the Node drop-down menu). It also offers the Create Map button which allows a user to create a network map from a selected node.
- Node Manager – This window appears when the user connects to a network element from the Craft Interface Launcher. It provides the functions necessary to work with the network element across a variety of command functional areas such as Provision/Info, Performance, Test/Analysis, and Fault.
- Cut-Through Interface – This window appears when the user connects to a network element from the Craft Interface Launcher by selecting the cut-through option. It is a command line driven interface to the network element and requires specific knowledge of the commands in their TL1 form. One powerful feature of the cut-through interface is the scripting capability. Here the user can sequence any number of TL1 commands in a single file and have the CIT batch execute them one after the other. This is useful for provisioning large numbers of parameters at one time.

Important! For details on installing and setting up the CIT software and associated documentation, see *LambdaXtreme® Transport Installation Manual and System Turn-up Services*.



Craft Interface Launcher

Introduction

Once the CIT application is launched, the Craft Interface Launcher window appears. After NEs and/or networks have been identified on the CIT, the Craft Interface Launcher becomes the launching point for providing the CIT user the ability to interact with NEs. The Craft Interface Launcher allows the user to specify which types of NEs to display.

Step-by-step instructions for using the Craft Interface Launcher using the CIT are covered in [Appendix A, "Using the CIT"](#).

After a user has identified at least one network element, the user can perform the following actions:

- Display the network map for the network to which the NE belongs
- Log in to an NE within the maintenance subnetwork and using the CIT Node Manager to invoke CIT user functions on the NE
- Log in to an NE within the maintenance subnetwork and issuing the appropriate TL1 command directly to the NE without use of the CIT GUI. This is called the cut-through option.

Craft Interface Launcher Features

During a CIT session, the user can perform the following Craft Interface Launcher functions by accessing these functions from one of the Craft Interface Launcher menus:

- Retrieve information about NEs and their associated networks
- Display the network map for the network to which the NE belongs
- Log in to an NE
- Access cut-through option to issue TL1 commands
- Establish communications to NEs
- Search for a node
- Assign gateways.

Important! The login ID and password used for map creation and update, and alarm update are prompted for whenever these features are invoked. This ID and password **must** be valid on each node accessed in the map.

Craft Interface Launcher Display

The Craft Interface Launcher contains the following sections:

- Title bar – displays the title of the software and contains the window controls to minimize, maximize, or close the window.
- Menu bar – provides access to the Craft Interface Launcher functions. These menus are also accessible using keyboard shortcuts.
- Toolbar – includes a Map section, Node section, and Alarms section to provide the following functions:
 - Map section – Select the map to be displayed. Also create and/or update network maps. Nodes can also be viewed in tabular format by clicking the Details button.
 - Node section – Launch Node Manager sessions, which are used for management and provisioning of the network elements. Multiple Node Manager sessions may be run at the same time, and an icon for each active session is shown in the Node Monitor area of the Launcher window.
 - Alarms section – Update alarm indicators (highest alarm present on each node) in the graphical network map. Also, enable Alarms Monitor for the map currently in view which allows the map display to be automatically updated whenever the highest severity alarm level changes on a network element (see [“Network Map” \(p. 8-6\)](#)). The date and time of the last update is displayed here as well. This date and time is updated only when the entire map is updated. When logged into an NE through the Node Manager, the icon corresponding to that node is updated automatically, but since the entire map is not refreshed, the date and time shown is not changed. If the Update button has not been clicked since starting the Launcher, no date and time will be shown.
- Network map – displays the NEs defined for this system.
- Status bar – displays messages from the Craft Interface Launcher.
- Node Monitor toolbar – displays the NEs to which you are currently connected and provides the ability to restore or disconnect a Node Manager or display the properties of the node.
- Map Navigator window – provides a miniature image of the entire selected network map and defines the portion of the network map displayed in the Craft Interface Launcher. Users can navigate the entire selected network by dragging the Map Navigator image. Users can also jump around and view different areas of the network map by clicking on the desired portion of the image. A “Zoom” control in the Map Navigator window (also available from the menu bar) allows the user to change the scope of the network map by reducing or enlarging it. The Map Navigator window can be undocked from the Craft Interface Launcher and become a standalone floating window.

Network Map

The network map displayed in the Craft Interface Launcher window is to provide information to help expedite the process of connecting to an NE. To find out more detailed information about an NE, the user must log in to the NE and invoke the desired function from the Node Manager menu.

The CIT network map displays the following information:

- All NEs in the network which are reachable from the login node when the map is created/updated. Network map information is provided for all network map icons including: NE type, NE TID or alias.
- The connections between the NEs
- Any LAN/WAN accessible gateway NEs.
- The highest alarm level icon is displayed next to each node.

Important! At login, the highest alarm level indicators are not shown regardless of option setting because the information is static as of the time of the last Update Map. The highest alarm level indicator is updated only when the user logs into the node again or an Update Map or Update Alarms is performed. An Enable Auto-Update feature is available in the Alarm toolbar section (or from the menu bar). This allows the map display (for the map currently being viewed) to be automatically updated whenever the highest severity alarm level changes on a network element. The button is re-labeled to Disable Auto-Update when auto-updates are running, and an indication is shown on the status bar of the map being monitored. When Auto-Update is not running, the map display must be updated manually by clicking the Update button in the Alarms section (or from the menu bar). Only one map may be in auto-update mode at any one time.

Alarm Trigger Assignments

From the Craft Interface Launcher window menu bar, select **Alarm > Trigger Assignments** to receive email notification of alarms.

To ensure the right settings for this feature, perform the following steps:

- Select **Virus Scan Console**.
- Select **Access Protection**.
- In the Access Protection Properties window, select the Port Blocking tab. Make sure that the “Prevent mass mailing worms from sending mail” option is unchecked.



Node Manager

Introduction

The Node Manager appears after you log in to an NE from the Craft Interface Launcher. From this window the user performs network management functions on the NE such as performance, fault management, provisioning, channel connection management, and administration.

Step-by-step instructions for using the Node Manager using the CIT are covered in [Appendix A, “Using the CIT”](#).

The Node Manager window remains visible as long as the user is logged into the NE. The Node Manager screen closes when the NE login session is terminated from one of the following:

- The user disconnects from the NE.
- The user manually closes the Node Manager window.
- The connection with the NE is terminated due to network problems, NE reboot, logout due to session inactivity, and so forth.

Node Manager Display

The Node Manager contains the following sections:

- Title Bar – This displays the title of the software and displays the TID of the NE to which you are connected. Also contains the window controls to minimize, maximize, or close the window.
- Menu Bar – Provides access to the Node Manager pull down menus. With this, the user can perform any of the available features including generating reports, adding channel connections, system administration, and access help.
- Alarm Section – Displays a summary of the current alarms in the system by severity, including the counts for each occurrence. The user can click on this display to view more details for each alarm severity.
- Functions Toolbar – Contains the five available views that correspond to the Node Manager functions (Equipment, Provision/Info, Performance, Test/Analysis, and Fault).

- Controls Section – This allows the user to control the operation of the network element:
 - The Auto Update icon is a 2-position switch. When depressed, it indicates that autonomous messaging is enabled to this CIT. The Node Manager always initializes autonomous messaging to the Enabled state. Click the icon to disable autonomous messaging. Disabling autonomous messaging applies only to the current CIT session, and has no effect on other users.
 - The Audible CutOff icon allows the user to silence current audible alarms on the network element. This does not affect future audible alarms, which will be triggered by the arrival of a new alarm.
 - The Log out icon logs out of the network element.
- NE Equipment Tree – This is similar to a windows explorer tree. This hierarchical display allows the user to select equipment that is part of the NE. A piece of equipment is selected by clicking on it. The alarm icon in the tree automatically becomes dimmed if the View chosen in the View Toolbar is not applicable to the associated equipment.
- Display Panel – Displays the appropriate information based on the highlighted equipment and the view. This area may display graphics, static information, or allow the user to enter data. When existing data is modified, a change gliff symbol appears next to the field that has been modified and also in the display panel tab. This indicates a change is pending but has not yet been applied.
- Status Bar – The status bar is located across the bottom of the Node Manager window and is divided into three sections. The left side of the status bar displays any messages or instructions from the Node Manager. The middle section displays the AID of the equipment selected in the tree. The right side displays the currently active view from the View Toolbar.

NE Equipment Tree

The NE Equipment Tree allows the user to navigate through the NE equipment in a hierarchical fashion from the system level down to the port level and select a single entity from the hierarchy. The NE Equipment Tree is always displayed on the Node Manager and provides the equipment selection mechanism for all the NE management functions supported within the Node Manager window. The selection on the NE Equipment Tree is always in sync with the information displayed in the Display Panel.

When navigating the equipment tree, the following applies:

- Click on the plus sign (+) next to the piece of equipment to expand the tree (or double-click the piece of equipment when closed).
- Click on the minus sign (-) next to a piece of equipment to collapse the tree (or double-click the piece of equipment when open).
- Click on a piece of equipment to select it.

Equipment Tree Hierarchy

The Equipment Tree hierarchy is as follows:

- System (Level 1) – This is the highest level on the NE Equipment Tree.
- Miscellaneous Discretes (Level 2)
- Optical Lines 1E, 1W, 2E, and/or 2W (Level 2)
- Bay (Level 2)
- Shelf (Level 3)
- Slot (Level 4)
- Port (Level 5).



TL1 Cut-Through Interface

Overview

The CIT cut-through interface is a command line interface for issuing TL1 commands directly to the NE. This interface requires specific knowledge of TL1 commands.

- Step-by-step instructions for using the TL1 cut-through interface using the CIT are covered in [Appendix A, “Using the CIT”](#).
- information regarding TL1 command usage using the EMS, see the *Navis® Optical Management System (OMS) Provisioning Guide*.

Important! The set of supported TL1 commands for the LambdaXtreme® Transport system can be accessed by clicking on the Documentation Library icon, which appears on the PC desktop once the documentation CD is installed. A link to the TL1 command library is available from the HTML page that is launched from this desktop icon. When connected to an NE, the supported TL1 commands can be viewed in the TL1 command list displayed in the TL1 cut-through interface.

The CIT user can see TL1 messages sent to the NE and the responses received from the NE. The following modes can be selected:

- Sent/Reply – Display only those commands sent to the NE and the responses received from the NE.
- Autonomous – Display only the autonomous messages received from the NE.
- All – Display all commands (includes both of the above).

Features

After the CIT user invokes the cut-through function, the user has the following capabilities:

- Send commands to the NE.
- Display the TL1 response.
- Toggle logging on or off (user can specify a file name for the log).
- Start/stop the FTP server.
- Execute a script containing a sequence of commands.

Note: When using cut-through, the semicolon character is not supported as data because it has special meaning to the TL1 commands. Therefore, semicolons cannot be used in any command sent through the cut-through interface. When executing commands using the TL1 cut-through interface, the user should wait until a command completes before issuing another.

TL1 Cut-Through Functionality

The cut-through interface provides two basic modes to issue commands: interactive and scripting. Interactive mode allows the user to issue TL1 commands one at a time. Scripting mode allows the user to issue a group of TL1 commands to the NE. The latter is useful for provisioning large numbers of parameters at one time. The user can script any number of TL1 commands in a single file and have the CIT batch execute them one after the other.

The cut-through window is divided into the following five sections:

- **TL1 Command List (Interactive mode only)** – This lists the TL1 commands available for the current release of the software. The user can choose to view all the commands in an alphabetical list or a list organized by functionality. Options on the command list allow the user to select the desired view. A TL1 Help button displays information for the selected command. The TL1 Help describes the command and shows input/output format, valid parameters, and error responses for the selected command.
- **TID Selection (Interactive mode only)** – A drop down list allows the user to select the TID to which the TL1 command(s) are to be sent. The TL1 command will have the TID field pre-populated with this value.
- **Interactive Command Line (Interactive mode only)** – This section displays a template of the TL1 command that was highlighted in the TL1 command list. The user has the opportunity to edit the parameters and add any optional parameters that are desired before pressing the Send button to send the command to the NE. The Command Line also functions as a drop down to view and select previously sent commands.
- **Message Monitor** – This area displays the TL1 command sent to the NE and the response from the NE. The user can choose to display only those commands sent to and the responses from the NE (Interactive tab), the autonomous messages received from the NE (Autonomous tab), or all the commands (All tab).
- **Logging** – This section allows the user to specify whether they want to log the communications between the CIT and the NE. The user can specify which file to log the commands to and can view the log file.

TL1 Logging

The CIT provides the ability to turn on/off a logging function that logs communications between the CIT and the NE. The CIT user has the ability to perform the following TL1 logging functions:

- Activate a TL1 message logging function.
- Choose the TL1 log file.

- View the TL1 log file.
- Toggle the TL1 logging function on/off. At the beginning of a cut-through session, the TL1 logging function is initially be set to “Off” and the TL1 log file name is set to a default.

FTP Server

Starting and stopping the FTP server can be performed using the CIT cut-through interface. This feature provides the user with a convenient method of launching an FTP server task which must be done prior to performing backup and restore operations or downloading software.

Secure file transfer over SSH is supported for software download, backup database, and restore database operations. This feature is configurable (on/off) using the CIT cut-through interface (see [“Execute Commands Interactively Using TL1 Cut Through”](#) (p. A-42)) or using the ENT-CID-SECU TL1 command.

Important! When a user requests an operation through the CIT GUI which requires the FTP Server on the CIT to become active, or when a CIT cut-through user requests that the FTP Server be started, the FTP Server is started with a software generated User ID and a password that is unique each time the FTP server is started. The password consists of printable and reproducible characters that a user may need to type into a TL1 command when using the CIT cut-through.

□

Data Tables and Lists

Overview

This section includes general information regarding data tables and lists available with theLambdaXtreme® Transport system.

Following is an overview of the features available in the CIT data tables and lists:

- All data tables and lists in the CIT GUI contain the TID and the System Date/Time of the NE to which the information applies. All dates and times are in the format designated on the NE (SONET or SDH).
- A Report button allows the user to send data to the PC browser and the user can then save the data to a file and/or print it. When the Report button is clicked, the default browser of the PC opens. For this functionality, there must be an HTML browser properly installed on the PC.
- Data tables and lists support column resizing and rearranging. The user can resize columns by placing the cursor between column headings and dragging horizontally. The user can move entire columns by dragging on the column heading.
- Data tables and lists support sorting (ascending and descending) of rows based on the values in one of the columns. The user clicks on the header of the column whose values are to be used for the sort.



Appendix A: Using the CIT

Overview

Purpose

This section illustrates, through procedural exercises, the features and capabilities of Alcatel-Lucent LambdaXtreme® Transport CIT application software. The CIT provides the user with access to the command functions that are necessary to operate a newly installed NE and maintain the LambdaXtreme® Transport system. The procedures in this section should prove useful when training new personnel regarding user operations on the CIT. It is strongly recommended that such training only be run with a LambdaXtreme® Transport network or subnetwork that is out of service.

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Launch CIT Application

Purpose

Open the LambdaXtreme® Transport CIT application on the PC.

Procedure

- 1 At the Windows desktop, double-click on the LambdaXtreme® Transport CIT icon that was created when the LambdaXtreme® Transport CIT applications software was installed.

Result: The following legal notice is displayed (see [Figure A-1, “LambdaXtreme Transport CIT Legal Notice”](#) (p. A-5)):

Figure A-1 LambdaXtreme Transport CIT Legal Notice

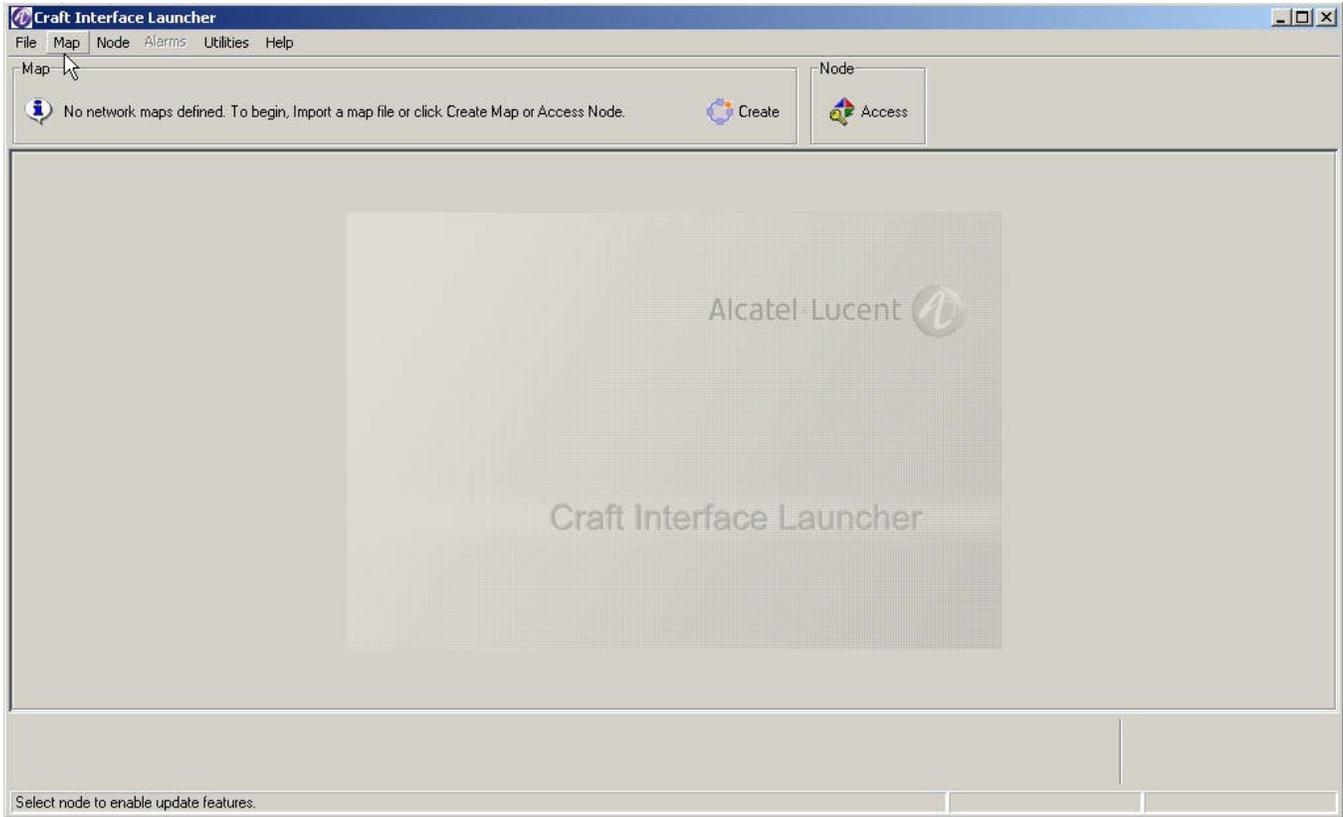


Note: The LambdaXtreme® Transport CIT application software no longer installs individual desktop shortcuts for specific products and releases. The shortcut executes the Launcher. The Launcher then searches the PC for Node Managers that are installed and presents those in the Launcher About box.

- 2 Read the legal notice and click **OK**.

Result: The Craft Interface Launcher window is displayed (Figure A-2, “Craft Interface Launcher Window” (p. A-6)):

Figure A-2 Craft Interface Launcher Window



END OF STEPS



Identify CIT Software Version

Purpose

Determine the version of the LambdaXtreme® Transport CIT software currently being used.

Procedure

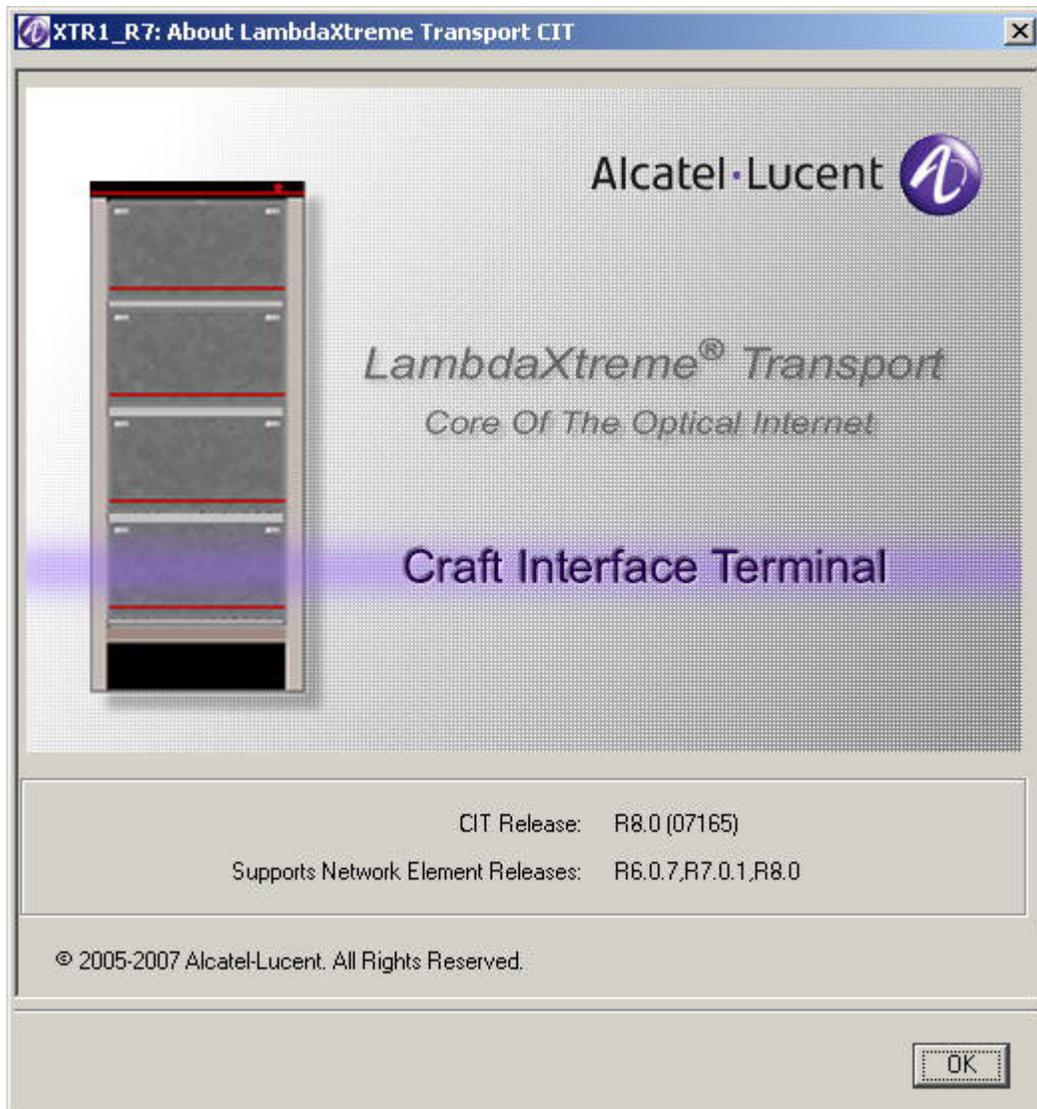
- 1 From the Craft Interface Launcher menu, select **Help > About LambdaXtreme Transport CIT**.

Note: When logged into an NE, this procedure can also be performed from the Node Manager menu, which results in [“Procedure”](#) (p. A-9).

Result: Figure A-3, “About Craft Interface Launcher Window” (p. A-8) is displayed with the CIT software release and build information:

Figure A-3 About Craft Interface Launcher Window





-
- 2 Click **OK** to close the window.

END OF STEPS



Install Initial NE Software

Purpose

Copy the NE software generic (executable code and data) from the CIT-PC to the FMM for use by the NE.

TL1 Commands

DWNLD-SW

Procedure

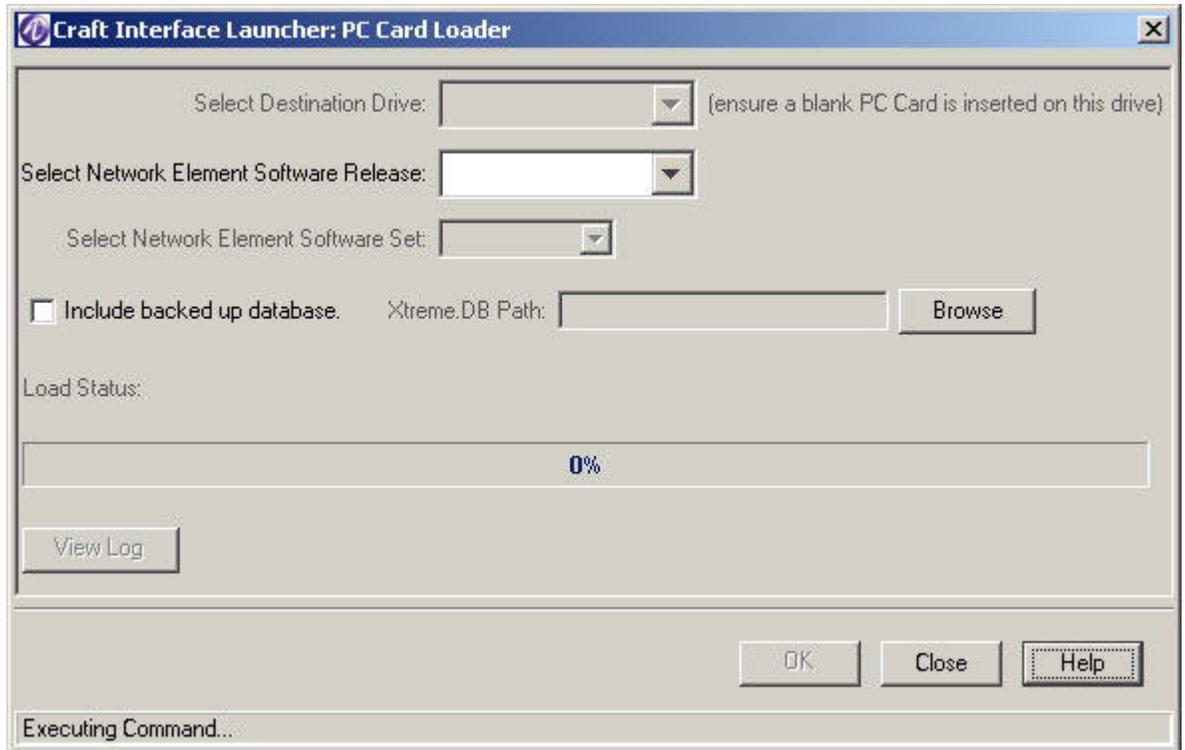
- 1 Insert the FMM into the PCMCIA slot on the CIT PC.

Important! See the *LambdaXtreme® Transport Software Release Description* for formatting information.

- 2 From the Craft Interface Launcher menu, select **Utilities > PC card loader...**

Result: The PC Card Loader window is displayed (see [Figure A-4, “PC Card Loader Window”](#) (p. A-11)).

Figure A-4 PC Card Loader Window



-
- 3 Make appropriate selections for Destination Drive and NE Software Release. You can also choose to install a backed-up database.
-
- 4 Click **OK**.

Result: The progress bar displays the progress of the Copy operation.
-
- 5 A message window informs you when the PC Card has been successfully loaded. Click **OK**.

-
- 6** Remove the FMM from the CIT PC. Insert the FMM into the slot on the NCTL and the software is automatically loaded on the NE.

END OF STEPS



Access Node

Purpose

Define access to a node. (This is necessary only if accessing the NE using the LAN/WAN).

TL1 Commands

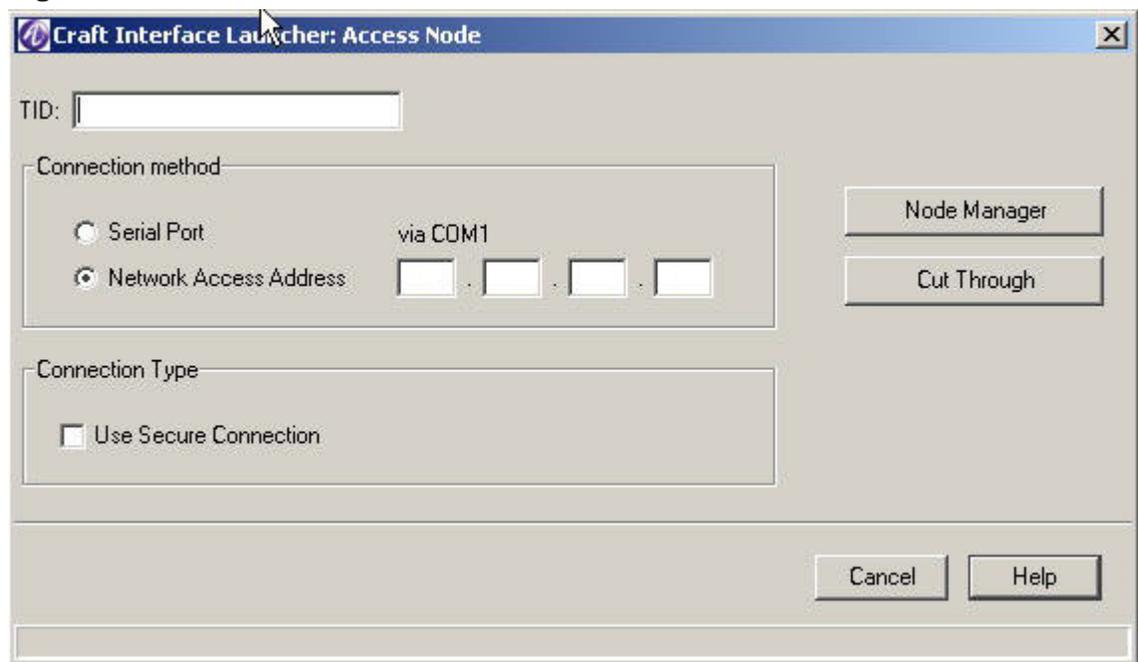
- ACT-USER
- RTRV-SYS

Procedure

- 1 From the Craft Interface Launcher menu, select **Node > Access...** or click **Node Access** in the Toolbar.

Result: The Access Node window is displayed (see [Figure A-5, “Access Node Window”](#) (p. A-13)).

Figure A-5 Access Node Window

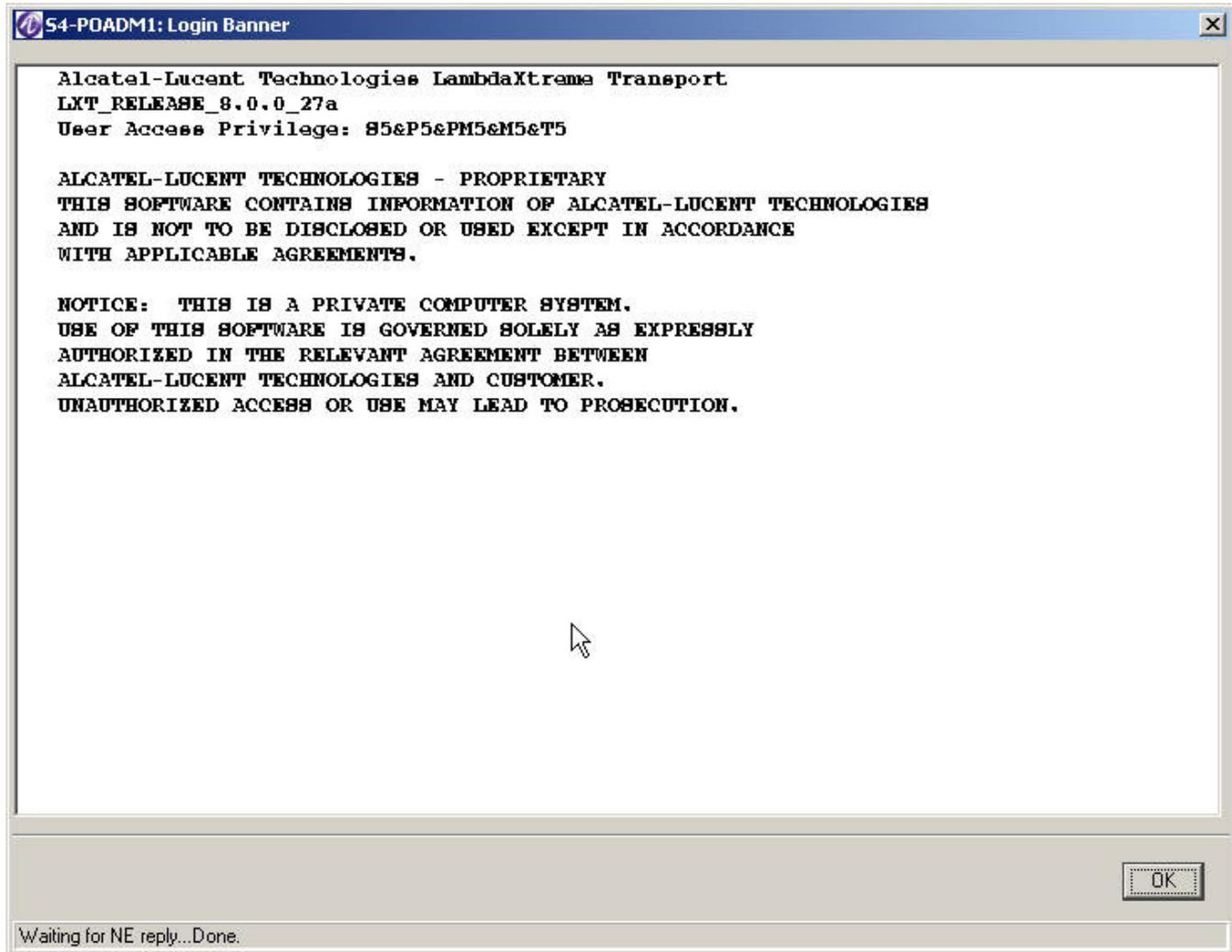


- 2 Enter the appropriate information in this window.

- 3 Click **Node Manager** to connect to the node (see “[Log Into Node](#)” (p. A-52)), or click **Cut Through** to start a Cut Through interface to the node (see “[Execute Commands Interactively Using TL1 Cut Through](#)” (p. A-42)).

The Login Banner appears (see [Figure A-6](#), “[Login Banner](#)” (p. A-14)).

Figure A-6 Login Banner



END OF STEPS



Disconnect Node

Purpose

Disconnect from a selected node(s) that the user is currently logged into.

Note: In addition to the following procedure, you can also disconnect from a node by right-clicking the NE in the Craft Interface Launcher Node Monitor, or by clicking **Log out** on the Node Manager toolbar.

Procedure

- 1 From the Craft Interface Launcher menu, select **Node > Disconnect**.

Result: The Disconnect Nodes window is displayed (see [Figure A-7, “Disconnect Nodes Window”](#) (p. A-15)).

Figure A-7 Disconnect Nodes Window



- 2 Select the node(s) to be disconnected. Click **OK**.

Result: The node is disconnected and the user is returned to the Craft Interface Launcher.

END OF STEPS



Assign/Unassign Gateway Nodes

Purpose

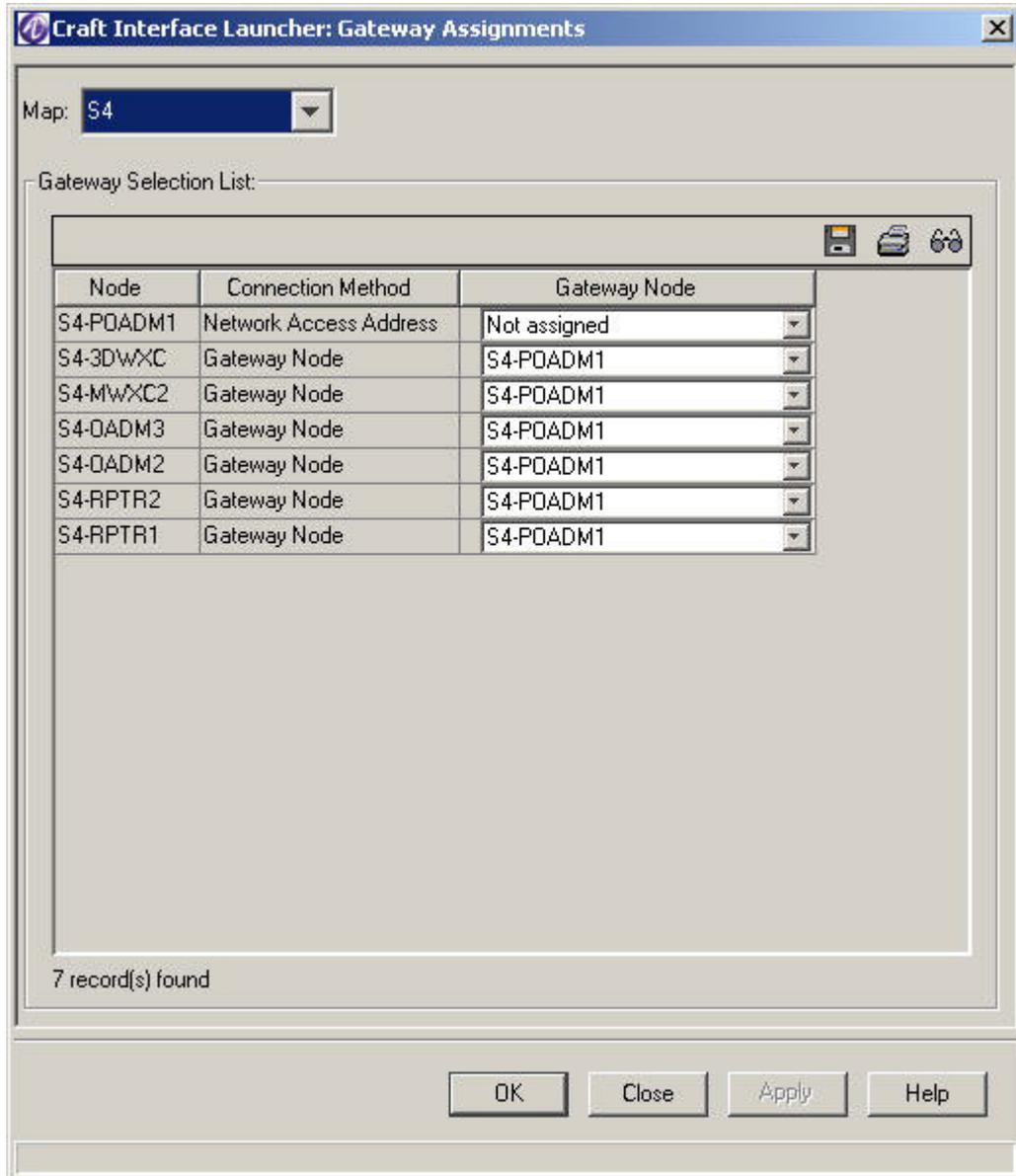
Define access to nodes that do not have an IP address and to which you are not currently connected. These nodes can only be accessed through a Gateway node.

Procedure

- 1 From the Craft Interface Launcher menu, select **Map > Gateway Assignments**.

Result: The Gateway Assignments window is displayed (see [Figure A-8, “Gateway Assignments Window”](#) (p. A-17)).

Figure A-8 Gateway Assignments Window



- 2 Select the Map to be provisioned.

Result: A list of the nodes in that map is shown.

Note: The table also indicates the Connection Method currently set for each particular node. These settings can be changed on the Node Properties window.

.....
3 Select the Gateway Node(s) from the drop down list(s).
.....

4 Click **OK** or **Apply** to have the assignments take effect.

.....
E N D O F S T E P S
.....



Create Network Map

Purpose

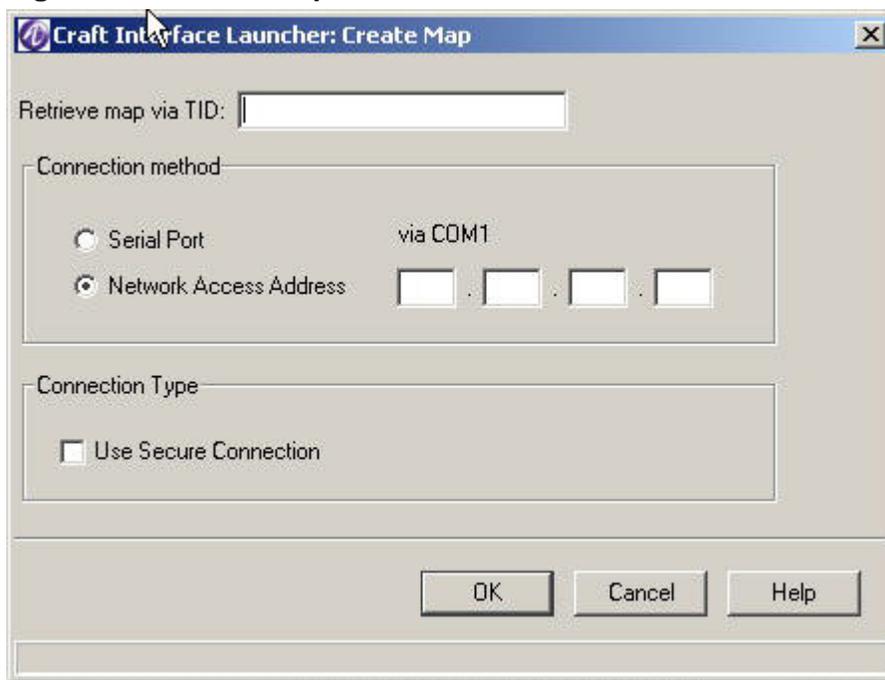
Display all NEs in the network map that contains the NE where the command is issued.

Procedure

- 1 In the Craft Interface Launcher, click **Create**. (You can also perform this step by selecting **Map > Create...** from the Craft Interface Launcher menu.)

Result: The Create Map window is displayed (see [Figure A-9, “Create Map Window”](#) (p. A-19)).

Figure A-9 Create Map Window



- 2 Enter TID and Network Access Address. Click **OK**.

Result: The Login window is displayed (see [Figure A-10, “Login Window”](#) (p. A-20)).

Figure A-10 Login Window



-
- 3 Enter User ID and Password. Click **OK**.

Result: The Create Map window is displayed (see [Figure A-11, “Create Map Window”](#) (p. A-20)).

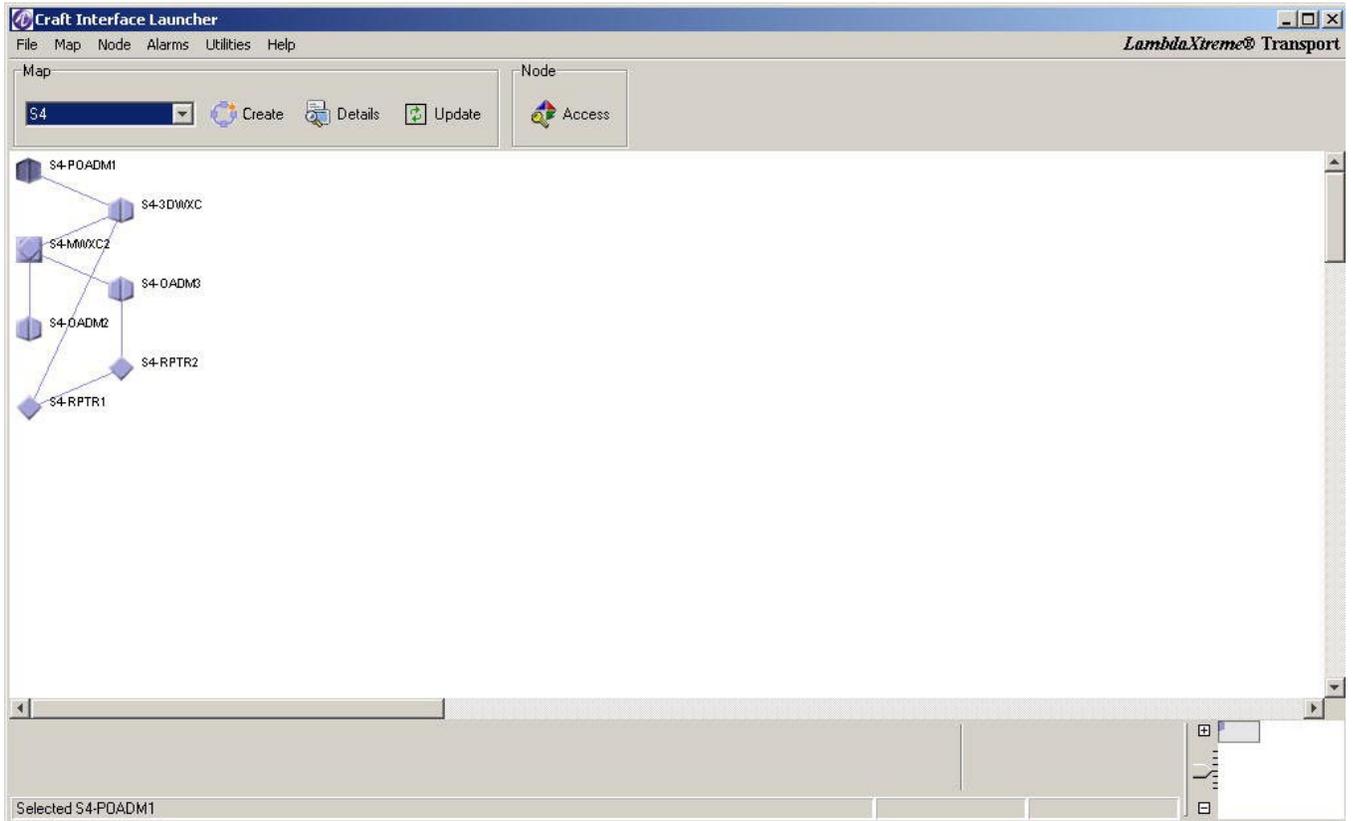
Figure A-11 Create Map Window



-
- 4 Enter the map name to be created. Click **OK**.

Result: The Create Network Map process is complete. You are returned to the Craft Interface Launcher, which displays the newly created map (see [Figure A-12, “New Network Map”](#) (p. A-21)). The selection is set to the value specified in the Create Network Map dialog.

Figure A-12 New Network Map

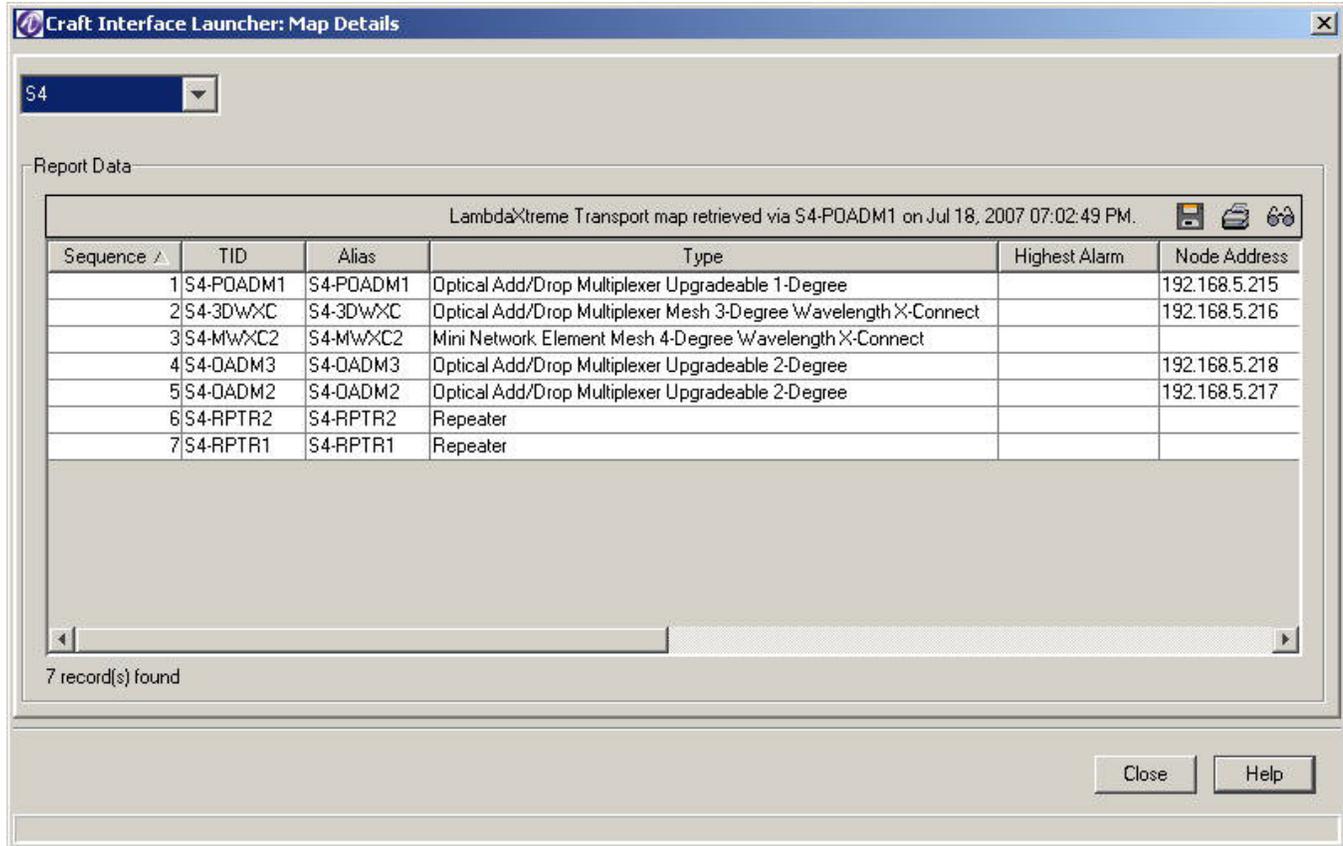


-
- 5 To view details of the selected network map, click **Details**.

Note: This can also be performed from the Craft Interface Launcher menu “[View Map Details](#)” (p. A-29) by selecting **Map > Details**.

Result: The Map Details window is displayed (see [Figure A-13, “Map Details Window”](#) (p. A-22)).

Figure A-13 Map Details Window



END OF STEPS



Update Network Map

Purpose

Update all NEs in the current network map.

Note: This function cannot be performed while Auto-Update is enabled (see [“Craft Interface Launcher Display”](#) (p. 8-5)).

Procedure

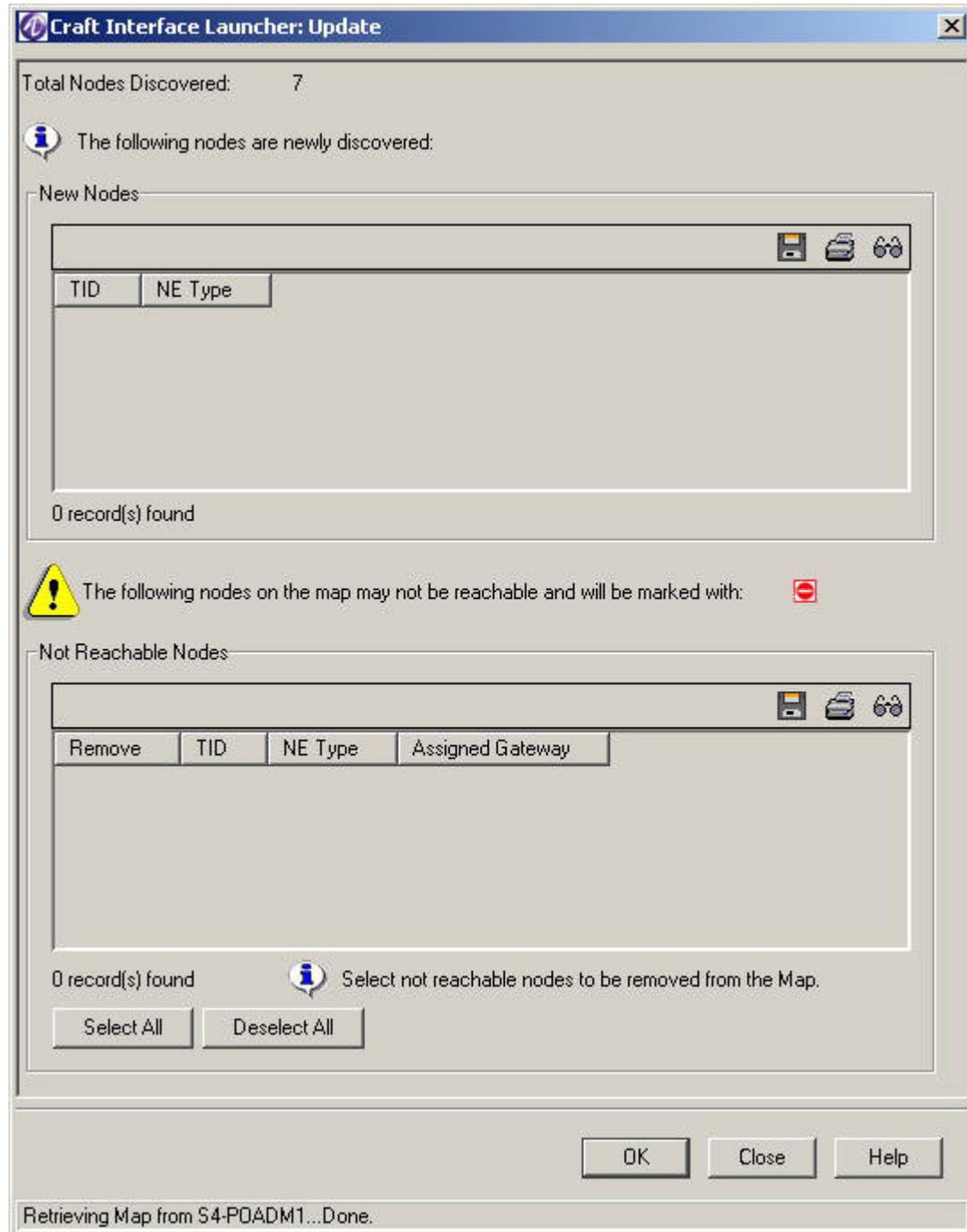
- 1 In the Craft Interface Launcher toolbar, click **Update** in the Map section. You can also perform this by selecting **Map > Update** from the Craft Interface Launcher menu.

Result: The Login window is displayed (see [Figure A-10, “Login Window”](#) (p. A-20)).

- 2 Enter User ID and Password. Click **OK**.

Result: The Update window is displayed (see [Figure A-14, “Update Window”](#) (p. A-24)).

Figure A-14 Update Window



-
- 3** The user has an option to select any unreachable nodes for removal from the Network Map. Click **OK**.

Result: The Update Network Map process is complete and you are returned to the Craft Interface Launcher which displays the updated map.

END OF STEPS



Set Craft Interface Launcher Preferences

Purpose

Use this procedure to specify how the CIT displays the network map in the Craft Interface Launcher.

TL1 Commands

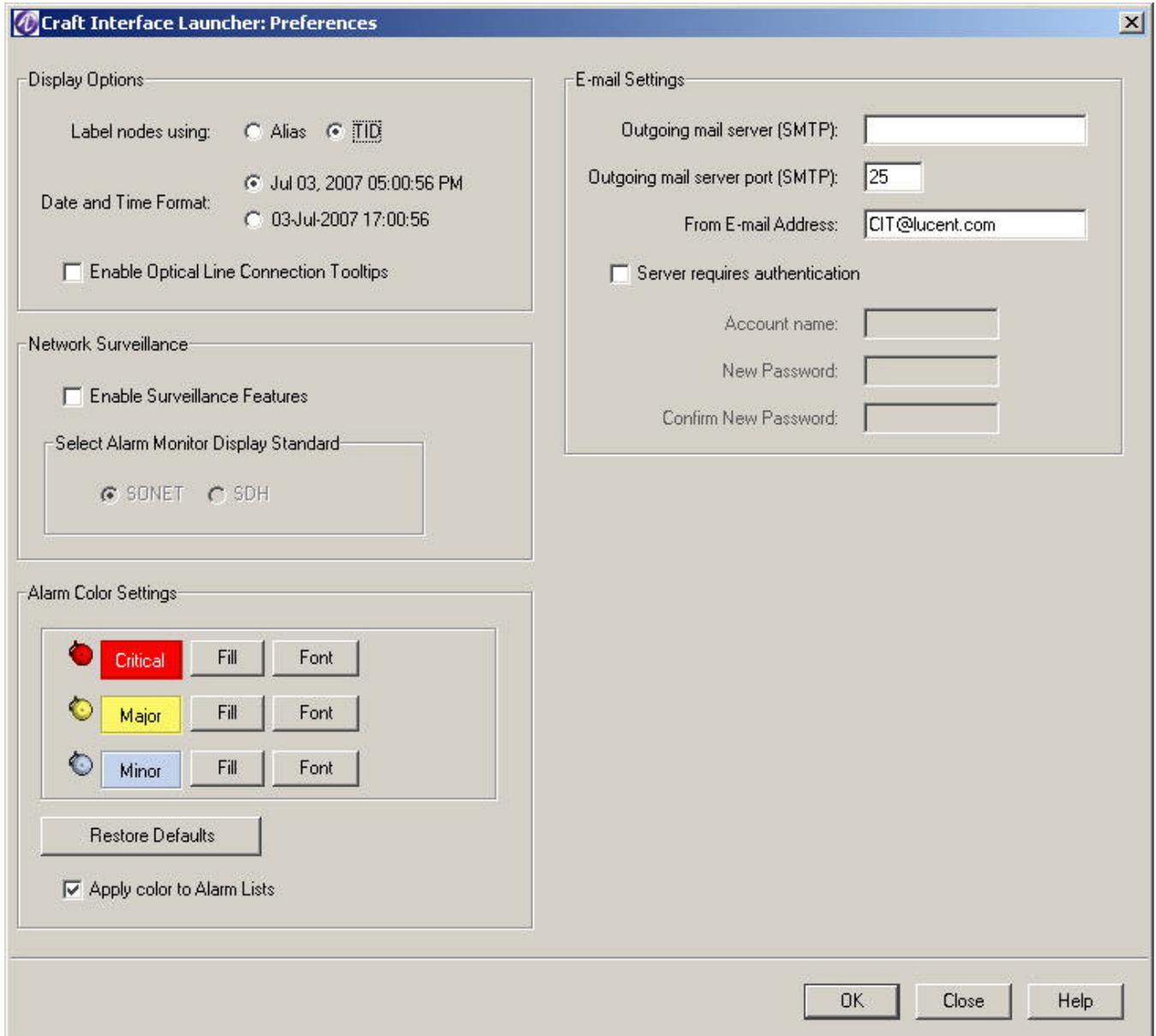
- ED-DAT
- RTRV-DAT

Procedure

- 1 From the Craft Interface Launcher menu, select **File > Preferences**.

Result: The Preferences window is displayed (see [Figure A-15, “Preferences Window”](#) (p. A-27))

Figure A-15 Preferences Window



Note: To define Aliases see [“View/Modify Node Properties”](#) (p. A-40).

- 2 Specify the Craft Interface Launcher preferences to be used.

.....
3 Click OK.

.....
E N D O F S T E P S
.....



View Map Details

Purpose

Display a report listing all NEs in the network map currently selected in Craft Interface Launcher.

TL1 Commands

- RTRV-AVAIL-NE
- RTRV-SYS

Procedure

- 1 From the Craft Interface Launcher menu, select **Map > Details** or click **Details** in the Map section of the toolbar.

Result: The Map Details window is displayed (see [Figure A-13, “Map Details Window”](#) (p. A-22)).

END OF STEPS



View/Edit Map Properties

Purpose

View or change properties for an existing network map.

TL1 Commands

- RTRV-AVAIL-NE
- RTRV-SYS

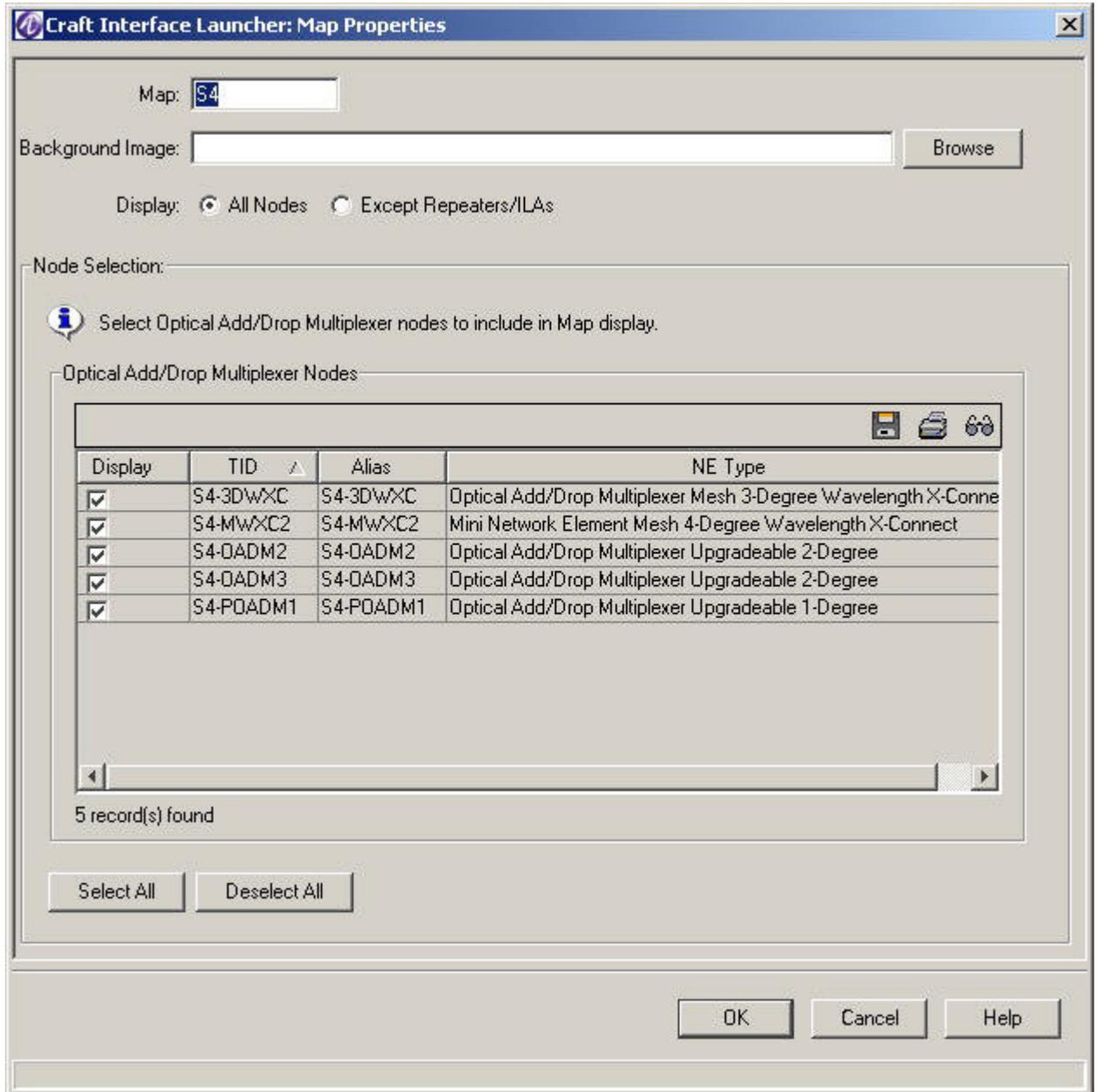
Procedure

- 1 Select the map from the **Map** field drop down list.

- 2 From the Craft Interface Launcher menu, select **Map > Properties**

Result: The Map Properties window is displayed (see [Figure A-16, “Map Properties Window”](#) (p. A-31)).

Figure A-16 Map Properties Window



- 3 Enter the new map properties.

.....
4 Click **OK**.

Result: The map properties are set to the new selections.

.....
E N D O F S T E P S
.....



Delete Map

Purpose

Delete an existing map that is no longer needed/applicable.

Note: This function cannot be performed while Auto-Update is enabled (see [“Craft Interface Launcher Display”](#) (p. 8-5)).

Procedure

- 1 Select the map to be deleted from the **Map** field drop down list.
-

- 2 From the Craft Interface Launcher menu, select **Map > Delete**.

Result: The following warning is displayed (see [Figure A-17, “Warning Confirmation Window”](#) (p. A-33)).

Figure A-17 Warning Confirmation Window



- 3 Click **Yes**.

Result: The specified map is deleted and the user is returned to the Craft Interface Launcher menu.

END OF STEPS



Export Map Information

Purpose

Save network map information that can then be read in using the “[Import Map Information](#)” (p. A-36) function.

Procedure

- 1 From the Craft Interface Launcher menu, select **Utilities > Export...**

Result: The Export Map window is displayed (see [Figure A-18, “Export Map Window”](#) (p. A-34)).

Figure A-18 Export Map Window



-
- 2 Select the map(s) to be exported and specify the **Export filename** to be used.
 - 3 Click **OK**.
-

Result: The file is saved to a predetermined directory (*lx_xportcit/workspace* on the same drive where the CIT is installed) using the specified filename. The information can then be read in using the “[Import Map Information](#)” (p. A-36) function. The file may be transferred to other CIT PCs as needed.

.....
E N D O F S T E P S



Import Map Information

Purpose

Import a file containing network map information. The file must have been created previously using the “[Export Map Information](#)” (p. A-34) function.

Note: The execution of the Import function will cause all existing information to be replaced.

Procedure

- 1 From the Craft Interface Launcher menu, select **Utilities > Import...**

Result: The Import window is displayed (see [Figure A-19, “Import Window”](#) (p. A-36)).

Figure A-19 Import Window



-
- 2 Select an existing file from the drop down list, then click **OK**.

Note: To import existing map preferences, check this box.

END OF STEPS



Node Search

Purpose

Search for a node(s) on all LANs that the CIT PC can access.

TL1 Commands

RTRV-AVAIL-NE

Procedure

- 1 From the Craft Interface Launcher menu, select **Node > Search...**

Result: The Node Search window is displayed (see [Figure A-20, “Node Search Window”](#) (p. A-38)).

Figure A-20 Node Search Window

The screenshot shows the 'Craft Interface Launcher: Node Search' dialog box. It is organized into several sections:

- Search Section:**
 - 'From IP Address:' followed by four input fields for octets.
 - 'To:' followed by four input fields for octets.
 - A 'Search' button.
- Search Options Section:**
 - Radio button for 'All nodes' (selected).
 - Radio button for 'Specific node with TID:' followed by a text input field.
 - 'Increase address by:' followed by a spinner control set to '1' and the text 'increment (1 - 20)'.
- Search Results Section:**
 - 'Nodes Found:' label above a table.
 - Table with columns: TID, IP Address, Product.
 - Text below table: '0 record(s) found'.
 - Buttons: 'Node Manager', 'Cut Through', 'Create Map'.
- Bottom Section:**
 - 'Cancel' and 'Help' buttons.

-
- 2 Enter the IP Address Range and Search Options. Click **Search**.

Result: The search results appear.

- 3 Click on the desired node in the Search Results list. Then click **Node Manager** to connect to the node (see [“Log Into Node”](#) (p. A-52)), or click **Create Map** to create the graphical map of the network that contains the node (see [“Create Network Map”](#) (p. A-19)), or click **Cut Through** to start a Cut Through interface to the node (see [“Execute Commands Interactively Using TL1 Cut Through”](#) (p. A-42)).

END OF STEPS



View/Modify Node Properties

Purpose

View/modify properties of existing nodes and to define new gateway nodes by specifying the values used to connect to the node (the connection method).

Important! Node properties cannot be modified (only viewed) while the map is being monitored by Auto-Update (see “[Craft Interface Launcher Display](#)” (p. 8-5)). In order to modify properties, the user must stop the Alarms Auto-Update monitor.

TL1 Commands

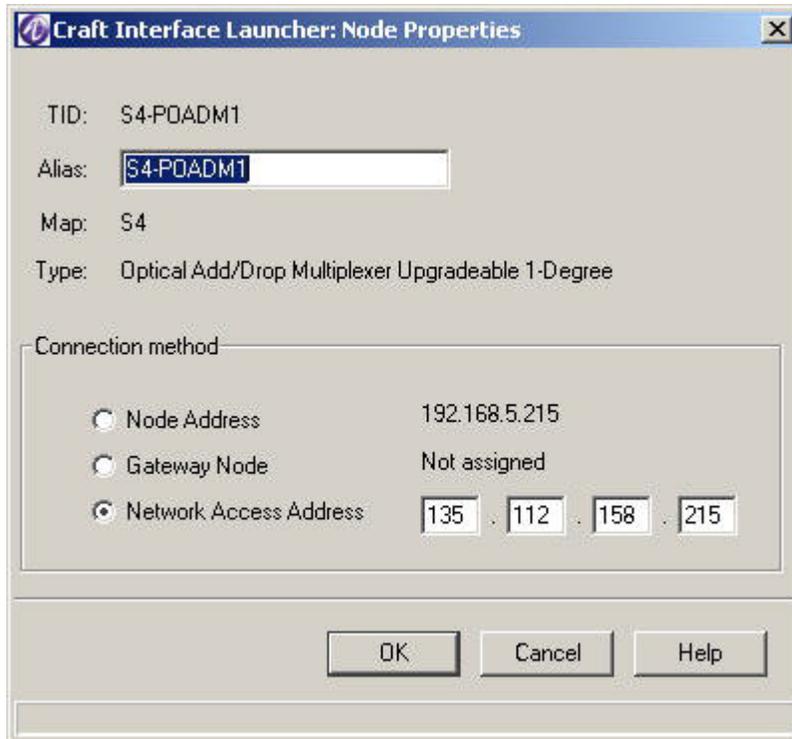
- RTRV-HDR
- RTRV-SYS

Procedure

- 1 From the Craft Interface Launcher, click on the desired node to select it. From the Craft Interface Launcher menu select **Node > Properties** or right-click on the desired node and select **Properties**.

Result: The Node Properties window is displayed (see [Figure A-21, “Node Properties Window”](#) (p. A-41)):

Figure A-21 Node Properties Window



-
- 2 After information has been entered or viewed, click on **OK** to apply changes and return to the Craft Interface Launcher.

END OF STEPS



Execute Commands Interactively Using TL1 Cut Through

Purpose

Execute a TL1 command on an interactive basis directly to the NE.

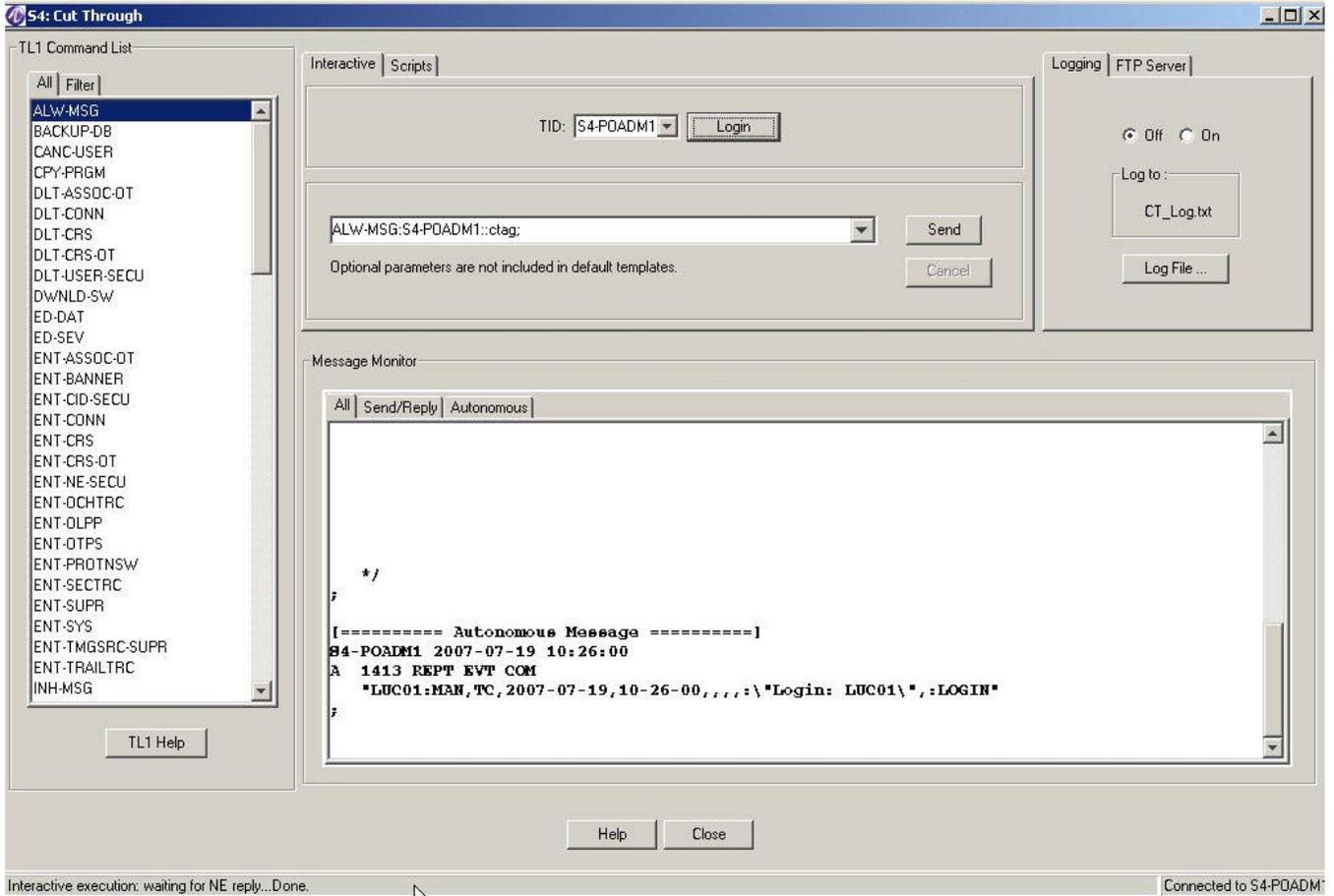
Important! When using Cut through, the semicolon character is not supported as data because it has special meaning to the TL1 commands. Therefore, semicolons cannot be used in any command sent through the Cut through interface except for the semicolon at the end of the TL1 command.

Procedure

- 1 In the Craft Interface Launcher, click the desired node to select it. From the menu select **Node > Cut Through** or right-click on the node icon and select **Cut Through**.

Result: The Cut Through window is displayed (see [Figure A-22, “Cut Through Window”](#) (p. A-43)).

Figure A-22 Cut Through Window



- From the Cut Through window, select the desired **TID** from the drop down list and click (highlight) the appropriate selections. Be sure that the **Interactive** tab (not the **Scripts** tab) is selected.

Important! Clicking **Login** displays a window with User ID and Password fields. When this information is entered, the **act-user** TL1 command is executed.

- Click on the desired command from the TL1 Command List.

Result: The TL1 template for the selected command is displayed. Insert your desired parameters into the template. TL1 syntax and guidance are obtained by clicking **TL1 Help**.

The two button tabs (All, Filter) located at the top of the TL1 Command List panel can be used to modify the list. The purpose of these are as follows:

- **All** – This shows all of the TL1 commands available for selection.
- **Filter** – This allows the user to filter the list by checking or unchecking the desired boxes. The Filter field can also be used to enter a command or part of a command to filter the list.

4 Click **Send**.

Result: When the command is executed, the command information is displayed in the Message Monitor.

Other available features in this window include:

- Information can be recorded in a Log File by clicking the “On” box under Logging. The Log File is set or viewed by clicking **Log File....**
- **Sent/Reply, Autonomous, or All** messages can be selected for display in the Message Monitor by clicking the desired tab above the Message Monitor (see [Figure A-23, “Cut Through Window \(All TL1 Messages\)”](#) (p. A-45)).
- The FTP server supports secure file transfer over SSH for software download, backup database, and restore database operations. This feature can be configured (that is, started and stopped) by using the ENT-CID-SECU TL1 command or the CIT Cut through interface. When configuring FTP server support on the CIT Cut through interface, click the **FTP Server** tab, and then click **Start** or **Stop**. To view Server information, click **Info**.

When the **FTP Server** tab is selected in the Cut Through window, the following window (see [Figure A-24, “Cut Through Window \(FTP Server\)”](#) (p. A-46)).

Figure A-23 Cut Through Window (All TL1 Messages)

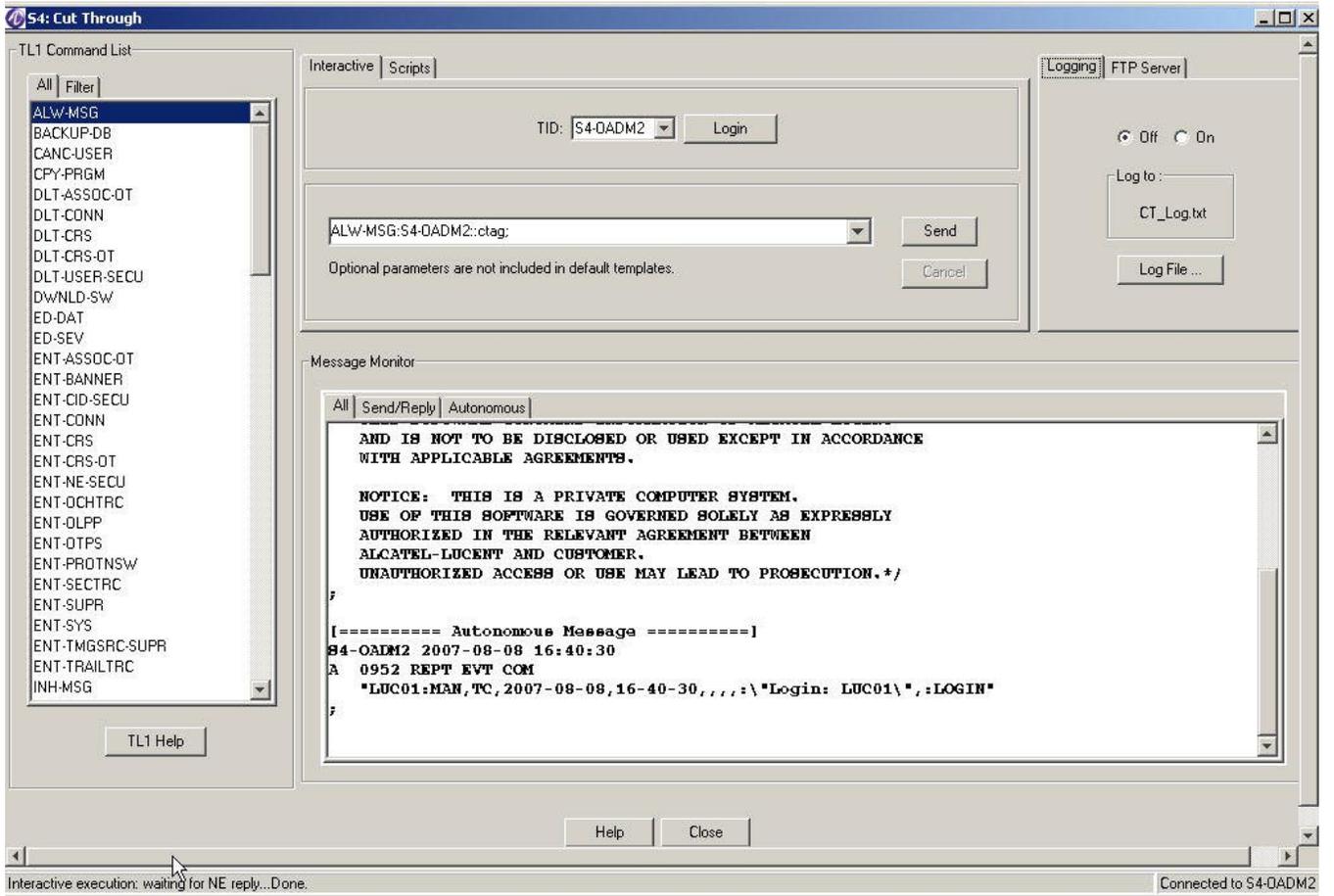
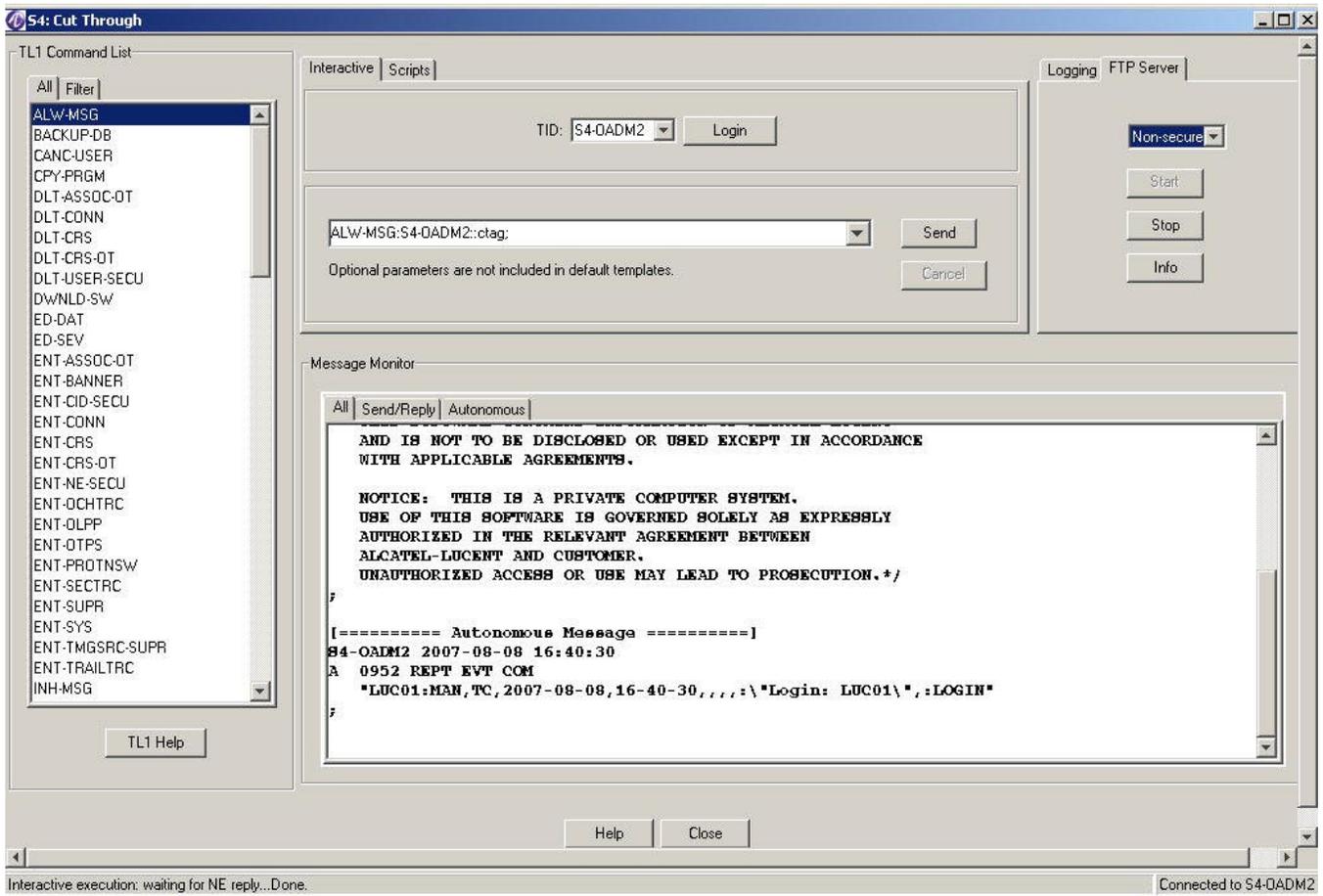


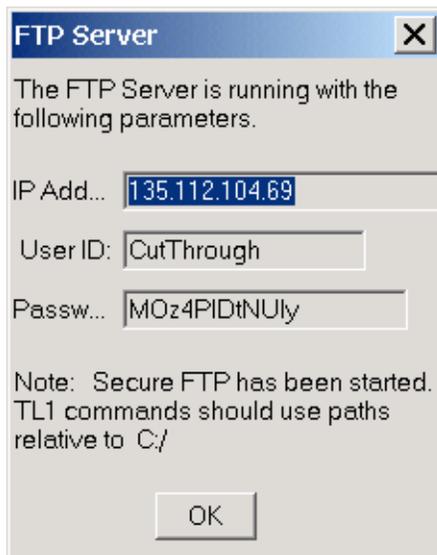
Figure A-24 Cut Through Window (FTP Server)



If you click **Start** in Non-secure mode, the FTP Server window is displayed as follows (see [Figure A-25, “FTP Server Window \(Non-Secure Mode\)”](#) (p. A-47)).

Figure A-25 FTP Server Window (Non-Secure Mode)

If you click **Start** in Secure mode, the following window is displayed (see [Figure A-26, “FTP Server Window \(Secure Mode\)”](#) (p. A-47)).

Figure A-26 FTP Server Window (Secure Mode)

The CIT user should be aware of the following:

- The SSH file transfer protocol (sftp) can only be run if the GNE is running Release 6.0 or later and ENCRYPTION is enabled. The maximum number of concurrent sftp operations is restricted to six.
- If the GNE is running a release prior to Release 6.0 and ENCRYPTION is enabled, the Override automatic security option must be selected for the FTP Server.

- When the GNE has ENCRYPTION enabled, do not include the drive letter in the PATHNAME of the TL1 command. The drive letter will be assigned by sftp according to where it is installed. If the drive letter is included in the PATHNAME, the command will fail with a communication error.
- CIT ftp operations will fail if the user's PC has a firewall enabled unless the necessary program or ports are allowed by firewall exceptions.

.....

5 To close the Cut Through window, click on **Close**.

.....

END OF STEPS

.....



Run Scripts Using TL1 Cut Through

Purpose

Script any number of TL1 commands in a single file and batch execute them all one after the other. This is useful for provisioning large numbers of parameters at one time.

Important! When a new release of LambdaXtreme® is installed, the user must copy any existing scripts from the previous release into the new release (CIT script folder) in order to continue using them.

Procedure

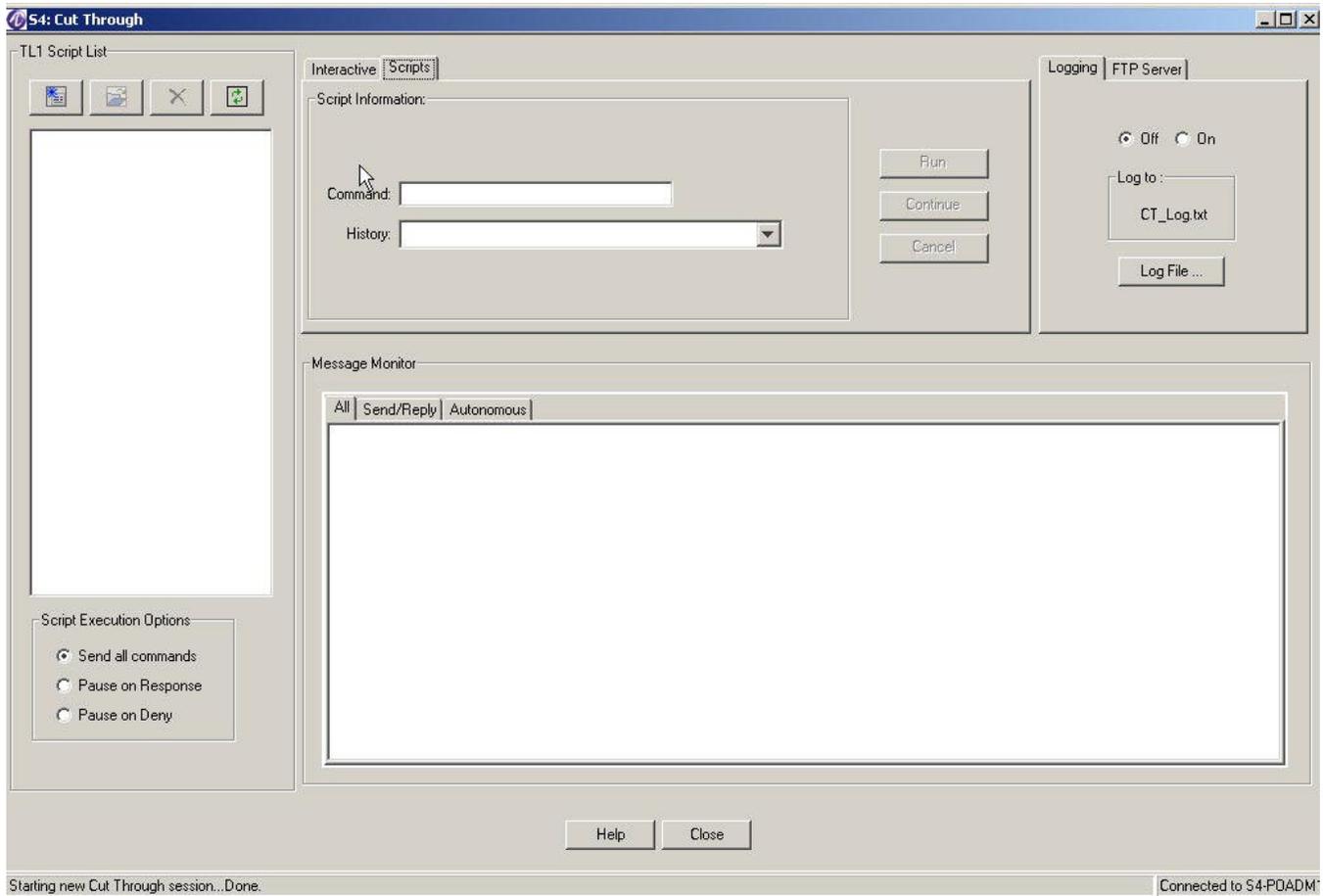
- 1 In the Craft Interface Launcher, click the desired node to select it. From the menu select **Node > Cut Through** or right-click on the node icon and select **Cut Through**.

Result: The Cut Through window is displayed.

- 2 Click on the **Scripts** tab.

Result: The Cut Through window is displayed in scripting mode (see [Figure A-27](#), “Cut Through Window (Scripting Mode)” (p. A-50)).

Figure A-27 Cut Through Window (Scripting Mode)



-
- 3** Create a new script, which can then be executed, or select the desired script from the TL1 script list.
-

- 4** Click **Run**.

Result: The execution of the commands is displayed in the Message Monitor as the script is run.

The four icons located at the top of the TL1 Script List panel are used as follows:

- **Left icon (New)** – Click this to create a new script (a Notepad window opens).
- **Second to left icon (Open)** – Click this to open the selected (highlighted) script from the list (a Notepad window opens).

- **Second to right icon (Delete)** – Click this to remove selected (highlighted) script files that are not needed.
- **Right icon (Refresh)** – Click this to refresh the list after a new script has been created.

The user can select **Send All, Pause after each command, or Pause after Deny response** during command execution.

- 5 To close the Cut Through window, click **Close**.

A warning window appears (see [Figure A-28, “Close Cut Through Session Confirmation Window”](#) (p. A-51)).

Figure A-28 Close Cut Through Session Confirmation Window



END OF STEPS



Log Into Node

Purpose

Log in to a node to perform network management functions on the NE.

Procedure

- 1 First, ensure that an access method is defined (see [“Assign/Unassign Gateway Nodes”](#) (p. A-16)). In the Craft Interface Launcher, select the desired node by clicking on its icon. Click **Access**. (You can also login by selecting **Node > Access...** from the Craft Interface Launcher menu, or by double-clicking or right-clicking on the node icon.)

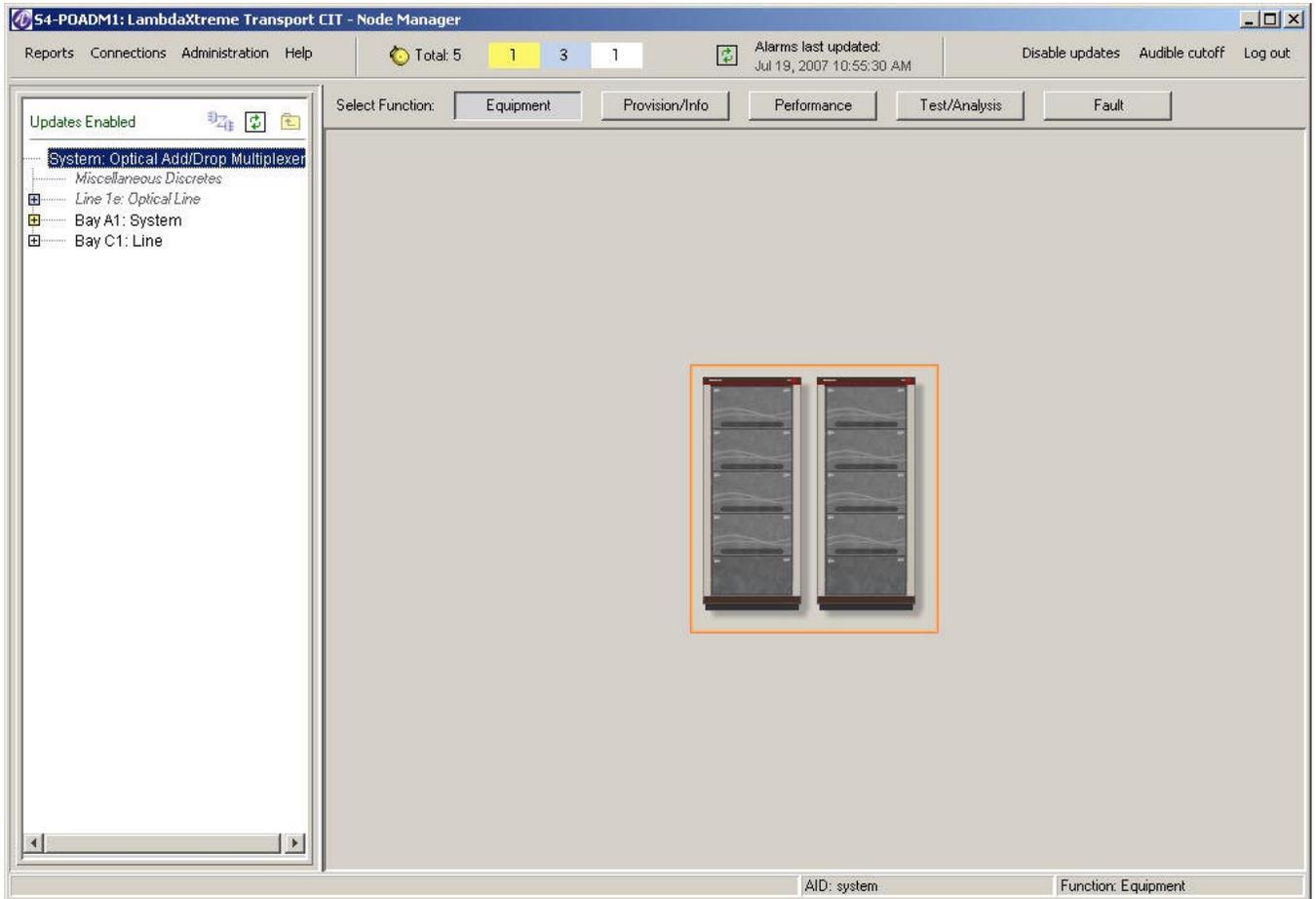
Result: The Login window is displayed (see [Figure A-10, “Login Window”](#) (p. A-20)).

- 2 Enter **User ID** and **Password** information (this is case sensitive). Click on **OK**.

Note: If **Save User ID and Password** is checked, the User ID and Password are retained (only during this session of the Craft Interface Launcher) for subsequent NE logins.

Result: The Node Manager window is displayed (see [Figure A-29, “Node Manager Window”](#) (p. A-53)).

Figure A-29 Node Manager Window



END OF STEPS



Refresh Alarms

Purpose

To update the Node Manager Alarm Toolbar.

Procedure

- 1 In the Node Manager, select the **Refresh alarms** icon in the toolbar.

Result: The alarm toolbar is reinitialized.

END OF STEPS



Auto Update Messages

Purpose

To allow/disallow the reporting of autonomous messages.

Important! The setting is on a per-login basis and works like a toggle switch.

TL1 Commands

- ALW-MSG
- INH-MSG

Procedure

- 1 The system default allows the reporting of autonomous messages. To disallow reporting of these messages, click **Disable updates** located in the Toolbar. Clicking it again will allow reporting of autonomous messages. The current state of this option is displayed in the Equipment Tree panel.

Important! Every time the user logs into the Node Manager, Autonomous Messages are automatically set to Enable.

END OF STEPS



Cut Off Audible Alarms

Purpose

To turn off (silence) existing alarm sounds.

TL1 Command

OPR-ACO-ALL

Procedure

- 1 From the Node Manager, click **Audible cutoff** in the toolbar (see [Figure A-30](#), “Audible Cutoff Button” (p. A-56)).

Figure A-30 Audible Cutoff Button



Result: Existing audible alarms are silenced.

END OF STEPS



View New Connection Events

Purpose

To view new connection event(s).

Note: A visual indication blinks in the Equipment Tree panel when a new connection event occurs and a message is displayed. This is reset when the user clicks on the icon.

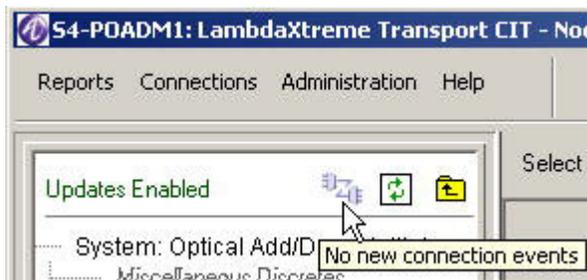
TL1 Command

RTRV-CRS-OT

Procedure

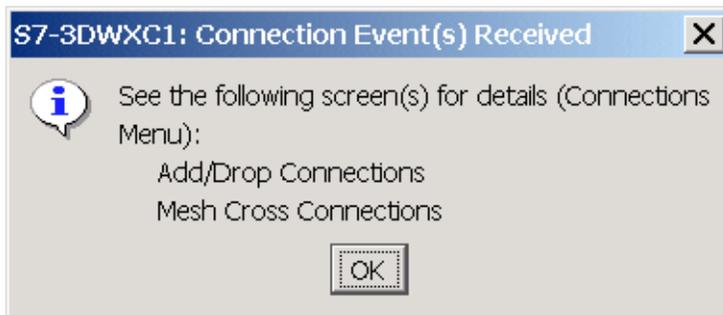
- 1 To view new connection events, click on the Connection Events icon in the Equipment Tree panel (see [Figure A-31, “Connection Events Icon”](#) (p. A-57)).

Figure A-31 Connection Events Icon



Result: The Connection Events Received window is displayed (see [Figure A-32, “Connection Events Received Window”](#) (p. A-57)).

Figure A-32 Connection Events Received Window



2 Click **OK**.

Result: The Connection Events indicator is reset and the new connection can be viewed from the Connections menu.

END OF STEPS



Refresh Alarms and Equipment

Purpose

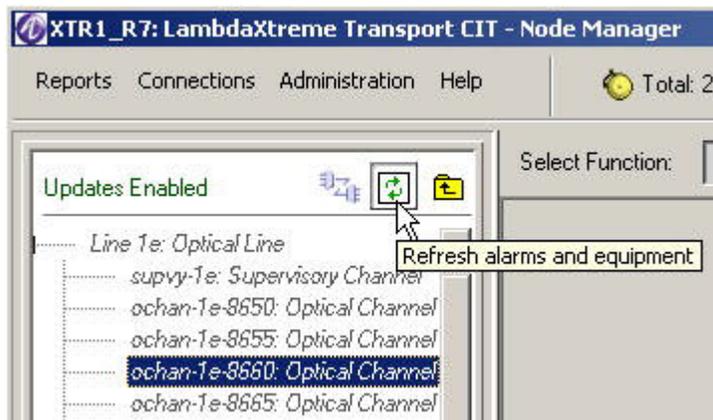
To update the Node Manager Equipment Tree and alarm information.

Important! The Equipment Tree is never updated automatically when NE equipment changes. The user must operate this function to refresh the tree manually. A visual indication blinks in the Equipment Tree panel when equipment is added or removed from the NE and a message is displayed. This is reset when the user refreshes the equipment.

Procedure

- 1 To refresh the equipment and alarm information in the Node Manager window, click on the **Refresh alarms and equipment** icon in the Equipment Tree panel (see [Figure A-33, “Refresh Alarms and Equipment Button”](#) (p. A-59)).

Figure A-33 Refresh Alarms and Equipment Button



Result: The equipment tree and alarms are updated and any new equipment is added.

END OF STEPS



View Alarm List Report

Purpose

To display a report listing the active alarms retrieved from the NE.

TL1 Commands

- REPT-ALM
- RTRV-ALM-ALL
- RTRV-COND
- RTRV-COND-ALL

Procedure

- 1 From the Node Manager, click on **Reports > Alarm/Message List > [Selection]**. You can also view the alarm list by clicking on **Total:** in the Alarms section of the toolbar.

Result: The Alarm List window displays information for the selected category (see [Figure A-34, “Alarm List Window”](#) (p. A-60)).

Figure A-34 Alarm List Window

Report Data

Jul 19, 2007 01:22:47 PM

Level	Category	AID	Occurred On	Description	Type	Service Affectir
Minor	OTPS	port-a1-3-8-in_wxyz	Jul 19, 2007 12:58:53 PM	Line side WaveWrapper-OTUk LOS failure	FAIL	Yes
Major	Equipment	port-a1-2-16-in_mux	Jul 18, 2007 02:05:13 PM	OMS LOS: add 100GHz at OM (0GHz)/150G at...	CTNEQPT	Yes
Minor	OTPS	port-a1-3-12-in_trib4	Jul 18, 2007 10:07:54 AM	Add side OC-192/STM-64/OTU2 LOS failure	FAIL	Yes
Minor	Equipment	port-a1-3-12-plug1	Jul 18, 2007 10:07:53 AM	Incompatible Pluggable Module Inserted in OT	FAIL	No

4 record(s) found

New alarms and messages will be inserted at the top of the report as they occur.

Close Help

-
- 2** The Report Filters section of the window summarizes the total number of alarms retrieved and the total number of informational messages. Each report is launched with a default set of filters. The filters may be changed by clicking the appropriate filter box (**Critical, Major, Minor**). To display the informational messages, click the **Messages** box.

END OF STEPS



View Neighbors Report

Purpose

To display a report listing all neighboring NEs that are connected to this NE.

TL1 Command

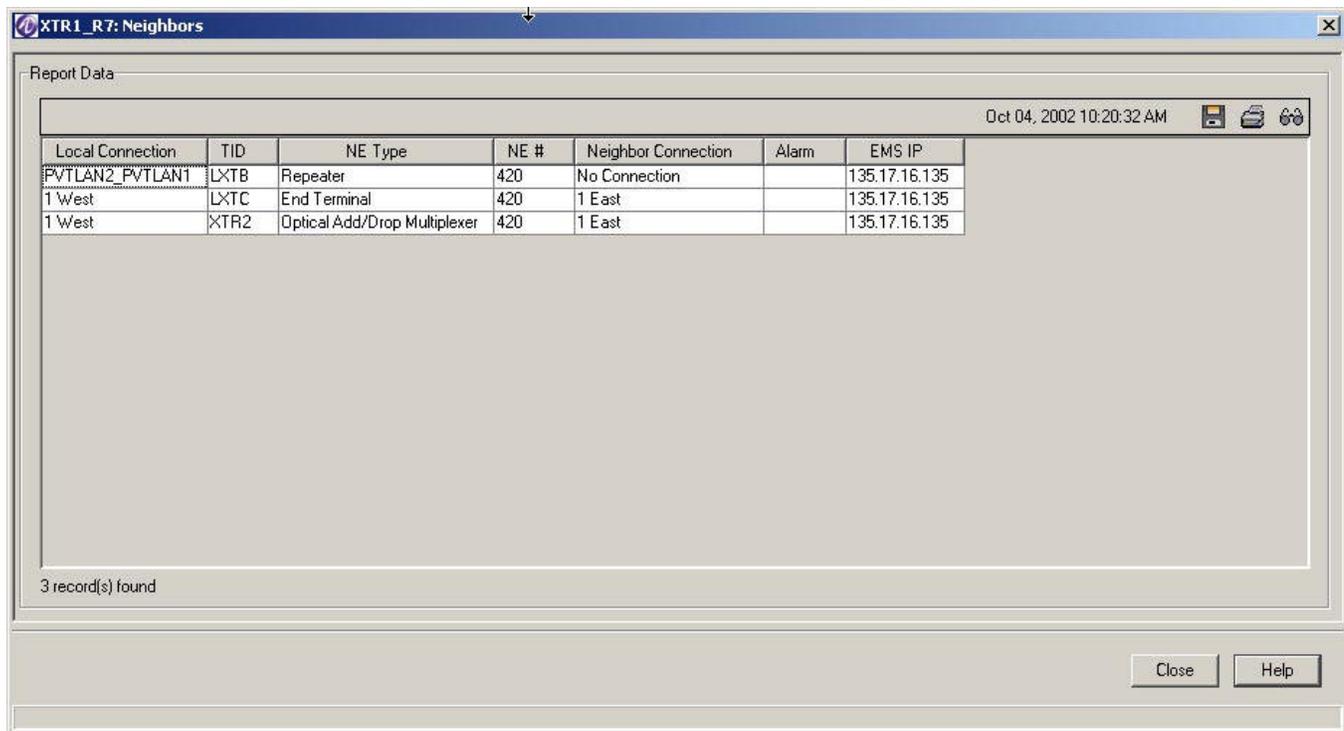
RTRV-MAP-NEIGHBOR

Procedure

- 1 From the Node Manager menu, select **Reports > Neighbors**.

Result: The Neighbors window is displayed with report data (see [Figure A-35](#), “Neighbors Window” (p. A-62)).

Figure A-35 Neighbors Window



END OF STEPS



View Event History Report

Purpose

To display the contents of the Event History log for the NE.

TL1 Commands

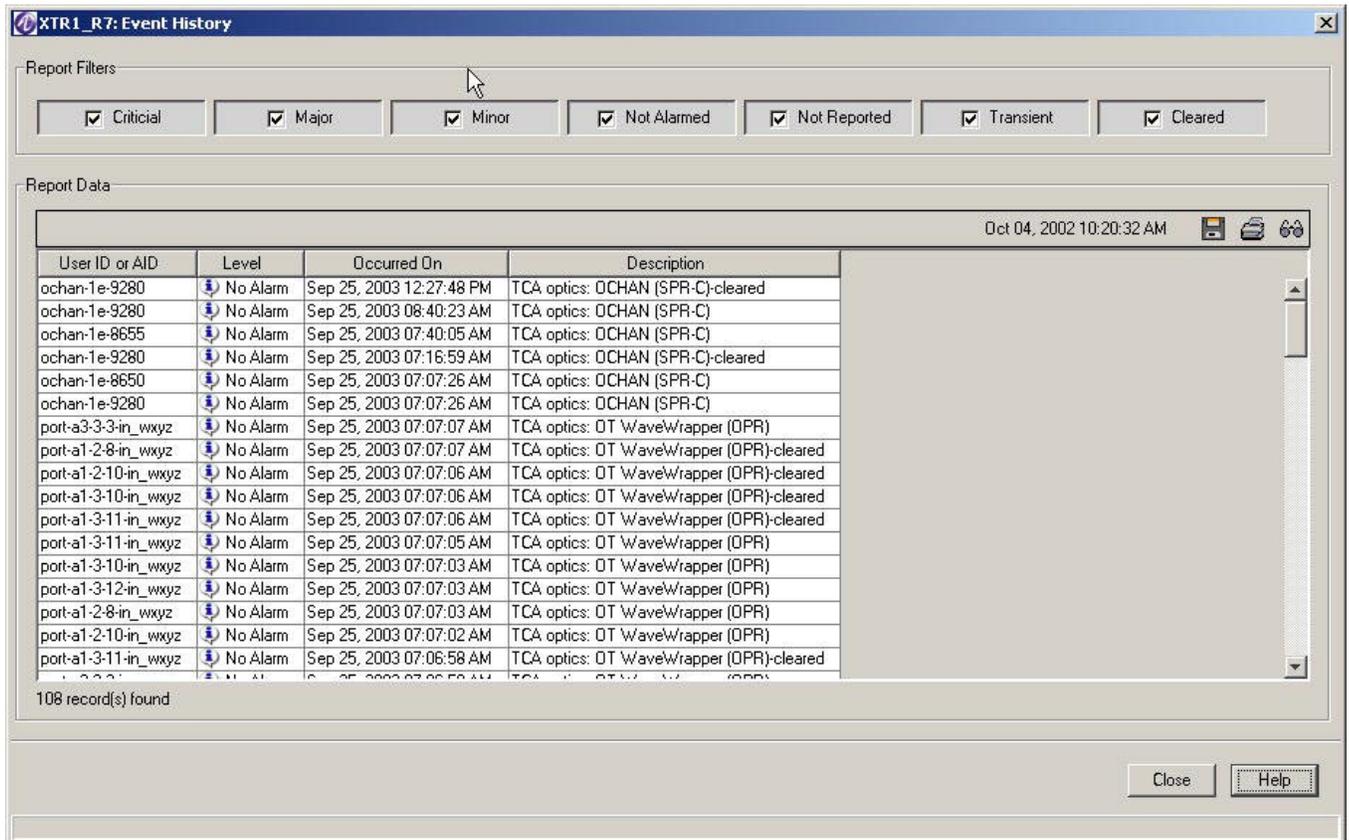
- RTRV-LOG
- REPT-EVT
- RTRV-AO

Procedure

- 1 From the Node Manager menu, select **Reports > Event History**.

Result: The Event History window is displayed with the report data (see [Figure A-36, “Event History Window”](#) (p. A-63)).

Figure A-36 Event History Window



Note: When first launched, all available events are displayed. However, the user can suppress particular event levels by deselecting one or more of the Report Filters checkboxes. All Cleared events are displayed whenever the associated checkbox is selected, regardless of alarm severities chosen.

.....
E N D O F S T E P S



View Security History Report

Purpose

To display the contents of the Security History log for the NE.

TL1 Command

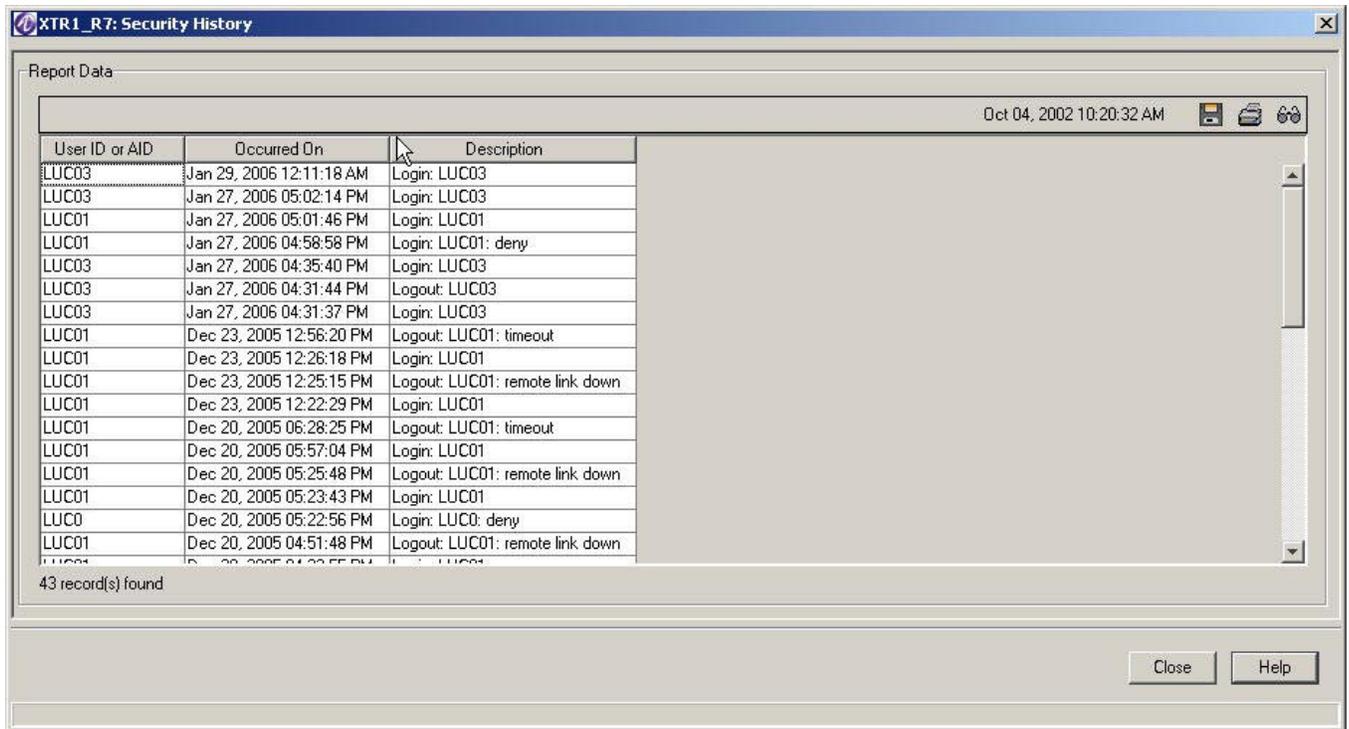
RTRV-LOG-SECU

Procedure

- 1 From the Node Manager menu, select **Reports > Security History**.

Result: The Security History window displaying the report data is displayed (see [Figure A-37, “Security History Window”](#) (p. A-65)).

Figure A-37 Security History Window



END OF STEPS



View Channel Map Report

Purpose

To display a report listing all optical channels that are being used at the current NE or all NEs in the network.

TL1 Command

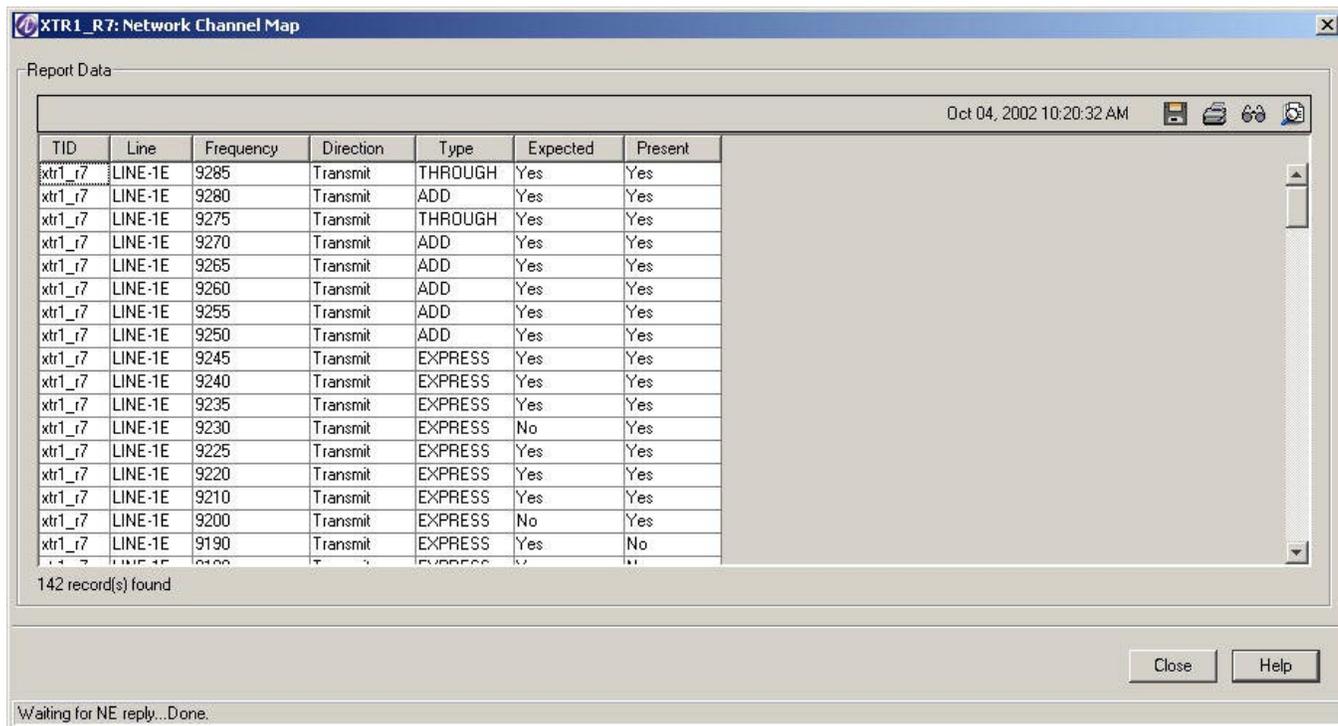
RTRV-OCHAN-MAP

Procedure

- 1 From the Node Manager menu, select **Reports > Channel Map > This Network Element** or **This Optical Network**.

Result: The Network Channel Map window is displayed (see [Figure A-38](#), “Network Channel Map Window” (p. A-66)).

Figure A-38 Network Channel Map Window



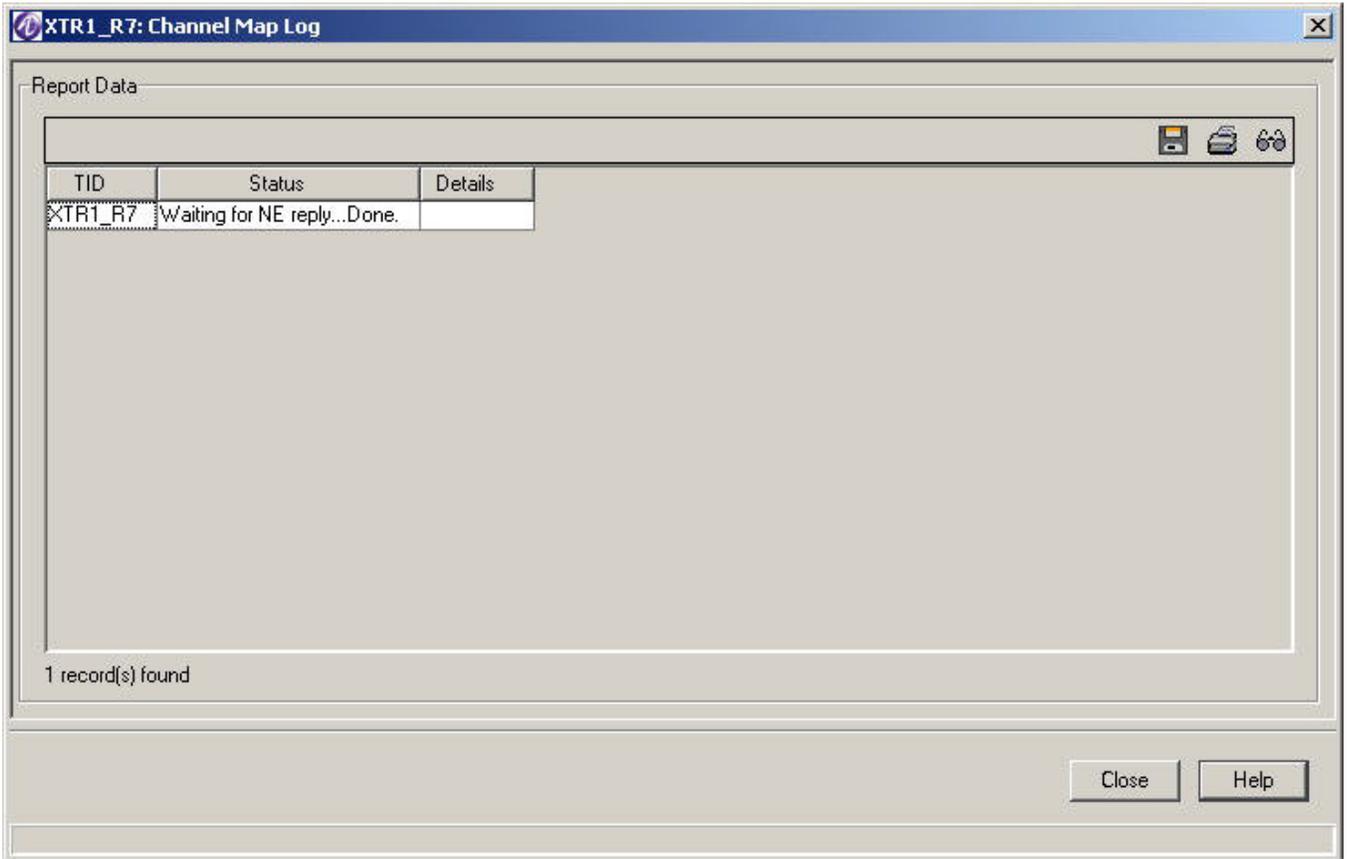
- 2 To view any possible errors encountered during data collection, click **View Log** (see [Figure A-39, “View Log Button”](#) (p. A-67)).

Figure A-39 View Log Button



Result: The Channel Map Log window is displayed (see [Figure A-40, “Channel Map Log Window”](#) (p. A-67)).

Figure A-40 Channel Map Log Window



END OF STEPS



View Circuit Pack Inventory Report

Purpose

To generate a report that contains circuit pack inventory information from the NE(s).

TL1 Commands

- RTRV-EQPT
- RTRV-COMP-INV

Procedure

- 1 From the Node Manager menu, select **Reports > Circuit Pack Inventory>This Network Element** or **This Optical Network**.

Result: The Circuit Pack Inventory window displaying the report data is displayed (see [Figure A-41, “Circuit Pack Inventory Window”](#) (p. A-68)).

Figure A-41 Circuit Pack Inventory Window

Report Data

Jul 19, 2007 11:54:10 AM

TID	AID	Circuit Pack Type	Apparatus Code	Series #	CLEI	Catalog Item	Serial #	Cc
S4-POADM1	SLOT-A1-1-1	XIO	WWAD35	S1-1	WM7C405BAA	112324	WECO03-F606493260	
S4-POADM1	SLOT-A1-1-2	OMON (8 PORT)	WWAD06B	S1-1	WMEFHJKDAA	126413	01MV07438019	OS
S4-POADM1	SLOT-A1-1-6	OA (OADM LineIn rp2 dsp)	WWAA32	S1-2	WMAPNNRAAB	117688	WECO03-MV11153462	
S4-POADM1	SLOT-A1-1-10	RP (DCF rp2 dsp)	WWAF33	S1-1	WMAFWRRAAA	111892	WECO03-MV01152135	
S4-POADM1	SLOT-A1-1-14	RP (rp2 dsp)	WWAF31	S1-2	WMAFMNPAAB	117703	WECO03-MV08153276	
S4-POADM1	SLOT-A1-1-15	SCTL	WWAD03	S0-0	0000000000	290832	WECO02-Y606511009	
S4-POADM1	SLOT-A1-1-16A	PWR	WWAD07	S1-1A			WECO02-8N04000120	
S4-POADM1	SLOT-A1-1-16B	CID	WWAD01	S1-1	WM3CY0HBAA	291340	WECO02-R325036539	
S4-POADM1	SLOT-A1-1-16C	PWR	WWAD07	S1-1A			WECO02-8N04000104	
S4-POADM1	SLOT-A1-2-4	OD (MOADM 0GHz Offset)	WWAB21D	S1-1	WMA4EE6CAA	109894	WECO03-MV06152536	
S4-POADM1	SLOT-A1-2-8	DA (OADM LineOut rp2 dsp)	WWAA33	S1-2	WMAAPPNPAAB	117689	WECO03-MV07152895-A	
S4-POADM1	SLOT-A1-2-12	DA (OADM A/D dsp)	WWAG31	S1-1	WMANBDBBAA	112320	WECO03-MV07152710-A	
S4-POADM1	SLOT-A1-2-16	OM (MOADM 0GHz Offset)	WWAC31B	S0-2	WWAC31BAAB	725311	WECO04-MV04154093	
S4-POADM1	SLOT-A1-3-3	SIO	WWAD04	S0-0	WM3C10JBAA	291359	000000000000000000000000	
S4-POADM1	SLOT-A1-3-4	NCTL	WWAD02	S1-2	WM3CX0GBAB	113103	WECO01-Y611011163	
S4-POADM1	SLOT-A1-3-5	SUPVY	WWAD05	S1-1	WM3C20GBAA	290833	WECO01-Y611301081	

57 record(s) found

Close Help

-
- 2** To view any possible errors encountered during data collection, click the **View Log** icon.

END OF STEPS



View Network Configuration Report

Purpose

To display a report listing all NEs in the network.

TL1 Commands

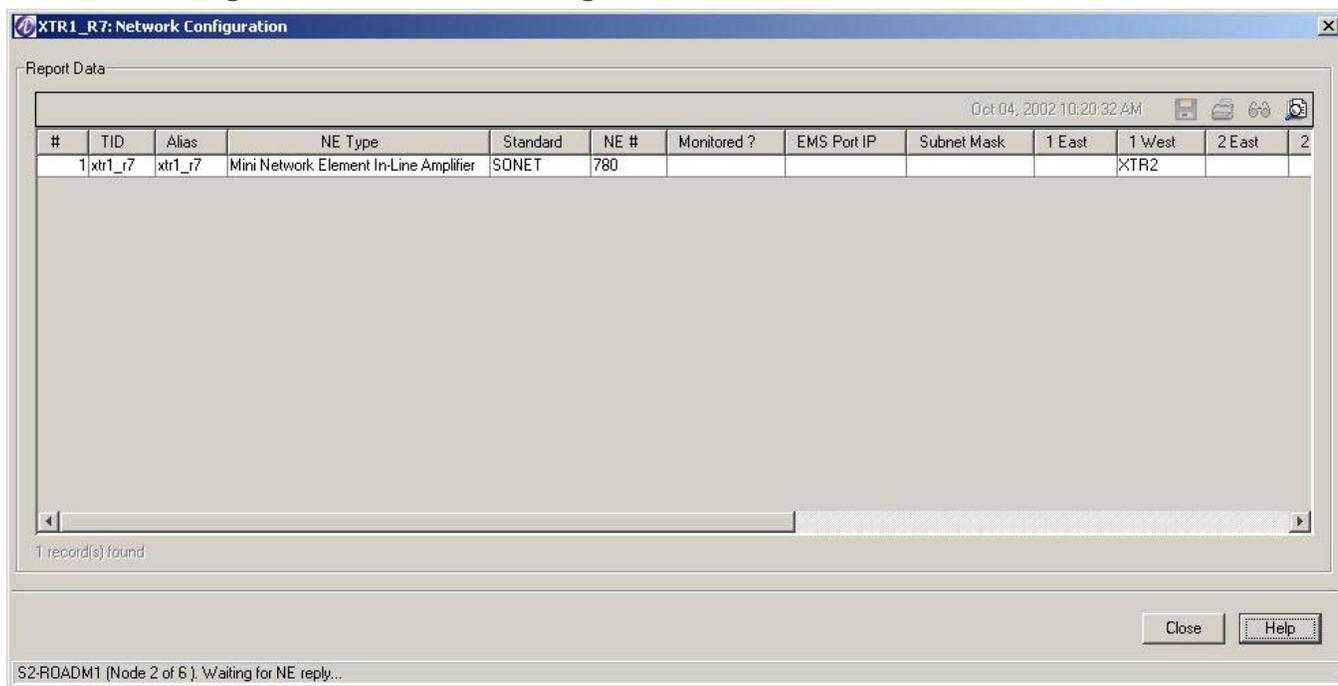
- RTRV-AVAIL-NE
- RTRV-SYS

Procedure

- 1 From the Node Manager menu, select **Reports > Network Configuration**.

Result: The Network Configuration window is displayed (see [Figure A-42](#), “Network Configuration Window” (p. A-70)).

Figure A-42 Network Configuration Window



-
- 2** To view any possible errors encountered during data collection, click the **View Log** icon.

END OF STEPS



View Network Software/Database Report

Purpose

To display a report listing current software and database information on all NEs in the network.

TL1 Commands

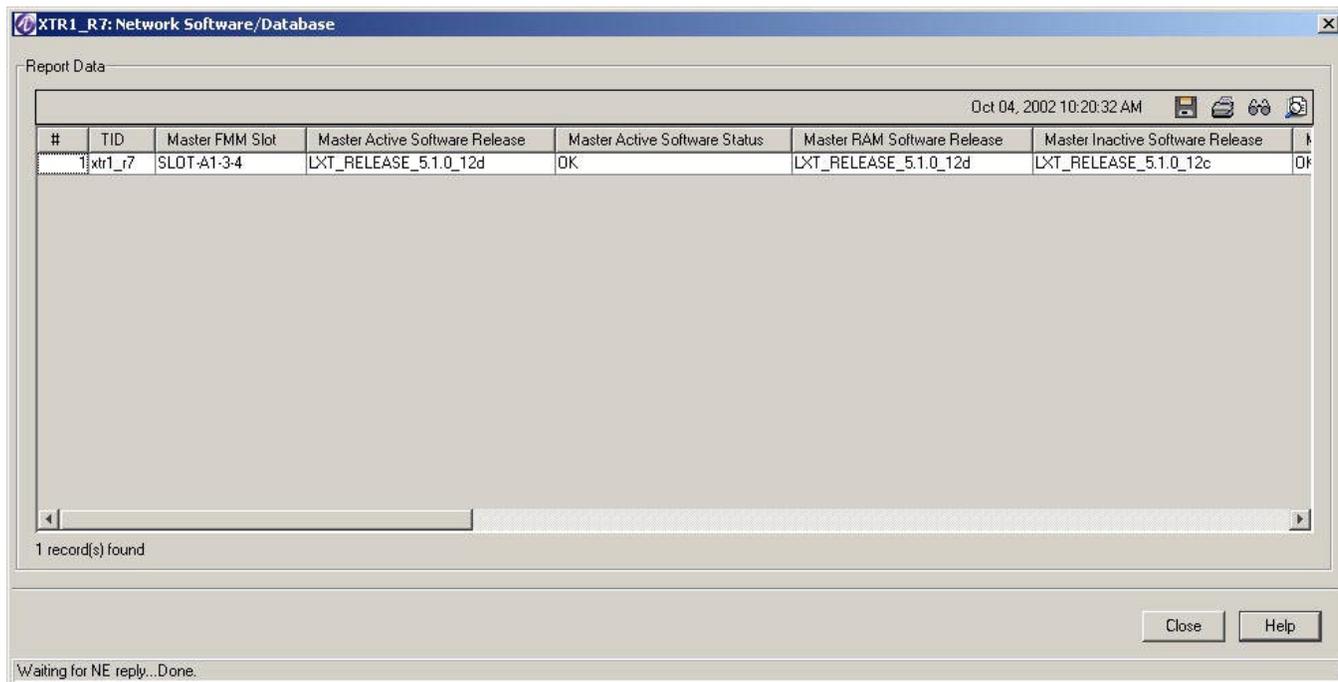
- RTRV-SWDB-ATTR
- RTRV-AVAIL-NE

Procedure

- 1 From the Node Manager menu, select **Reports >Network Software/Database**.

Result: The Network Software/Database window displaying the report data is displayed (see [Figure A-43, “Network Software/Database Window”](#) (p. A-72)).

Figure A-43 Network Software/Database Window



-
- 2** To view any possible errors encountered during data collection, click the **View Log** icon.

END OF STEPS



Add Mux OT Cross-Connection

Purpose

To add a Mux OT Cross-Connection.

TL1 Commands

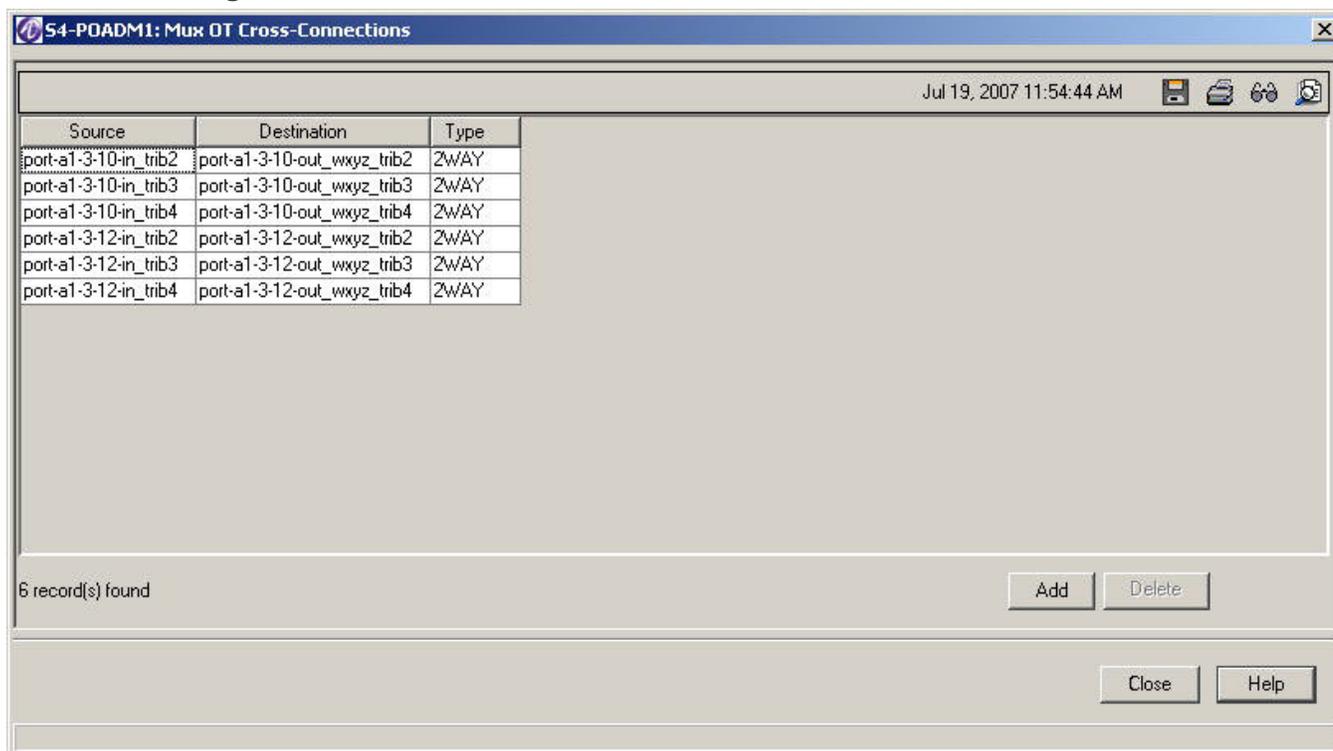
- ENT-CRS-OT
- RTRV-CRS-OT

Procedure

- 1 From the Node Manager menu, select **Connections > Mux OT Cross-Connections**

Result: The Mux OT Cross-Connections window is displayed (see [Figure A-44](#), “Mux OT Cross-Connections Window” (p. A-74)):

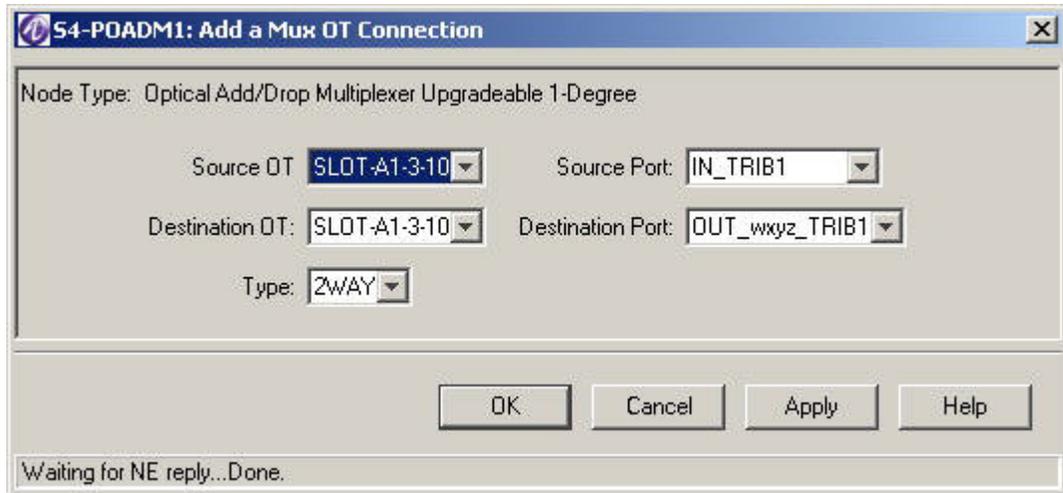
Figure A-44 Mux OT Cross-Connections Window



- 2 To add a connection, click **Add**.

Result: The Add Connection window is displayed (see [Figure A-45, “Add Connection Window”](#) (p. A-75)).

Figure A-45 Add Connection Window



- 3 Select the source and destination data and type of connection. Click **OK** or **Apply** to add the connection.
- 4 To view connection events received during this session, click the **Display Connection Events** icon on the Mux OT Cross-Connections window (see [Figure A-44, “Mux OT Cross-Connections Window”](#) (p. A-74)).

END OF STEPS



Delete Mux OT Cross-Connection

Purpose

To delete a Mux OT Cross-Connection that is no longer needed or cannot be accessed.

TL1 Commands

- DLT-CRS-OT
- RTRV-CRS-OT

Procedure

- 1 From the Node Manager menu, select **Connections > Mux OT Cross-Connections**

Result: The Mux OT Cross-Connections window is displayed (see [Figure A-44, “Mux OT Cross-Connections Window”](#) (p. A-74))

- 2 Select the connection to be deleted and click **Delete**.

Result: The following warning is displayed (see [Figure A-46, “Warning Confirmation Window \(Delete Connection\)”](#) (p. A-76)):

Figure A-46 Warning Confirmation Window (Delete Connection)



- 3 Click **Yes** to delete the connection.

END OF STEPS



Add Add/Drop Connection

Purpose

To add an Add/Drop connection.

Important! This procedure does not apply to Repeaters or MINILA equipped MINI NE nodes.

Important! The CIT GUI does not support pre-provisioning. The supporting circuit packs must be present before the frequencies can be chosen.

TL1 Commands

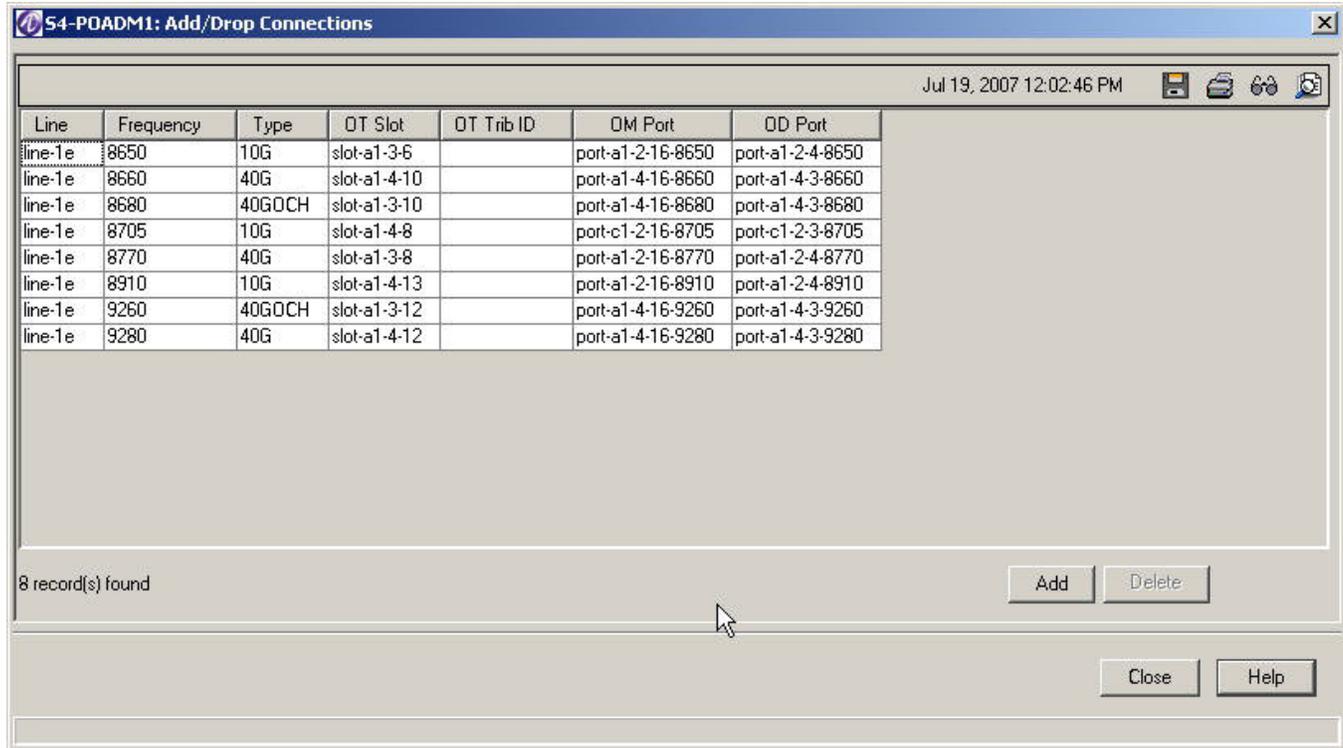
- ENT-CONN
- RPT-CONN
- RTRV-AO
- RTRV-CONN

Procedure

- 1 From the Node Manager menu, select **Connections > Add/Drop Connections**.

Result: The Add/Drop Connections window is displayed (see [Figure A-47](#), “Add/Drop Connections Window” (p. A-78)).

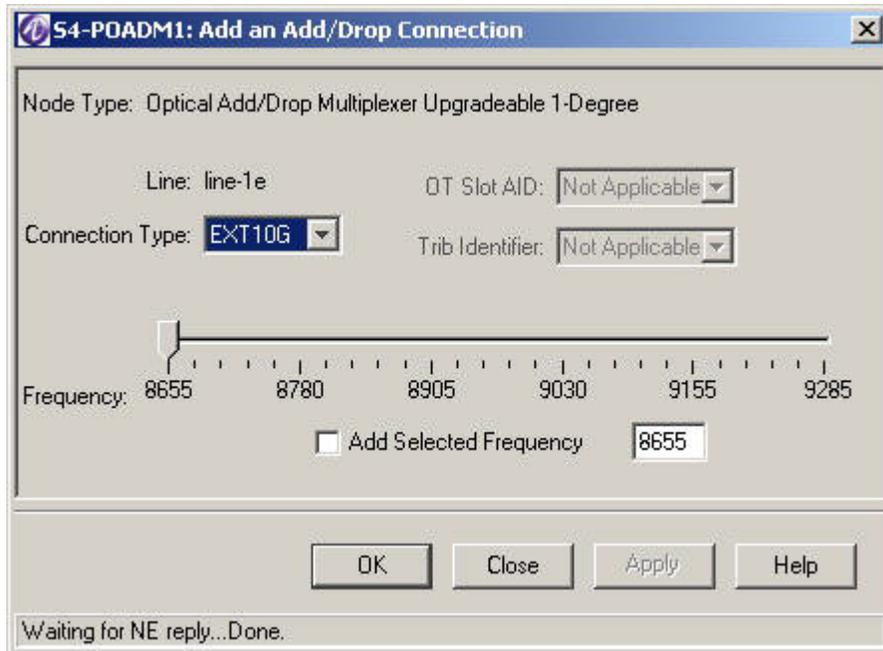
Figure A-47 Add/Drop Connections Window



-
- 2 To add a connection, click **Add**.

Result: The Add an Add/Drop Connection window is displayed (see Figure A-48, “Add an Add/Drop Connection Window” (p. A-79)

Figure A-48 Add an Add/Drop Connection Window



- 3 Select the appropriate **Line** and/or **Connection Type** from the drop down list(s). Next, select the channel frequency by moving the slider or typing the value directly into the field.

Important! All valid and available channel frequencies are selectable. These values are based on node type. Only the available frequencies configured to Add/Drop are selectable. The frequency of an “unavailable” channel is not selectable.

When adding a connection, all available frequencies based on the NE application are displayed. The user has the option to either select one of the frequency values displayed or enter the frequency explicitly. The following applies:

1. Available frequencies are valid optical channels which have neither been used for cross connections, nor been used for add/drop connections. For cross-connections, available frequency must be free of connections on both source and destination.
2. For both Add/Drop Connections and Cross Connections, CIT filters out frequencies availability based on the equipage of RPG circuit pack:
 - If there is no RPG pack equipped on the OADM, then only first 28 start-up channels are selectable. (First 28 start-up channels are Frequencies 8650 - 8920, in incremental of 10)

3. For Add/Drop Connections, CIT also filters out frequencies availability based on the equipage of OM and OD circuit packs :
 - If either OM (0GHz Offset) or OD (0GHz Offset) pack for the targeted Line is not equipped on the OADM, then frequencies with 0GHz offset are NOT selectable. (Frequencies with 0GHz offset are frequencies 8650 - 9270, in incremental of 20)
 - If either OM (100GHz Offset) or OD (100GHz Offset) pack for the targeted Line is not equipped on the OADM, then frequencies with 100GHz offset are NOT selectable. (Frequencies with 100GHz offset are frequencies 8660 - 9280, in incremental of 20)

.....

- 4 After the channel frequency has been chosen, click the **Add Selected Frequency** check box.

.....

- 5 Click **OK** or **Apply** to add the Add/Drop OT Connection.

.....

- 6 To view connection events received during this session, click the **Display Connection Events** icon on the Add/Drop OT Connections window.

.....

END OF STEPS

.....



Delete Add/Drop Connection

Purpose

To delete an Add/Drop Connection that is no longer needed or cannot be accessed.

TL1 Commands

- DLT-CONN
- RTRV-CONN

Procedure

- 1 From the Node Manager menu, select **Connections > Add/Drop Connections**.

Result: The Add/Drop Connections window is displayed (see [Figure A-47](#), “Add/Drop Connections Window” (p. A-78))

- 2 Select the connection to be deleted and click **Delete** .

Important! When you complete this step, there is no confirmation window displayed. Be sure you want to delete the connection you have selected.

- 3 Click **Yes** to delete the connection.

END OF STEPS



Add Mesh Cross-Connection

Purpose

To add a Mesh Cross-Connection.

Important! The CIT GUI does not support pre-provisioning. The supporting circuit packs must be present before the frequencies can be chosen.

TL1 Commands

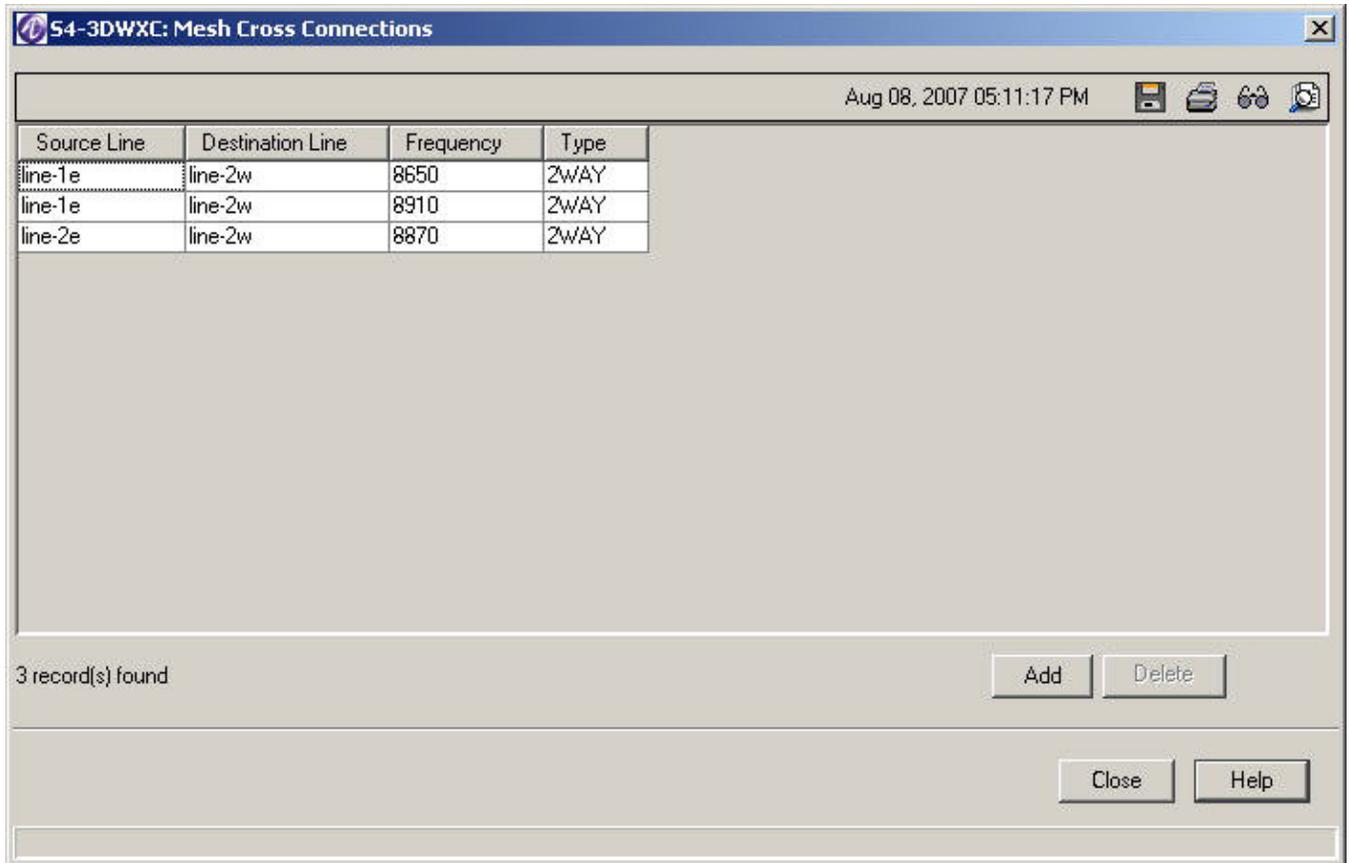
- ENT-CRS
- ENT-CRS-OT
- RTRV-CRS-CONN

Procedure

- 1 From the Node Manager menu, select **Connections > Mesh Cross-Connections**.

Result: The Mesh Cross-Connections window is displayed (see [Figure A-49](#), “Mesh Cross-Connections Window” (p. A-83)).

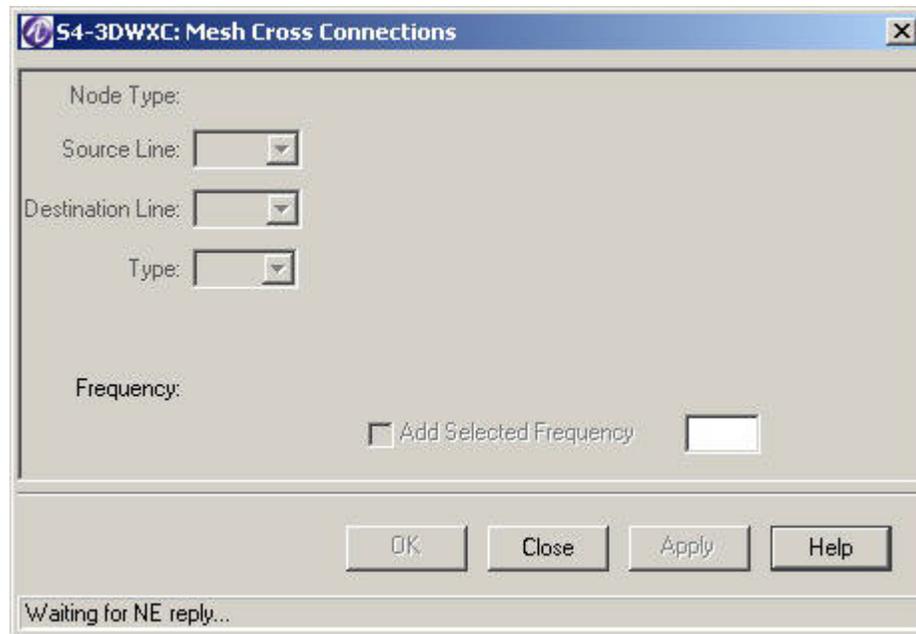
Figure A-49 Mesh Cross-Connections Window



-
- 2 To add a Cross Connection, click **Add**.

Result: The Add Mesh Cross Connections window is displayed (see [Figure A-50](#), “Add Mesh Cross Connections Window” (p. A-84)).

Figure A-50 Add Mesh Cross Connections Window



- 3 Select the appropriate **Source Line**, **Destination Line**, and **Type** values from the drop down lists. Next, select the channel frequency by moving the slider or typing the value directly into the field.

Important! All valid and available channel frequencies are selectable. These values are based on node type. The frequency of an “unavailable” channel is not selectable.

When adding a connection, all available frequencies based on the NE application are displayed. The user has the option to either select one of the frequency values displayed or enter the frequency explicitly. The following applies:

1. Available frequencies are valid optical channels which have neither been used for cross connections, nor been used for add/drop connections. For cross-connections, available frequency must be free of connections on both source and destination.
2. For both Add/Drop Connections and Cross Connections, CIT filters out frequencies availability based on the equipage of RPG circuit pack:
 - If there is no RPG pack equipped on the OADM, then only first 28 start-up channels are selectable. (First 28 start-up channels are Frequencies 8650 - 8920, in incremental of 10)
3. When adding a cross connection, circuit packs needed to support both source and destination Lines are taken into consideration for the frequency selection.

.....

4 After the channel frequency has been chosen, click the **Add Selected Frequency** check box.

.....

5 Click **OK** or **Apply** to add the Cross Connection.

.....

6 To view connection events received during this session, click the **Display Connection Events** icon on the Cross Connections window.

.....

END OF STEPS

.....



Delete Mesh Cross-Connections

Purpose

To delete a Mesh Cross-Connection that is no longer needed or cannot be accessed.

TL1 Commands

- DLT-CRS
- DLT-CRS-OT
- RTRV-CRS-OT

Procedure

-
- 1 From the Node Manager menu, select **Connections > Mesh Cross-Connections**.

Result: The Mesh Cross Connections window is displayed (see [Figure A-49, “Mesh Cross-Connections Window”](#) (p. A-83)).

- 2 Select the connection to be deleted and click **Delete**.

Result: The following warning is displayed (see [Figure A-46, “Warning Confirmation Window \(Delete Connection\)”](#) (p. A-76)).

- 3 Click **Yes** to delete the connection.

END OF STEPS



Add OT Association

Purpose

Provision the association between two G.709 MUX OT packs (the OT (10G SFP MUX Tunable) circuit packs).

Important! Pre-provisioning is not allowed (that is, appropriate circuit packs must be installed in order to provision OT associations).

TL1 Commands

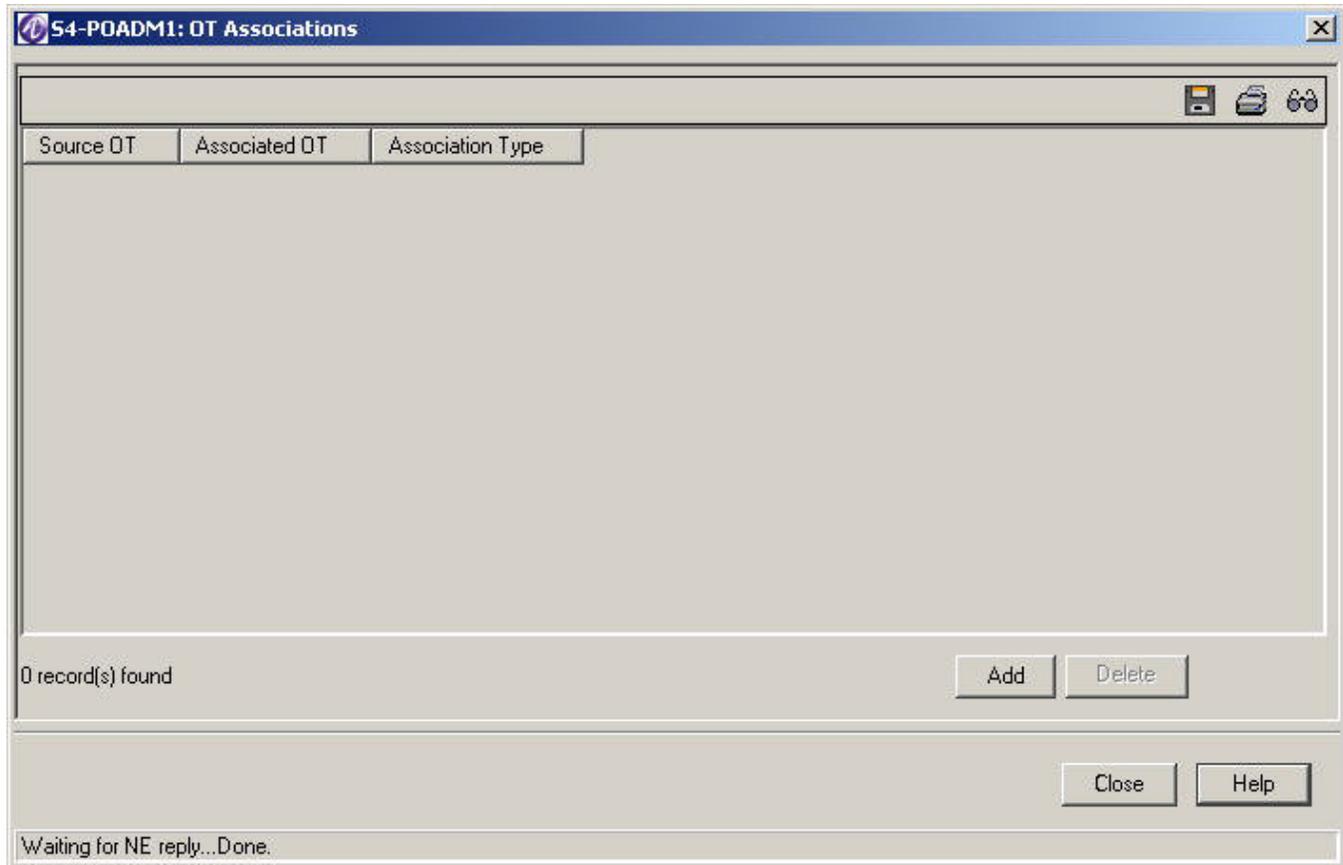
- ENT-ASSOC-OT
- RTRV-ASSOC-OT

Procedure

- 1 From the Node Manager menu, select **Connections > OT Associations**.

Result: The OT Associations window is displayed (see [Figure A-51, “OT Associations Window”](#) (p. A-88)).

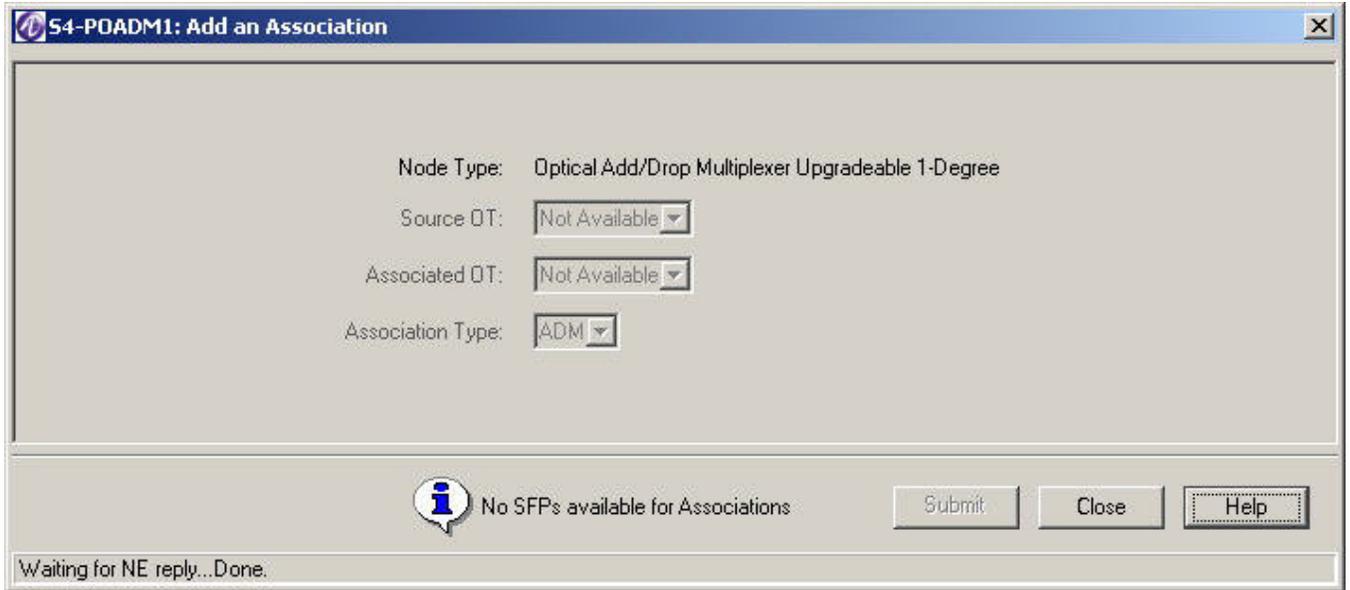
Figure A-51 OT Associations Window



-
- 2 To add an association, click **Add**.

Result: The Add an Association window is displayed (see [Figure A-52, “Add an Association Window”](#) (p. A-89)).

Figure A-52 Add an Association Window



- 3 Select the desired Source OT and Associated OT from the drop-down lists and click **Submit** to add the OT association.

END OF STEPS



Delete OT Association

Purpose

Delete the association between two G.709 MUX OT packs (the OT (10G SFP MUX Tunable) circuit packs).

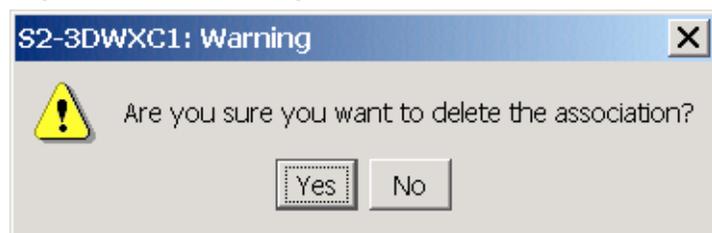
TL1 Command

DLT-ASSOC-OT

Procedure

- 1 From the Node Manager menu, select **Connections > OT Associations**.
Result: The OT Associations window is displayed (see [Figure A-51, “OT Associations Window”](#) (p. A-88)).
 - 2 To delete an association, highlight the selection and click **Delete**.
Result: The following warning is displayed (see [Figure A-53, “Warning Confirmation Window \(Delete OT Association\)”](#) (p. A-90)).
-

Figure A-53 Warning Confirmation Window (Delete OT Association)



- 3 Click **Yes** to delete the OT association.

END OF STEPS



Provision System Level Attributes for the NE

Purpose

To provision the system level attributes for the NE including parameters for Configuration, TID, EMS Port, Date/Time, and OA Pack.

TL1 Commands

- ENT-SYS
- RTRV-SYS
- RTRV-ATTR-CONT
- SET-ATTR-CONT
- RTRV-ATTR-ENV
- SET-ATTR-ENV
- RTRV-ATTR-ALM
- SET-ATTR-ALM

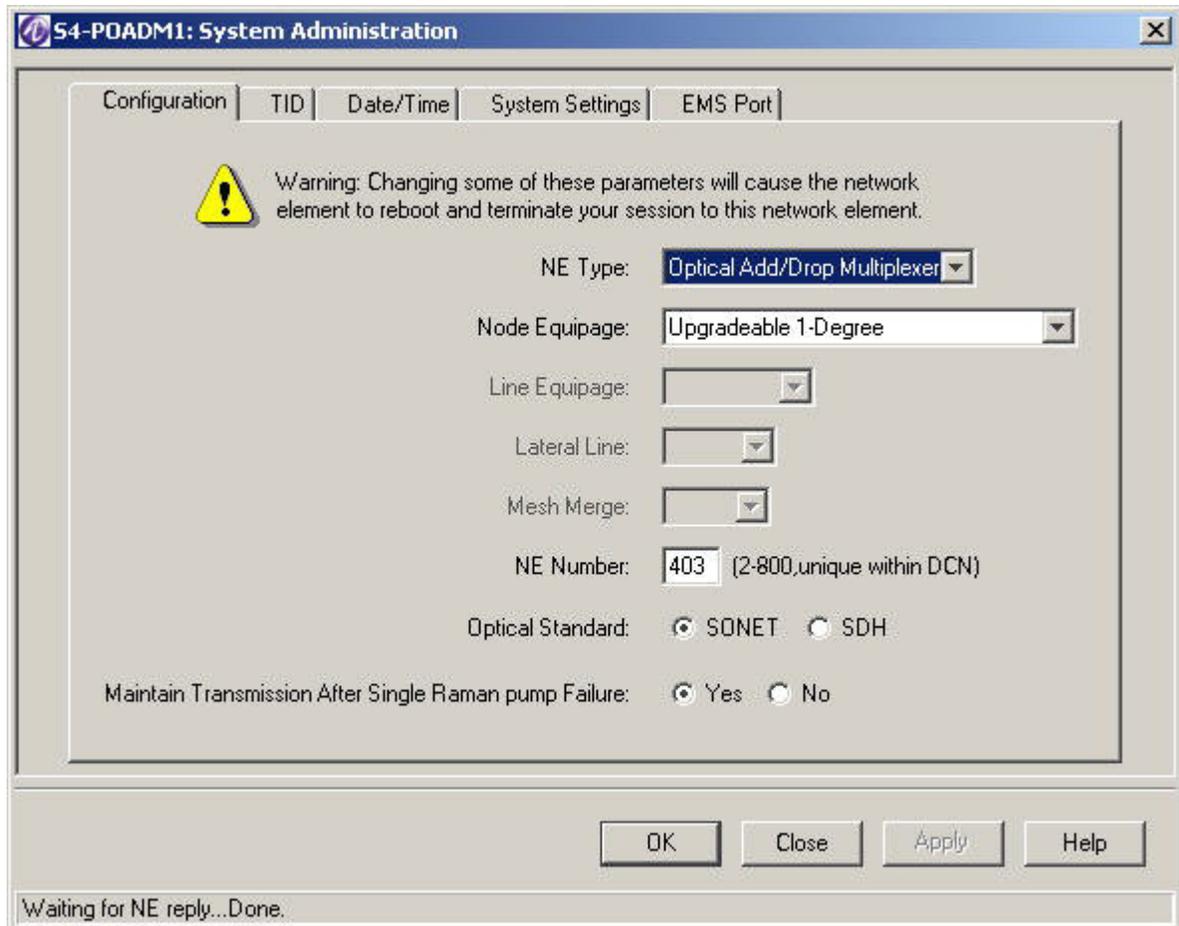
Procedure

- 1 From the Node Manager menu, select **Administration > System**.

Important! The parameters displayed in this window change in accordance with the NE type. All fields will not be displayed for certain NEs (for example, a Repeater).

Result: The following System Administration window is displayed (see [Figure A-54, “System Administration Window \(Configuration\)”](#) (p. A-92)).

Figure A-54 System Administration Window (Configuration)



-
- 2 Select the appropriate tabs to enter the appropriate system parameter changes as needed.
-

- 3 Click **OK** or **Apply** to execute changes.

Important! All the parameters which cause a reboot of the system are set from within the Configuration tab in order to avoid repetitive reboots. The user should finish setting all system parameters that cause a reboot of the NE before executing the change for any of these parameters.

- 4 For any further changes needed to the system level parameters, select the **TID**, **Date/Time**, **System Settings**, or **EMS Port** tabs at the top of the window and enter relevant information (see [Figure A-55](#), “TID Window” (p. A-93), [Figure A-56](#), “Date/Time Window” (p. A-94), [Figure A-57](#), “System Settings Window” (p. A-95), and [Figure A-58](#), “EMS Port Window” (p. A-96)).

Figure A-55 TID Window

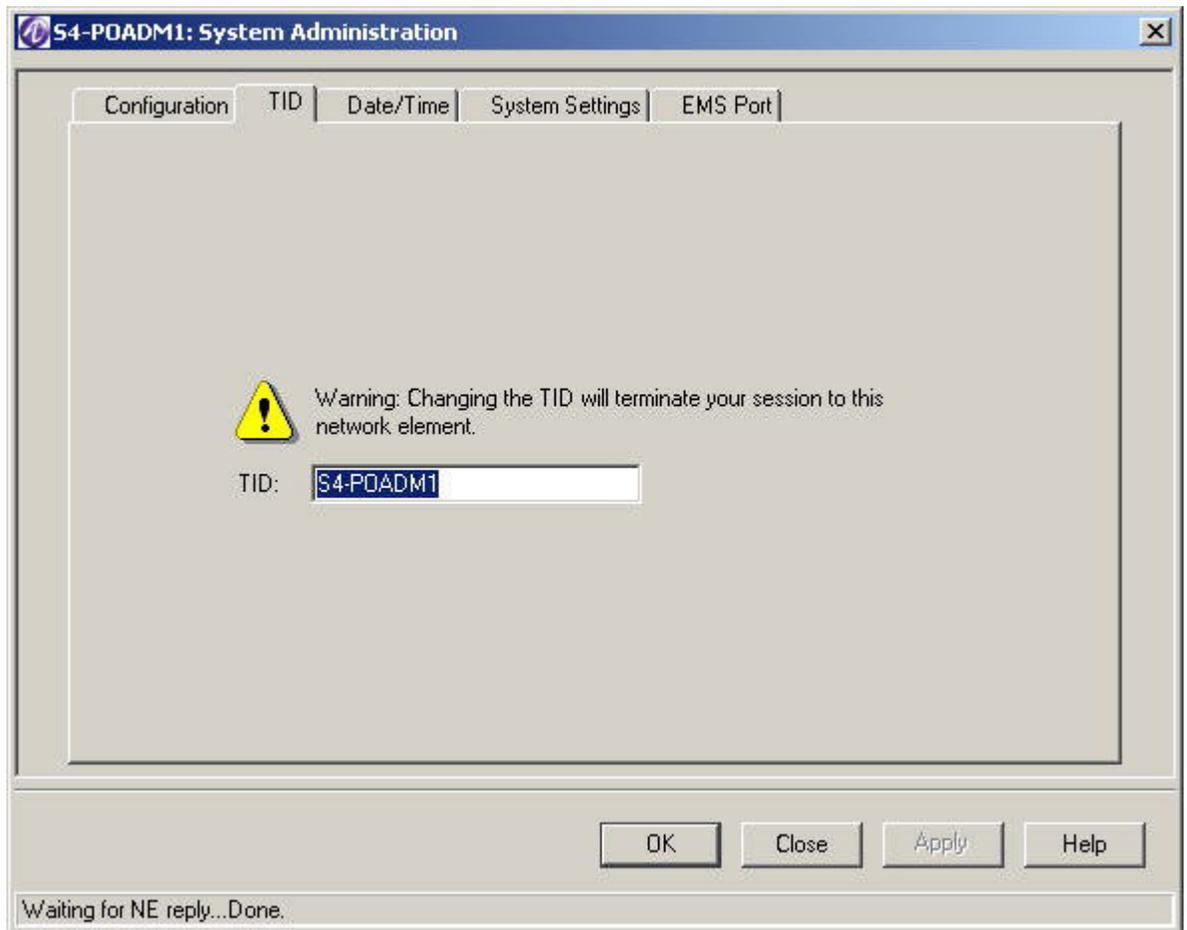


Figure A-56 Date/Time Window

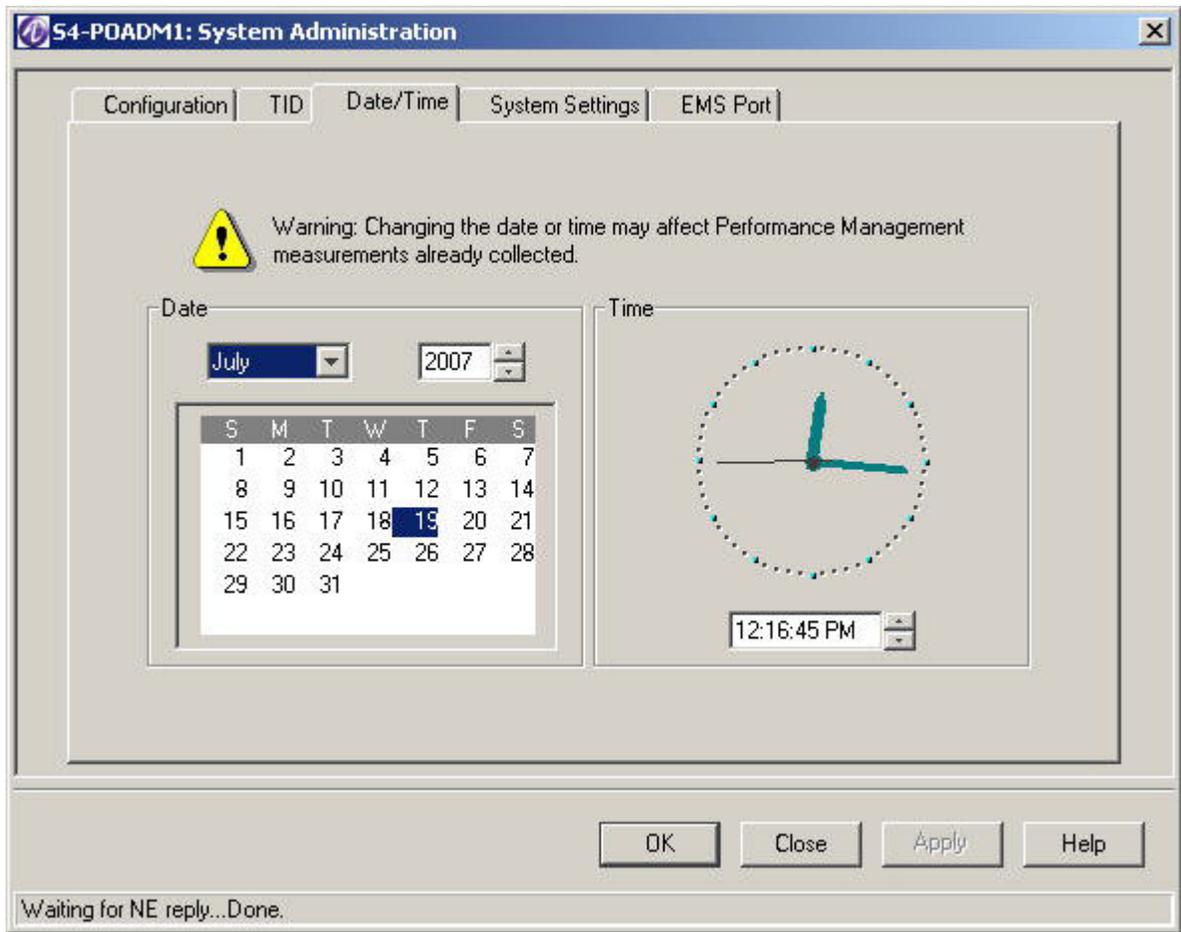


Figure A-57 System Settings Window

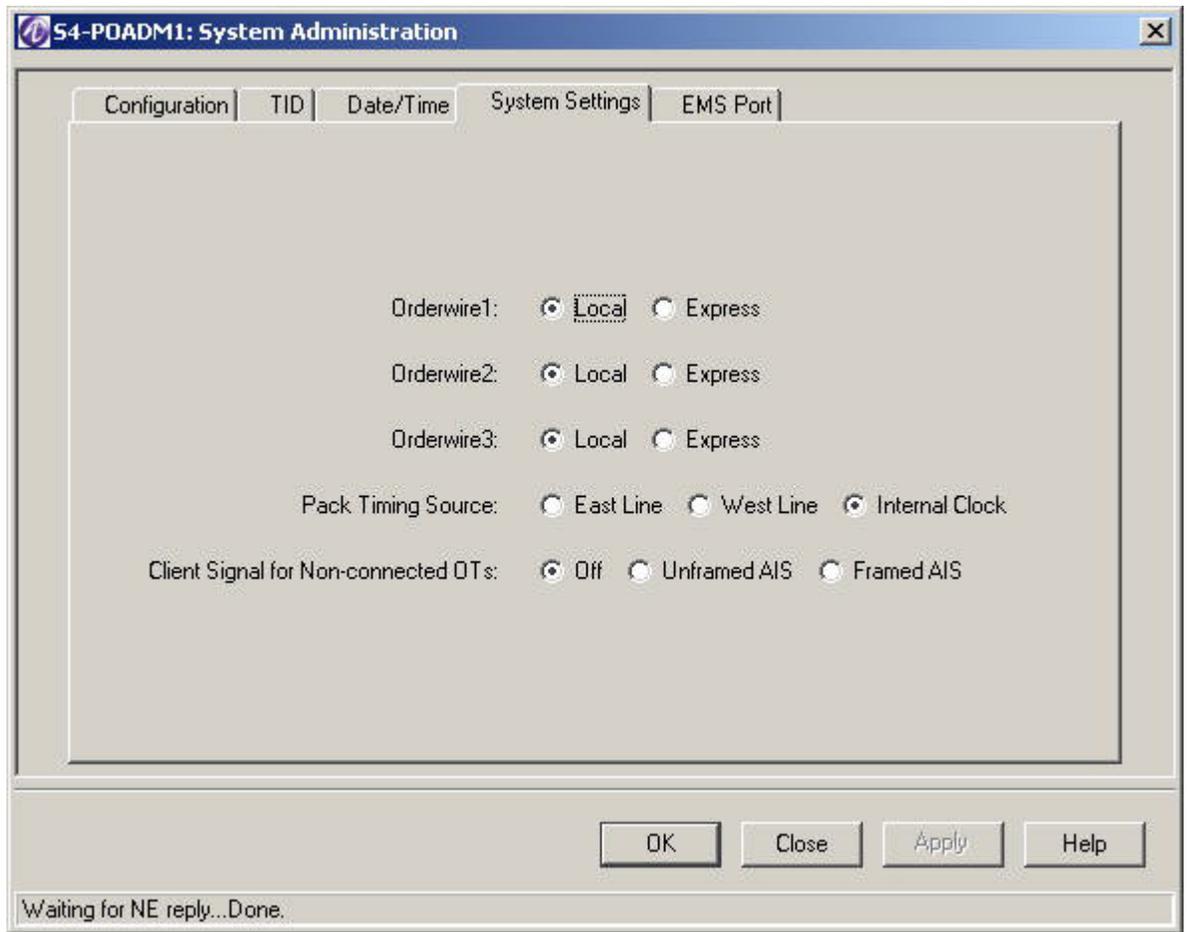
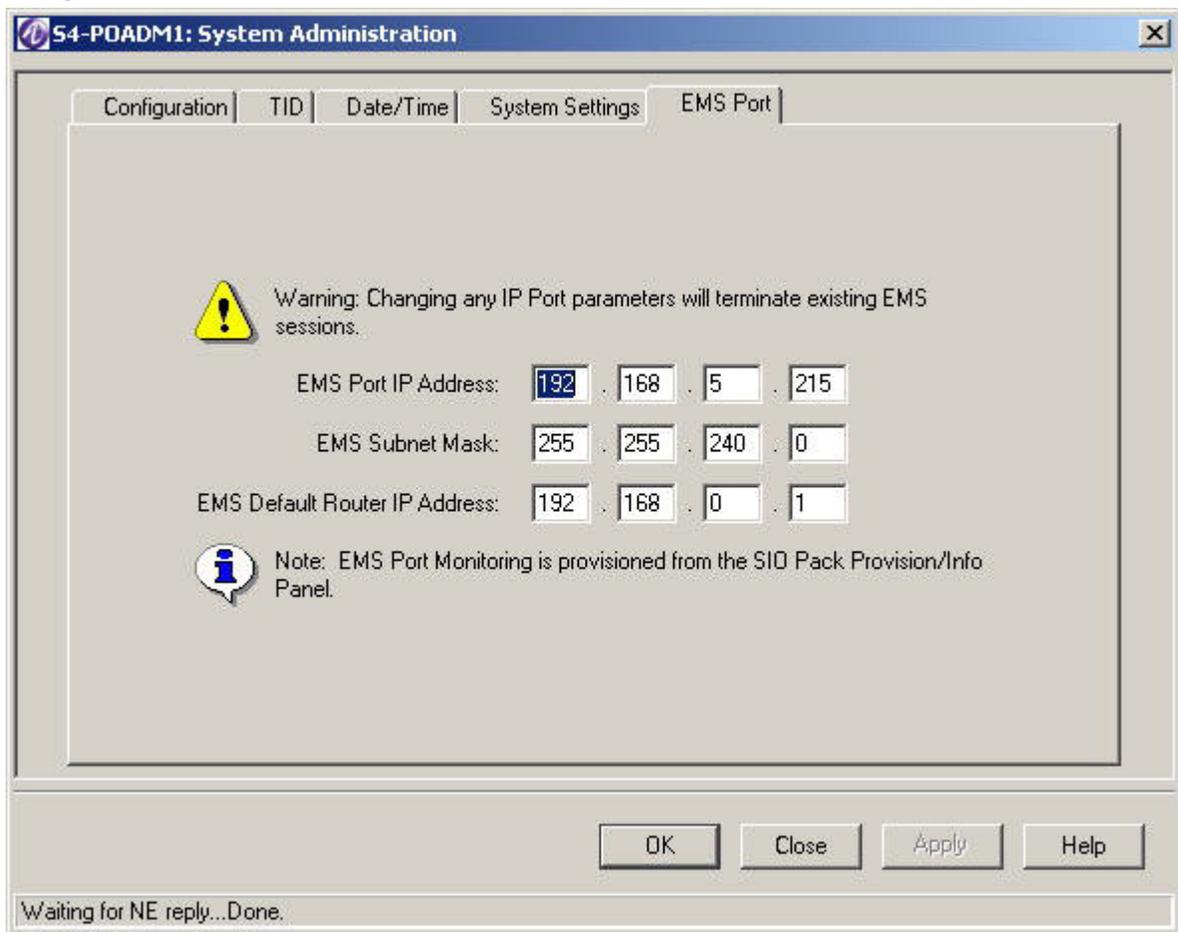


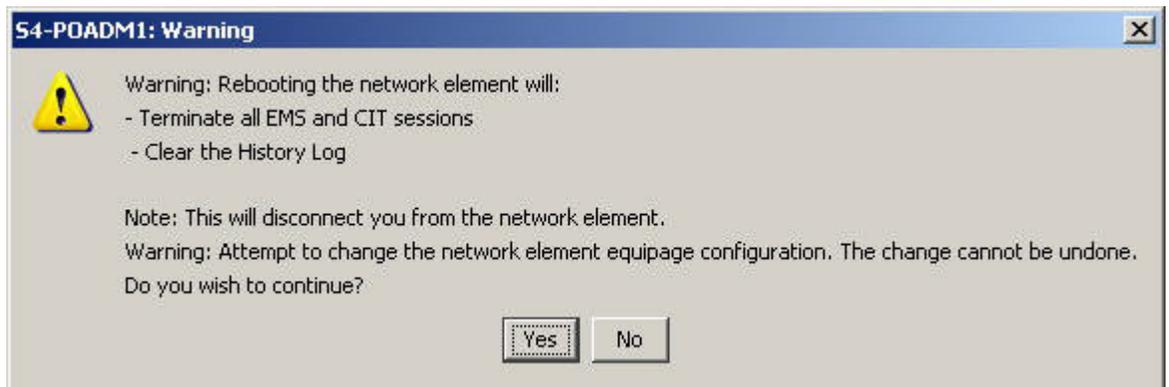
Figure A-58 EMS Port Window



- 5 Click **Apply** to provision all changes. Then click **OK**.

Result: If you applied changes on the Configuration window (see [Figure A-54, “System Administration Window \(Configuration\)”](#) (p. A-92)), the following warning is displayed (see [Figure A-59, “Warning Confirmation Window \(Reboot NE\)”](#) (p. A-97)). The included message(s) are generated based upon which parameters are changed:

Figure A-59 Warning Confirmation Window (Reboot NE)



6 Click **Yes**.

Result: The system provisioning operation is complete and the user is disconnected from the NE if necessitated by the provisioning.

END OF STEPS



Security Administration - Set System Security Parameters

Purpose

To set security parameters on the network element.

TL1 Commands

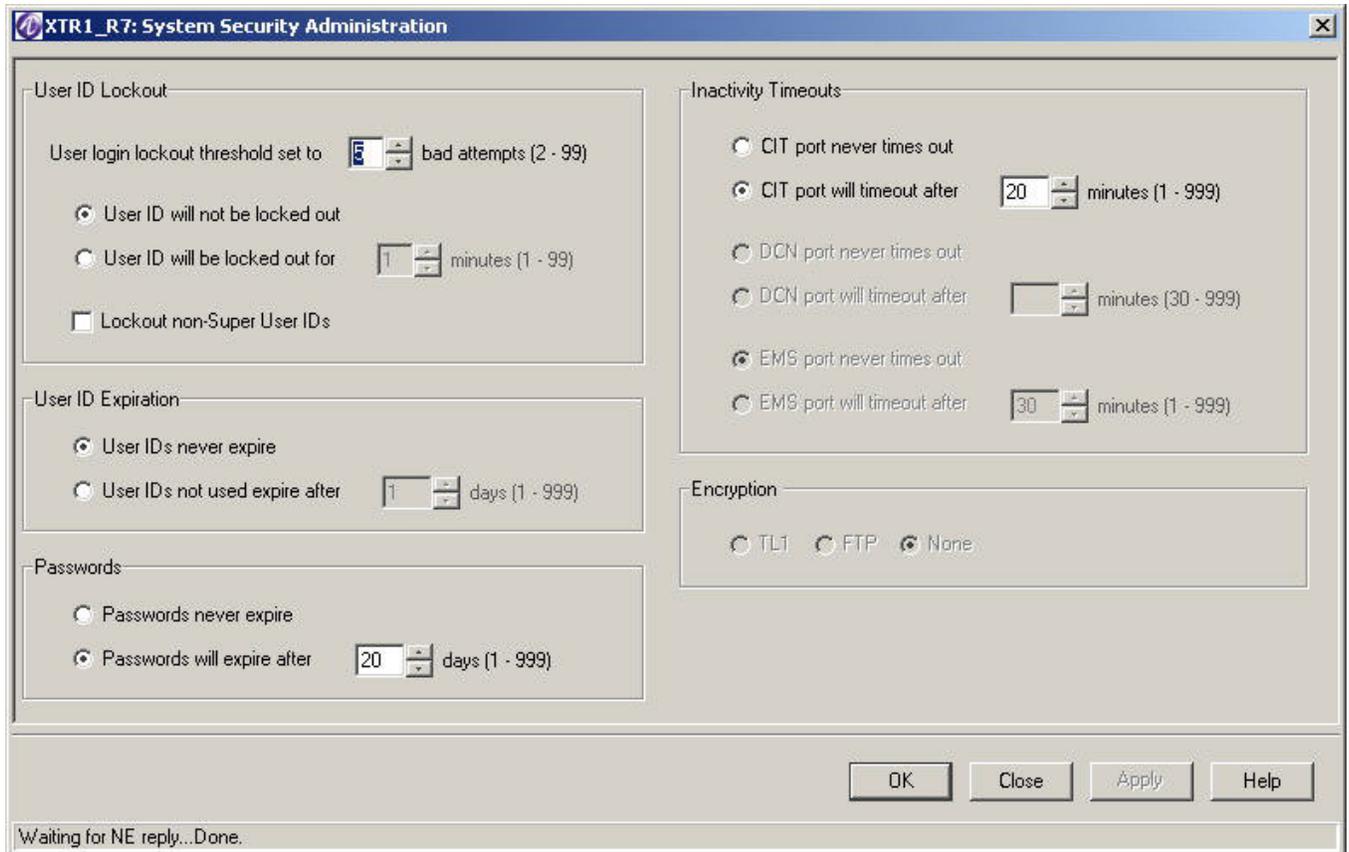
- ED-USER-SECU
- ENT-NE-SECU
- RTRV-NE-SECU
- ENT-CID-SECU

Procedure

- 1 From the Node Manager menu, select **Administration > Security > System**.

Result: The System Security Administration window is displayed (see [Figure A-60](#), “System Security Administration Window” (p. A-99)).

Figure A-60 System Security Administration Window



2 Set appropriate information for the following as necessary:

- User ID Lockout
- User ID Expiration
- Passwords
- Inactivity Timeouts
- Encryption

3 Click **OK** or **Apply** to process new settings.

END OF STEPS



Security Administration - Add a User

Purpose

To add a new user to the system.

TL1 Commands

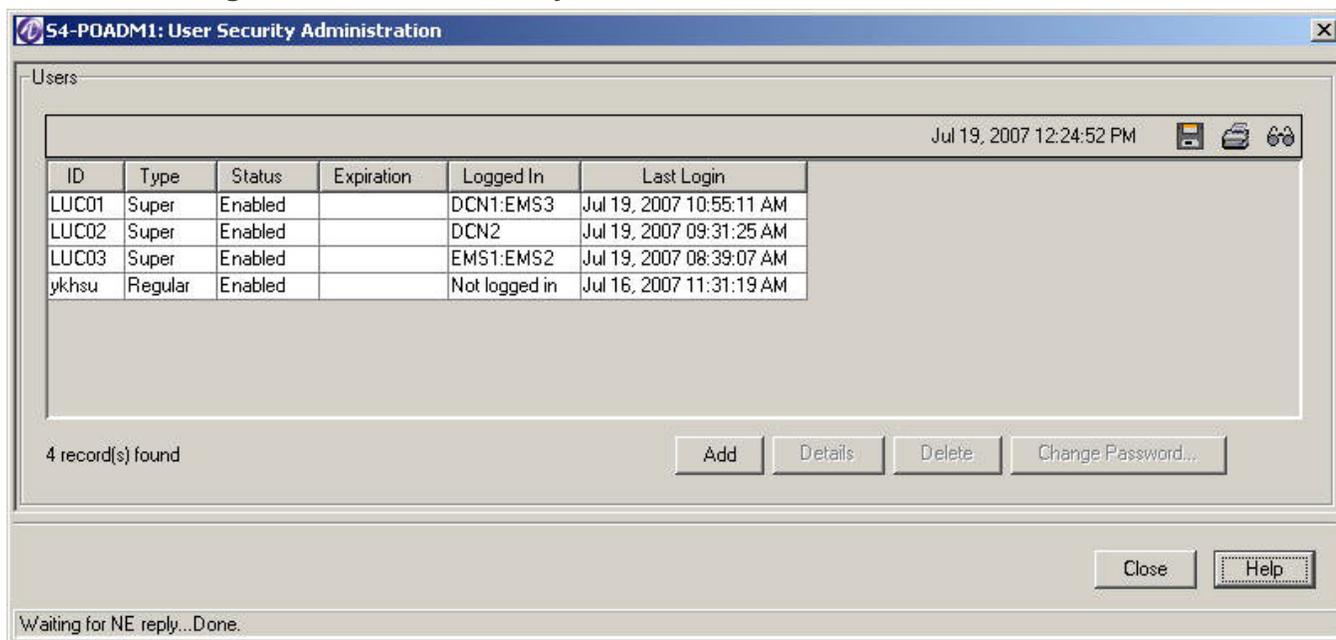
- ENT_USER-SECU
- RTRV-USER-SECU

Procedure

- 1 From the Node Manager menu, select **Administration > Security > Users**.

Result: The User Security Administration window is displayed (see [Figure A-61](#), “User Security Administration Window” (p. A-100)).

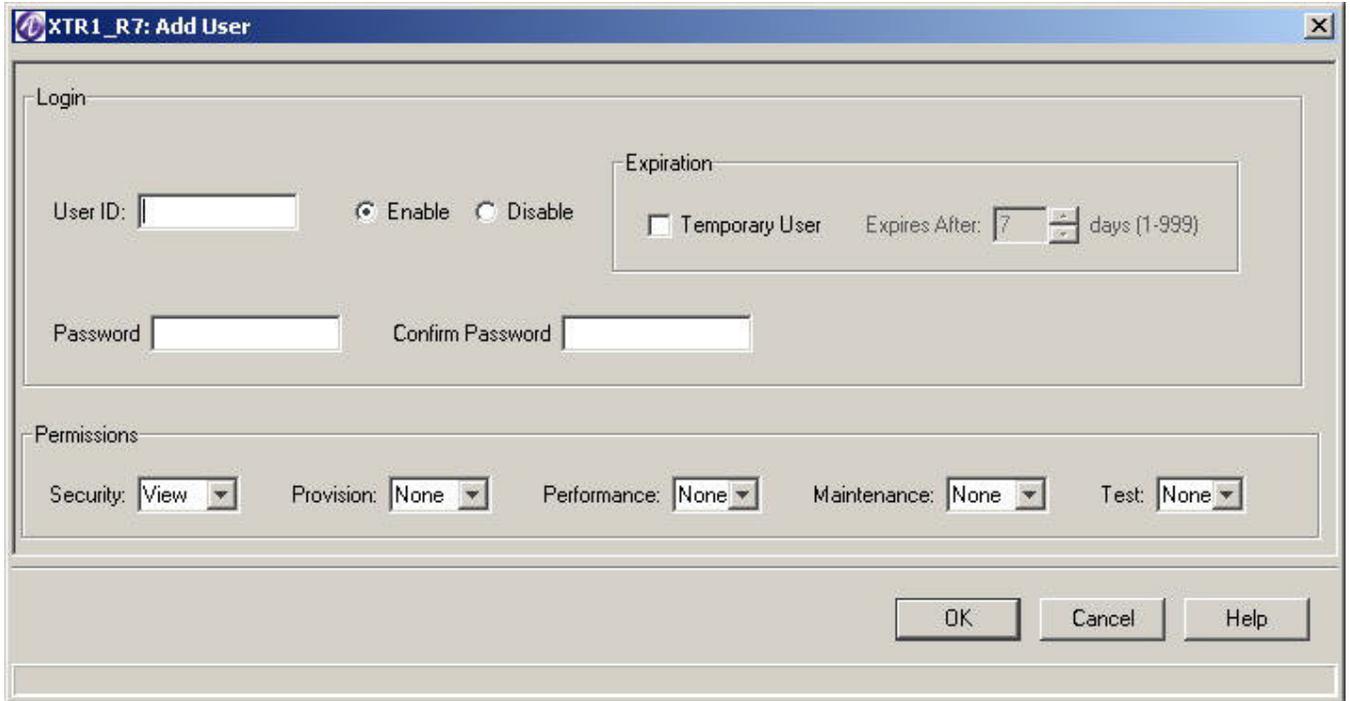
Figure A-61 User Security Administration Window



- 2 Click the **Add User** icon.

Result: The Add User window is displayed (see [Figure A-62, “Add User Window”](#) (p. A-101)).

Figure A-62 Add User Window



.....
3 Enter security data for the new user.
.....

4 Click **OK**.

END OF STEPS
.....



Security Administration - Modify User Security Settings

Purpose

To modify security settings for an existing user.

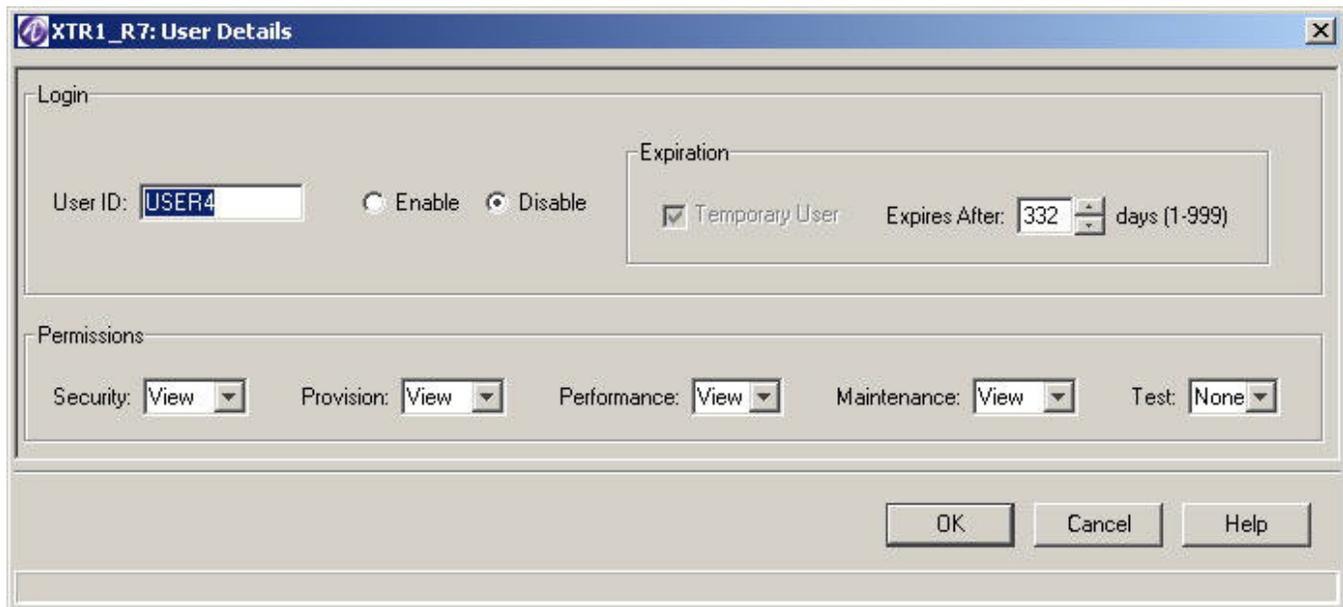
TL1 Commands

- ED-USER-SEC
- RTRV-CID-SECU
- RTRV-USER-SEC

Procedure

- 1 From the Node Manager menu, select **Administration > Security > Users**
Result: The User Security Administration window is displayed (see [Figure A-61, “User Security Administration Window”](#) (p. A-100)).
 - 2 Select the user whose security settings are to be modified and click **Details**.
Result: The User Details window is displayed (see [Figure A-63, “User Details Window”](#) (p. A-102)).
-

Figure A-63 User Details Window



-
- 3 Select desired security settings for the specified user and click **OK** to process the new settings.
-
- 4 To change a user's password, select the user from the User Security Administration window (see [Figure A-61, "User Security Administration Window"](#) (p. A-100)) and click **Change Password....**

Result: The Change Password window is displayed (see [Figure A-64, "Change Password Window"](#) (p. A-103)).

Figure A-64 Change Password Window



-
- 5 Enter the required information (see [Table 4-1, "Alphabetic Character Set"](#) (p. 4-5), [Table 4-2, "Numeric Character Set"](#) (p. 4-5), and [Table 4-3, "Symbolic Character Set"](#) (p. 4-8) for the characters that can be used), then click **OK** to process the change.

END OF STEPS

□

Security Administration - Delete a User

Purpose

To delete an existing user from the system.

Important! Only Non-Super Users can be deleted.

TL1 Command

DLT-USER-SECU

Procedure

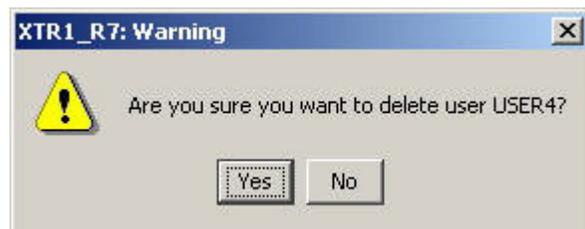
- 1 From the Node Manager menu, select **Administration > Security > Users**.

Result: The User Security Administration window is displayed (see [Figure A-61, “User Security Administration Window”](#) (p. A-100)).

- 2 Highlight the user to be deleted and click **Delete**.

Result: The following warning is displayed (see [Figure A-65, “Warning Confirmation Window \(Delete User\)”](#) (p. A-104)).

Figure A-65 Warning Confirmation Window (Delete User)



- 3 Click on **Yes** to delete the specified user.

END OF STEPS

□

Security Administration - Change Password

Purpose

To change your current password.

Important! From the Change Password window, the only password that can be changed is the password of the user who is currently logged in.

TL1 Command

ED-PID

Procedure

- 1 From the Node Manager menu, select **Administration > Security > Change Password...**

Result: The Change Password window is displayed (see [Figure A-66, “Change Password Window \(From Menu\)”](#) (p. A-105)).

Figure A-66 Change Password Window (From Menu)



- 2 Enter the required information in the appropriate fields. (See [Table 4-1, “Alphabetic Character Set”](#) (p. 4-5), [Table 4-2, “Numeric Character Set”](#) (p. 4-5), and [Table 4-3, “Symbolic Character Set”](#) (p. 4-8) for the characters that can be used).

-
- 3 Click **OK** to change the password.

.....

END OF STEPS

.....



View Software Release Information

Purpose

To display the current software information for the active and inactive areas of the FlashDisk Memory Module (FMM).

TL1 Command

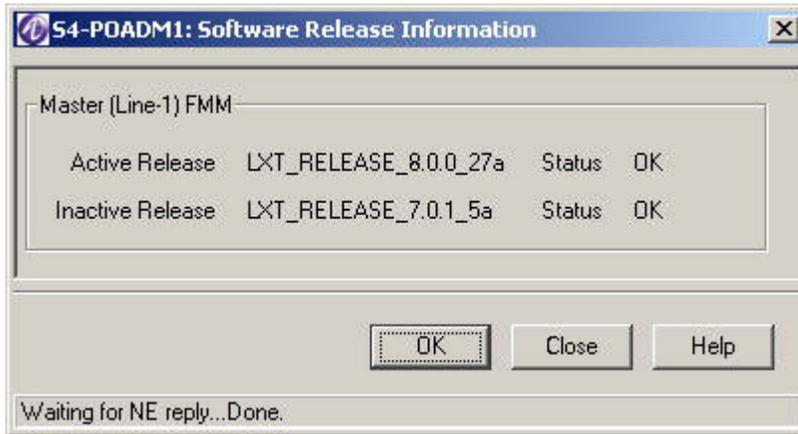
RTRV-SWDB-ATTR

Procedure

- 1 From the Node Manager menu, select **Administration > Software > Release Information**

Result: The Software Release Information window is displayed (see [Figure A-67](#), “Software Release Information Window” (p. A-107)).

Figure A-67 Software Release Information Window



- 2 Click **OK** to close the window.

END OF STEPS



Download Software

Purpose

To download a software generic to the inactive partition of the FlashDisk Memory Module (FMM).

TL1 Command

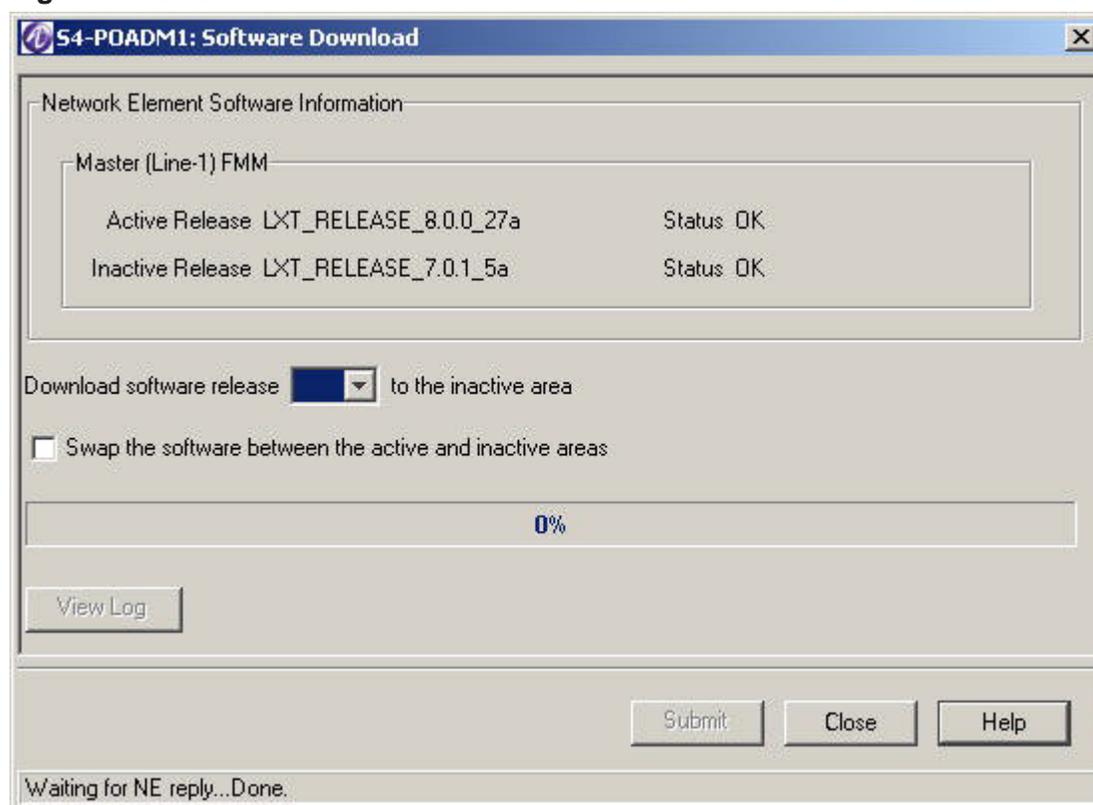
DWNLD-SW

Procedure

- 1 From the Node Manager menu, select **Administration > Software > Download**

Result: The Software Download window is displayed (see [Figure A-68, “Software Download Window”](#) (p. A-108))

Figure A-68 Software Download Window

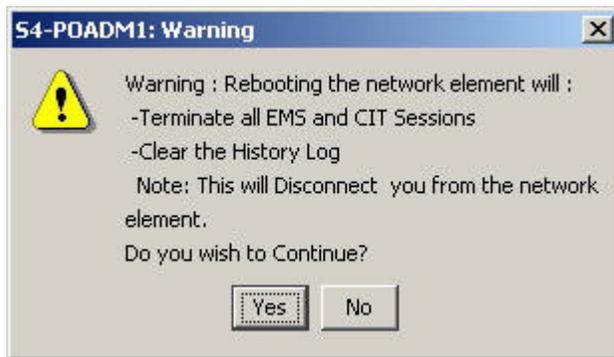


-
- 2 Network Element Software Information is displayed for the active and inactive partition of the FlashDisk Memory Module (FMM). From the drop-down list, select the NE software release to be downloaded. Click **Submit**.

Result: The software is downloaded and **View Log** is enabled.

Note: If the **Swap the software between the active and inactive areas** checkbox is selected, then a reboot is required, and the following warning is displayed (see [Figure A-69, “Warning Confirmation Window \(Reboot NE After Software Download\)”](#) (p. A-109)).

Figure A-69 Warning Confirmation Window (Reboot NE After Software Download)



-
- 3 To view a File Transfer Log of this operation, click **View Log**.

END OF STEPS



Copy Software

Purpose

To copy the software generic contained in the active or the inactive memory partition of the network element currently connected (the source) to the inactive memory partition of another network element (the destination).

TL1 Command

CPY-PRGM

Procedure

- 1 From the Node Manager menu, select **Administration > Software > Copy**.

Result: The Software Copy window is displayed (see Figure A-70, “Software Copy Window” (p. A-111)).

Figure A-70 Software Copy Window

Network Element Software Information

Active Release LXT_RELEASE_8.0.0_27a Status OK

Inactive Release LXT_RELEASE_7.0.1_5a Status OK

Copy from software area: Active Inactive

Destination TID(s) Available

#	TID(s)	NE Type
1	S4-3DWXC	Optical Add/Drop Multiplexer
2	S4-MWXC2	Mini Network Element
3	S4-DADM3	Optical Add/Drop Multiplexer
4	S4-DADM2	Optical Add/Drop Multiplexer
5	S4-RPTR2	Repeater
6	S4-RPTR1	Repeater

6 record(s) found

Enter Destination TID:

Selected Destination TID(s)

Buttons: Add >, < Remove, View Log, Submit, Close, Help

- 2 Network Element Software Information is displayed for the active and inactive releases. For **Copy from software area**, select **Active** or **Inactive** to specify the software source to be copied.
- 3 Select the copy destination from **Destination TID(s) Available** or enter the TID in the **Enter Destination TID** field.

.....

4 Click **Add** to move the selected TID(s) to the **Selected Destination TID(s)** area (maximum of 16 destination nodes). To remove a TID(s) from this area, select the TID(s) and click **Remove**.

.....

5 Click **Submit** to copy the software to the TID(s) in the destination area.

.....

6 To view a Software Copy Log of this operation, click **View Log**.

Important! In the Software Copy Log, the command completion and various events/conditions (that is, remote copy failure due to FMM busy) during the copy are recorded and accessible even if the Software Copy window is closed and then re-opened.

.....

END OF STEPS

.....



Reboot System

Purpose

To reboot the NE and if needed, swap NE software between the active and inactive areas.

TL1 Commands

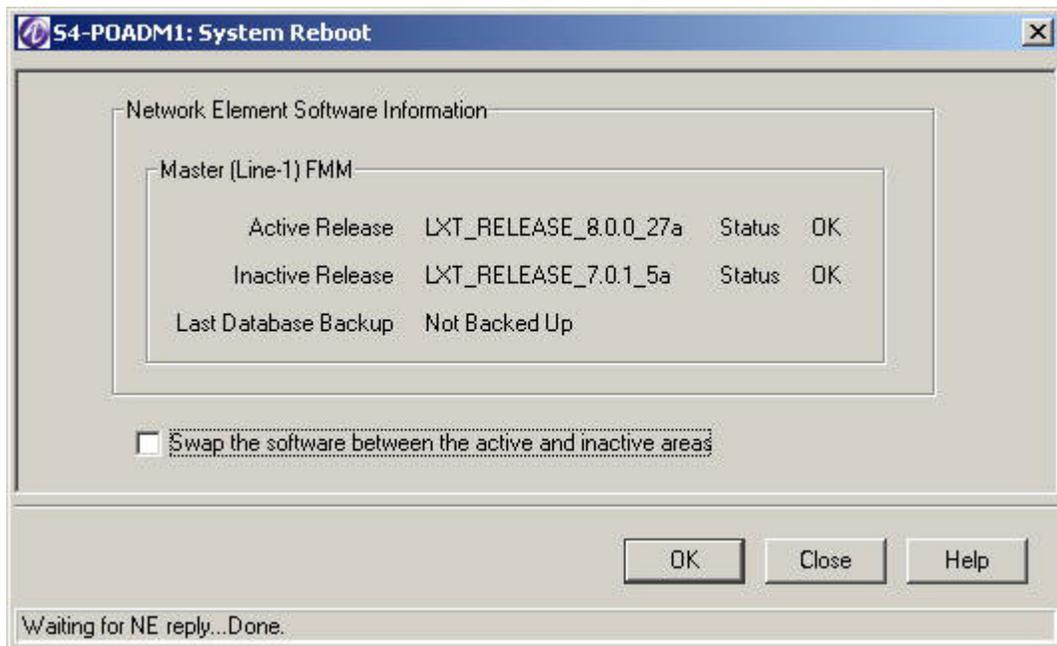
INIT-SYS

Procedure

- 1 From the Node Manager menu, select **Administration > Reboot**.

Result: The System Reboot window is displayed (see [Figure A-71, “System Reboot Window”](#) (p. A-113)).

Figure A-71 System Reboot Window



- 2 Network Element Software Information is displayed for the active and inactive software releases. To **Swap the software between the active and inactive areas**, click this box.

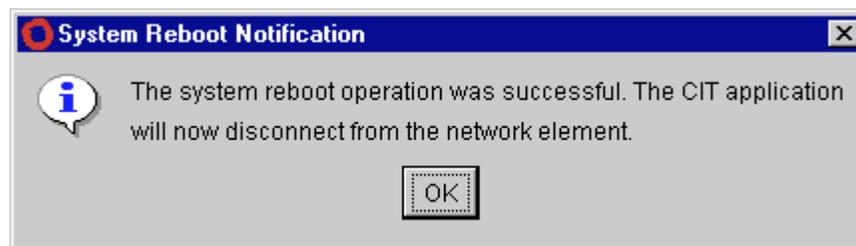
-
- 3 Click **OK**.

Result: The following warning is displayed (see [Figure A-69, “Warning Confirmation Window \(Reboot NE After Software Download\)”](#) (p. A-109)).

- 4 Click **Yes**.

Result: The following message is displayed (see [Figure A-72, “Warning Confirmation Window \(System Reboot\)”](#) (p. A-114)).

Figure A-72 Warning Confirmation Window (System Reboot)



-
- 5 Click **OK**.

Result: The Node Manager is disconnected.

END OF STEPS



Access Help Topics

Purpose

To view or search for help topics.

Procedure

- 1 From the Craft Interface Launcher menu or Node Manager menu, select **Help > Help Topics**.

Result: If using the Craft Interface Launcher, the CIT Help window is displayed (see [Figure A-73, “CIT Help”](#) (p. A-115)). If using the Node Manager, the Help Topics window is displayed (see [Figure A-74, “Help Topics”](#) (p. A-116)).

Figure A-73 CIT Help

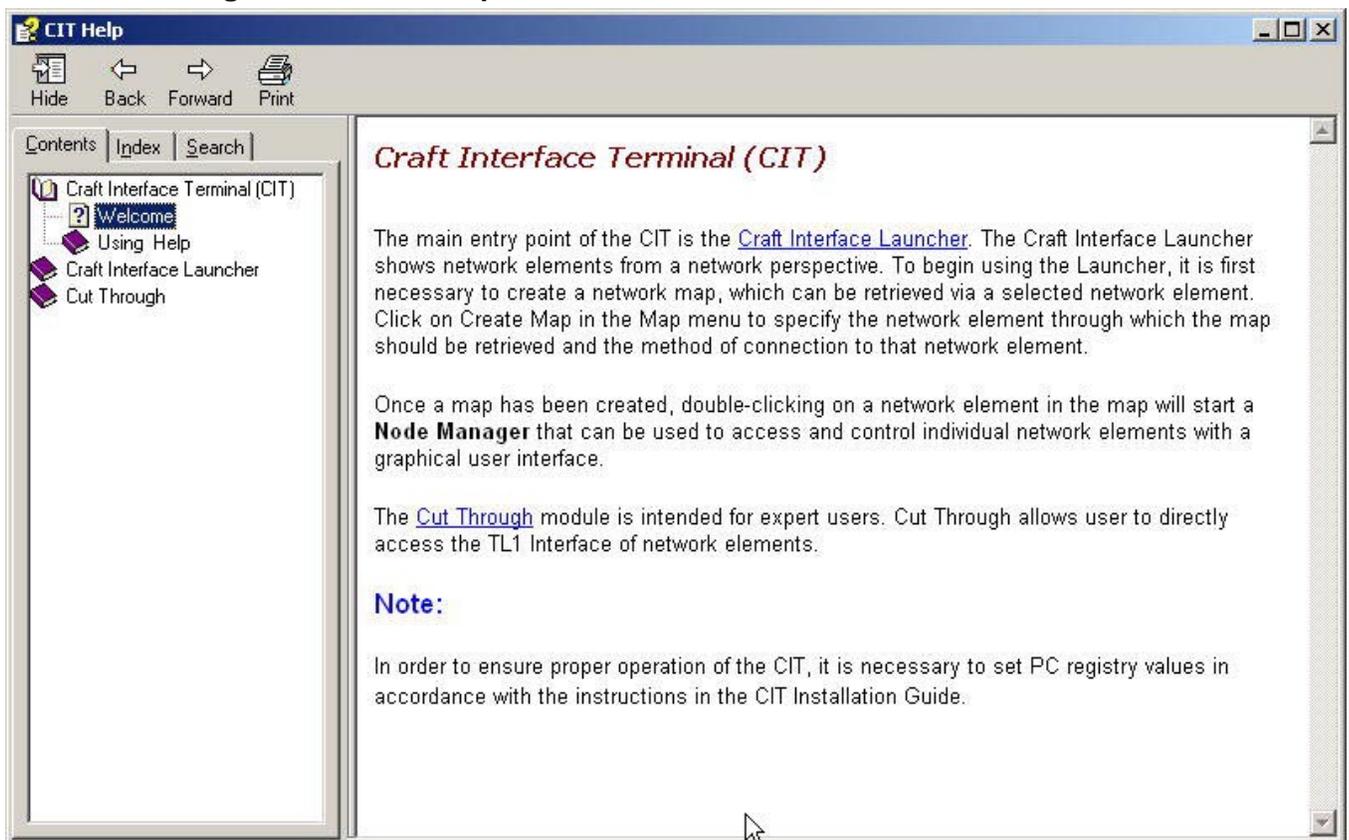
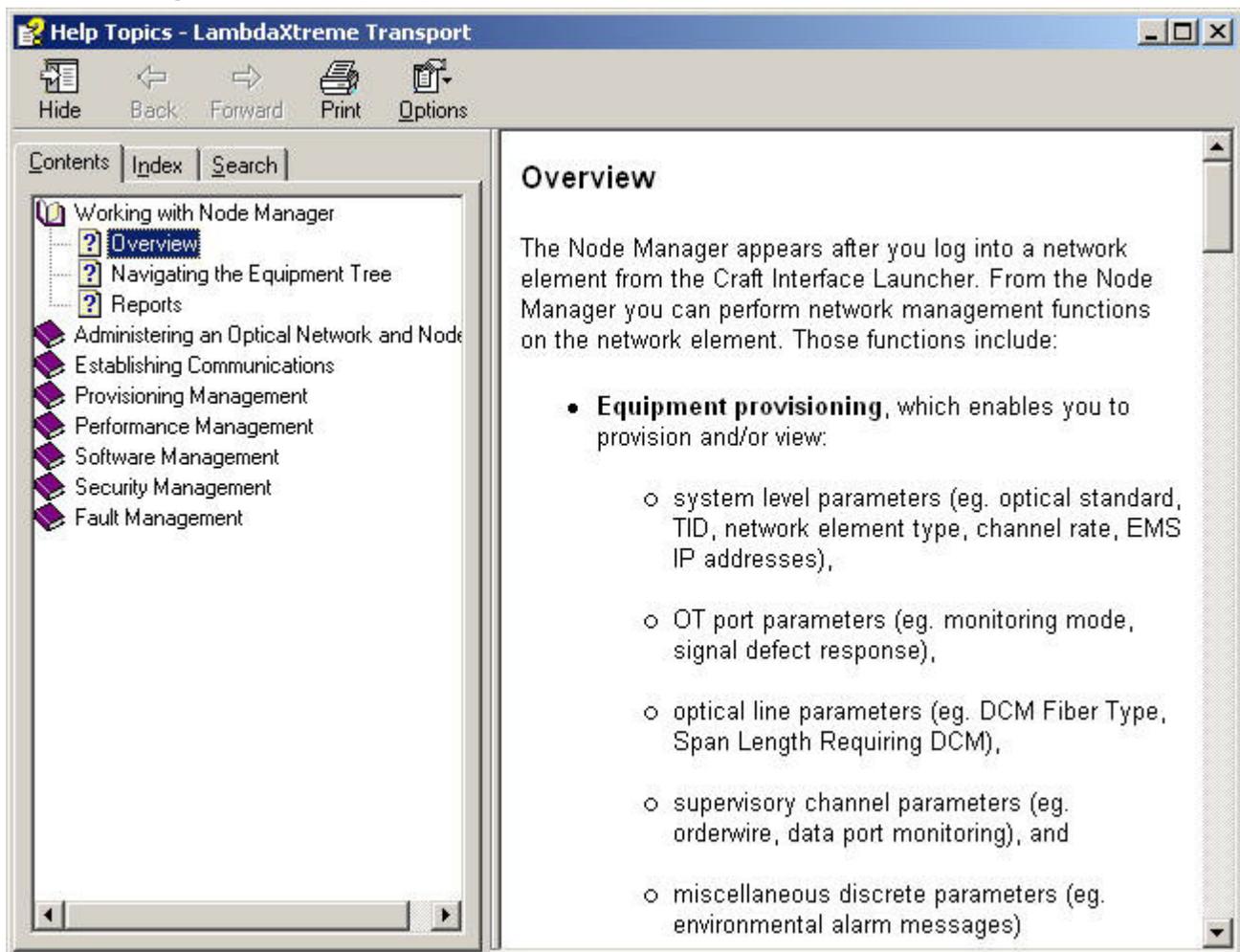


Figure A-74 Help Topics



2 To find a help topic, click one of the following tabs:

- **Contents** - The table of contents offers an expandable list of available topics. Click on a main topic to expand it, then click on the desired topic to display it.
- **Index** - The index provides a list of key words and subject names. Select an index term and click **Display**.
- **Search** - Displays every occurrence of a word or phrase contained in the help file. Type the keyword and click **List Topics**. Select the desired topic and click **Display**.

END OF STEPS



Access the Equipment View in Node Manager

Purpose

Display a graphical representation of the equipment selected in the Equipment Tree.

TL1 Command

RTRV-EQPT

Procedure

- 1 Click **Equipment** on the Node Manager toolbar.

Important! The Equipment View is the default view that is displayed when you log into a node.

Result: The Equipment View is displayed in the display panel of the Node Manager.

- 2 When equipment is selected in the Equipment Tree, the Equipment View displays a graphical representation (when available) of the selected equipment.

Important! When System or Bay level equipment (see [“NE Equipment Tree” \(p. 8-8\)](#)) is graphically displayed, the user can click on specific equipment in the graphic to display it. If the selected equipment is open (expanded) in the Equipment Tree, it is displayed with a single click. If the equipment is not open in the Equipment Tree, double-click to display it. As more detailed equipment is selected in the Equipment Tree hierarchy, the equipment becomes outlined in the display in order to identify it.

Result: Figure A-75, “Equipment Display” (p. A-118) is an example of an equipment graphical display.

Figure A-75 Equipment Display

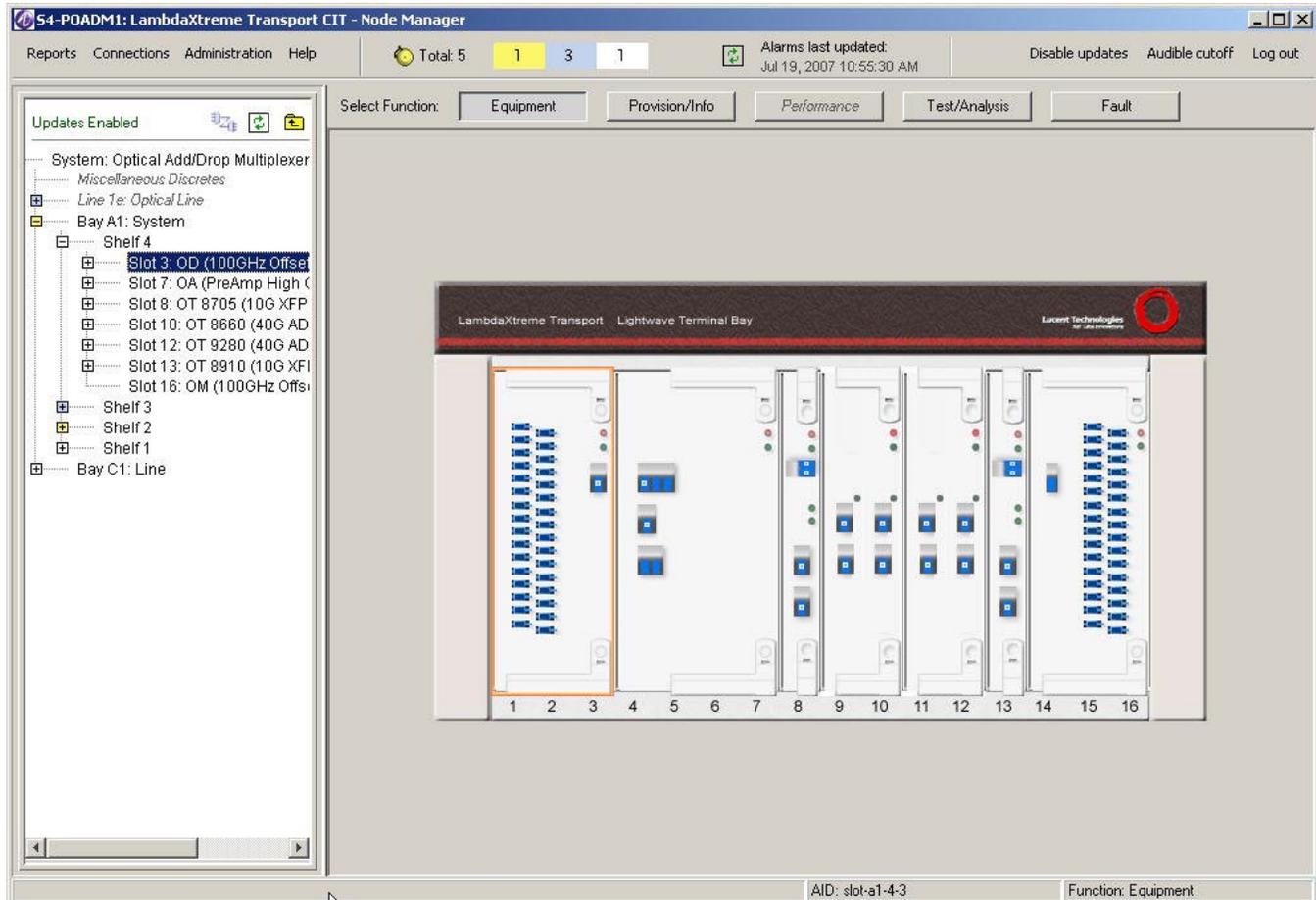
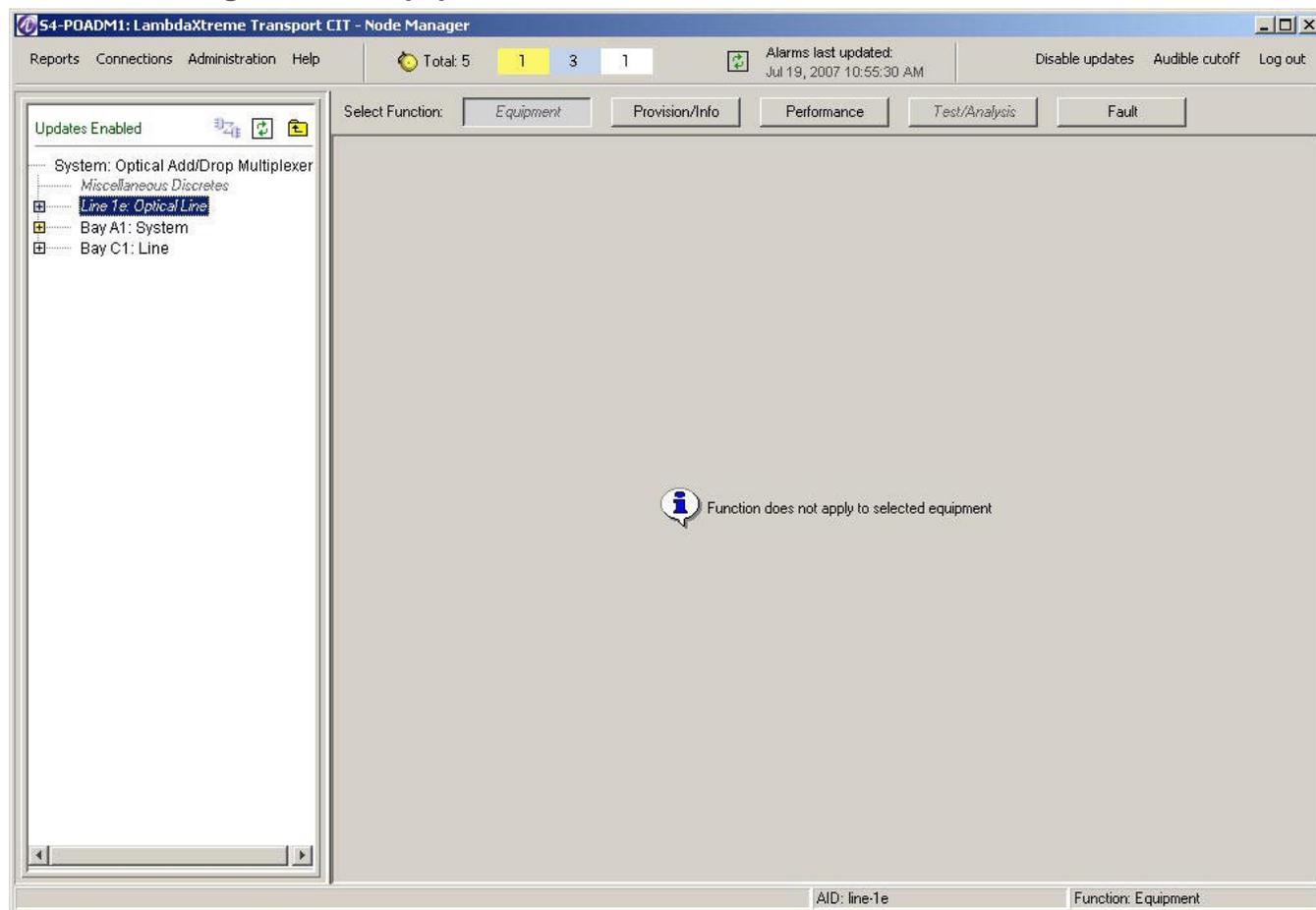


Figure A-76, “Equipment Window” (p. A-119) is displayed when no graphical representation is available.

Figure A-76 Equipment Window



END OF STEPS



Access the Provision/Info View in Node Manager

Purpose

Set or view provisioning parameters for the NE or for the piece of equipment selected in the Equipment Tree.

Procedure

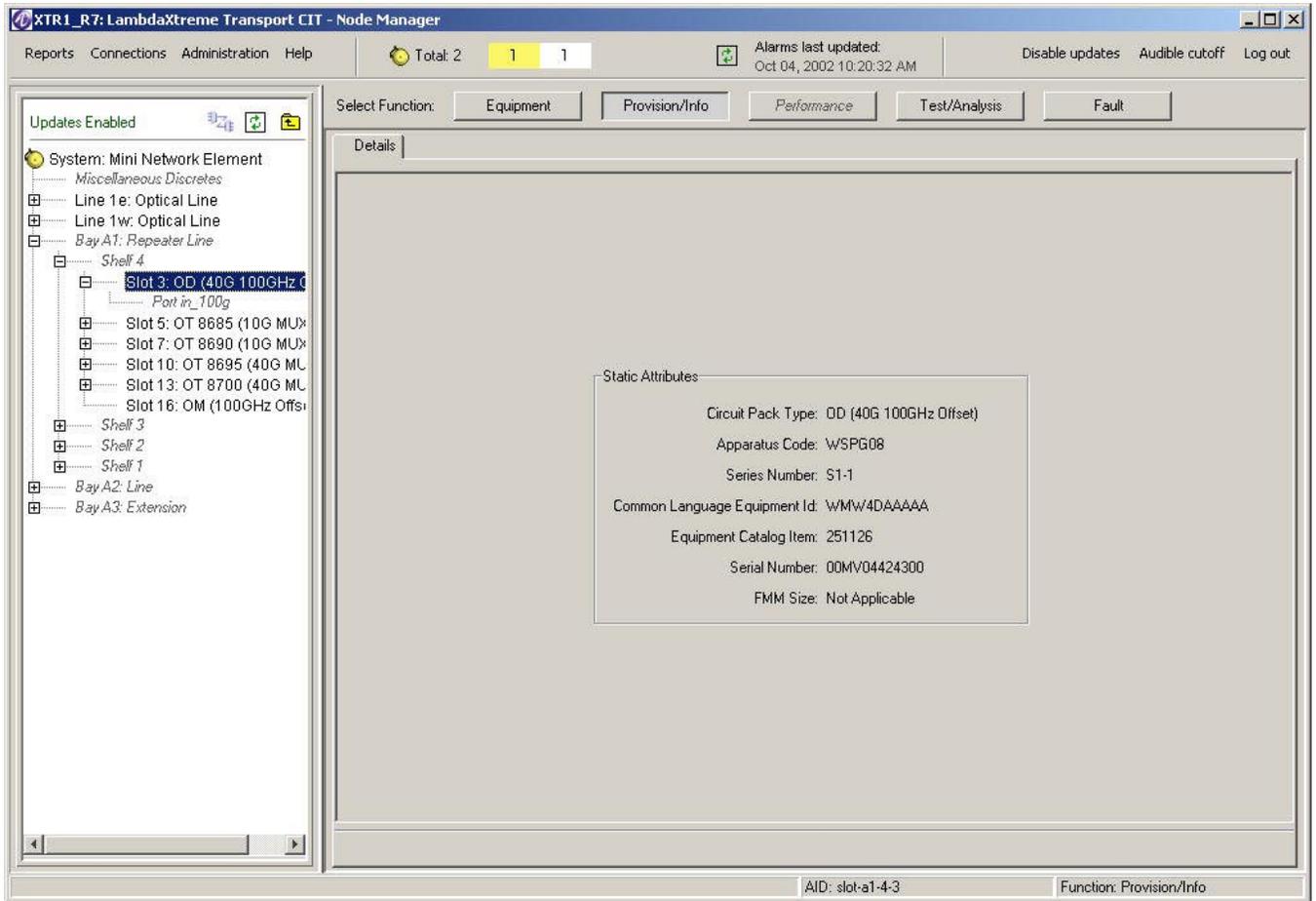
- 1 Click **Provision/Info** on the Node Manager toolbar.

Result: The Provision/Info View is displayed in the display panel of the Node Manager.

- 2 As equipment is selected in the Equipment Tree, the Provision/Info View offers details and/or other Provision/Info options (when available) for the selected equipment.

Result: Figure A-77, “The Provision/Info View” (p. A-121) is an example:

Figure A-77 The Provision/Info View



-
- 3 The available option(s) for the selected equipment are chosen from the tab(s) at the top of the display panel.

END OF STEPS

.....



View System Details

Purpose

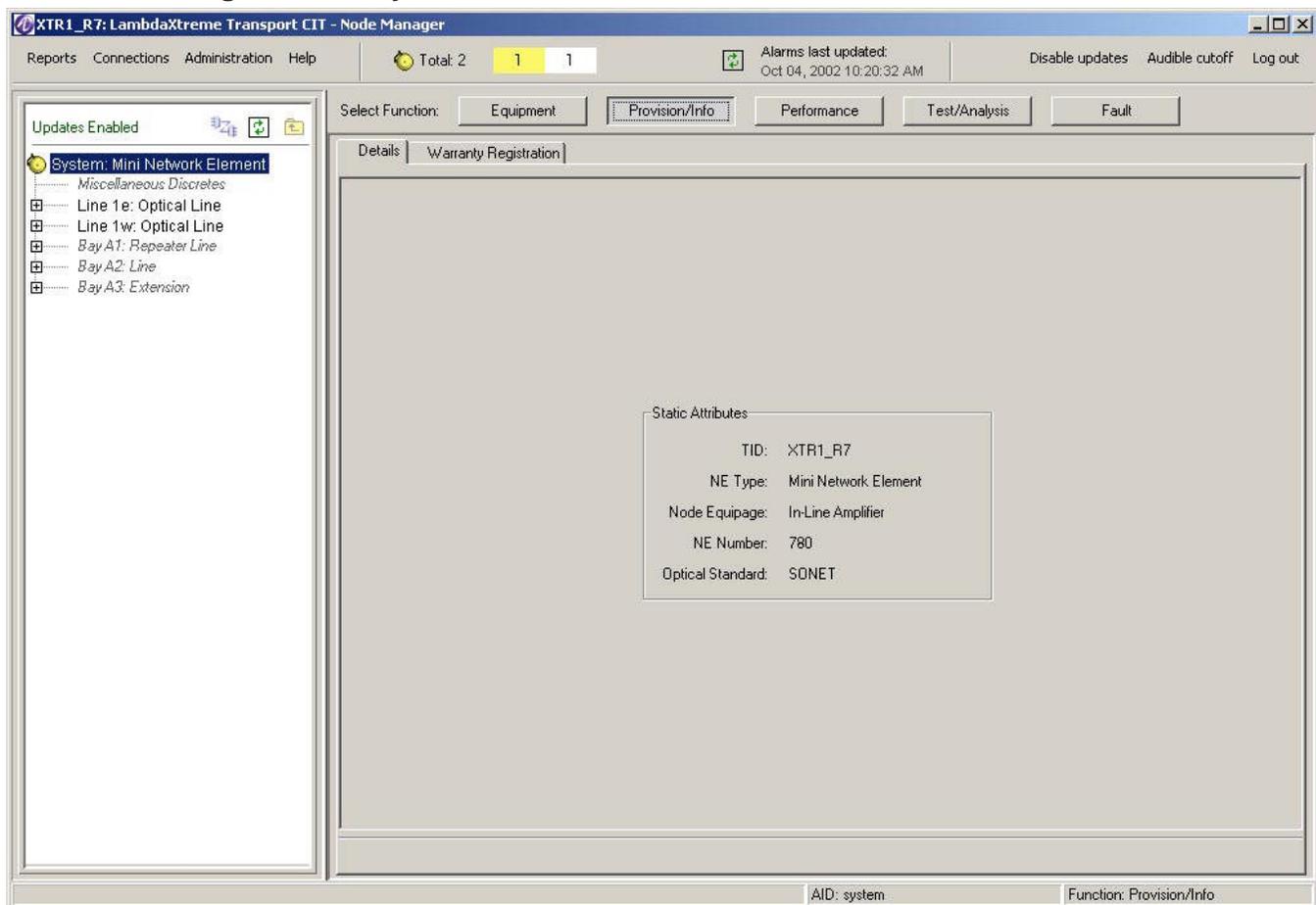
Display the provisioned information for the NE.

Procedure

- 1 [“Access the Provision/Info View in Node Manager”](#) (p. A-120).
 - 2 In the Equipment Tree, select the System (highest level). Click on the **Details** tab in the display panel.
-

Result: The System Details window is displayed (see [Figure A-78, “System Details Window”](#) (p. A-122)).

Figure A-78 System Details Window



END OF STEPS



Provision Optical Line Settings

Purpose

Provision the parameters associated with an optical line.

TL1 Commands

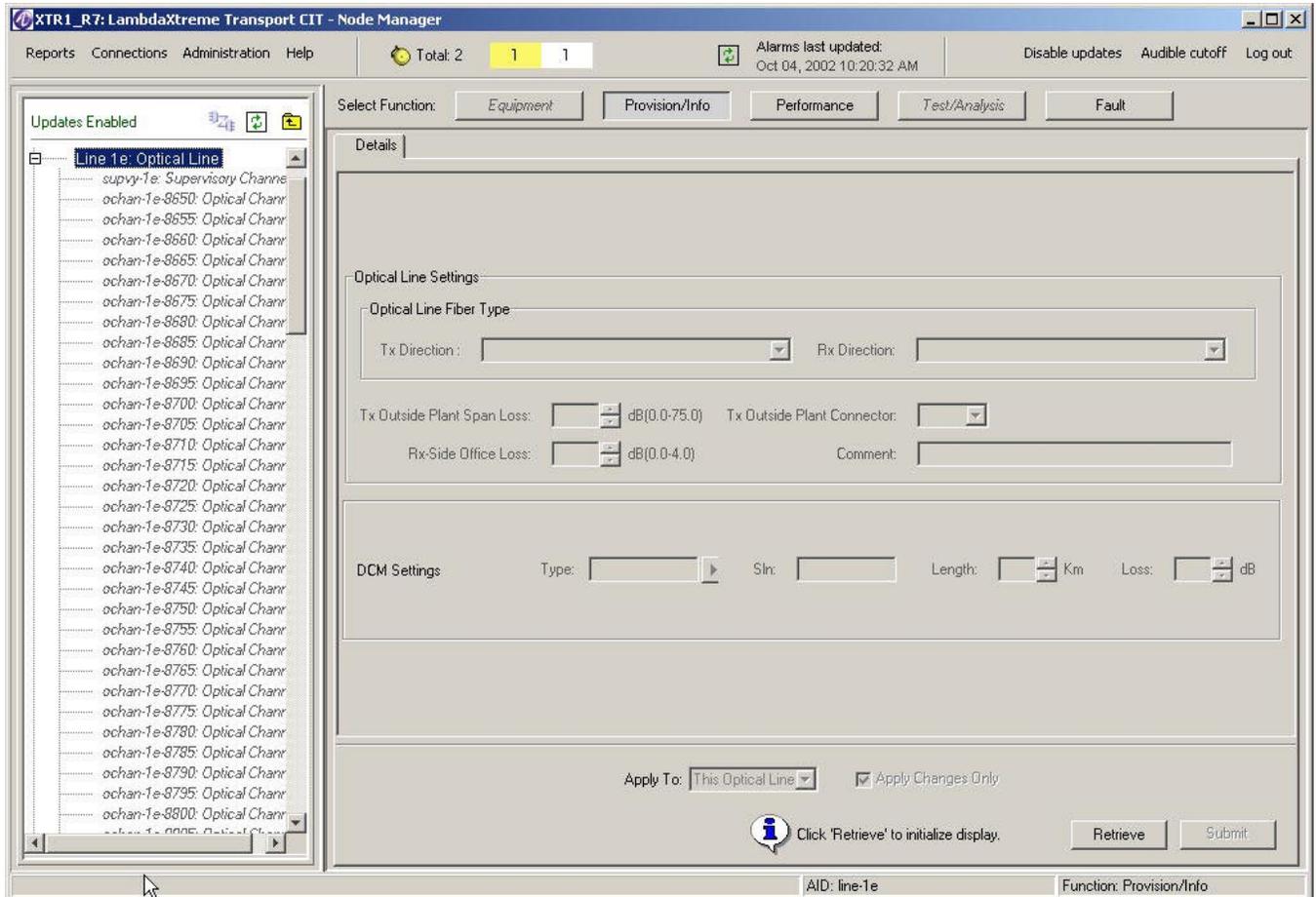
- ENT-OLPP
- RTRV-OLPP

Procedure

-
- 1 [“Access the Provision/Info View in Node Manager”](#) (p. A-120).
 - 2 From the Equipment Tree, select the desired Optical Line.
-

Result: The Optical Line Details window is displayed (see [Figure A-79, “Optical Line Details Window”](#) (p. A-125)).

Figure A-79 Optical Line Details Window



Note: The provisionable parameters for DCM Settings in this window will vary depending on the NE type (OADM or Repeater). For further information, see [“DCM Settings”](#) (p. 5-14).

- 3 Click **Retrieve** to display the currently provisioned data. To provision settings, select the desired values and click **Submit**.

END OF STEPS



View Circuit Pack Details

Purpose

Display the equipage information for a circuit pack.

TL1 Command

RTRV - EQPT

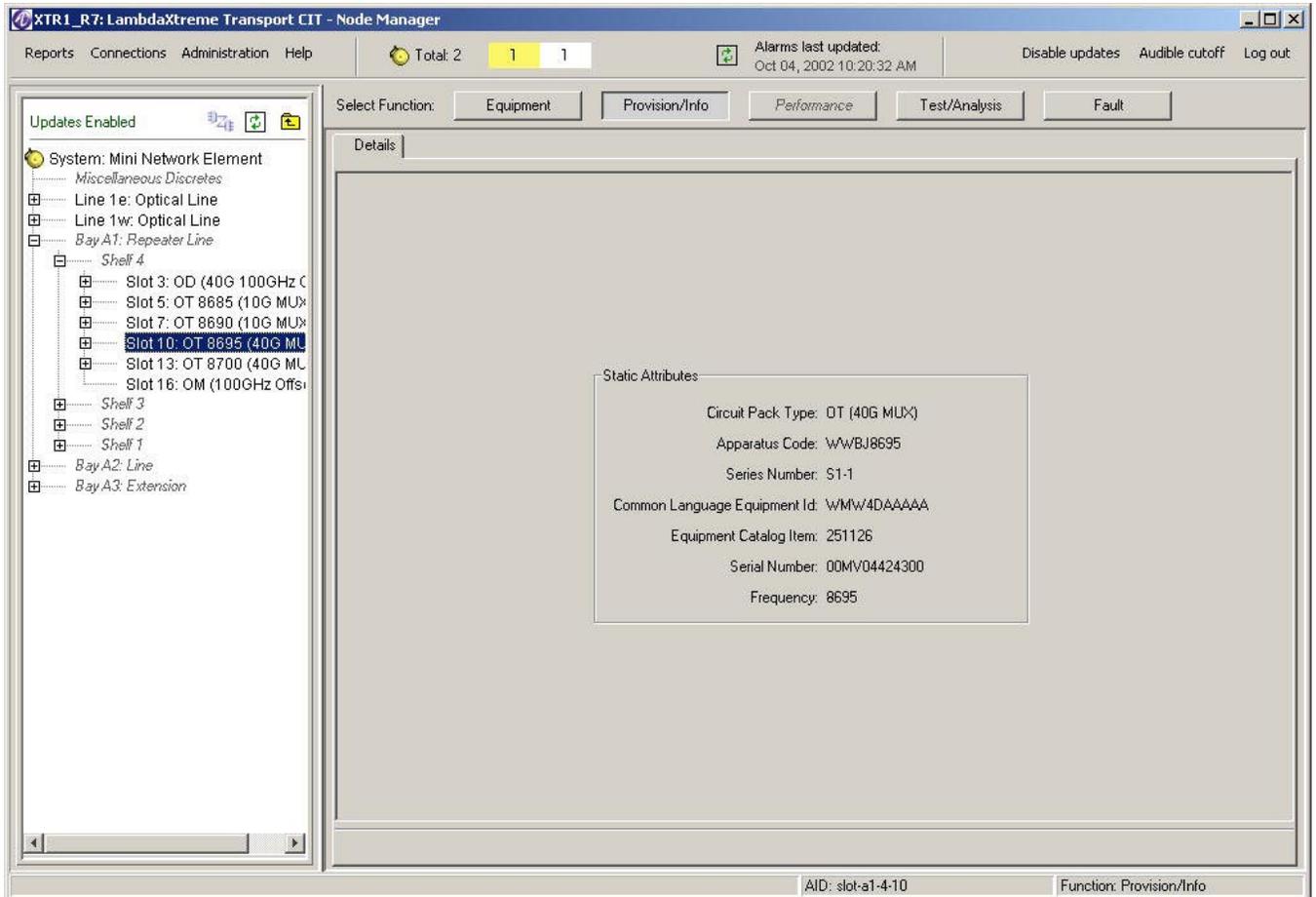
Procedure

- 1 Complete the steps in the procedure, [“Access the Provision/Info View in Node Manager”](#) (p. A-120).

- 2 Select the desired circuit pack slot in the Equipment Tree.

Result: The Circuit Pack Details window is displayed (see [Figure A-80, “Circuit Pack Details Window”](#) (p. A-127)).

Figure A-80 Circuit Pack Details Window



END OF STEPS



Provision Mode for OT Client Side Input Port

Purpose

Set the provisionable parameters of the OT Client In Port including Port Mode, Service Ready State, AIS Detect, Client Signal Type, and Mapping Mode.

Important! Client Signal Type is only applicable for the in_add port of G.709 OTs. Mapping Mode is only valid for the in_add port of G.709 40G Add-Drop OTs.

TL1 Commands

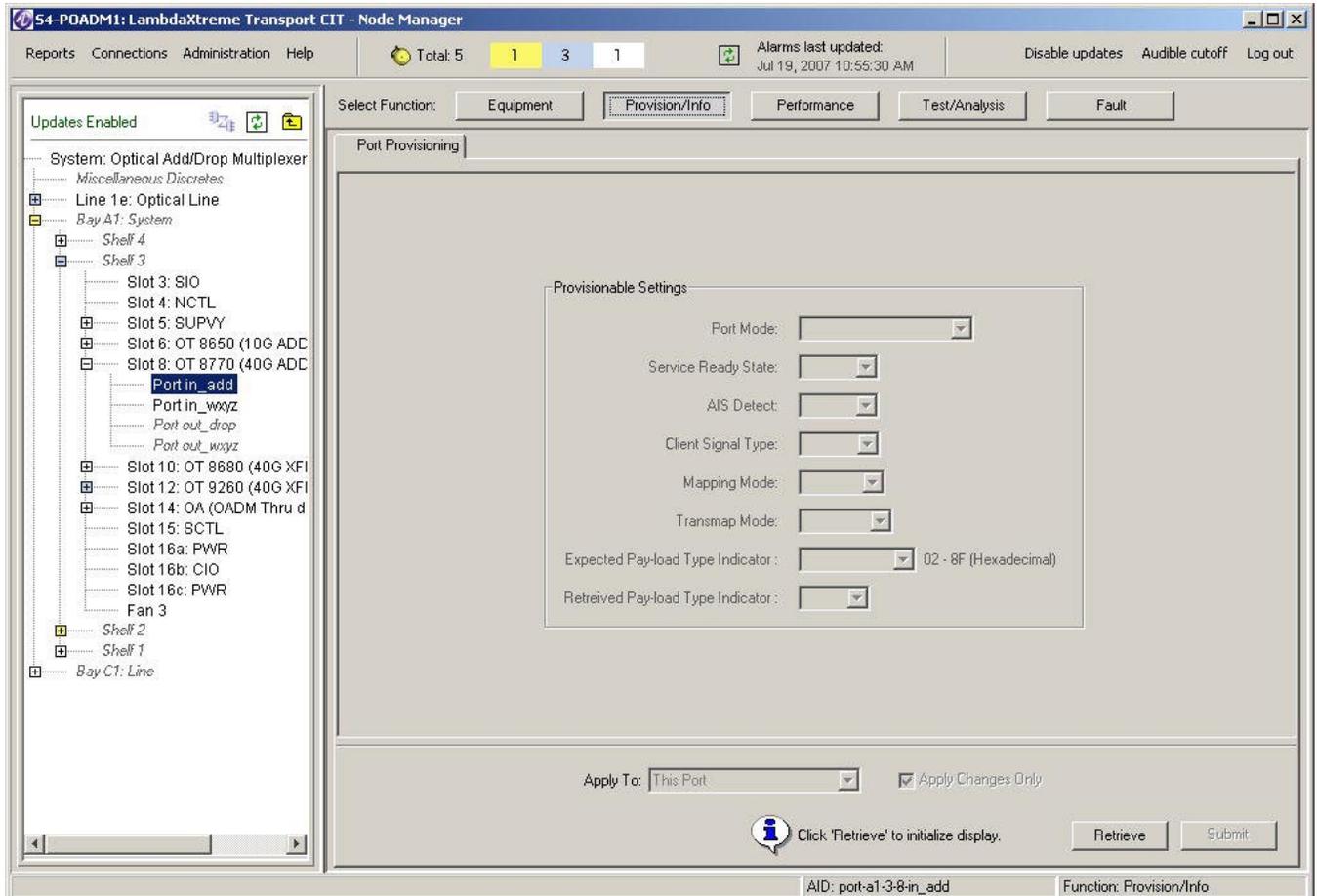
- ENT-OTPS
- RTRV-OTPS
- RTRV-STATE

Procedure

- 1 Complete the steps in the procedure, [“Access the Provision/Info View in Node Manager”](#) (p. A-120).
 - 2 From the Equipment Tree, select the OT Client In Port to be provisioned.
-

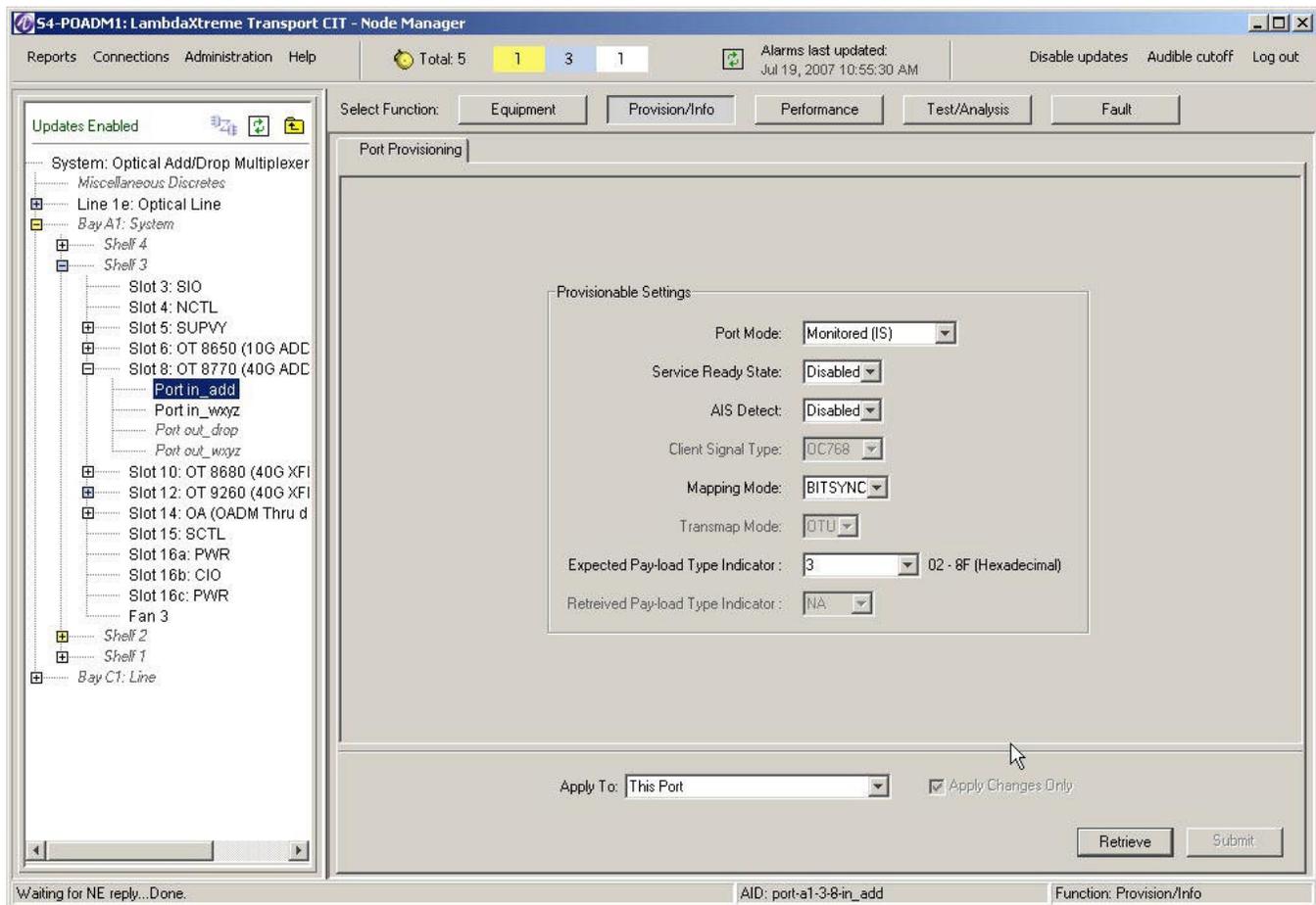
Result: The Port Provisioning window is displayed (see [Figure A-81, “Port Provisioning Window \(No Data\)”](#) (p. A-129)).

Figure A-81 Port Provisioning Window (No Data)



- 3 Click **Retrieve**. The currently provisioned data is displayed (see [Figure A-82, “Port Provisioning Window \(With Data\)”](#) (p. A-130)).

Figure A-82 Port Provisioning Window (With Data)

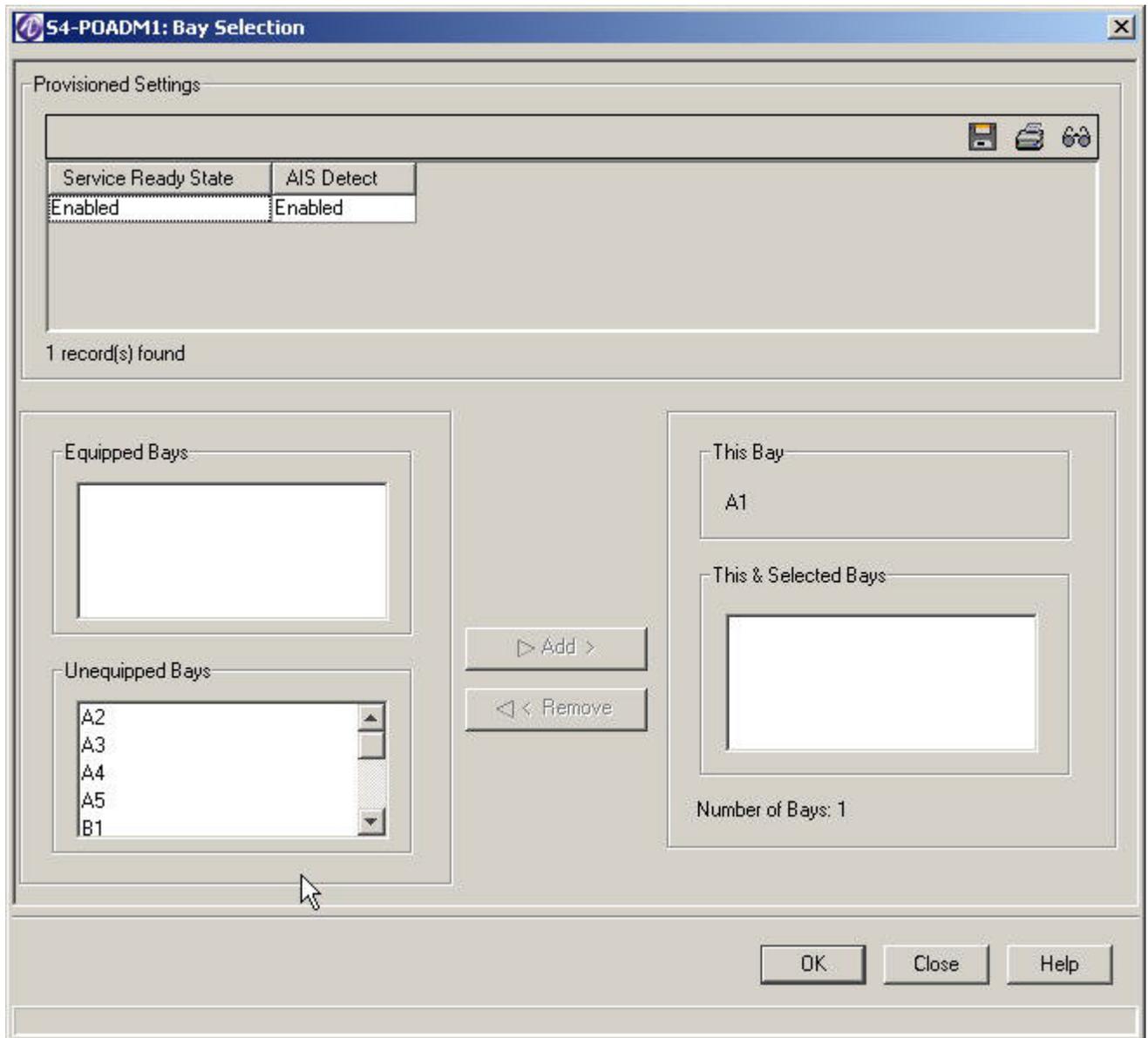


- 4 Select the provisionable settings from the drop-down lists.

Important! If the Port Mode is set to **Not Monitored (OOS)**, the port cannot be auto-discovered or auto-provisioned.

- 5 Make the appropriate selection from the **Apply to:** drop-down menu and click **Submit**.

Figure A-83 Bay Selection Window



Important! If **All Client In Ports, This & Selected Bays** is selected, the Bay Selection window is displayed (see [Figure A-83, “Bay Selection Window”](#) (p. A-131)).

- 6 Select the appropriate Equipped/Unequipped Bay(s) to which the settings are to be applied. Click **Add** to move the selected bay(s) to the **Selected Bays** area. To remove a bay(s) from this area, select the bay(s), then click **Remove**.

-
- 7 Click **OK** to apply the settings. A completion indicator (checkmark) is displayed beside each selected bay as the respective operation is completed.

.....
E N D O F S T E P S
.....



Provision Monitoring Status of SIO Ports

Purpose

To select SIO port(s) to be monitored for LAN failure (link integrity failure).

TL1 Command

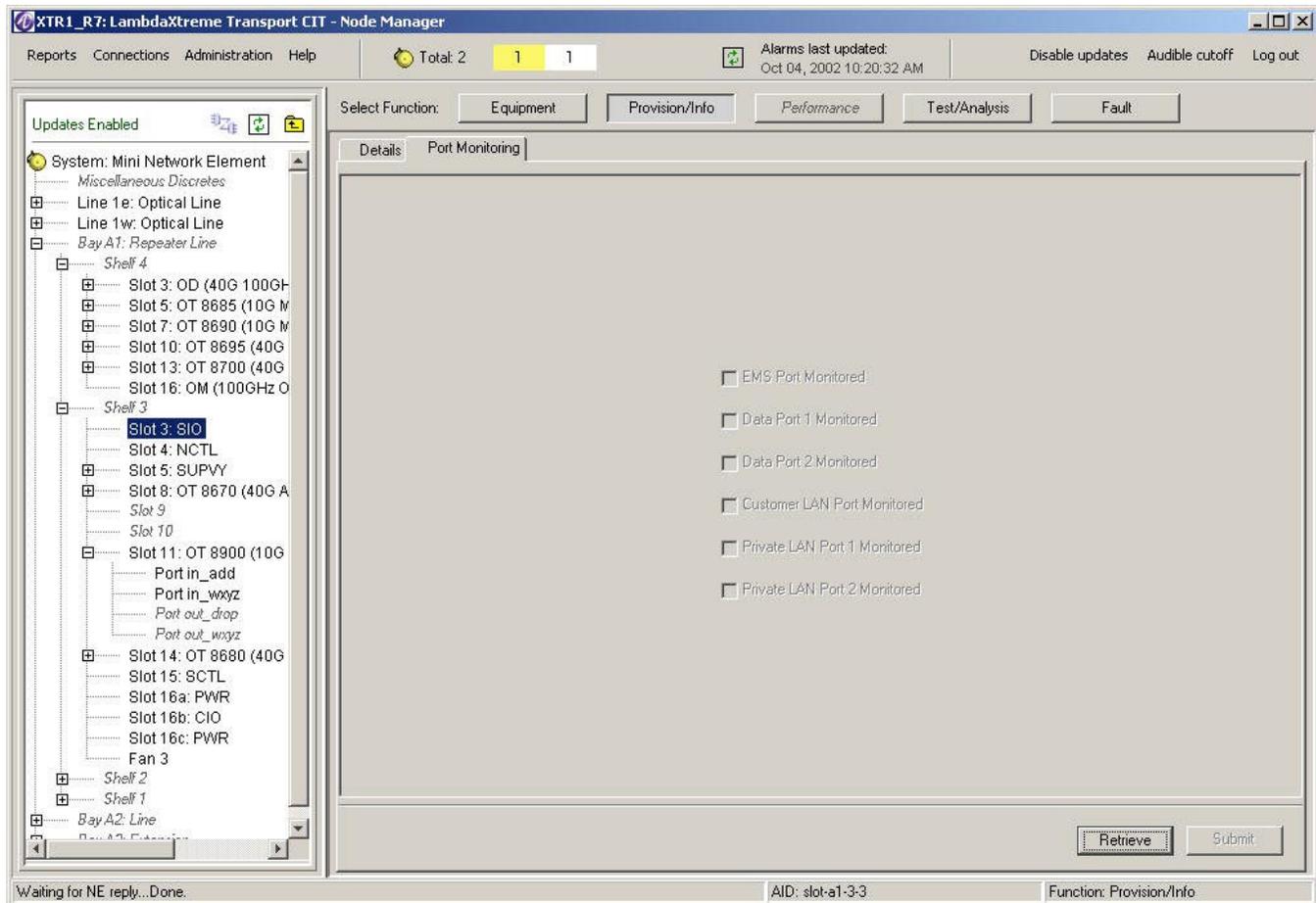
RTRV-DPM-OTPS

Procedure

- 1 Complete the steps in the procedure, [“Access the Provision/Info View in Node Manager”](#) (p. A-120).
 - 2 From the Equipment Tree, select the slot containing the SIO Pack to be provisioned. Click on the **Port Monitoring** tab in the display panel.
-

Result: The SIO Pack Port Monitoring window is displayed (see [Figure A-84](#), “SIO Pack Port Monitoring Window” (p. A-134)).

Figure A-84 SIO Pack Port Monitoring Window



- 3 Click **Retrieve** to display the currently provisioned data. Make the appropriate selections, then click **Submit**.

END OF STEPS



Reboot SCTL Circuit Pack

Purpose

To initialize (soft reset) the SCTL circuit pack.

TL1 Command

INIT-EQPT

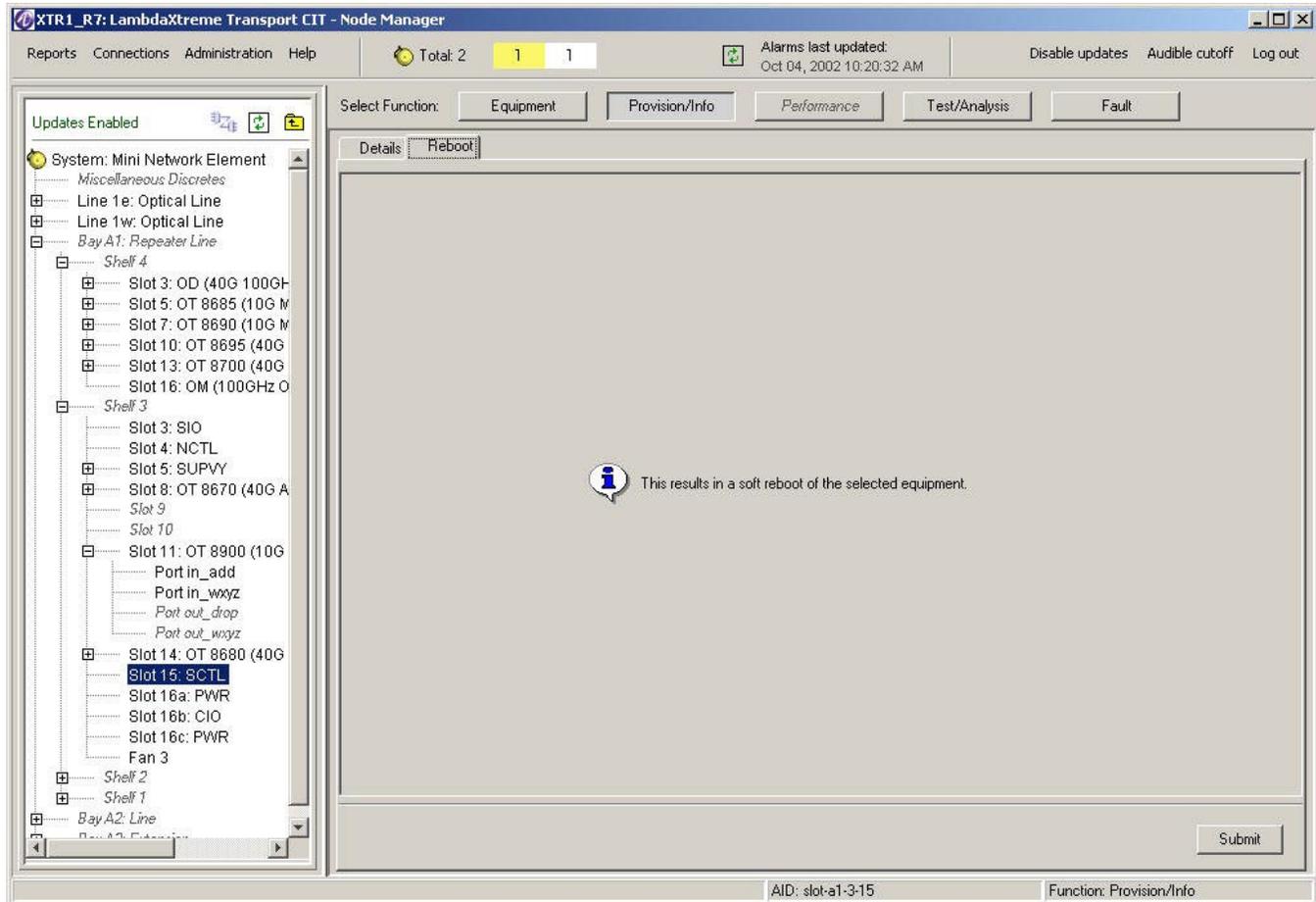
Important! This procedure may affect APR during shelf controller start-up.

Procedure

- 1 Complete the steps in the procedure, [“Access the Provision/Info View in Node Manager”](#) (p. A-120).
 - 2 From the Equipment Tree, select the slot containing the SCTL pack to be rebooted. Click on the **Reboot** tab in the display panel.
-

Result: The Circuit Pack Reboot window is displayed (see [Figure A-85, “Circuit Pack Reboot Window”](#) (p. A-136)).

Figure A-85 Circuit Pack Reboot Window



- 3 Click **Submit** to reboot (soft reset) the SCTL circuit pack.

END OF STEPS



Provision OT Line In Error Response

Purpose

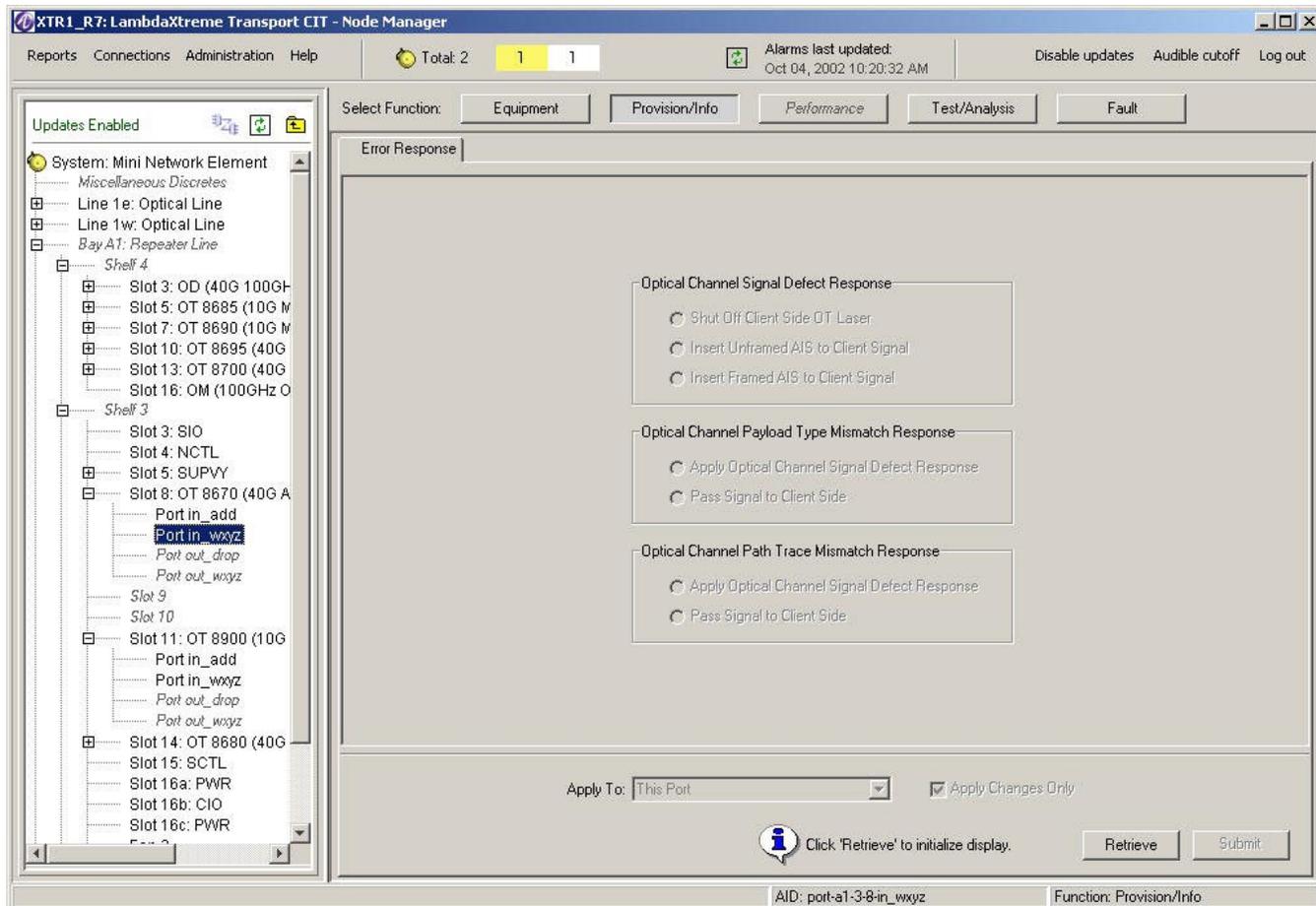
To determine how an OT responds when various signal errors are detected.

Procedure

- 1 Complete the steps in the procedure, [“Access the Provision/Info View in Node Manager”](#) (p. A-120).
- 2 From the Equipment Tree, select the Port to be provisioned (*Port in_wxyz* selected in [Figure A-86, “OT Line In Error Response Window”](#) (p. A-138)).

Result: The OT Line In Error Response window is displayed (see [Figure A-86](#), “OT Line In Error Response Window” (p. A-138)).

Figure A-86 OT Line In Error Response Window



Note: The Optical Channel Signal Defect Response is not applicable to the G.709 MUX OT, and is not shown for the line port of the G.709 MUX OT pack.

- 3 Click **Retrieve** to display the currently provisioned data. Make the appropriate selections, then click **Submit**.

END OF STEPS



Provision OT XFP Line In

Purpose

Set parameters for Line In ports on OT XFP packs.

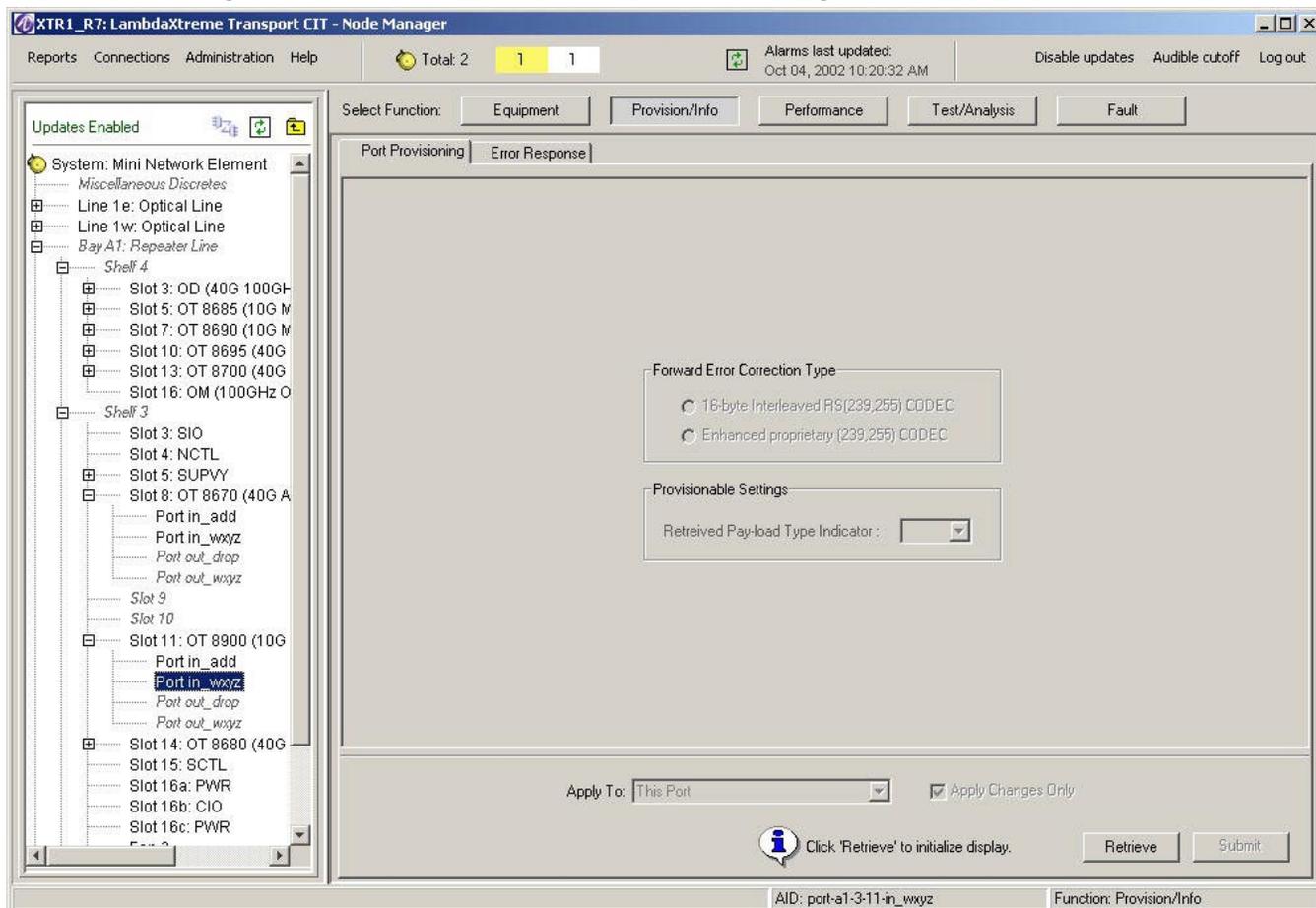
Important! This is only applicable to the G.709 10G OT.

Procedure

- 1 Complete the steps in the procedure, [“Access the Provision/Info View in Node Manager”](#) (p. A-120).
- 2 From the Equipment Tree, select the Port to be provisioned (*10G XFP Port in_wxyz* selected in [Figure A-87, “OT XFP Line In Port Provisioning Window”](#) (p. A-140)).

Result: The OT XFP Line In Port Provisioning window is displayed (see [Figure A-87](#), “OT XFP Line In Port Provisioning Window” (p. A-140)).

Figure A-87 OT XFP Line In Port Provisioning Window



- 3 Click **Retrieve** to display the currently provisioned data. Make the appropriate selections, then click **Submit**.

END OF STEPS



Provision UPOP/OP1P1 Circuit Pack

Purpose

Allows you to retrieve and provision the working port selection and switch mode on the UPOP/OP1P1 circuit pack.

TL1 Commands

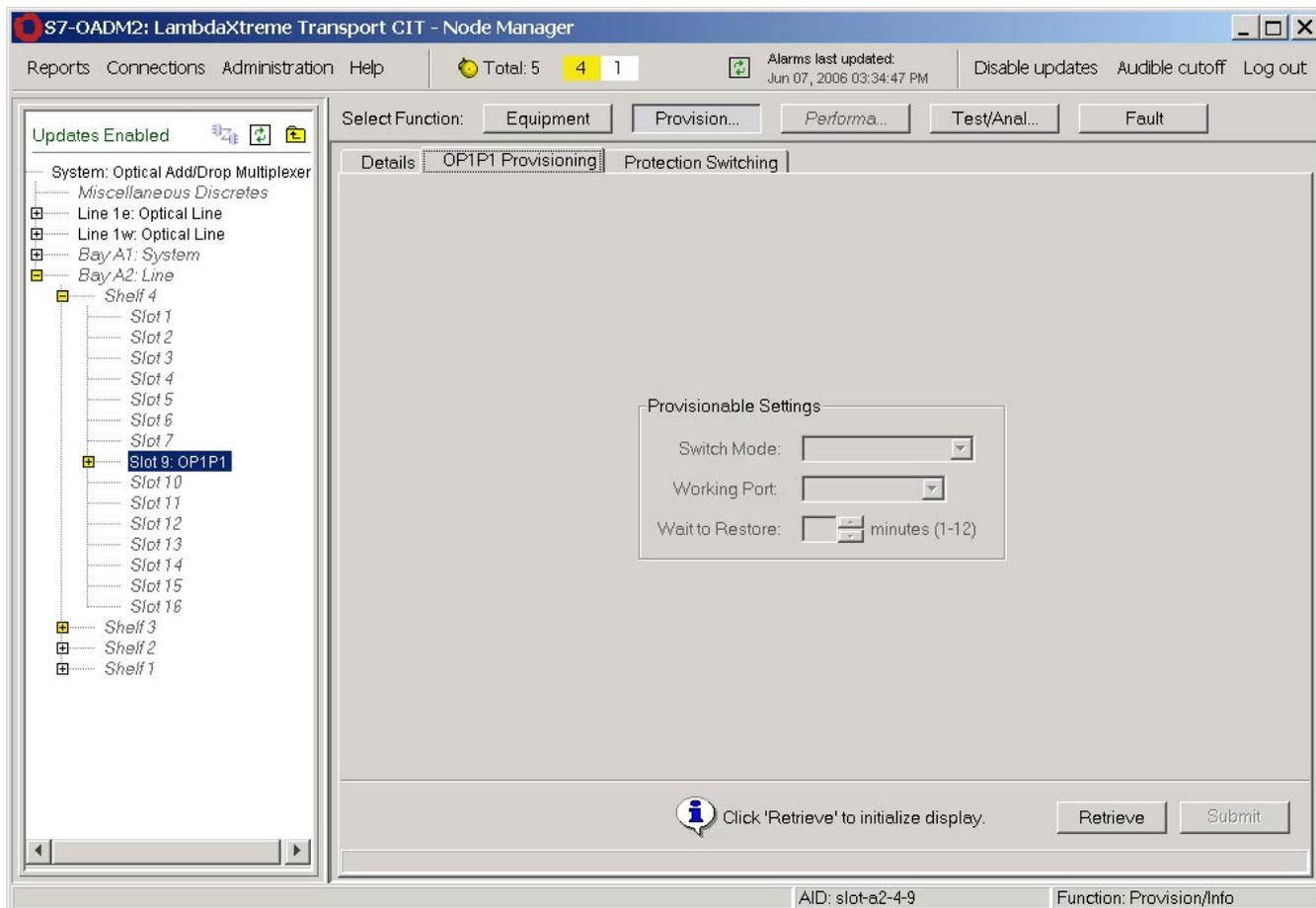
- ENT-PROTNSW
- OPR-PROTNSW
- REPT-PROTNSW
- RLS-PROTNSW
- RTRV-PROTNSW

Procedure

-
- 1 Complete the steps in the procedure, [“Access the Provision/Info View in Node Manager”](#) (p. A-120).
-
- 2 From the Equipment Tree, select the UPOP/OP1P1 pack to be provisioned. Click on the **OP1P1 Provisioning** tab in the display panel.

Result: The UPOP/OP1P1 Provisioning window is displayed (see [Figure A-88](#), “UPOP/OP1P1 Provisioning Window” (p. A-142)).

Figure A-88 UPOP/OP1P1 Provisioning Window



- 3 Click **Retrieve** to obtain the current settings. To change the provisionable settings, select the new values, then click **Submit**.

END OF STEPS



Provision UPOP/OP1P1 Protection Switching

Purpose

Allows you to retrieve and provision the switch state and the active switch position on the UPOP/OP1P1 protection switch pack.

TL1 Commands

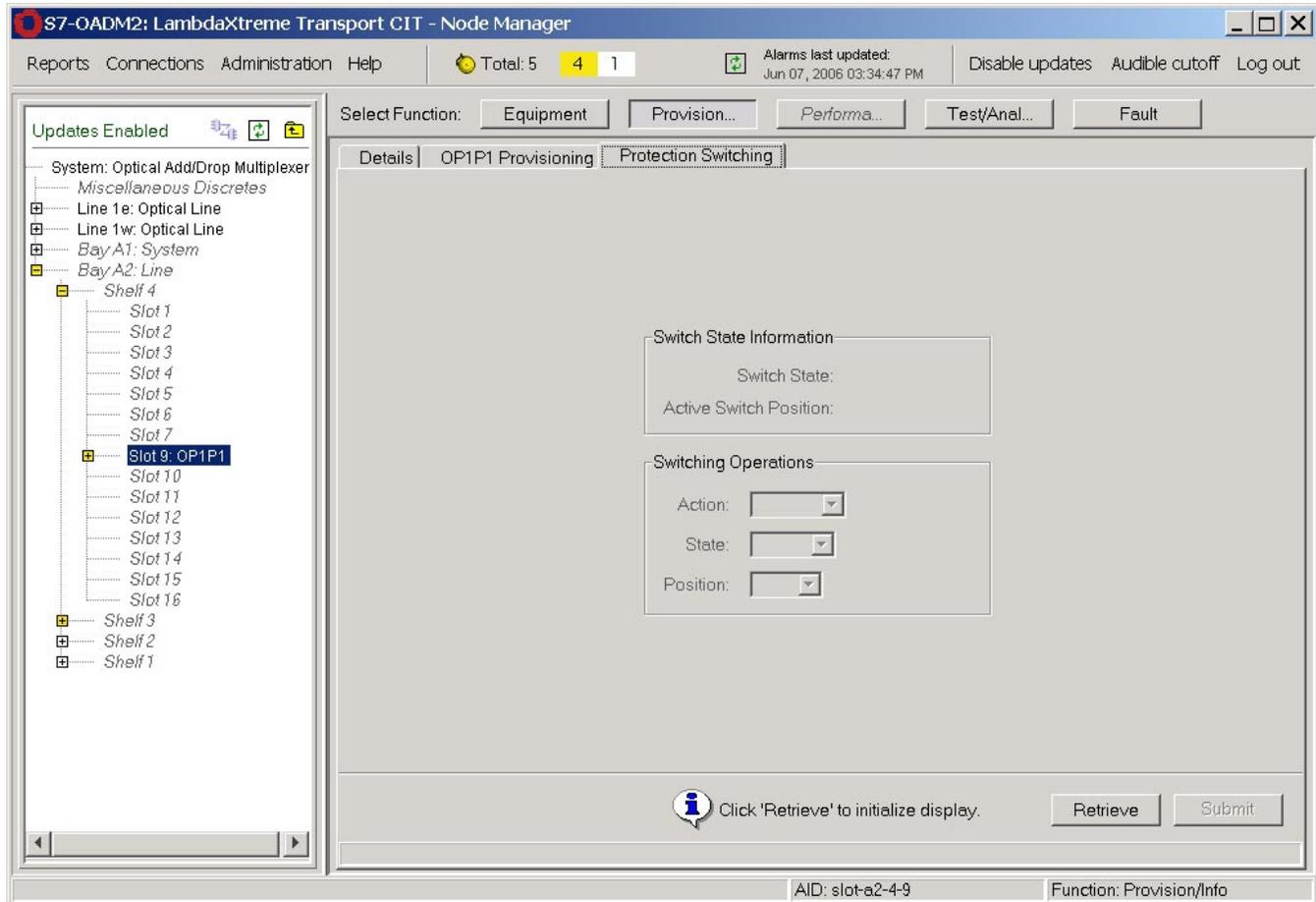
- ENT-PROTNSW
- OPR-PROTNSW
- REPT-PROTNSW
- RLS-PROTNSW
- RTRV-PROTNSW

Procedure

-
- 1 [“Access the Provision/Info View in Node Manager” \(p. A-120\)](#).
-
- 2 From the Equipment Tree, select the UPOP/OP1P1 pack to be provisioned. Click on the **Protection Switching** tab in the display panel.

Result: The Protection Switching window is displayed (see [Figure A-89](#), “Protection Switching Window” (p. A-144)).

Figure A-89 Protection Switching Window



-
- 3** Click **Retrieve** to obtain the present switch state and the active switch position. Make the appropriate selections, then click **Submit**.
- When Switch State = Inhibit Switch, protection switching cannot occur. You must select Action = Release to unfreeze the protection switching mechanism
 - When you want to change the Switch State to Forced Switch (FS), you must select state = Forced and also specify which position or port that you want to force the optical switch to use. The port choices are either L1_IN or L2_IN.
 - When executing a Manual Switch request, the Switch State must be Auto Switch (AS). That is, it is a prerequisite that the Switch State be Auto Switch before a request to perform a manual protection switch is made. You must specify the position or port that you want the optical switch to use when a manual protection switch request is made. The port choices are either L1_IN or L2_IN.

END OF STEPS



Access the Performance View in Node Manager

Purpose

To execute performance management functions to monitor transmission quality and equipment health.

TL1 Commands

- RTRV-DPM-OTPS
- RTRV-PM-OCHAN
- RTRV-PM-OLINE
- RTRV-PM-SUPR

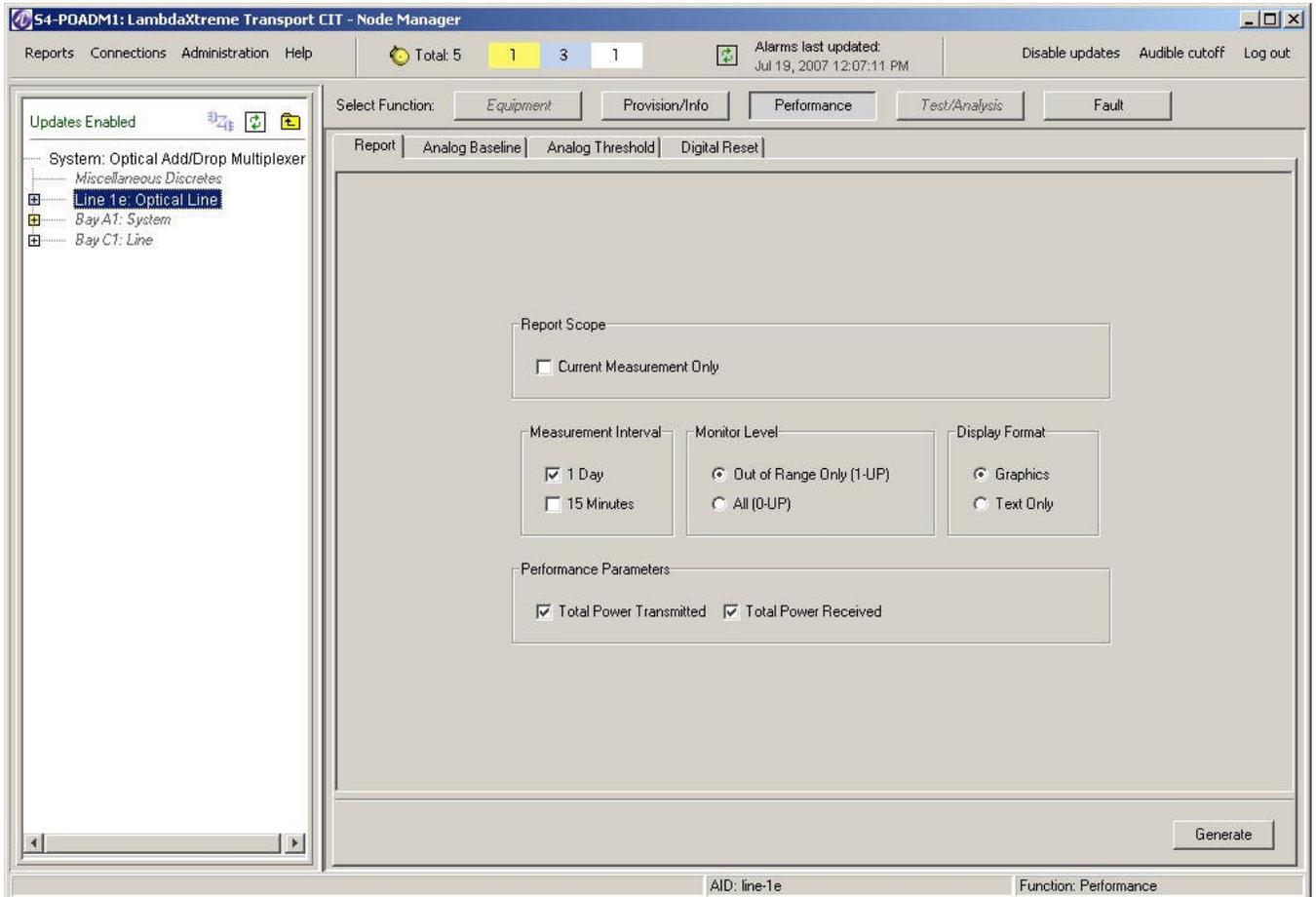
Procedure

- 1 Click **Performance** on the Node Manager toolbar.
Result: The Performance View is displayed in the display panel of the Node Manager.

- 2 When equipment is selected in the Equipment Tree, the Performance View displays available Performance Management options (if any) for the selected equipment.

Result: The following is an example (see [Figure A-90, “The Performance View”](#) (p. A-147)):

Figure A-90 The Performance View



-
- 3 The available options for the selected equipment are chosen from the tabs at the top of the display panel.

END OF STEPS

.....



Set Start Time for Performance Monitoring

Purpose

To select or view the start time for the measurement of performance monitoring.

TL1 Commands

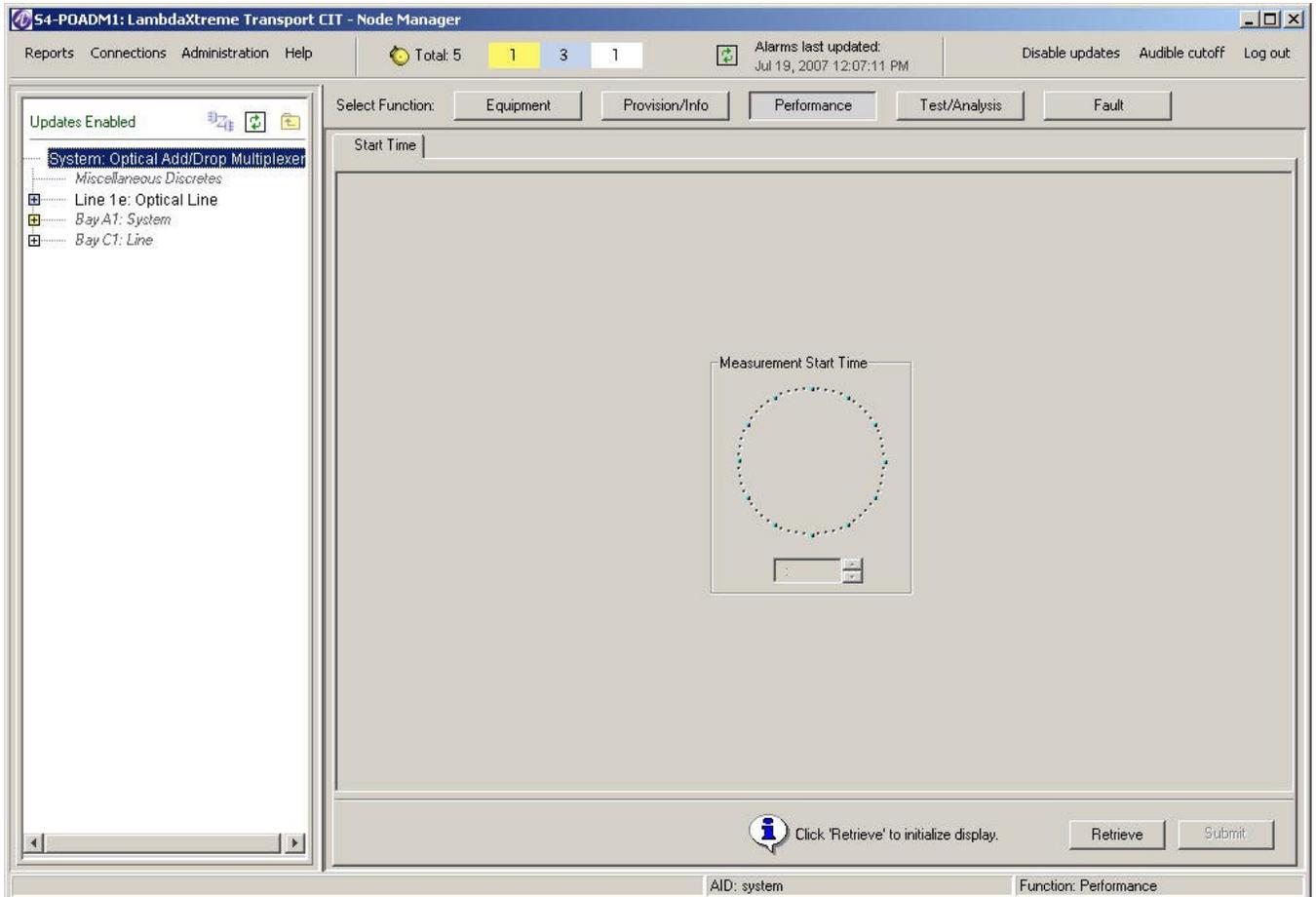
- RTRV-PM-STIME
- SET-PM-STIME

Procedure

- 1 [“Access the Performance View in Node Manager” \(p. A-146\)](#).
 - 2 Select the System (highest level) in the Equipment Tree.
-

Result: The Start Time window is displayed (see [Figure A-91, “Start Time Window”](#) (p. A-149)).

Figure A-91 Start Time Window



- 3 Click **Retrieve** to display the currently provisioned data. Make the appropriate selection, then click **Submit**.

END OF STEPS



Establish Baseline Values for Total Power

Purpose

To set baseline values for power transmitted/received to provide a basis from which to measure deviation from nominal.

TL1 Commands

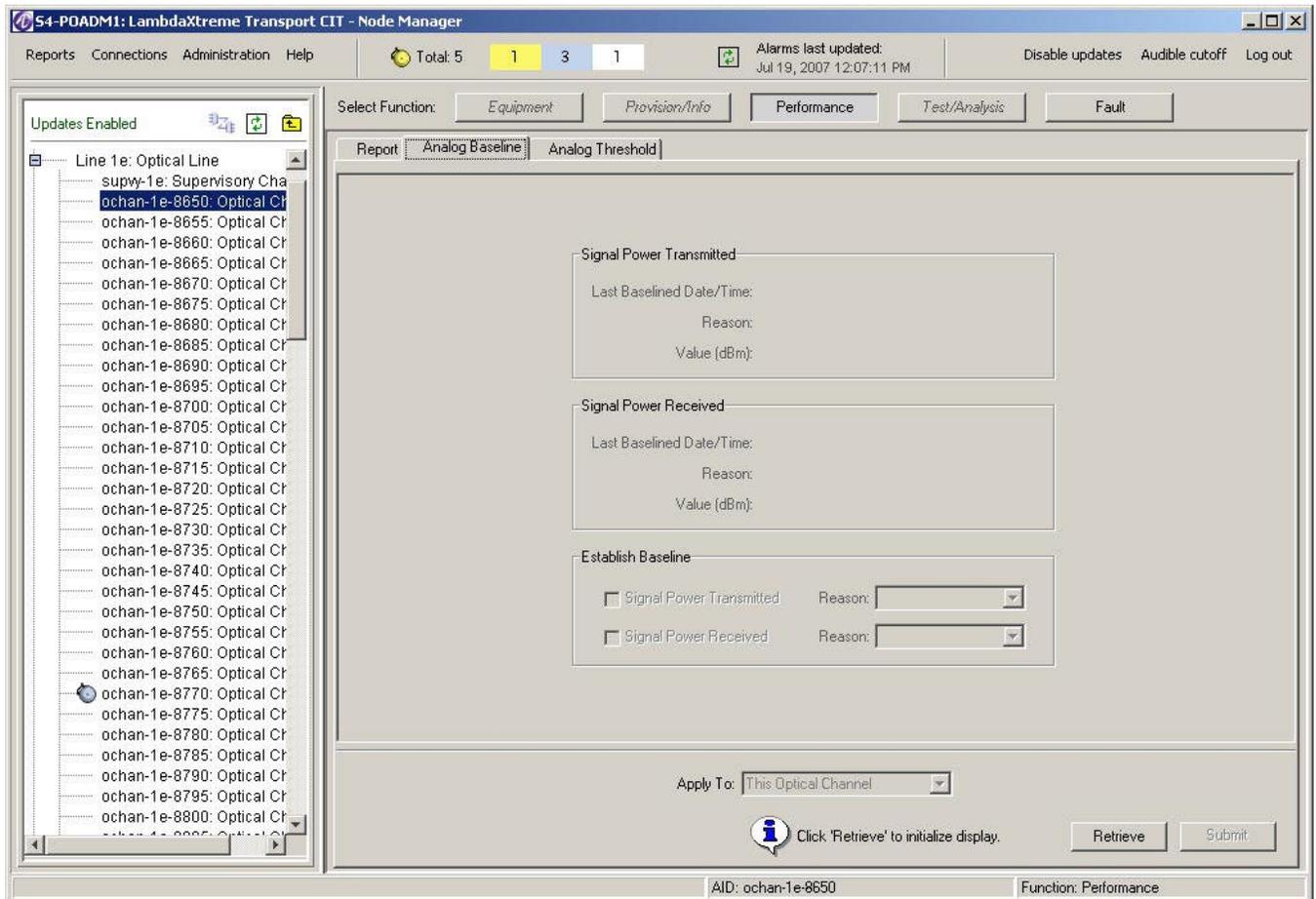
- RTRV-BASELINE-OCHAN
- SET-BASELINE-OCHAN
- RTRV-BASELINE-OLINE
- SET-BASELINE-OLINE
- RTRV-BASELINE-SUPR
- SET-BASELINE-SUPR

Procedure

- 1 [“Access the Performance View in Node Manager” \(p. A-146\)](#).
 - 2 From the Equipment Tree, select the optical line, supervisory channel, or optical channel to be baselined. Click on the **Analog Baseline** tab in the display panel.
-

Result: Depending on which piece of equipment is selected in the Equipment Tree, an Analog Baseline window such as the following is displayed (see [Figure A-92](#), “Analog Baseline Window” (p. A-151)).

Figure A-92 Analog Baseline Window



- 3 Click **Retrieve** to display the currently provisioned data. Select appropriate settings, then click **Submit**.

END OF STEPS



Provision Analog Threshold Levels and Message Notification

Purpose

To set analog threshold level/crossing alert parameters to monitor transmission quality and equipment health.

TL1 Commands

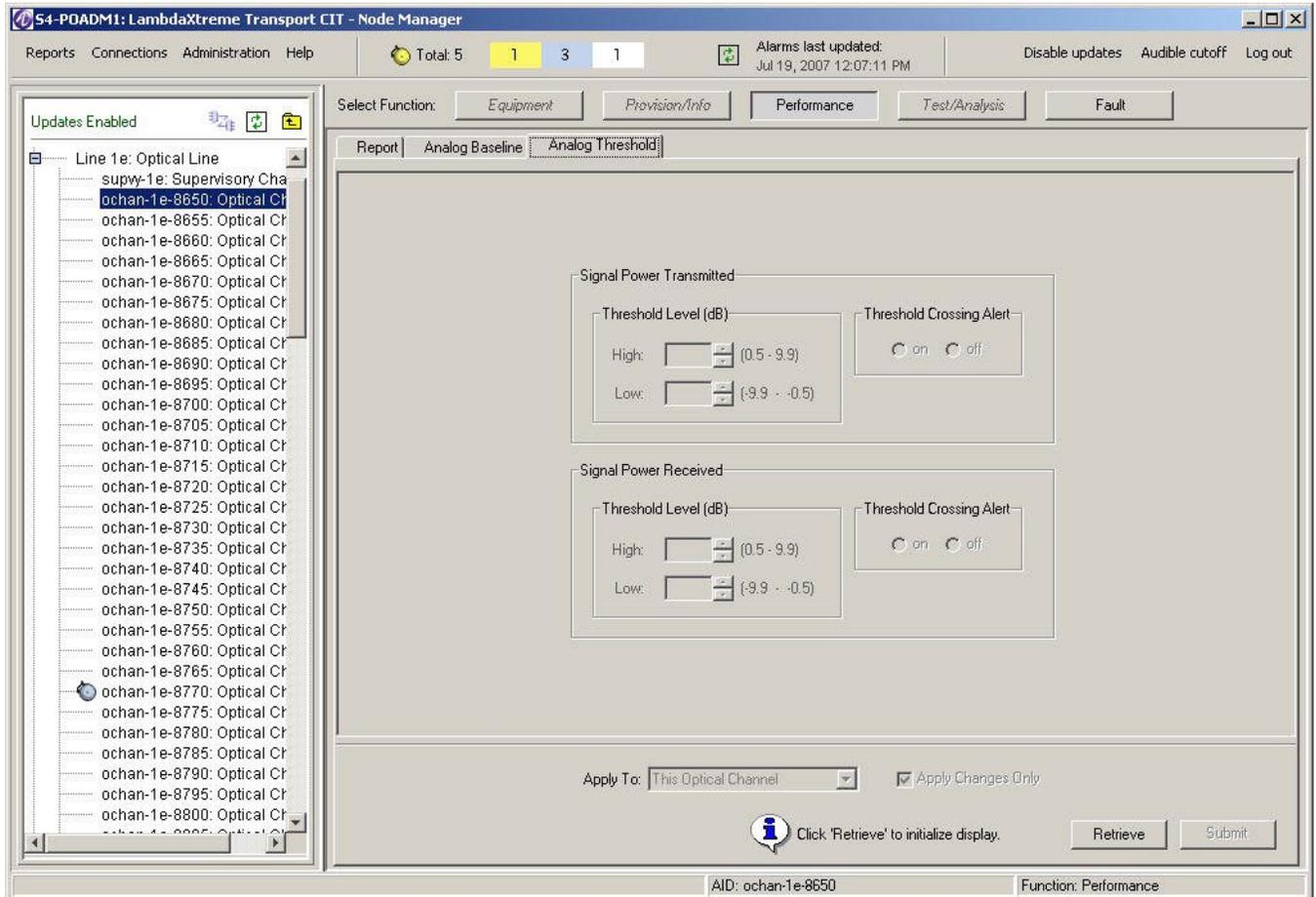
- RTRV-TH-OCHAN
- SET-TH-OCHAN
- RTRV-TH-OLINE
- SET-TH-OLINE
- RTRV-SUPR
- ENT-SUPR
- RTRV-TH-SUPR
- SET-TH-SUPR
- RTRV-TH-OTPS
- SET-TH-OTPS

Procedure

-
- 1 [“Access the Performance View in Node Manager” \(p. A-146\)](#).
-
- 2 From the Equipment Tree, select the optical line, supervisory channel, or optical channel to be provisioned. Click on the **Analog Threshold** tab in the display panel.

Result: Depending on which piece of equipment is selected in the Equipment Tree, an Analog Threshold window such as the following is displayed (see [Figure A-93](#), “Analog Threshold Window” (p. A-153)).

Figure A-93 Analog Threshold Window



- 3 Click **Retrieve** to display the currently provisioned data. Enter appropriate values, then click **Submit**.

END OF STEPS



Provision Digital Threshold Levels and Message Notification

Purpose

To set digital threshold level/crossing alert parameters to monitor transmission quality and equipment health.

TL1 Commands

- RTRV-TH-SUPR
- SET-TH-SUPR

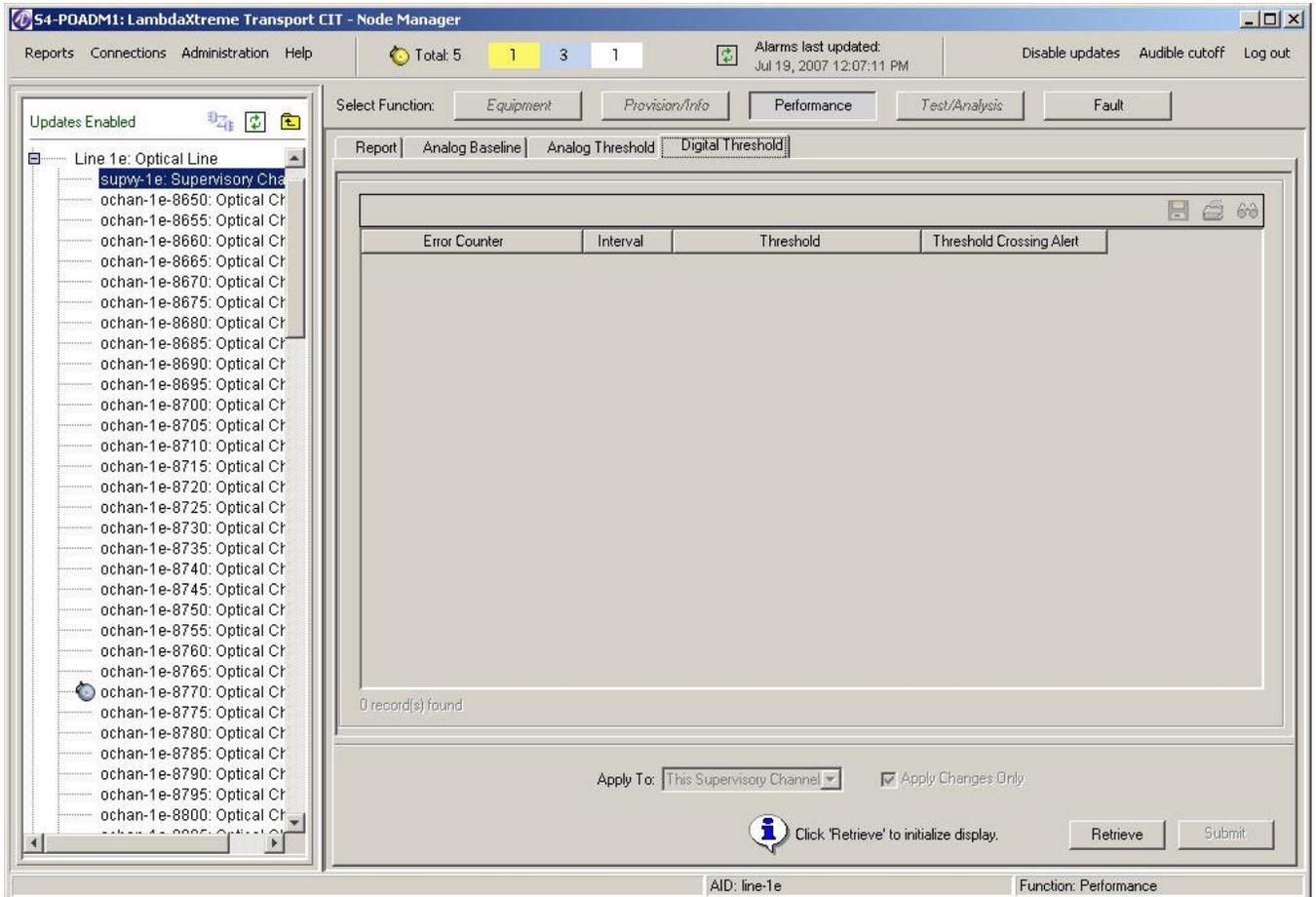
Procedure

- 1 [“Access the Performance View in Node Manager”](#) (p. A-146).

- 2 From the Equipment Tree, select the supervisory channel to be provisioned. Click on the **Digital Threshold** tab in the display panel.

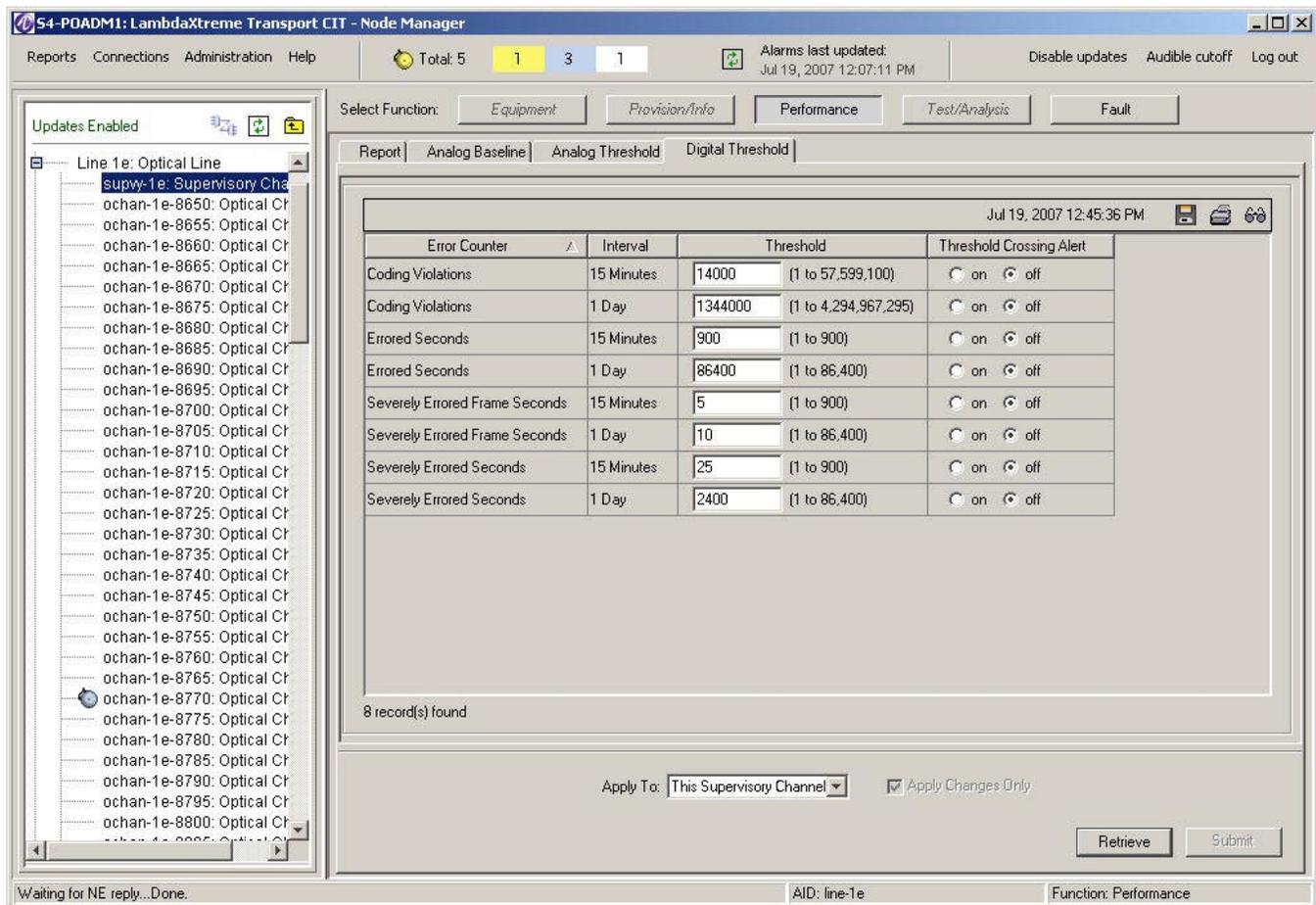
Result: The Digital Threshold window is displayed (see [Figure A-94](#), “Digital Threshold Window (No Data)” (p. A-155)).

Figure A-94 Digital Threshold Window (No Data)



- 3 Click **Retrieve** and the currently provisioned data is displayed (see [Figure A-95](#), “Digital Threshold Window (With Data)” (p. A-156)).

Figure A-95 Digital Threshold Window (With Data)



4 Enter the desired values, then click **Submit**.

END OF STEPS



Reset Digital Performance Monitoring Storage Registers

Purpose

To initialize (reset) the error counts for all current day and/or all current 15-minute PM storage registers.

TL1 Commands

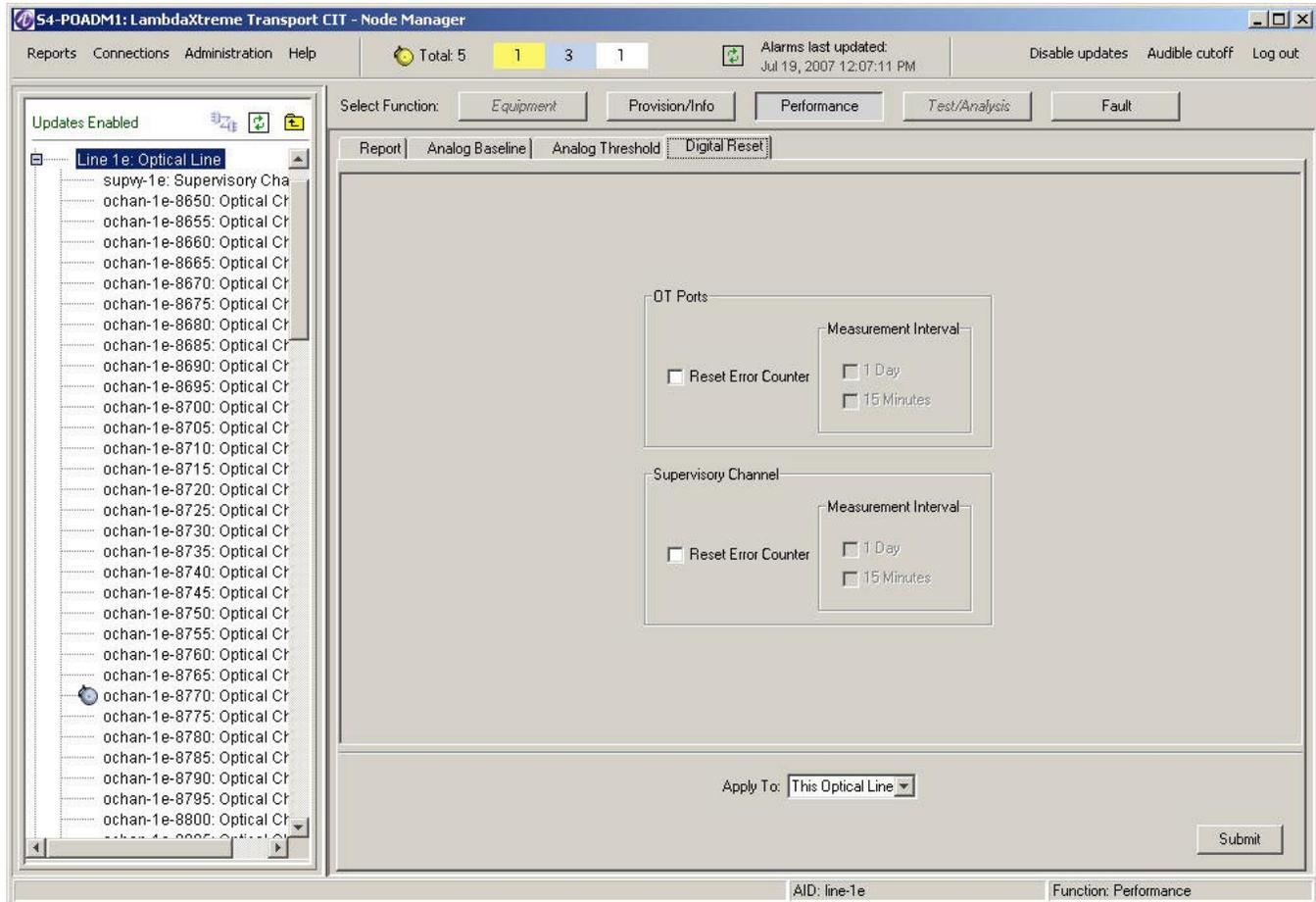
- INIT-REG-OTPS
- INIT-REG-ALL

Procedure

-
- 1 [“Access the Performance View in Node Manager”](#) (p. A-146).
-
- 2 From the Equipment Tree, select an optical line to be reset. Click on the **Digital Reset** tab in the display panel.

Result: The Digital Reset window is displayed (see [Figure A-96](#), “Digital Reset Window” (p. A-158)).

Figure A-96 Digital Reset Window



- 3 Make the appropriate selections, then click **Submit**.

Result: The following window is displayed (see [Figure A-97, “Warning Confirmation Window \(Reset PM Data\)”](#) (p. A-159)).

Figure A-97 Warning Confirmation Window (Reset PM Data)



.....

4 Click **Yes**.

END OF STEPS

.....



Generate Performance Monitoring Data

Purpose

To request current and historical PM data for optical line, supervisory channel, optical channel, or OT port.

TL1 Commands

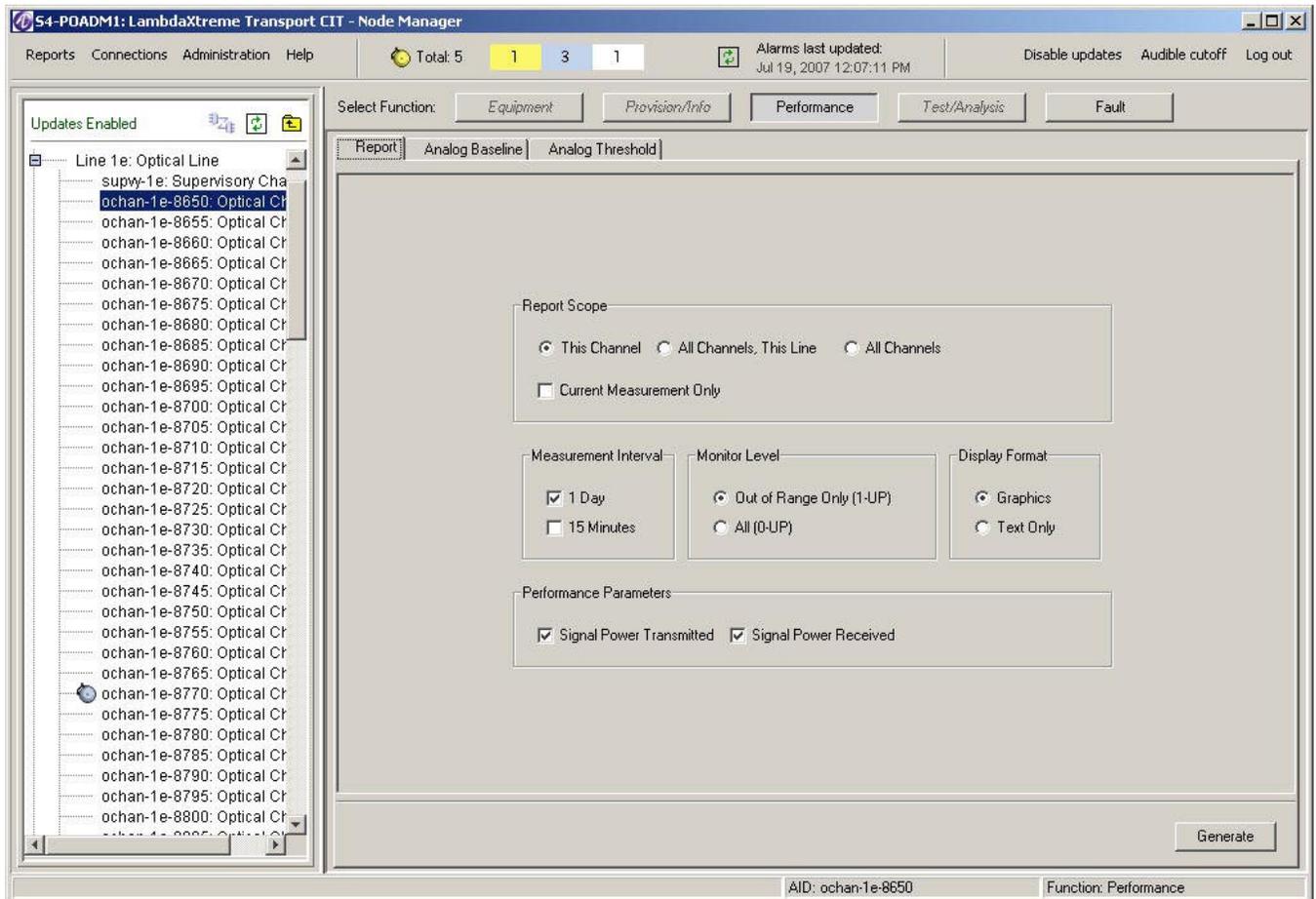
- RTRV-PM-OTPS
- RTRV-PM-OLINE
- RTRV-PM-STIME

Procedure

- 1 [“Access the Performance View in Node Manager” \(p. A-146\)](#).
- 2 From the Equipment Tree, select the optical line, supervisory channel, optical channel, or OT port for which the report is to generated. Click on the **Report** tab in the display panel.

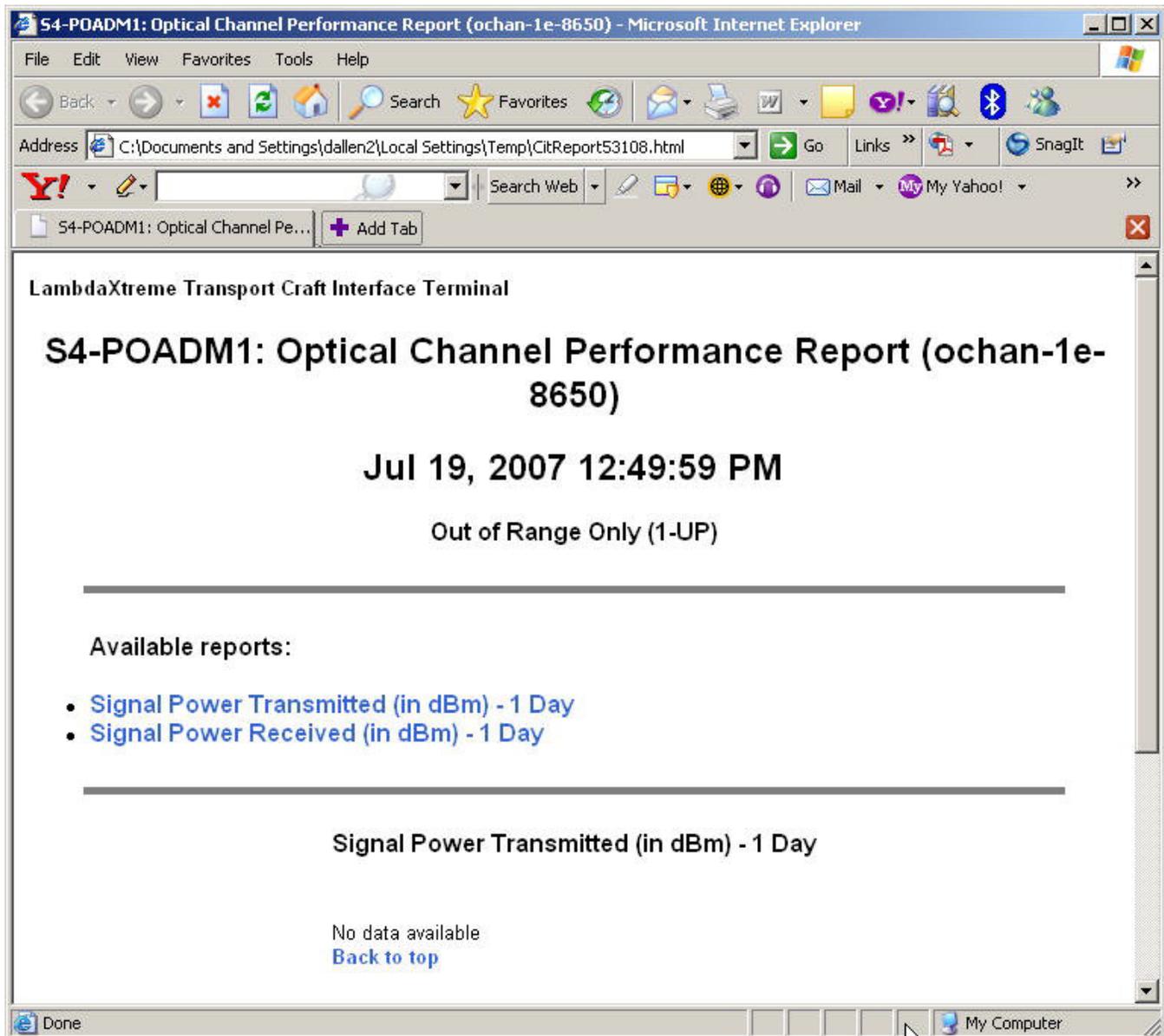
Result: Depending on which piece of equipment is selected in the Equipment Tree, a Report Parameters window such as the following is displayed (see [Figure A-98](#), “Report Parameters Window” (p. A-161)).

Figure A-98 Report Parameters Window



- 3 Specify all appropriate parameters, then click **Generate** to display the report in your web browser (see [Figure A-99](#), “Performance Report (Generated in Web Browser)” (p. A-162)).

Figure A-99 Performance Report (Generated in Web Browser)



Note: In a 15-minute PM report, the first bin of data usually does not contain a full 15 minutes of data because the request will probably not be made exactly at a 15-minute time boundary.

Important! When running PM reports in Graphics Display Format, if the bar charts do not display, it may be because of the security setting on the browser. If using Internet Explorer 6.0.2900 or later under Windows XP, the security setting “Allow active content to run in files on My Computer” must be selected. This setting is located in Internet Explorer under Tools > Internet Properties > Advanced.



Access the Test/Analysis View in Node Manager

Purpose

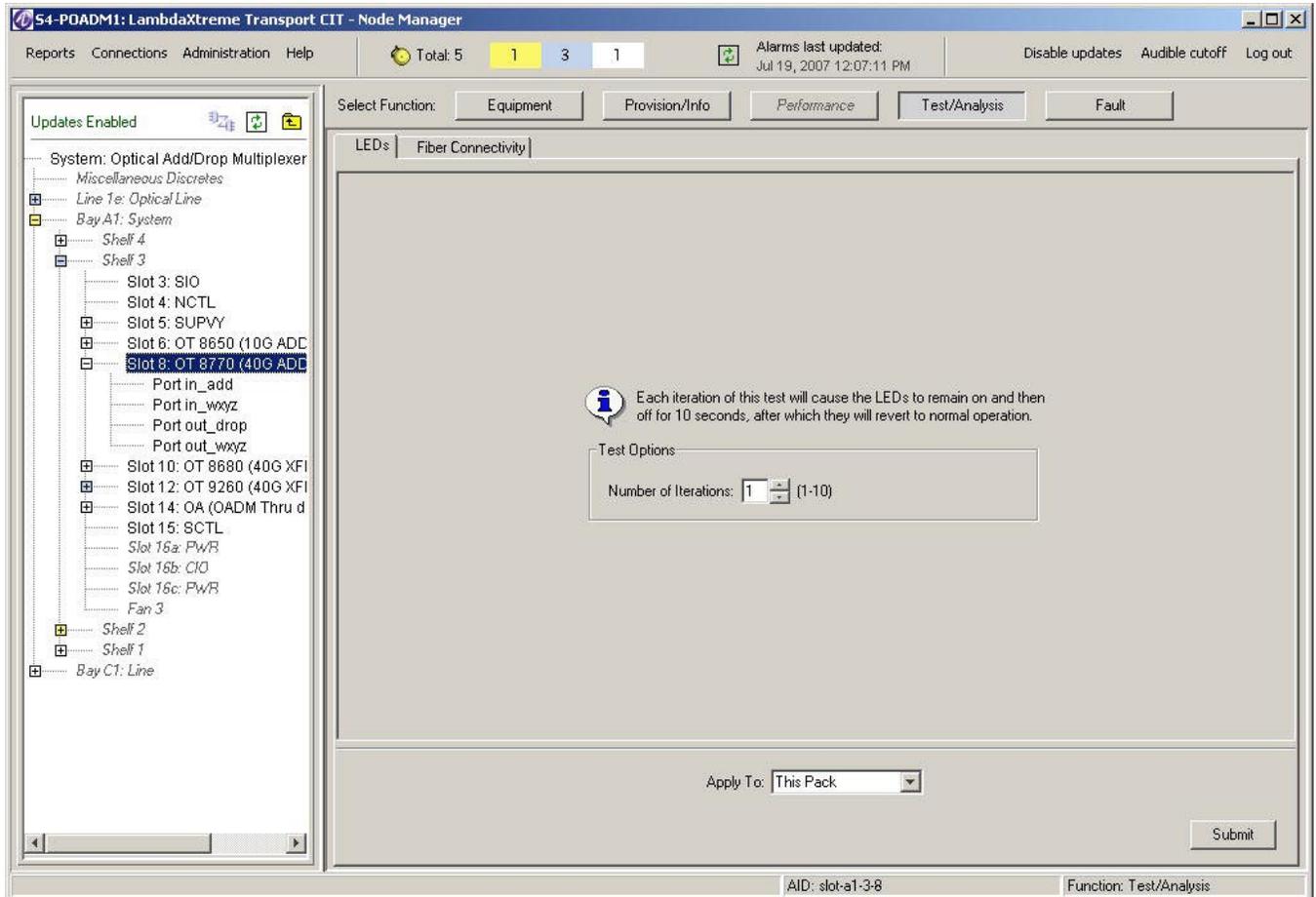
To perform test and analysis procedures on equipment/signals.

Procedure

- 1 Click **Test/Analysis** on the Node Manager toolbar.
Result: The Test/Analysis View is displayed in the display panel of the Node Manager.
 - 2 When equipment is selected in the Equipment Tree, the Test/Analysis View displays available Test/Analysis options (if any) for the selected equipment.
-

Result: Figure A-100, “Test/Analysis View (LEDs Window)” (p. A-165) is an example of the Test/Analysis View.

Figure A-100 Test/Analysis View (LEDs Window)



- 3 The available options for the selected equipment are chosen from the tabs at the top of the display panel, such as LEDs or Fiber Connectivity (see Figure A-102, “Fiber Connectivity Window” (p. A-170)).

END OF STEPS



Test System Office Alarms

Purpose

To ensure the integrity of the audible and visible office alarms and status indicators.

TL1 Command

TEST-ALM

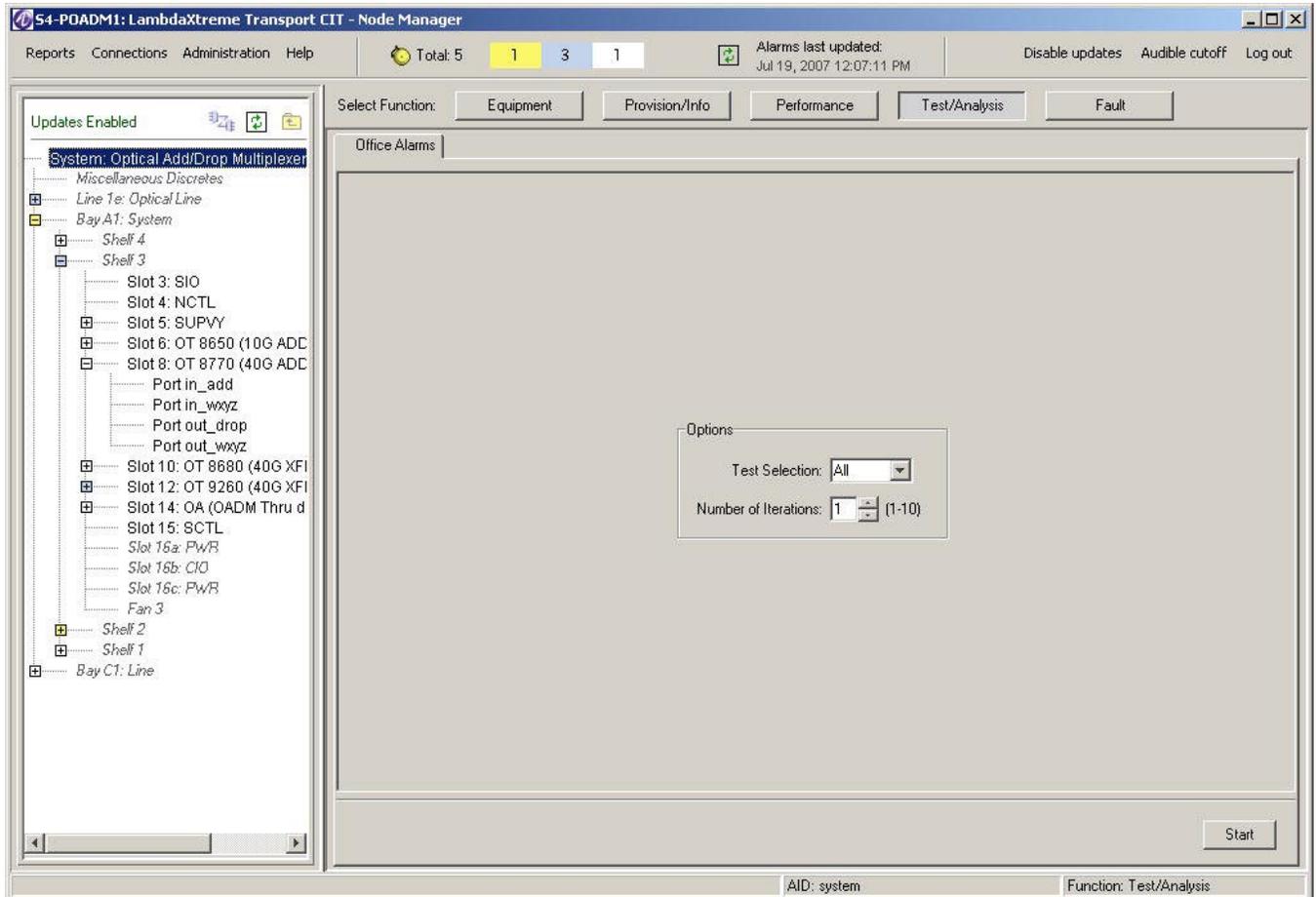
Procedure

- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).

- 2 Select the System (highest level) in the Equipment Tree.

Result: The Office Alarms window is displayed (see [Figure A-101, “Office Alarms Window”](#) (p. A-167))

Figure A-101 Office Alarms Window



3 Make the appropriate selections, then click **Start**.

Result: The LED alarm indications on the NE light and the alarm relays on the NE operate, causing local office audible and visual alarms to activate. The corresponding User Panel LEDs are illuminated simultaneously with each office alarm and status indicator.

END OF STEPS



Test Circuit Pack LEDs

Purpose

To visually inspect the circuit pack LEDs during installation or regular maintenance.

Important! If there are more than two LEDs on any circuit pack, the number of iterations must be an even number (test an even number of times) in order for all LEDs to be tested. DM packs do not have LEDs and do not support the test LEDs function.

TL1 Command

TEST - LED

Procedure

- 1 Complete the procedure, [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
-

- 2 From the Equipment Tree, select the desired slot to be tested. Click on the **LEDs** tab in the display panel.

Result: The LEDs window is displayed (see [Figure A-100, “Test/Analysis View \(LEDs Window\)”](#) (p. A-165)).

- 3 Make the appropriate selections, then click **Submit**.

Result: The LEDs under test turn on and off for 10 seconds, then the LEDs revert to normal operation.

END OF STEPS



Verify Fiber Connectivity

Purpose

To test the add-side fiber connectivity between an OT and OM after installing growth OTs in the in-service NE.

TL1 Command

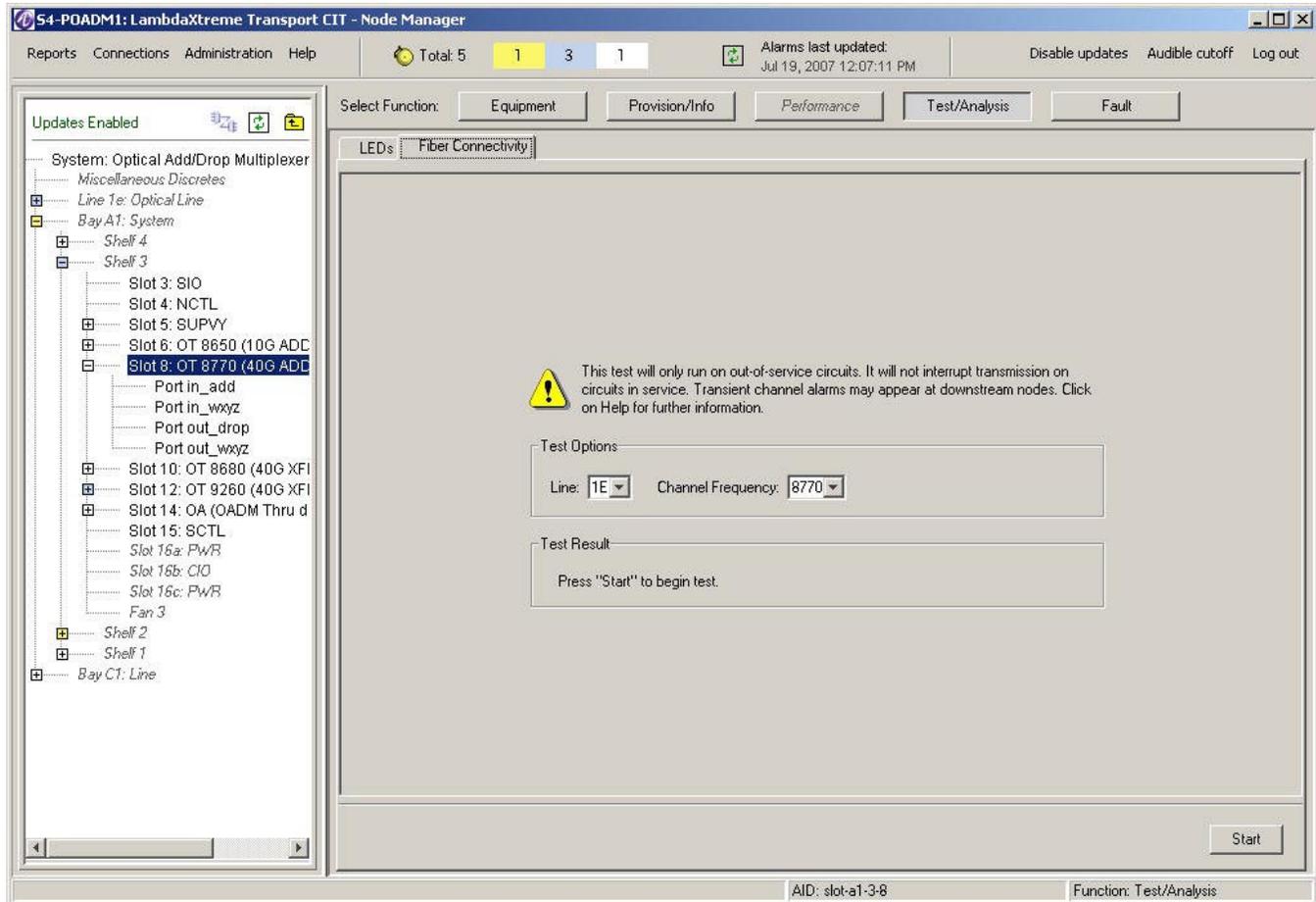
VERIFY-CONN

Procedure

- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
 - 2 From the Equipment Tree, select the desired OT slot to be tested. Click on the **Fiber Connectivity** tab in the display panel.
-

Result: The Fiber Connectivity window is displayed (see [Figure A-102](#), “Fiber Connectivity Window” (p. A-170).

Figure A-102 Fiber Connectivity Window



-
- 3 Select the line and channel frequency to be tested, then click **Submit**.

END OF STEPS

.....



Obtain OT Section Trace

Purpose

To compare the expected incoming section trace byte (J0) identifier with the received incoming section trace to verify the integrity of the signal/connection.

Important! When the 40G pack Client Signal Type is provisioned for OTM-0.3, the section trace feature does not apply.

TL1 Command

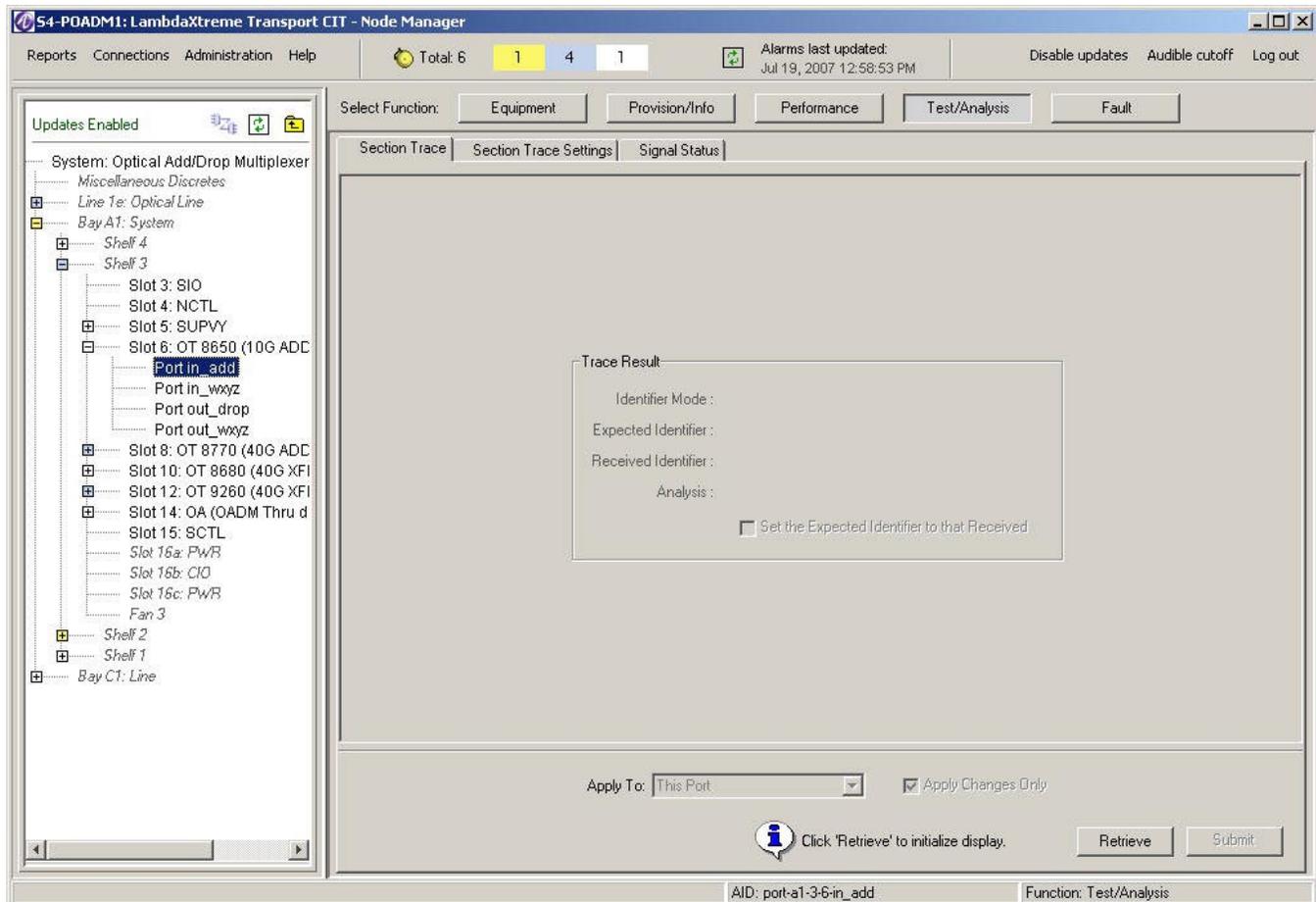
RTRV-SECTRC

Procedure

- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
- 2 From the Equipment Tree, select the appropriate port. Click on the **Section Trace** tab in the display panel.

Result: The OT Section Trace window is displayed (see [Figure A-103](#), “OT Section Trace Window” (p. A-172)).

Figure A-103 OT Section Trace Window



- 3 Click **Retrieve** and the currently provisioned data is displayed.
- 4 To set the value of the expected identifier to that received, check the box.
- 5 Make the appropriate selection from the **Apply to:** drop-down menu, then click **Submit**.

END OF STEPS



Specify OT Section Trace Settings

Purpose

To set the mode (length of the received and expected incoming messages) and specify the expected trace identifier.

Important! When the 40G pack Client Signal Type is provisioned for OTM-0.3, the section trace feature does not apply.

TL1 Commands

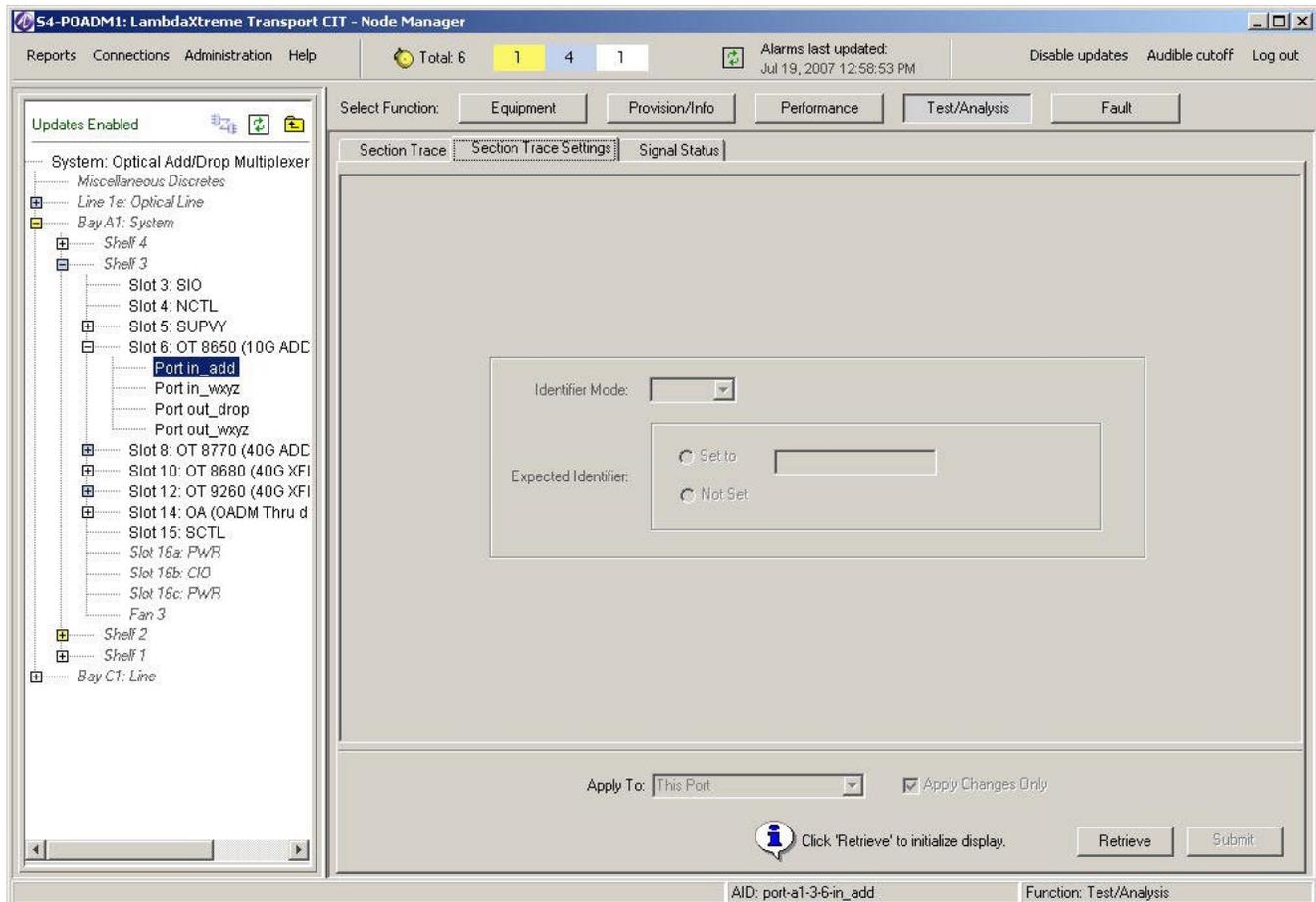
- ENT-SECTRC
- ENT-TRAILTRC

Procedure

-
- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
-
- 2 From the Equipment Tree, select the desired port. Click on the **Section Trace Settings** tab in the display panel.

Result: The OT Trace Settings window is displayed (see [Figure A-104, “OT Trace Settings Window”](#) (p. A-174)

Figure A-104 OT Trace Settings Window



- 3 Click **Retrieve** and the currently provisioned data is displayed.
- 4 Select or enter the appropriate values.
- 5 Make the appropriate selection from the **Apply to:** drop-down menu, then click **Submit**.

END OF STEPS



Obtain OT Trail Trace

Purpose

Display the results of a trail trace on G.709 client and line ports.

Important! Trail Trace results are available on G.709 10G/40G Add-Drop Client In port only if the signal type is OTM-0.2. For G.709 10G MUX Client In ports, the trail trace results are available only if the signal type is OTM-0.1.

TL1 Commands

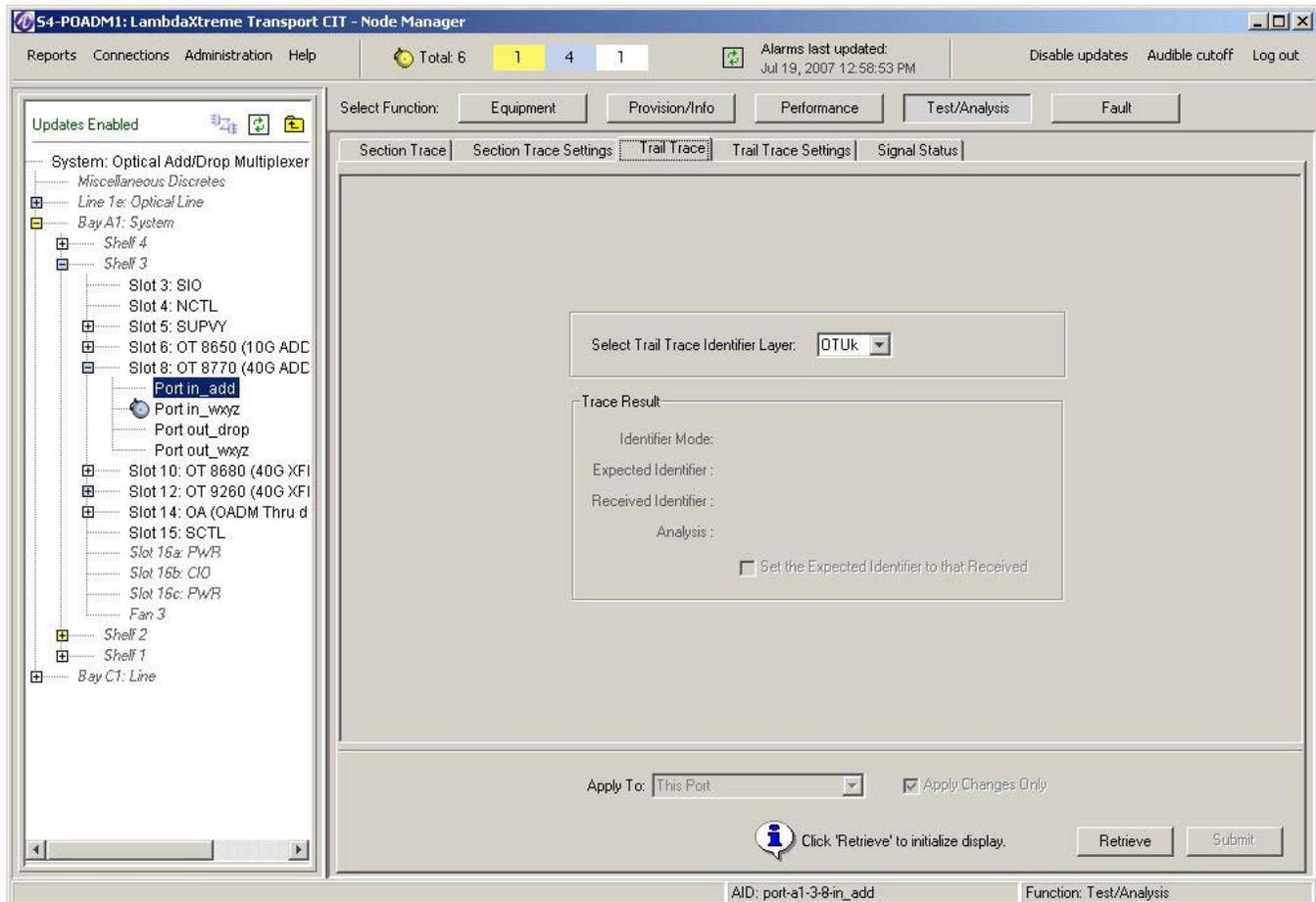
ENT-TRAILTRC

Procedure

- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
 - 2 From the Equipment Tree, select the desired port. Click on the **Trail Trace** tab in the display panel.
-

Result: The OT Trail Trace window is displayed (see [Figure A-105, “OT Trail Trace Window”](#) (p. A-176)).

Figure A-105 OT Trail Trace Window



- 3 Click **Retrieve** and the currently provisioned data is displayed.
- 4 Select or enter the appropriate values.
- 5 Make the appropriate selection from the **Apply to:** drop-down menu, then click **Submit**.

END OF STEPS



Specify OT Trail Trace Settings

Purpose

Set the Expected (for In Ports) and Transmitted (for Out Ports) Identifier for use in TRrail Traces based on the Trail Trace Identifier Layer.

Important! For In Add and Out Drop ports of G.709 10G ADD-DROP OTs, the Expected Identifier cannot be set if the signal type is not OTM-0.2. For In Trib and Out Trib ports of G.709 10G MUX OTs, the Expected Identifier cannot be set if the signal type is not OTM-0.1.

TL1 Command

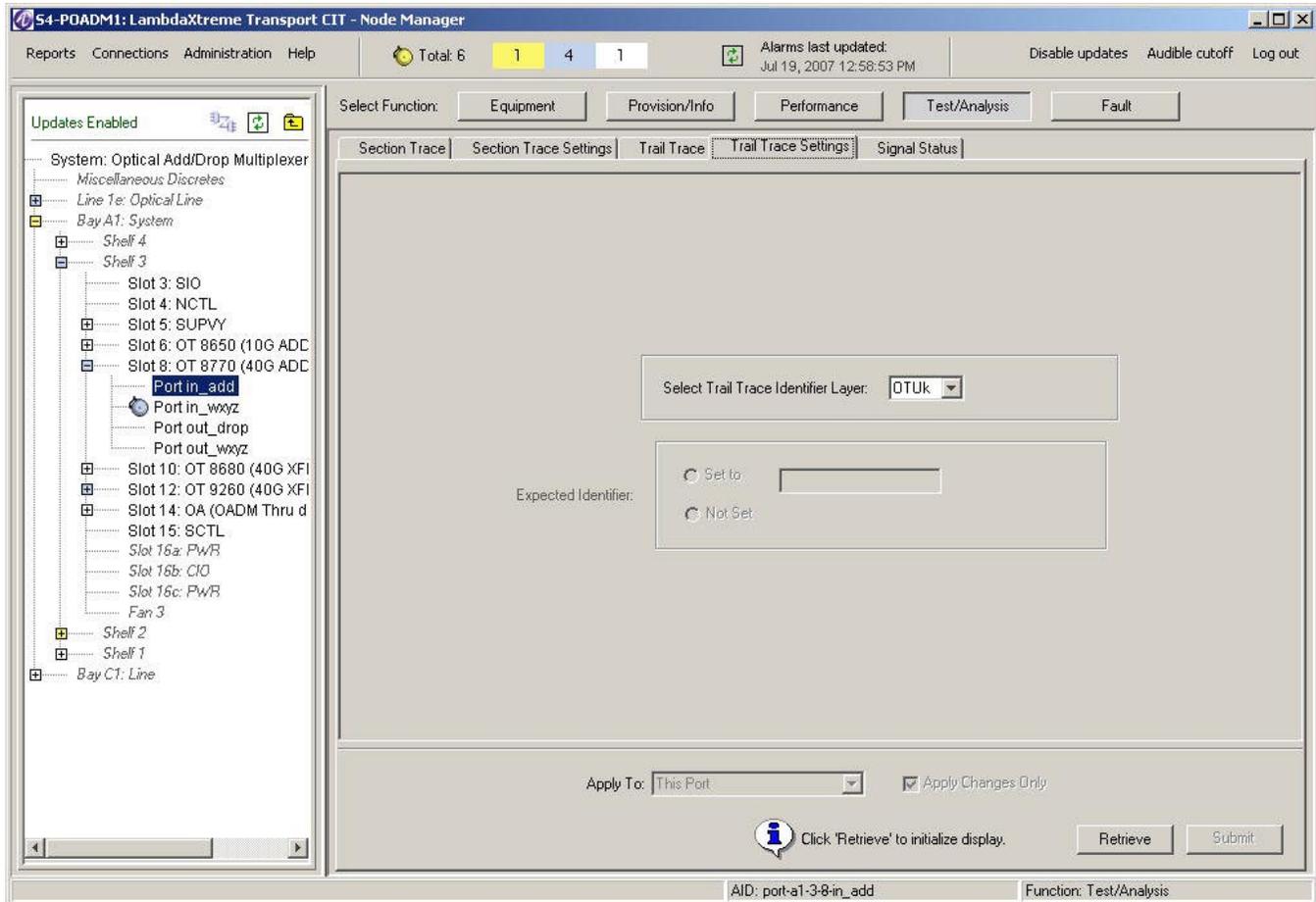
ENT-TRAILTRC

Procedure

-
- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
 - 2 From the Equipment Tree, select the desired port. Click on the **Trail Trace Settings** tab in the display panel.

Result: The OT Trail Trace Settings window is displayed (see Figure A-106, “OT Trail Trace Settings Window” (p. A-178))

Figure A-106 OT Trail Trace Settings Window



- 3 Click **Retrieve** and the currently provisioned data is displayed.
- 4 Select or enter the appropriate values.
- 5 Make the appropriate selection from the **Apply to:** drop-down menu, then click **Submit**.

END OF STEPS



View Signal Status of OT Port

Purpose

To retrieve incoming signal status of any OT input port to isolate signal defect conditions during installation of NEs.

TL1 Commands

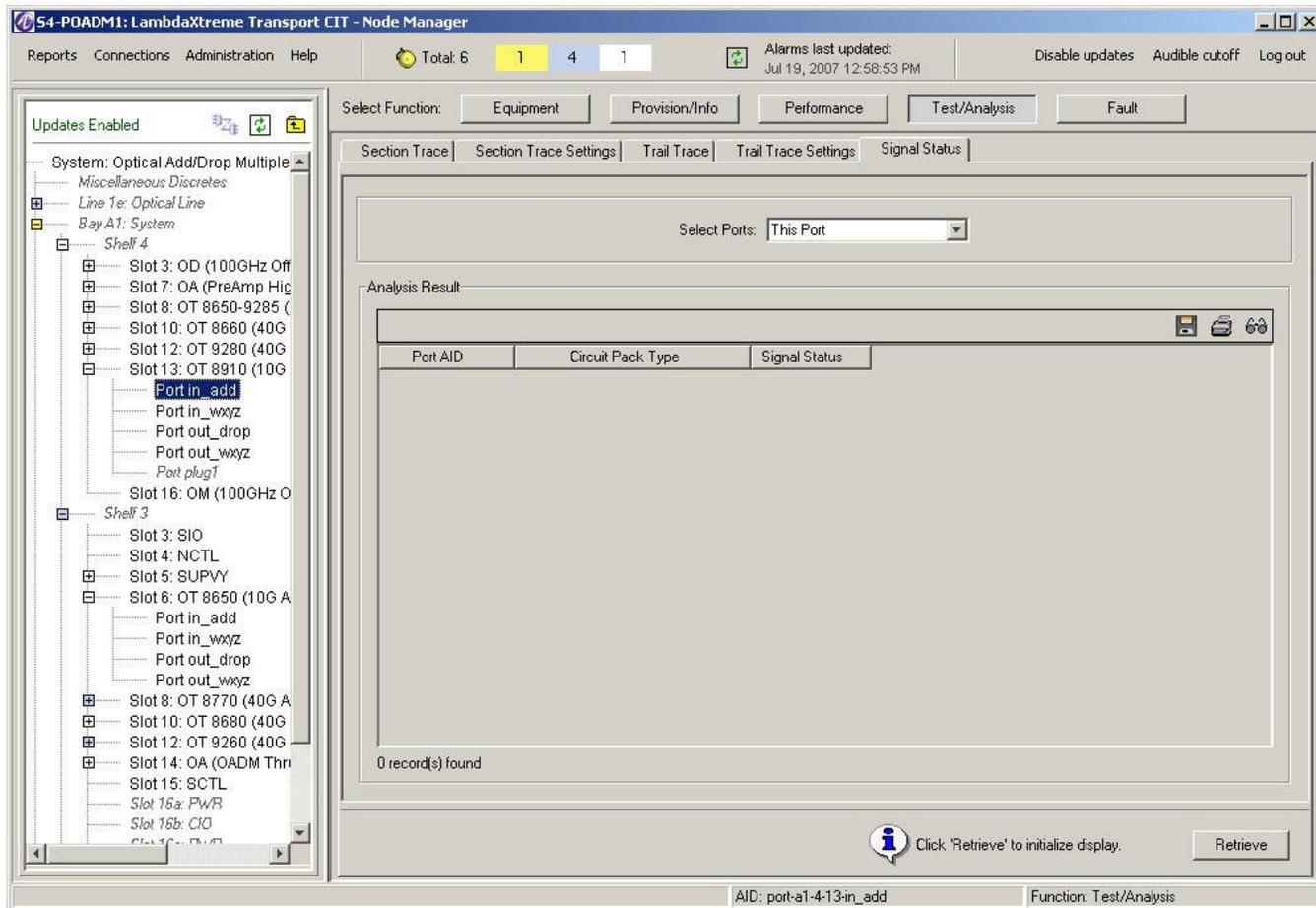
RTRV-SGNL-STATUS

Procedure

- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
- 2 From the Equipment Tree, select the desired input port. Click on the **Signal Status** tab in the display panel.

Result: The OT Signal Status window is displayed (see [Figure A-107, “OT Signal Status Window”](#) (p. A-180)).

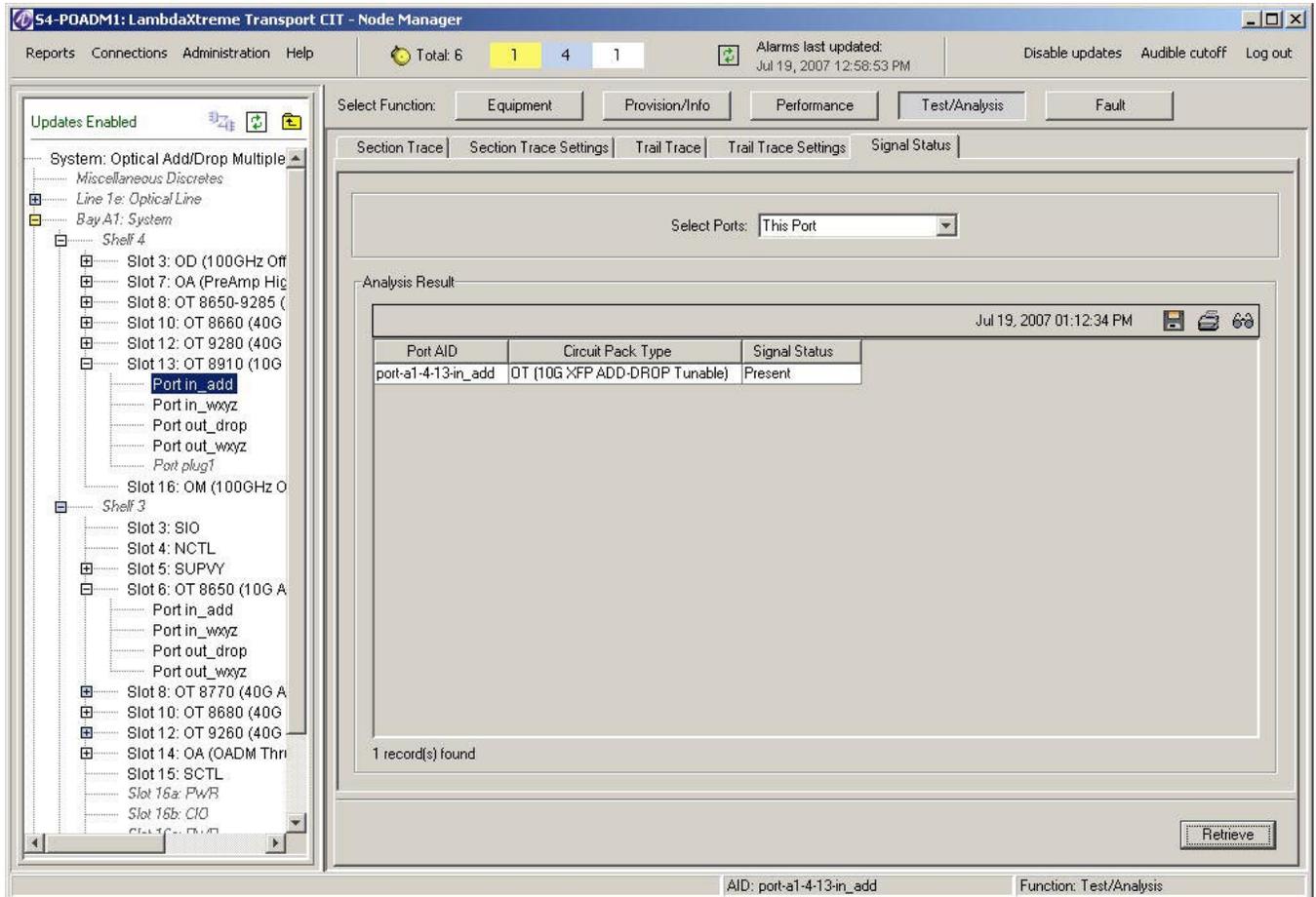
Figure A-107 OT Signal Status Window



- 3 Select the appropriate port(s) from the drop-down list, then click **Retrieve**.

Result: The signal status is displayed for the port(s) selected (see [Figure A-108](#), “Signal Status Window” (p. A-181)).

Figure A-108 Signal Status Window



END OF STEPS



Obtain Optical Channel Path Trace

Purpose

To compare the expected identifier with the received identifier at the drop side of an Add/Drop OT.

Important! This parameter is valid only on non-G.709 OTs

TL1 Commands

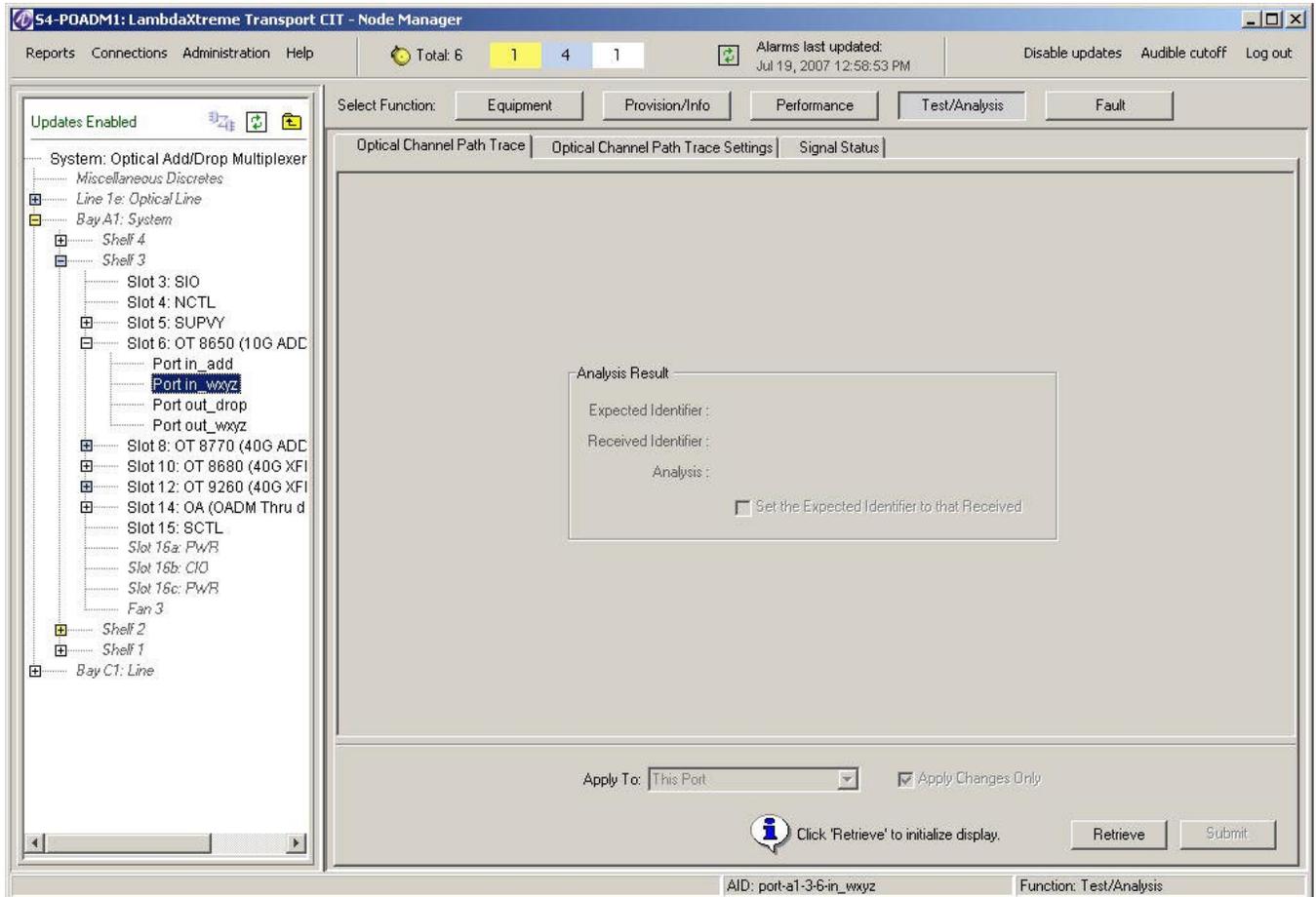
- ENT-TRAILTRC
- RTRV-TRAILTRC
- RTRV-ochtrc

Procedure

-
- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
-
- 2 From the Equipment Tree, select the drop-side line port of the Add/Drop OT. Click on the **Optical Channel Path Trace** tab in the display panel.

Result: The Optical Channel Path Trace window is displayed (see [Figure A-109](#), “Optical Channel Path Trace Window” (p. A-183)).

Figure A-109 Optical Channel Path Trace Window



-
- 3 Click **Retrieve** to obtain the results of the path trace.
-
- 4 To set the value of the expected identifier to that received, check the box.
-
- 5 Make the appropriate selection from the **Apply to:** drop-down menu, then click **Submit**.
-
- END OF STEPS
-



Specify Optical Channel Path Trace Settings

Purpose

To set the expected/transmitted identifiers for the optical channel path trace to verify connectivity between path terminating NEs.

Important! This parameter is valid only on non-G.709 OTs

TL1 Commands

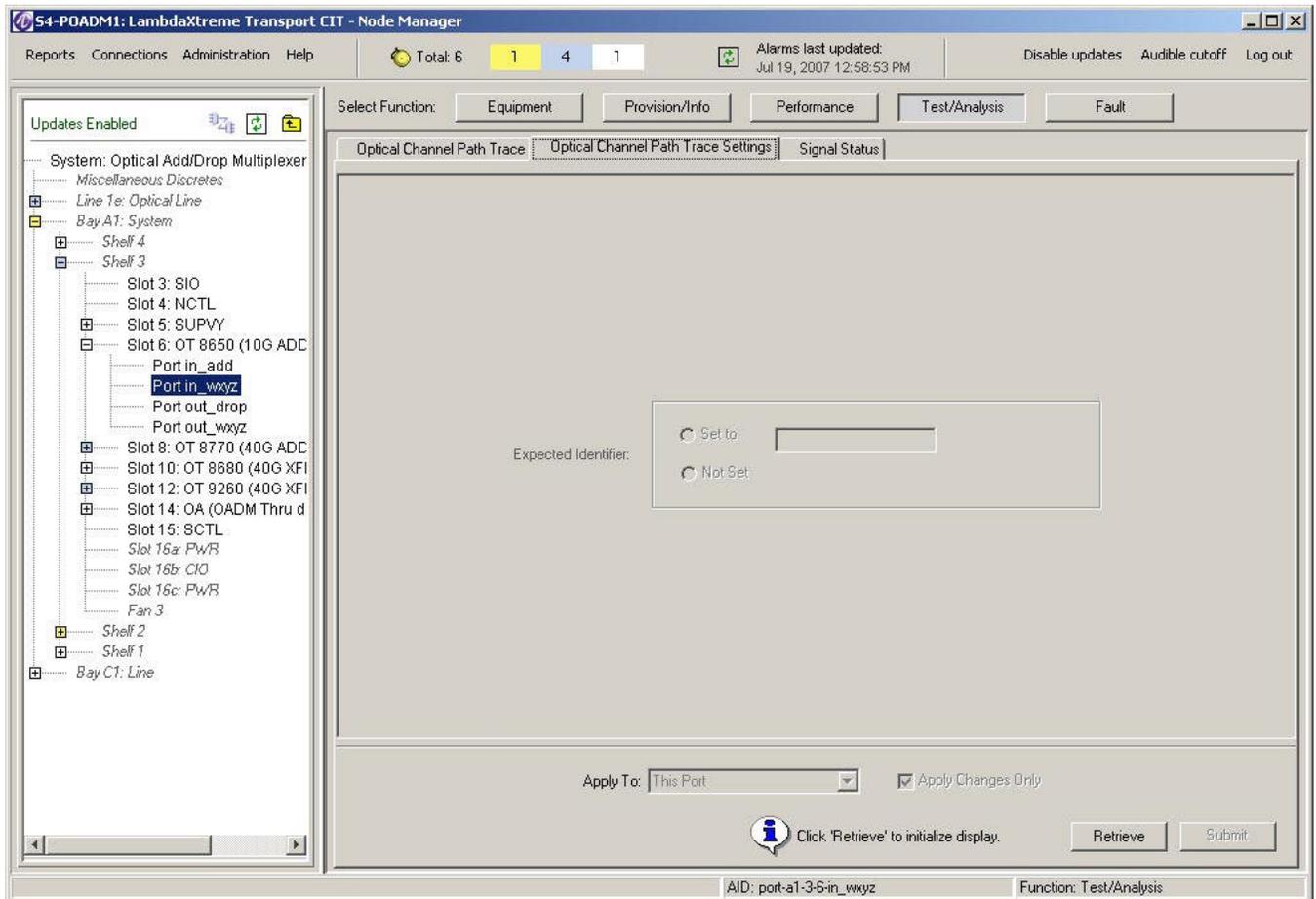
- ENT-0CHTRC
- RTRV-TRAILTRC

Procedure

-
- 1 [“Access the Test/Analysis View in Node Manager”](#) (p. A-164).
 - 2 From the Equipment Tree, select the appropriate drop/add port. Click the **Optical Channel Path Trace Settings** tab in the display panel.
-

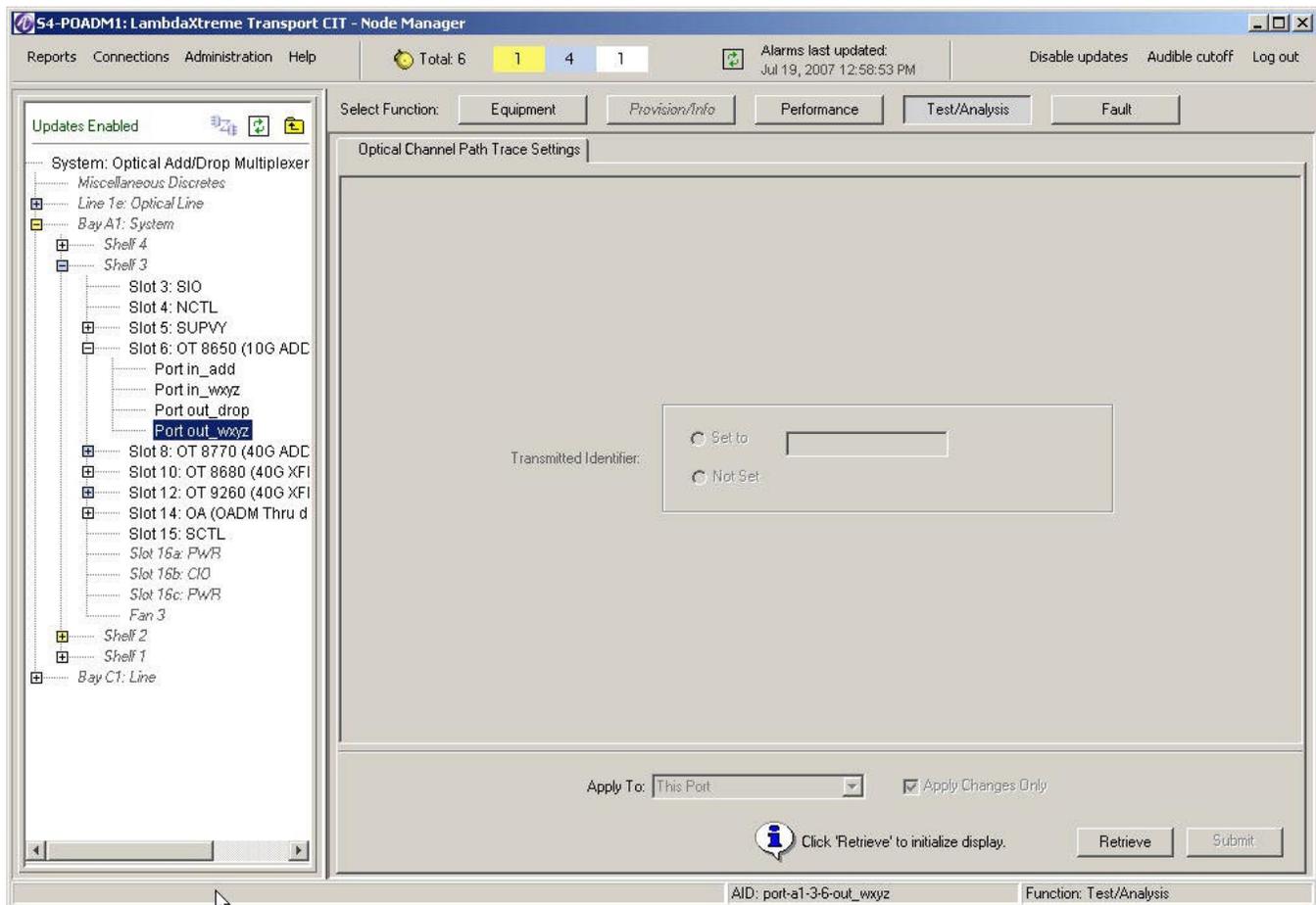
Result: For the drop-side port, the following Optical Channel Path Trace Settings window is displayed (see [Figure A-110, “Optical Channel Path Trace Settings Window \(Drop Side\)”](#) (p. A-185)).

Figure A-110 Optical Channel Path Trace Settings Window (Drop Side)



For the add-side port, the following Optical Channel Path Trace Settings window is displayed (see [Figure A-111, “Optical Channel Path Trace Settings Window \(Add Side\)”](#) (p. A-186)).

Figure A-111 Optical Channel Path Trace Settings Window (Add Side)



- 3 Click **Retrieve** and the currently provisioned data is displayed.
- 4 Select or enter the appropriate values.
- 5 Make the appropriate selection from the **Apply to:** drop-down menu, then click **Submit**.

END OF STEPS



Access the Fault View in Node Manager

Purpose

To provision parameters related to system alarm options and settings, and generate alarm lists.

Procedure

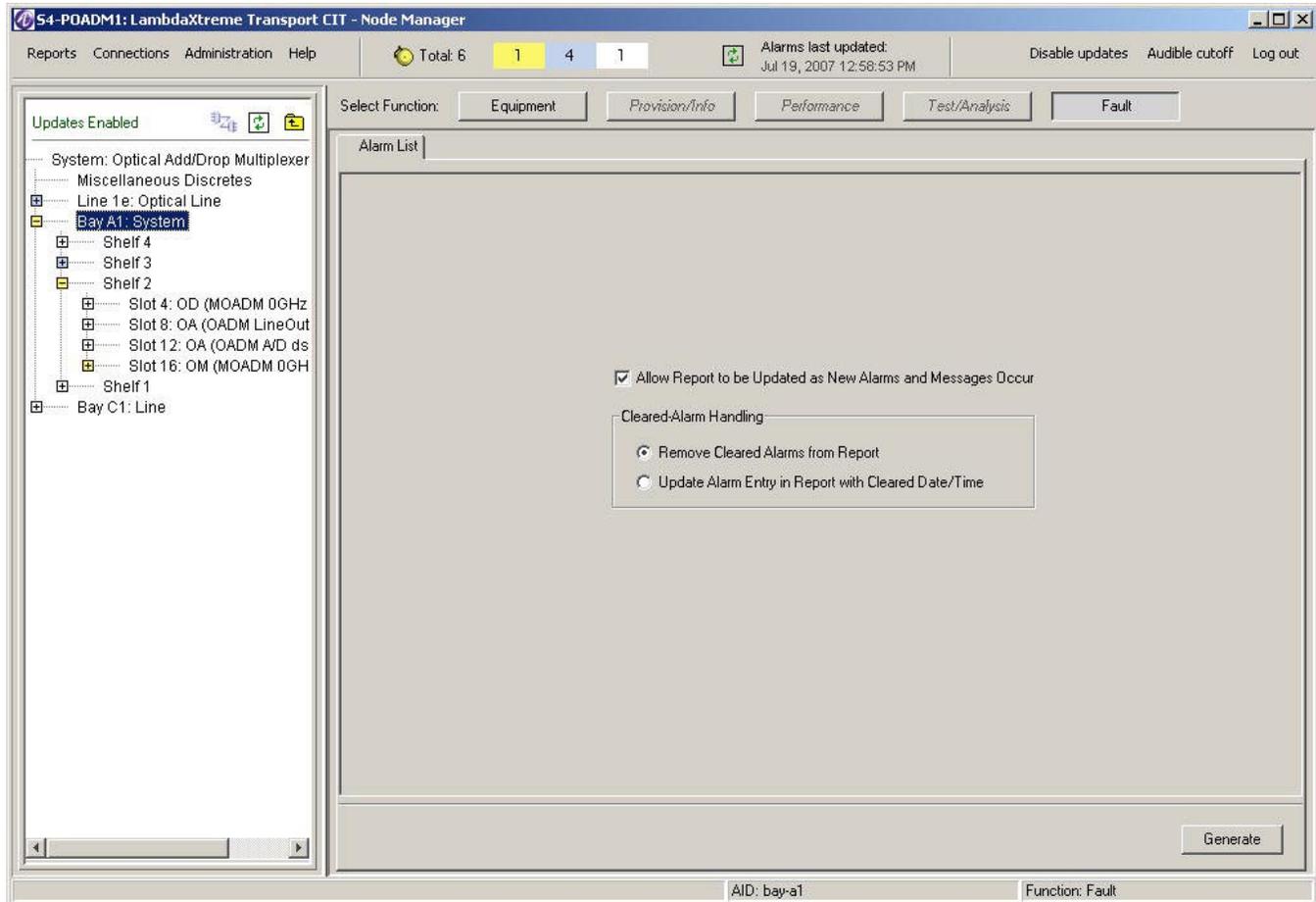
- 1 Click **Fault** on the Node Manager toolbar.

Result: The Fault View is displayed in the display panel of the Node Manager.

- 2 When equipment is selected in the Equipment Tree, the Fault View displays available Fault options for the selected equipment.

Result: Figure A-112, “Fault View (Alarm List Window)” (p. A-188) is an example (the Alarm List window).

Figure A-112 Fault View (Alarm List Window)



-
- 3 The available options for the selected equipment are chosen from the tabs at the top of the display panel.

END OF STEPS

.....



Set Options and Generate Alarm List for Selected Equipment

Purpose

To set options to be used when generating an Alarm List for selected equipment.

TL1 Command

RTRV-SEV

Procedure

- 1 [“Access the Fault View in Node Manager”](#) (p. A-187).

- 2 From the Equipment Tree, select the piece of equipment for which an Alarm List is to be generated. Click on the **Alarm List** tab in the display panel.
Result: The Alarm List window is displayed (see [Figure A-112, “Fault View \(Alarm List Window\)”](#) (p. A-188)).

- 3 Select the settings to be applied to the Alarm List. Click **Generate** to create the Alarm List for the selected equipment.

Result: The Alarm/Message List is displayed for the selected equipment (see Figure A-113, “Alarm/Message List” (p. A-190)).

Figure A-113 Alarm/Message List

Report Data

Jul 19, 2007 01:22:47 PM

Level	Category	AID	Occurred On	Description	Type	Service Affectir
Minor	OTPS	port-a1-3-8-in_wxyz	Jul 19, 2007 12:58:53 PM	Line side WaveWrapper-OTUk LOS failure	FAIL	Yes
Major	Equipment	port-a1-2-16-in_mux	Jul 18, 2007 02:05:13 PM	OMS LOS: add 100GHz at OM (0GHz)/150G at...	CTNEQPT	Yes
Minor	OTPS	port-a1-3-12-in_trib4	Jul 18, 2007 10:07:54 AM	Add side OC-192/STM-64/OTU2 LOS failure	FAIL	Yes
Minor	Equipment	port-a1-3-12-plug1	Jul 18, 2007 10:07:53 AM	Incompatible Pluggable Module Inserted in OT	FAIL	No

4 record(s) found

New alarms and messages will be inserted at the top of the report as they occur.

Close Help

END OF STEPS



Provision Alarm Severity Levels

Purpose

To customize individual alarm severities to tailor operations plans to specific operations environments.

TL1 Commands

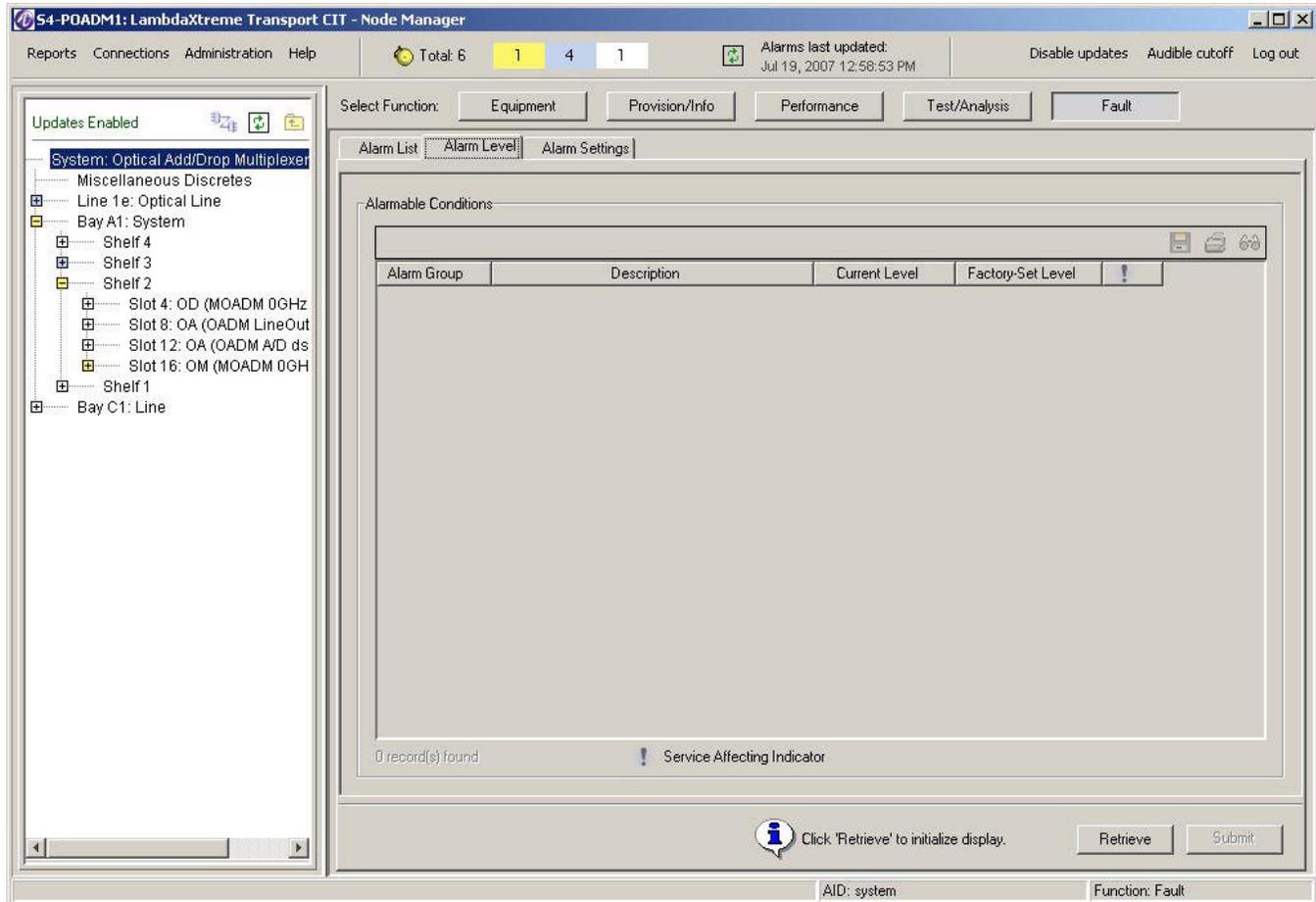
- ED-SEV
- RTRV-SEV

Procedure

- 1 [“Access the Fault View in Node Manager”](#) (p. A-187).
 - 2 Select the System (highest level) in the Equipment Tree. Click on the **Alarm Level** tab in the display panel.
-

Result: The System Alarm Level window is displayed (see [Figure A-114](#), “System Alarm Level Window” (p. A-192)).

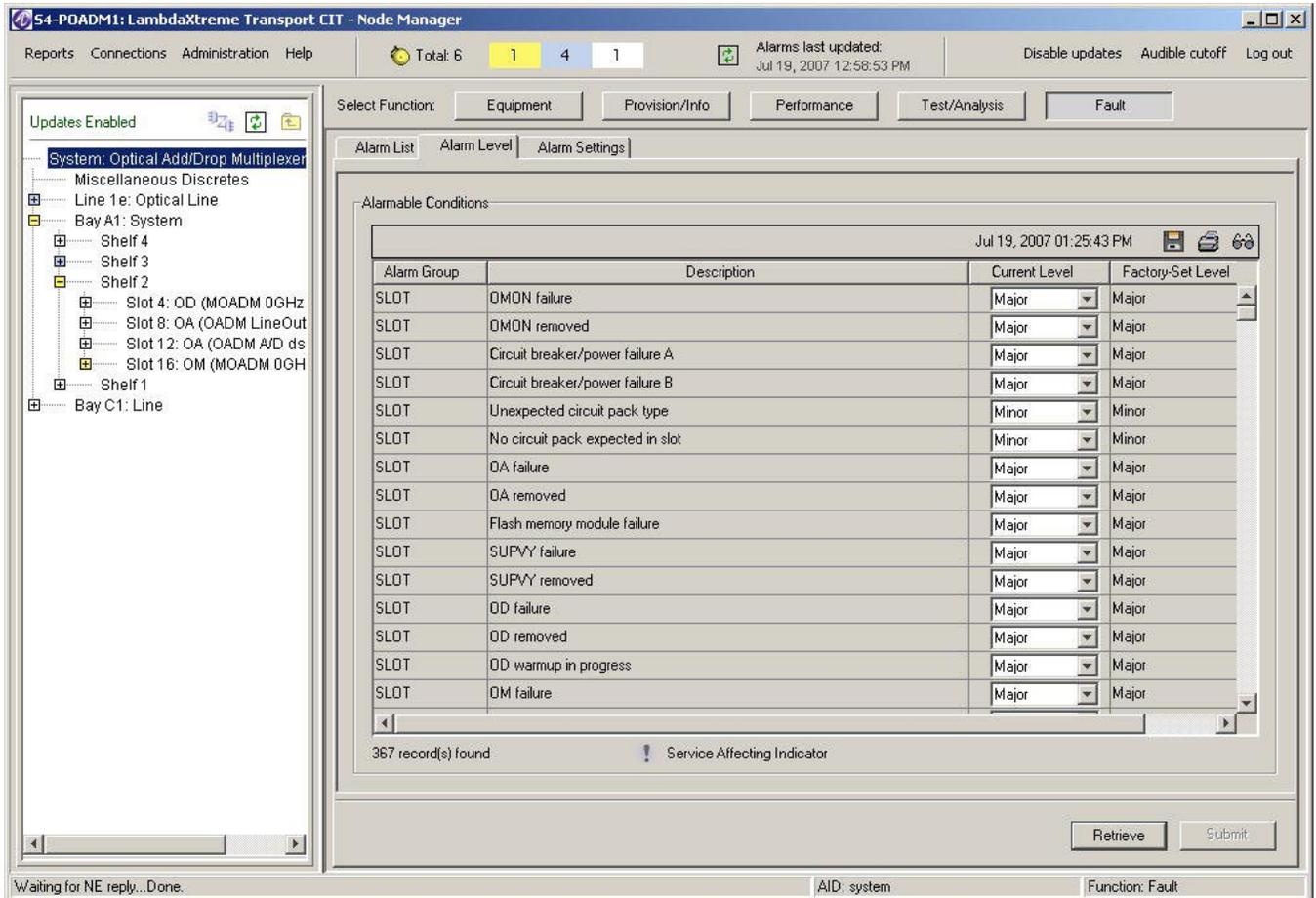
Figure A-114 System Alarm Level Window



- 3 Click **Retrieve** to display the currently provisioned data.

Result: The System Alarm Level window is displayed displaying the alarmable conditions (see [Figure A-115, “System Alarm Level Window”](#) (p. A-193)).

Figure A-115 System Alarm Level Window



- From the drop-down lists, select the appropriate alarm level for any alarm condition being modified, then click **Submit**.

END OF STEPS



Provision System Alarm Settings

Purpose

To configure the parameters that control the Office Alarms behavior.

TL1 Commands

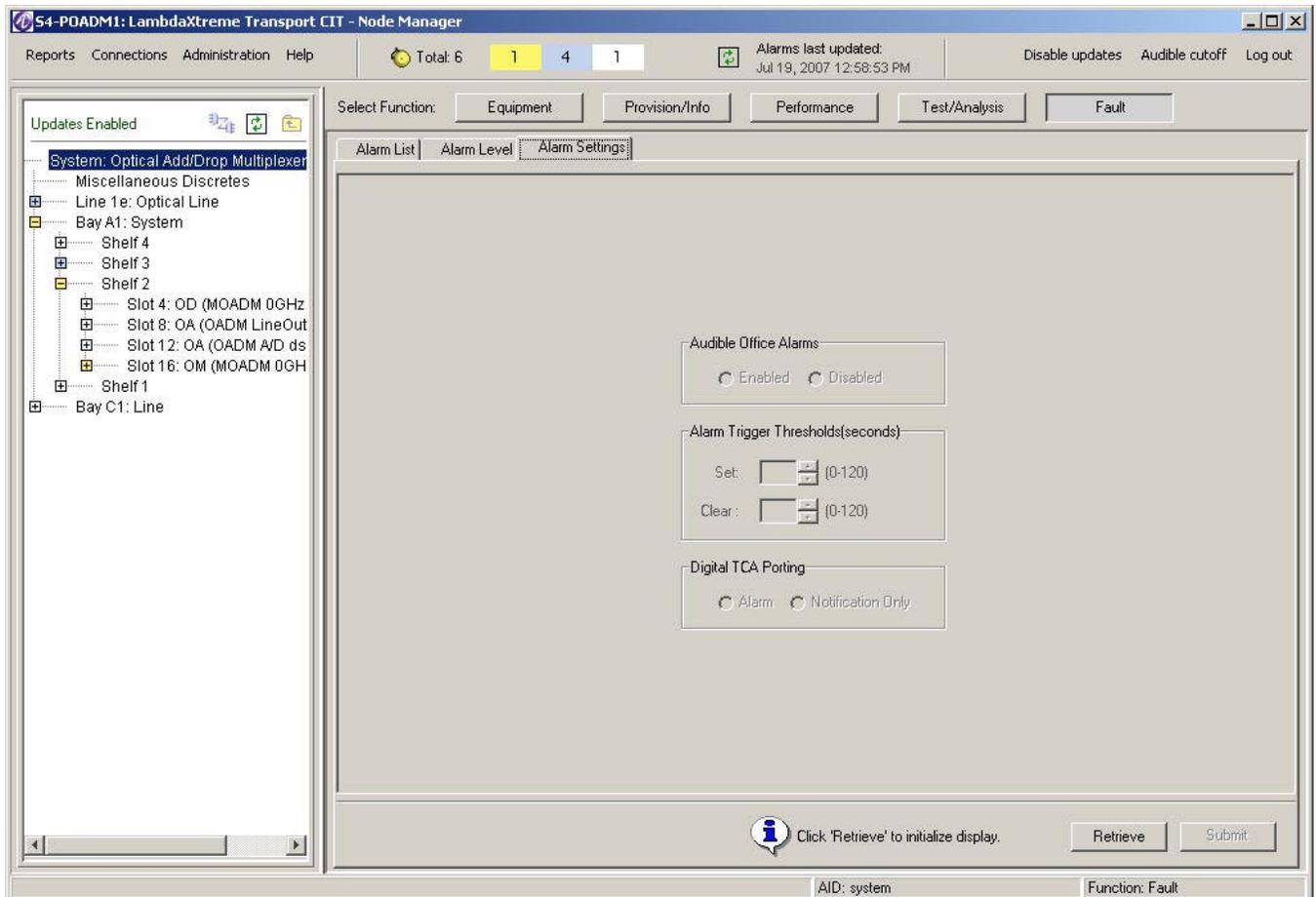
- RTRV-ATTR-ALM
- RTRV-SYS

Procedure

-
- 1 [“Access the Fault View in Node Manager”](#) (p. A-187).
-
- 2 Select the System (highest level) in the Equipment Tree. Click on the **Alarm Settings** tab in the display panel.

Result: The System Alarm Settings window is displayed (see [Figure A-116](#), “System Alarm Settings Window” (p. A-195)).

Figure A-116 System Alarm Settings Window



-
- 3 Click **Retrieve** to display the currently provisioned data.
-

- 4 Select the appropriate values, then click **Submit**.

END OF STEPS

.....



Provision Miscellaneous Discretets Environmental Points

Purpose

To define the alarm severities and the alarm messages for miscellaneous discrete alarms in order to monitor the environment around the bay.

TL1 Commands

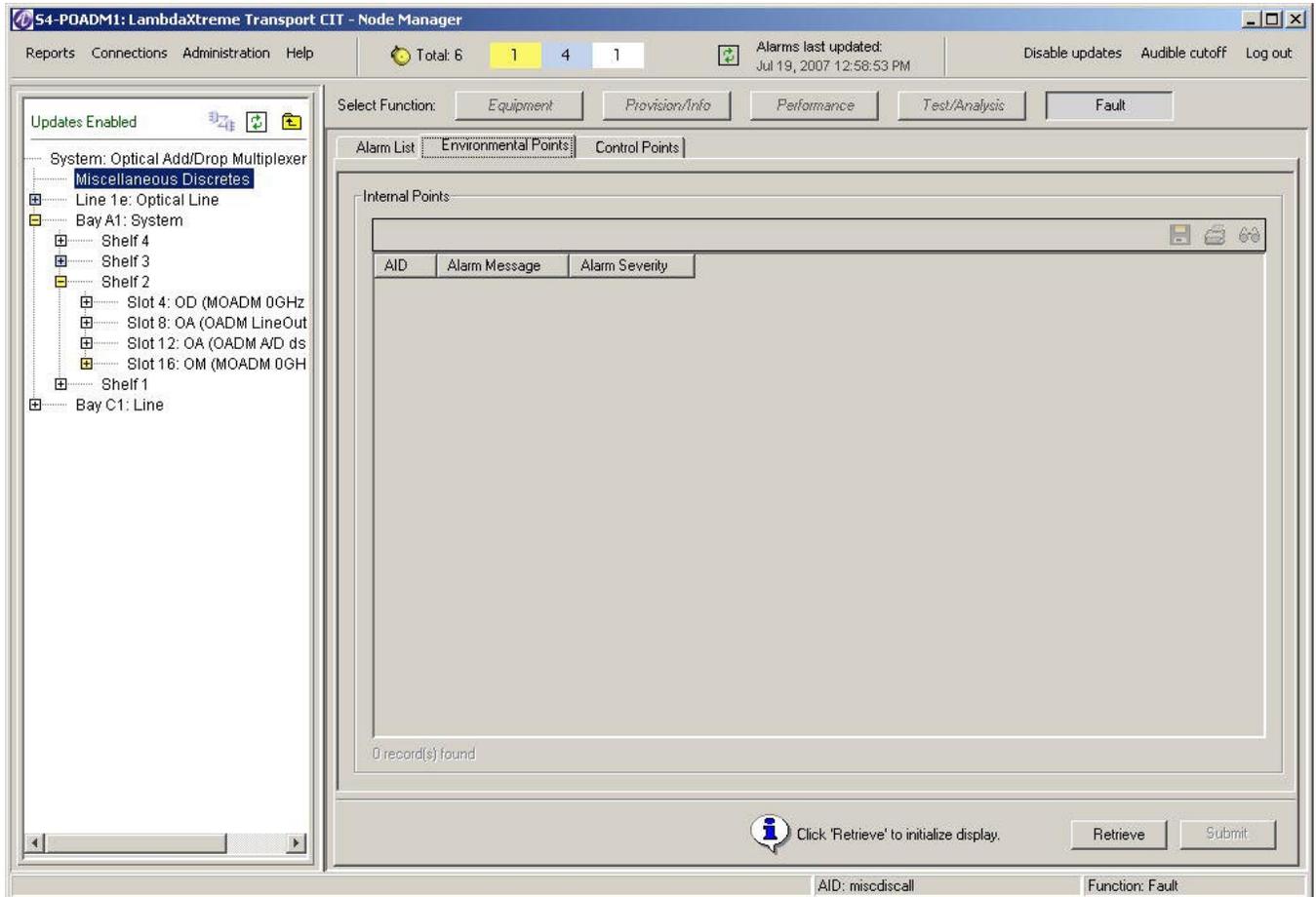
RTRV-ATTR-ENV

Procedure

-
- 1 [“Access the Fault View in Node Manager”](#) (p. A-187).
 - 2 From the Equipment Tree, select Miscellaneous Discretets. Click on the **Environmental Points** tab in the display panel.

Result: The Environmental Points Provisioning window is displayed (see [Figure A-117](#), “Environmental Points Provisioning Window” (p. A-197)).

Figure A-117 Environmental Points Provisioning Window



-
- 3 Click **Retrieve** to display the currently provisioned data.
-

- 4 Enter or select the appropriate values, then click **Submit**.

END OF STEPS

.....



Provision/Operate Miscellaneous Discretes Control Points

Purpose

To define the condition names for the miscellaneous discrete controls and activate/release control points.

TL1 Commands

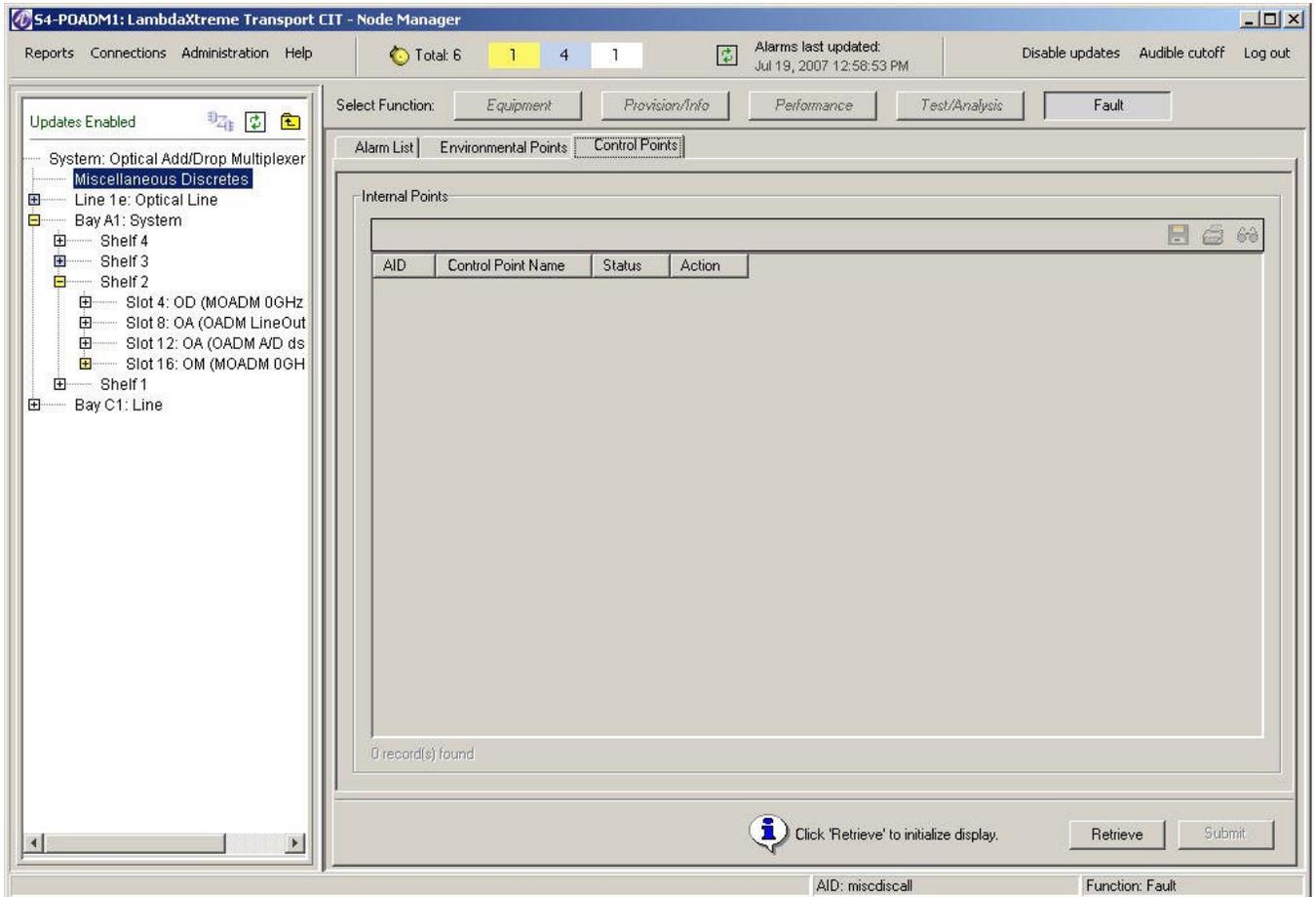
- OPR-EXT-CONT
- RLS-EXT-CONT
- RTRV-ATTR-CONT

Procedure

- 1 [“Access the Fault View in Node Manager”](#) (p. A-187).
- 2 From the Equipment Tree, select Miscellaneous Discretes. Click on the **Control Points** tab in the display panel.

Result: The Control Points Provisioning window is displayed (see Figure A-118, “Control Points Provisioning Window (No Data)” (p. A-199)).

Figure A-118 Control Points Provisioning Window (No Data)



- 3 Click **Retrieve** to display the currently provisioned data.

Result: The Control Points Provisioning window is populated with the currently provisioned data (see Figure A-119, “Control Points Provisioning Window (With Data)” (p. A-200)).

Figure A-119 Control Points Provisioning Window (With Data)

Internal Points

AID	Control Point Name	Status	Action
CONT-1	control 1	Open	None
CONT-2	control 2	Open	None
CONT-3	control 3	Open	None
CONT-4	control 4	Open	None

4 record(s) found

Retrieve Submit

Waiting for NE reply...Done. AID: miscdiscall Function: Fault

4 The following applies:

- **Status** shows the current status of the control point (Open or Closed).
- **Action** allows you to operate the control point. If the current status is Open, then it is possible to Close or Pulse (close momentarily) the control point. If the current status is Closed, then it is possible to Open it.

Enter or select the appropriate values, then click **Submit**.

END OF STEPS



Appendix B: TL1 Commands

Caution

Using TL1 commands from the CIT TL1 Cut-Through should only be attempted by knowledgeable users. Some commands may affect service, reset system parameters, and so forth.

Table B-1, “TL1 Commands” (p. B-1) lists the available LambdaXtreme® Transport TL1 commands and their associated CIT procedures that are presented in [Appendix A, “Using the CIT”](#). For a full description of TL1 commands, see “Using Cut-Through and TL1” from the CIT Help Viewer (see [“Access Help Topics” \(p. A-115\)](#)).

Table B-1 TL1 Commands

TL1 Command	Procedure
ACT-USER	“Access Node” (p. A-13)
ALW-MSG	“Auto Update Messages” (p. A-55)
BACKUP-DB	“Database Backup and Restore” (p. 3-29)
CANC-USER	“Node Manager Display” (p. 8-7)
CPY-PRGM	“Copy Software” (p. A-110)
DLT-ASSOC-OT	“Delete OT Association” (p. A-90)
DLT-CONN	“Delete Add/Drop Connection” (p. A-81)
DLT-CRS	“Delete Mesh Cross-Connections” (p. A-86)
DLT-CRS-OT	“Delete Mux OT Cross-Connection” (p. A-76)
DLT-USER-SECU	“Security Administration - Delete a User” (p. A-104)
DWNLD-SW	“Install Initial NE Software” (p. A-10) “Download Software” (p. A-108) “Downloading Software” (p. 3-27)
ED-DAT	“Set Craft Interface Launcher Preferences” (p. A-26)

Table B-1 TL1 Commands (continued)

TL1 Command	Procedure
ED-PID	“Security Administration - Change Password” (p. A-105)
ED-SEV	“Provision Alarm Severity Levels” (p. A-191)
ED-USER-SECU	“Security Administration - Modify User Security Settings” (p. A-102) “Security Administration - Set System Security Parameters” (p. A-98)
ENT-ASSOC-OT	“Add Mux OT Cross-Connection” (p. A-74) “Add OT Association” (p. A-87)
ENT-CID-SECU	“Security Administration - Set System Security Parameters” (p. A-98)
ENT-CONN	“Add Add/Drop Connection” (p. A-77)
ENT-CRS	“Add Mesh Cross-Connection” (p. A-82)
ENT-CRS-OT	“Add Mux OT Cross-Connection” (p. A-74)
ENT-NE-SECU	“Security Administration - Set System Security Parameters” (p. A-98)
ENT-OCHTRC	“Specify Optical Channel Path Trace Settings” (p. A-184)
ENT-OLINE-DATA	Alcatel-Lucent Use Only
ENT-OLPP	“Provision Optical Line Settings” (p. A-124)
ENT-OTPS	“Provision Mode for OT Client Side Input Port” (p. A-128)
ENT-PROTNSW	“Provision UPOP/OP1P1 Protection Switching” (p. A-143)
ENT-SECTRC	“Specify OT Section Trace Settings” (p. A-173)
ENT-SUPR	“Provision Analog Threshold Levels and Message Notification” (p. A-152)
ENT-SYS	“Provision System Level Attributes for the NE” (p. A-91) “Access Node” (p. A-13)
ENT-TMGSRG-SUPR	“Supervisory Channel Provisioning” (p. 5-16)
ENT-TRAILTRC	“Specify OT Section Trace Settings” (p. A-173) “Specify Optical Channel Path Trace Settings” (p. A-184)
ENT-USER-SECU	“Security Administration - Add a User” (p. A-100)
FACTORY-UTIL	Alcatel-Lucent Use Only
INH-MSG	“Auto Update Messages” (p. A-55)
INIT-EQPT	“Access the Equipment View in Node Manager” (p. A-117) “Reboot SCTL Circuit Pack” (p. A-135)

Table B-1 TL1 Commands (continued)

TL1 Command	Procedure
INIT-REG-ALL	“Reset Digital Performance Monitoring Storage Registers” (p. A-157)
INIT-REG-OTPS	“Reset Digital Performance Monitoring Storage Registers” (p. A-157)
INIT-SYS	“Database Restore and Activate” (p. 3-32) “Reboot System” (p. A-113)
OPR-ACO-ALL	“Cut Off Audible Alarms” (p. A-56)
OPR-EXT-CONT	“Provision/Operate Miscellaneous Discretes Control Points” (p. A-198)
OPR-FORCED-APR	Alarms, Messages, and Trouble Clearing Guide, Chapter 4
OPR-PROTNSW-OTPS	“Provision UPOP/OP1P1 Protection Switching” (p. A-143)
REPT ALM	“View Alarm List Report” (p. A-60)
REPT ALM ENV	“View Alarm List Report” (p. A-60)
REPT CONN	“Add Add/Drop Connection” (p. A-77)
REPT DBCHG	“View Network Software/Database Report” (p. A-72)
REPT EVT	“View Event History Report” (p. A-63)
REPT PROTNSW	“Provision UPOP/OP1P1 Protection Switching” (p. A-143)
RESTORE-DB	“Database Backup and Restore” (p. 3-29)
RLS-EXT-CONT	“Provision/Operate Miscellaneous Discretes Control Points” (p. A-198)
RLS-PROTNSW-OTPS	“Provision UPOP/OP1P1 Protection Switching” (p. A-143)
RTRV-ALM-ALL	“View Alarm List Report” (p. A-60)
RTRV-AO	“View Event History Report” (p. A-63) “View Network Software/Database Report” (p. A-72)
RTRV-ASSOC-OT	“Add Add/Drop Connection” (p. A-77) “Add OT Association” (p. A-87)
RTRV-ATTR-ALM	“Provision System Level Attributes for the NE” (p. A-91) “Provision System Alarm Settings” (p. A-194)
RTRV-ATTR-CONT	“Provision/Operate Miscellaneous Discretes Control Points” (p. A-198) “Provision System Level Attributes for the NE” (p. A-91)

Table B-1 TL1 Commands (continued)

TL1 Command	Procedure
RTRV-ATTR-ENV	<p>“Provision Miscellaneous Discretis Environmental Points” (p. A-196)</p> <p>“Provision System Level Attributes for the NE” (p. A-91)</p>
RTRV-AVAIL-NE	<p>“View Map Details ” (p. A-29)</p> <p>“View/Edit Map Properties” (p. A-30)</p> <p>“Node Search” (p. A-37)</p> <p>“View Network Configuration Report” (p. A-70)</p> <p>“View Network Software/Database Report” (p. A-72)</p>
RTRV-BASELINE-OCHAN	“Establish Baseline Values for Total Power ” (p. A-150)
RTRV-BASELINE-OLINE	“Establish Baseline Values for Total Power ” (p. A-150)
RTRV-BASELINE-SUPR	“Establish Baseline Values for Total Power ” (p. A-150)
RTRV-CID-SECU	“Security Administration - Modify User Security Settings” (p. A-102)
RTRV-COMP-INV	“View Circuit Pack Inventory Report” (p. A-68)
RTRV-COND-ALL	“View Alarm List Report” (p. A-60)
RTRV-CONN	<p>“Add Mux OT Cross-Connection” (p. A-74)</p> <p>“Delete Mux OT Cross-Connection” (p. A-76)</p> <p>“Add Add/Drop Connection” (p. A-77)</p> <p>“Delete Add/Drop Connection” (p. A-81)</p>
RTRV-CRS	<p>“Add Mesh Cross-Connection” (p. A-82)</p> <p>“Delete Mesh Cross-Connections” (p. A-86)</p>
RTRV-CRS-OT	<p>“View New Connection Events” (p. A-57)</p> <p>“Add Mux OT Cross-Connection” (p. A-74)</p> <p>“Delete Mux OT Cross-Connection” (p. A-76)</p>
RTRV-DAT	“Set Craft Interface Launcher Preferences” (p. A-26)
RTRV-DPM-OTPS	<p>“Establish Baseline Values for Total Power ” (p. A-150)</p> <p>“Provision Monitoring Status of SIO Ports” (p. A-133)</p>
RTRV-EQPT	<p>“View/Modify Node Properties” (p. A-40)</p> <p>“Access the Equipment View in Node Manager” (p. A-117)</p> <p>“View Circuit Pack Details” (p. A-126)</p> <p>“View Circuit Pack Inventory Report” (p. A-68)</p>
RTRV-HDR	“View/Modify Node Properties” (p. A-40)

Table B-1 TL1 Commands (continued)

TL1 Command	Procedure
RTRV-LOG	“Event History Log” (p. 3-12)
RTRV-LOG-SECU	“View Security History Report” (p. A-65)
RTRV-MAP-NEIGHBOR	“View Neighbors Report” (p. A-62)
RTRV-NE-SECU	“Security Administration - Set System Security Parameters” (p. A-98)
RTRV-OCHAN-MAP	“View Map Details ” (p. A-29) “View/Edit Map Properties” (p. A-30) “View Channel Map Report” (p. A-66)
RTRV-OCHTRC	“Obtain Optical Channel Path Trace” (p. A-182)
RTRV-OLINE-DATA	Alcatel-Lucent Use Only
RTRV-OLPP	“Provision Optical Line Settings” (p. A-124)
RTRV-OTPS	“Provision Mode for OT Client Side Input Port” (p. A-128) “Generate Performance Monitoring Data” (p. A-160)
RTRV-PM-OCHAN	“Access the Performance View in Node Manager” (p. A-146) “Generate Performance Monitoring Data” (p. A-160)
RTRV-PM-OLINE	“Access the Performance View in Node Manager” (p. A-146) “Generate Performance Monitoring Data” (p. A-160)
RTRV-PM-OTPS	“Generate Performance Monitoring Data” (p. A-160)
RTRV-PM-STIME	“Set Start Time for Performance Monitoring ” (p. A-148) “Generate Performance Monitoring Data” (p. A-160)
RTRV-PM-SUPR	“Access the Performance View in Node Manager” (p. A-146)
RTRV-PROTNSW	“Provision UPOP/OP1P1 Protection Switching” (p. A-143)
RTRV-SECTRC	“Obtain OT Section Trace” (p. A-171)
RTRV-SEV	“Set Options and Generate Alarm List for Selected Equipment” (p. A-189) “Provision Alarm Severity Levels” (p. A-191)
RTRV-SGNL-STATUS	“View Signal Status of OT Port” (p. A-179)
RTRV-STATE	“Provision Mode for OT Client Side Input Port” (p. A-128)
RTRV-SUPR	“Provision Analog Threshold Levels and Message Notification” (p. A-152)
RTRV-SWDB-ATTR	“View Network Software/Database Report” (p. A-72) “View Software Release Information” (p. A-107)

Table B-1 TL1 Commands (continued)

TL1 Command	Procedure
RTRV-SYS	<p>“Access Node” (p. A-13)</p> <p>“View Map Details ” (p. A-29)</p> <p>“View/Edit Map Properties” (p. A-30)</p> <p>“View/Modify Node Properties” (p. A-40)</p> <p>“View Network Configuration Report” (p. A-70)</p> <p>“Provision System Alarm Settings” (p. A-194)</p>
RTRV-TH-OCHAN	“Provision Analog Threshold Levels and Message Notification” (p. A-152)
RTRV-TH-OLINE	“Provision Analog Threshold Levels and Message Notification” (p. A-152)
RTRV-TH-OTPS	“Provision Analog Threshold Levels and Message Notification” (p. A-152)
RTRV-TH-SUPR	<p>“Provision Analog Threshold Levels and Message Notification” (p. A-152)</p> <p>“Provision Digital Threshold Levels and Message Notification” (p. A-154)</p>
RTRV-TMGSRV-SUPR	“Supervisory Channel Provisioning” (p. 5-16)
RTRV-TRAILTRC	<p>“Obtain Optical Channel Path Trace” (p. A-182)</p> <p>“Specify Optical Channel Path Trace Settings” (p. A-184)</p>
RTRV-TRANS-DATA	For Software Developers
RTRV-USER-SECU	<p>“Security Administration - Add a User” (p. A-100)</p> <p>“Security Administration - Modify User Security Settings” (p. A-102)</p>
SET-ATTR-ALM	“Provision System Level Attributes for the NE” (p. A-91)
SET-ATTR-CONT	“Provision System Level Attributes for the NE” (p. A-91)
SET-ATTR-ENV	“Provision System Level Attributes for the NE” (p. A-91)
SET-BASELINE-OCHAN	“Establish Baseline Values for Total Power ” (p. A-150)
SET-BASELINE-OLINE	“Establish Baseline Values for Total Power ” (p. A-150)
SET-BASELINE-SUPR	“Establish Baseline Values for Total Power ” (p. A-150)
SET-CERT	“Encryption (SSL/TLS)” (p. 4-15)
SET-PM-STIME	<p>“Set Start Time for Performance Monitoring ” (p. A-148)</p> <p>“Reset Digital Performance Monitoring Storage Registers” (p. A-157)</p>

Table B-1 TL1 Commands (continued)

TL1 Command	Procedure
SET-TH-OCHAN	“Provision Analog Threshold Levels and Message Notification” (p. A-152)
SET-TH-OLINE	“Provision Analog Threshold Levels and Message Notification” (p. A-152)
SET-TH-OTPS	“Provision Analog Threshold Levels and Message Notification” (p. A-152)
SET-TH-SUPR	“Provision Analog Threshold Levels and Message Notification” (p. A-152) “Provision Digital Threshold Levels and Message Notification” (p. A-154)
TEST-ALM	“Test System Office Alarms” (p. A-166)
TEST-LED	“Test Circuit Pack LEDs” (p. A-168)
UPDATE-COMP-FW	“View Network Software/Database Report” (p. A-72)
VERIFY-CONN	“Verify Fiber Connectivity” (p. A-169)



Glossary

Numerics

3R (Reshaping, Reamplification, Retiming) Functionality

When a signal is converted from optical to electrical, optical translators reshape, reamplify, and retime the electrical signal.

10/100 BASE-T

A twisted-pair cable version of an IEEE 802.3 network.

100BASE-TX

A 100 megabit-per-second local area network known by the generic name of Fast Ethernet operating over twisted-pair copper cable. This technology is becoming very popular and cost-effective. It is designed to integrate with existing networks with minimal disruption.

A **ACO (Alarm Cut-Off)**

A push-button switch on the indicator strip that can be used to retire an audible office alarm.

ADC (Analog Digital Converter)

A device that converts analog signals into digital signals.

AID (Access Identifier)

A unique identifier used to address equipment slots and ports, as well as facility tributaries, that are defined for the system architecture.

AIM (Alarm Indication Message)

A return message sent from one NE to another NE that indicates it has received a signal so degraded that it is raising an alarm.

AIS (Alarm Indication Signal)

A signal sent downstream by an NE to indicate that its incoming signal has failed.

Alarm

External notification or display of a failure condition. The indication of a failure towards an external system interface or from audible or visible indicators.

Alarm List

A status report that lists active alarms on the NE.

Alarm Log

A history of setting and clearing system alarms on the NE.

Alarm Severity

An attribute that defines the priority of the alarm message. The way alarms are processed depends on the severity.

Alarm Suppression

Selective removal of alarm messages from being forwarded to the GUI or to the network management layer OS.

Alcatel-Lucent Optical Management System (OMS)

An element management system that provides networks with operational functions such as configuration management, fault management, performance management, and security management.

Angular Misalignment

Loss at a connector caused by misaligned fiber end-face angles.

Anomaly

Any deviation from normal behavior. Anomalies do not result in any consequent actions, but are contributors to defects and performance monitoring counts.

ANSI (American National Standards Institute)

A United States standards body that accredits standards for programming languages, communications, and networking; it is the U.S. representative in the International Organization for Standardization (ISO).

APC (Angle Polished Connector)

A 5°-15° angle on the connector tip for the minimum possible back reflection.

Apparatus Code

ASCII name assigned by the manufacturer to identify a particular circuit pack by pack type and number.

APR (Automatic Power Reduction)

The lowering of the laser power to a limit that fits into the class 1 category for handling fiber cables. APR replaces the full power-off feature known as ALS (automatic laser shutdown) or APSD (automatic power shutdown).

AR (Antireflection coating)

A thin dielectric or metallic film applied to an optical surface to reduce its reflection and thereby increase its transmission.

ASE (Amplified Spontaneous Emission)

Optical noise generated in an erbium-doped fiber amplifier (EDFA) with and without signal input power.

ASTM (American Society for Testing and Materials)

A non-profit industry-wide organization that publishes standards, methods of test, recommended practices, definitions, and related material.

Asynchronous

Data that is transmitted without an associated clock signal.

ATAG (Autonomously Generated Correlation Tag)

An autonomous TL1 message (event) counter used to detect lost events.

ATM (Asynchronous Transfer Mode)

A high-speed digital transmission switching format, containing 5 bytes of header information followed by 48 data bytes.

Attenuation

The decrease in signal strength along a fiber optic waveguide caused by absorption and scattering. Attenuation is usually expressed in dB/km.

Attenuator

A passive device that reduces the amplitude of a signal without distorting the waveform.

Auto-Provisioning

Configuration of system parts without pre-provisioning. When a part is plugged into the system, it is accepted with its default configuration.

Automatic Protection Switch

A protection switch that occurs automatically in response to an automatically detected fault condition.

Autonomous Message

Message sent by the system to the CIT to notify it of any state change in the system. Autonomous messages are not responses to a CIT-initiated command. Examples of these messages include alarms, events (non-alarmed condition), notification of connections that are added or deleted, and changes in the system database.

B Back Reflection

See Fresnel Reflection.

Backscattering

The return of a portion of scattered light to the input end of a fiber; the scattering of light in the direction opposite to its original propagation.

Bay

An aluminum steel enclosure for rack-mounted equipment. Also known as rack.

BCM (Board Controller Module)

A small module (printed wiring board plus components) that plugs into almost every circuit pack (other than the NCTL, SCTL, and SUPVY) to supply the processor, memory, and intra-NE communications capabilities needed to operate the pack in the system.

Beamsplitter

An optical device, such as a partially reflecting mirror, that splits a beam of light into two or more beams. Used in fiber optics for directional couplers.

Bend Radius

The smallest radius an optical fiber or fiber cable can bend before increased attenuation or breakage occurs.

Bending Loss

Attenuation caused by high-order modes radiating from the outside of a fiber optic waveguide that occurs when the fiber is bent around a small radius. See also macrobending, microbending.

BER (Bit Error Rate)

BER measures how accurately a bit stream is transmitted through a system. It measures how many bits are received in error compared to how many are sent.

Birefringent

When light moving in one direction acts differently from light going in another direction.

BLKR (64 CH)

The BLKR circuit pack is used in the WXC for blocking channels that should not mesh to the other line. These packs are used for 40G transmission.

Blockers

Blockers allow reuse of channels that have been dropped by blocking wavelengths on an individual basis within an ROADM/WXC NE.

Brillouin Scattering

In a transmission path, scattering of lightwaves, caused by thermally driven density fluctuations. Brillouin scattering may cause frequency shifts of several gigahertz at room temperature.

C Cable Assembly

A cable that is connector-terminated and ready for installation.

Cable Plant

Consists of all the optical elements including fiber connectors and splices between a transmitter and a receiver.

CCITT (Consultative Committee for the International Telephone and Telegraph)

See ITU (International Telecommunications Union).

CDR (Clock and Data Recovery)

A technique used in Local Area Networks (LANs) whereby a data octet is subdivided, scrambled, and encoded into an expanded form. The expanded expression of the data value includes bits that are used for clock recovery.

CDS (Complementary Double Shelf)

See DS (Double Shelf).

Center Wavelength

In a laser, the nominal value central operating wavelength. It is the wavelength defined by a peak mode measurement where the effective optical power resides. In a LED, the average of the two wavelengths measured at the half-amplitude points of the power spectrum.

CFM (Cubic Feet per Minute)

A measure of how much air moves through the fan of air-cooled equipment.

Channel

A communications path or the signal sent over that path.

Chirp

In laser diodes, the shift of the laser's central wavelength during single pulse duration caused by laser instability.

Chromatic Dispersion

The speed that an optical pulse travels depends on the fiber wavelength. This is caused by several factors including material dispersion, waveguide dispersion, and profile dispersion. The net effect of chromatic dispersion is that if an optical pulse contains multiple wavelengths (colors), then the different colors travel at different speeds and arrive at different times, spreading the received optical signal.

CIO (Controller Input/Output) Circuit Pack

A circuit pack that indicates Ethernet port status.

CIT (Craft Interface Terminal)

A local interface between humans and an NE. It is used to issue commands to the local system or, by way of a remote login, to another system on the same fiber as the local system.

CL (Coupling Ratio/Loss)

The ratio/loss of optical power from one output port to the total output power, expressed as a percentage.

Cladding

Material that surrounds the core of an optical fiber that has a lower index of refraction compared to that of the core. The lower index of refraction causes the transmitted light to travel down the core.

CLEI (Common Language Equipment Identifier)

CLEI codes enable you to clearly and consistently identify and track virtually every type of telecommunications equipment. In the United States, these codes are assigned by Telecordia, and are 10 bytes long.

CO (Central Office)

A CO can be a building, a switch, or collection of switches where subscriber lines are joined to switching equipment that connects the subscribers to each other, other subscribers, and/or long distance subscribers.

Compact Flash Memory Module (CFMM)

A removeable memory module used with LambdaXtreme® Transport Repeaters for storage of executable code and provisioned data. CFMM is smaller than the FMM, and requires the use of an adaptor when inserted into the CIT PC. See also FMM

Connector

A mechanical or optical device that provides a demountable connection between two fibers or a fiber and a source or detector.

Connector Plug

A device that terminates an optical conductor cable.

Connector Receptacle

The fixed or stationary half of a connection that is mounted on a panel/bulkhead. Receptacles mate with plugs.

Connector Variation

The maximum value in dB of the difference in insertion loss between mating optical connectors (for example, with re-mating and temperature cycling). Also called Optical Connector Variation.

Core

The central portion of the fiber that transmits light. It is composed of material with a higher index of refraction than the cladding.

Coupler

An optical device that combines or splits power from optical fibers.

CPEDS (Circuit Pack Extraction Detection Switches)

Switches that are built into the circuit packs that detect when a circuit pack is being removed from the shelf.

CR (Coupling Ratio/Loss)

The ratio/loss of optical power from one output port to the total output power, expressed as a percentage.

CRC (Cyclic Redundancy Check)

A method to detect erroneous bits in a byte stream.

CSMA/CD (Carrier Sense Multiple Access with Collision Detection)

A control technique for getting onto and off a LAN. All devices attached to the network listen for transmissions in progress (that is, carrier sense) before starting to transmit (multiple access). If two or more begin transmitting at the same time and their transmissions crash into each other, each backs off (collision detection) for a different amount of time (determined by an algorithm) before again attempting to transmit.

CTAG (Correlation Tag)

A user-supplied label attached to an input command that is repeated in the associated response to facilitate the correlation of input to response.

Current SW Generic (Current Software Generic)

The software and data that the NE is currently using. It is loaded on to the active partition of the FlashDisk Memory Module.

CW (Continuous Wave)

The constant optical output from an optical source when it is turned on, but not modulated with a signal.

D DAC (Digital to Analog Converter)

A device that converts digital signals into analog signals.

Dark Current

The flow of electricity through the diode in a photodiode when no light is present.

DCC (Data Communication Channel)

A portion of the SDH/SONET signal that contains alarm, surveillance, and performance information.

DCF (Dispersion Compensating Fiber)

A special fiber with a negative chromatic dispersion coefficient used to compensate the positive chromatic dispersion of the transmission fiber in the third optical window.

DCM (Dispersion Compensation Module)

Spooled fiber used to control excess dispersion found in certain fiber types at pre- and post-amplification.

DCN (Data Communication Network)

DCN supports communications between NEs and the NMS.

DCS (Digital Cross-Connect System)

A system that has multiple input and output streams, and can interconnect a signal from any input to any output.

DEMUX or DMX (Demultiplexer)

A module that separates two or more signals previously combined by compatible multiplexing equipment.

Detector

An opto-electric transducer used in fiber optics to convert optical power to electrical current. Usually referred to as a photodiode.

DGD (Differential Group Delay)

In an optical fiber, the variation in propagation delay that occurs because of the different group velocities of different modes.

DGEF (Dynamic Gain Equalization Filter)

A filter that equalizes the gain of an optical signal.

DHCP (Dynamic Host Control Protocol)

DHCP enables PCs and workstations to get temporary or permanent IP addresses from the server.

Directional Coupler

A coupling device for separately sampling (through a known coupling loss) either the forward (incident) or the backward (reflected) wave in a transmission line.

Dispersion

The temporal spreading of a light signal in an optical waveguide caused by light signals traveling at different speeds through a fiber either due to modal or chromatic effects.

Distortion

The difference in value between two measurements of a signal (transmitted and received).

DL (Data Link)

The communication links used for data transmission from a source to a destination.

DM (Dispersion Management)

The DM circuit pack provides dispersion management on 40G OTs. This is a passive transmission circuit pack, and is managed by the SCTL.

DMS (Dispersion Managed Soliton)

A technique that allows solitons to become more resistant to errors when they are propagating inside optical fibers. See also Soliton.

DS (Double Shelf)

Two shelves with a fan assembly between them and a heat baffle below the lower shelf. A DS is NEBS level 3 compatible, and each shelf contains sixteen 30 mm slots. LambdaXtreme® Transport has the following double shelves: Network Controller Double Shelf (NCDS), Repeater Double Shelf (RDS), High Density Double Shelf (HDDS), and Complementary Double Shelf (CDS).

DSA (Directory System Agent)

An operating system application process that provides the Directory functionality.

DSF (Dispersion-Shifted Fiber)

Used to improve on Non-Zero Dispersion Shifted Fiber by shifting the interface between the fiber core and cladding. This fiber exhibits optimum attenuation performance at 1550 nm and optimum bandwidth at 1300 nm.

DSP (Digital Signal Processor)

A specialized semiconductor device that converts analog signals into digital signals.

DTE (Data Terminal Equipment)

DTE is part of a broader grouping of equipment known as customer premises equipment that includes voice, data, and OADMs.

Duplex Cable

A two-fiber cable suitable for duplex transmission.

Duplex Transmission

Transmission in both directions, either one direction at a time (half-duplex) or both directions simultaneously (full-duplex).

DWDM (Dense Wavelength Division Multiplexing)

Transmitting eight or more signals of different wavelengths simultaneously over a single fiber.

E E-LEAF (Enhanced-Large Effective Area Fiber)

A fiber type manufactured by Corning.

EDC (Error Detection Code)

Code construction that provides a way to protect, correct data from errors, and maintain the data integrity.

EDCV (Error Detection Code Violation)

Occurs when the calculated checksum over a signal does not match the received checksum.

EDFA (Erbium-Doped Fiber Amplifier)

Optical fibers doped with the rare earth element erbium that can amplify light in the 1550 nm region when pumped by an external light source.

EEPROM (Electrical Erasable and Programmable Read-Only Memory)

Kind of non-volatile memory often used to store inventory data.

EMI (Electromagnetic Interference)

High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

EML (Electroabsorption Modulated Laser)

When laser is modulated using a Mach-Zehnder modulator.

EMR (Electromagnetic Radiation)

Radiation made up of oscillating electric and magnetic fields and propagated with the speed of light. Includes gamma radiation, X-rays, ultraviolet, visible and infrared radiation, and radar and radio waves.

EMS (Element Management System)

System that manages NEs either directly attached to it or are remotely connected by using the DCN. Examples of these systems are the CIT and Alcatel-Lucent OMS.

Engineering Rules

A set of rules that determine the system configuration possibilities based on fiber type, OA, rate, and number of wavelengths. These rules also determine the maximum loss per span that can be tolerated, the maximum distance between spans allowed, and the maximum number of spans that can be supported.

EOL (End-Of-Life)

EOL defines the status or values at the end of the guaranteed lifetime of a component. EOL is reached when the wear-out failure rate dominates the component failure rate.

Error Recovery

The intent to recover from a detected error, such as inconsistent state or configuration information. See also Operational Recovery.

ES-IS (End System to Intermediate System Protocol)

An ISO OSI network-layer protocol (ISO 9542) for End Systems (alias hosts) communicating to Intermediate Systems (alias routers) that dynamically builds the relevant network routing databases (administrative protocol).

ESD (Electrostatic Discharge)

Static electrical energy potentially harmful to circuit packs and humans.

ETSI (European Telecommunications Standards Institute)

Located in Sophia-Antipolis, France, ETSI is the European counterpart to ANSI. Its task is to pave the way for telecommunications integration in the European community as part of the single European market program. It establishes telecommunication standards for the European community.

External Modulation

Modulation of a light source by an external device that acts as an electronic shutter.

Extinction Ratio

The ratio of two optical powers of a digital signal generated by an optical source.

Eye Pattern

The proper function of a digital system can be quantitatively described by its BER, or qualitatively by its eye pattern. The "openness" of the eye relates to the BER that can be achieved. Also called eye diagram.

F Fabric

The part of an optical system that is responsible for switching voice, data, or video from one place to another.

Failure

When a fault cause persists for a certain period of time.

Failure Rate

The number of failures of a device per unit of time.

Fall Time

The time required for the trailing edge of a pulse to fall from 90% to 10% of its amplitude; the time required for a component to produce such a result. Typically measured between the 80% and 20% points or the 90% and 10% points. Also called turn-off time.

Far-End Crosstalk

Crosstalk occurs when you hear someone you did not call talking to someone else on your telephone line. Far-End Crosstalk occurs when Crosstalk travels along a circuit in the same direction as the signals in the circuit.

FAS (Frame Alignment Signal)

A sequence at the beginning of an SDH/SONET frame that detects the frame start.

FC (Fiber Optic Connector)

A threaded optical connector for single-mode or multimode fiber and applications requiring low back reflection.

FC/PC

A special curved polish on the connector for very low back reflection.

FCC (Federal Communications Commission)

The U.S. federal regulatory agency responsible for the regulation of interstate and international communications by radio, television, wire, satellite, and cable.

FDDI (Fiber Distributed Data Interface)

A 100-Mbps fiber optic LAN.

FE (Far End)

Any network element in a maintenance subnetwork other than the one that the user is at or working on. Also called remote.

FEBE (Far End Block Error)

A maintenance signal transmitted in the physical overhead indicating that a bit error has been detected at the physical layer at the far end of the link.

FEC (Forward Error Correction)

A method to correct bit errors in a transmission signal whereby additional information is put into the data signal to allow bit errors to be corrected at the receiving end.

Ferrule

A rigid tube that confines or holds a fiber as part of a connector assembly.

FET (Field Effect Transistor)

Very thin and small transistors used to control pixels in a thin film transistor display.

Fiber Optic Attenuator

A component installed in a fiber optic transmission system that reduces the power in the optical signal. It is often used to limit the optical power received by the photo detector to within the limits of the optical receiver.

Fiber Optic Cable

A cable containing one or more optical fibers.

Fiber Optic Link

A transmitter, receiver, and cable assembly that can transmit information between two points.

Fiber Optic Span

An optical fiber/cable terminated at both ends that may include devices that add, subtract, or attenuate optical signals.

FIT (Failure In Time)

A unit of failure rate in reliability analysis. One FIT is equivalent to one failure per one billion operating hours.

FIT Rate

Number of device failures in one billion device hours.

FMM (FlashDisk Memory Module)

A nonvolatile memory device used to store the installation software generic or the NE database.

FPGA (Field Programmable Gate Array)

A user-configurable logic device that holds user-defined logic constructs and interconnects in the form of a microprocessor. Examples include EEPROM and FLASH.

Fresnel Reflection

A reflection of light that occurs at the air-glass interface at the ends of an optical fiber.

FSK (Frequency Shifting Key)

A modulation technique for transmitting data in digital format over an analog carrier. It involves shifting the frequency level of the carrier.

FTP (File Transfer Protocol)

A protocol used for exchanging files over the Internet. FTP uses the Internet TCP/IP protocols to enable data transfer. FTP is most commonly used to download/upload a file to/from a server using the Internet.

Fused Fiber

A bundle of fibers fused together so they maintain a fixed alignment with respect to each other in a rigid rod.

Fusion Splicer

An instrument that permanently bonds two fibers together by heating and fusing them.

G Gain

The increase in power and magnitude of a signal.

GbE (Gigabit Ethernet)

Ethernet that runs at 1,000 bits per second. It comes in two formats: shared and switched. The frame size is much larger than traditional Ethernet. The size increased by 64 byte to 512 bytes.

GFF (Gain-Flattening Filter)

When erbium-doped fibers are used to amplify the light traveling through the fiber, some wavelengths are amplified more than others. A gain-flattening filter restores all wavelengths to approximately the same intensity.

GNE (Gateway Network Element)

A system node that has a physical attachment to the management system to support the access of the remote NE. The number of remote NEs a GNE can serve is specified in

terms of the number of OSI stack associations that the GNE can support without running out of local resources.

GPIO (General Purpose Input/Output)

GPIO provides a flexible way of interfacing a wide range of peripheral devices with a computer. Among the interface methods GPIO uses are the configurable data sense and handshaking.

Grooming

Consolidating or segregating traffic.

Ground Loop Noise

Noise that results when equipment is grounded at points having different potentials, thereby creating an unintended current path. The dielectric properties of optical fiber provide electrical isolation, which eliminates ground loops.

H HDDS (High Density Double Shelf)

See DS (Double Shelf).

HEVMUX (High Extension VMUX [Virtual Multiplex Protocol])

A HEVMUX sits above several lower protocols, making them appear as a single protocol. HEVMUX decides which protocol to use for each connection. Note that it is only active during connection establishment.

HXDS (High Density Reconfigurable Double Shelf)

See DS (Double Shelf).

I ICEA (Insulated Cable Engineers Association)

A professional organization dedicated to developing cable standards for the electric power, control, and telecommunications industries.

IDI (Initial Domain Identifier)

Part of the NSAP, the IDI defines the country code of the registration authority responsible for the allocation and assignment of the NSAP address.

IEC (International Electrotechnical Commission)

The international standards and conformity assessment body for all fields of electrotechnology, including electricity and electronics.

IEEE (Institute of Electrical and Electronic Engineers)

The IEEE helps advance global prosperity by promoting the engineering process of creating, developing, integrating, sharing, and applying knowledge about electrical and information technologies and sciences for the benefit of humanity and the profession.

ILA (In-Line Amplifier)

See Repeater.

IMF (Infant Mortality Factor)

The ratio of the first-year failure rate to the steady-state failure rate.

Index of Refraction

Also refractive index. The ratio of the velocity of light in free space to the velocity of light in a fiber material. Symbolized by n and is greater than or equal to one.

Index-Matching Gel

A gel with an index of refraction nearly equal to that of the fiber's core. This gel is used to reduce Fresnel reflection at fiber ends.

Insertion Loss

The loss of power that results from inserting a component, such as a connector or splice, into a previously continuous path.

Intrinsic Loss

Splice loss arising from differences in the fibers being spliced.

IR (Intermediate Reach)

Optical sections from a few kilometers (km) to approximately 15 km.

Irradiance

The amount of power per unit area.

ISO (International Standards Organization)

A United Nations agency concerned with international standardization in a broad range of industrial and technical fields.

ISUG (In-Service Upgradeable)

It is unnecessary to shut down the system to upgrade it.

ITU (International Telecommunication Union)

A United Nations telecommunications agency established to provide standardized communications procedures and practices including frequency allocation and radio regulations on a worldwide basis.

J Jacket

The outer, protective covering of the cable.

Jitter

Small and rapid variations in the timing of a waveform due to noise, changes in component characteristics, supply voltages, or imperfect synchronizing circuits.

Jumper

A short fiber optic cable with connectors on both ends.

L L Band (Long Band)

An optical spectrum range of frequencies range from 1570 to 1610 nm, where a wide range of wavelengths are possible with low loss. L Band doubles the number of wavelengths best suited in DWDM applications and uses newer, more expensive optical amplifiers. In LambdaXtreme® Transport, the L Band is widened and referred to as Extended L Band.

L-Span

See Span Loss.

LA (Limiting Amplifiers)

A device that provides a constant output voltage until the input voltage drops under a certain level.

LAN (Local Area Network)

1. A communication link between two or more points within a small geographic area, such as between buildings. 2. A data network that has a size of normally up to 10 km. Important LANs are Ethernet, Token Ring, Token Bus, and FDDI.

LAPD (Link Access Protocol on D-channel)

A special protocol of the OSI Data Link Layer that provides the functional and procedural means to establish, maintain, and release data link connections for NEs. For NE-NE communications over the DCC, Layer 2 services are provided by LAPD.

Launch Fiber

An optical fiber used to couple and condition light from an optical source into an optical fiber. Often the launch fiber is used to create an equilibrium mode distribution in multimode fiber. Also called launching fiber.

LBC (Laser Bias Current)

Current that runs through the laser to make it work. LBC is monitored by performance monitoring. If the current goes beyond a certain threshold, the circuit pack must be replaced.

LBO (Line Build Out)

Attenuation used to simulate a load.

LC (Lucent Connector)

A small-form-factor (SFF) design based on a proven 1.25 mm ceramic ferrule. This connector uses RJ latching. It facilitates high-speed applications with lower power requirements due to lower insertion loss (0.1 dB typical) and higher return loss (55 dB single mode).

LD (Laser Diode)

A semiconductor that emits coherent light when forward biased.

LEAF® (Large Effective Area Fiber)

A type of fiber manufactured by Corning.

LED (Light-emitting diode)

A diode that translates electrical current into light. Made out of semiconductor material like Gallium-Arsenide. A semiconductor that emits incoherent light when forward biased.

LFA (Loss of Frame Alignment)

The time during which frame alignment is effectively lost.

LGX (Lightguide Cross-Connect)

Fiber termination shelves and hardware used for interconnecting fiber cables, jumper, and closures that connect the switching systems to the transmission equipment.

LH (Long Haul)

A 10-Gbps application for transmission of 128 channels, giving a capacity of 1.28 Tbps and a reach of up to 2000 km. Payload (per channel) can be one OC-192/STM-64 or four OC-48/STM-16 signals.

LID (Link ID Protocol)

A Alcatel-Lucent proprietary protocol for exchange of neighbor information over a DCC link. LID makes use of LAPD (OSI) or PPP (IP).

Interchannel Isolation

The ability to prevent undesired optical energy from appearing in one signal path as a result of coupling from another signal path.

LOC (Loss of Clock)

Loss of clock is detected when the clock of the OT is damaged.

LOF (Loss of Frame)

Loss of frame is detected when the OOF anomaly persists for a certain time.

LOM (Loss of Multiframe)

A failure declared when two consecutive multiframe alignment signals are received with an error.

Loose-Tube

A type of fiber optic cable construction where the fiber is contained within a loose tube in the cable jacket.

LOS (Loss of Signal)

A condition where the optical input power falls below a certain threshold.

Loss

The amount of a signal's power, expressed in dB, that is lost in connectors, splices, or fiber defects.

Lossy Span

Long distance loss in the fiber.

LR (Long Reach)

A standard for optics, concerning transmitters and receivers in a system and ensuring that transmission can be maintained for long distances (tens of kilometers). This standard constrains the output power of the transmitter and the sensitivity of the receiver for long-haul applications (up to 80 km) without the need for regeneration.

LVDS (Low Voltage Differential Signaling)

LVDS delivers high data rates while consuming significantly less power than competing technologies. In addition, it brings many other benefits including low-voltage power supply compatibility, low noise generation, high noise rejection, robust transmission signals, and ability to be integrated into system level ICs

LVDS technology allows products to address high data rates ranging from 100's of Mbps to greater than 2 Gbps. For all of the above reasons, it has been deployed across many market segments wherever the need for speed and low power exists.

M M1

A type of configuration that combines ROADMs to support mesh channel connectivity between the ROADMs without O-E-O for transmission. It is operated as a single NE with as many as four degrees (bi-directional DWDM interfaces) that comprise 2 lines for the east and 2 for the west.

Macrobending

In a fiber, all macroscopic deviations of the fiber axis from a straight line.

MAN (Metropolitan Area Network)

A network covering an area larger than a local area network. A wide area network (two or more local area networks) that covers a metropolitan area.

Margin

The allowance for attenuation in addition to that explicitly accounted for in system design.

MAS (Multiplex Alignment Signal)

A byte in the 40G overhead that allows the system to check if the four-bit multiplexed 10G data streams are demultiplexed correctly. It has a value of 10100101 in the first 10G data stream, and 01011010 in the other 10G data streams.

MD (Miscellaneous Discretes)

Interfaces that control the external equipment and system environment. LambdaXtreme® Transport contains two Miscellaneous Discrete Interfaces—Environmental points (inputs) control the environment around the bay (for example, smoke alarms, flood, fire, intruders, and so forth); and, Control points (outputs) control equipment external to the NE, through the NE control relays.

Mechanical Splice

An optical fiber splice accomplished by fixtures or materials, rather than by thermal fusion.

MEMS (Micro Electronic Mechanical Systems)

Semiconductor chips that have a top layer of mechanical devices, such as mirror or fluid sensors.

Mesh

A type of configuration that combines ROADMs to support mesh channel connectivity between the ROADMs without O-E-O for transmission. It is operated as a single NE with as many as four degrees (bi-directional DWDM interfaces) that comprise 2 lines for the east and 2 for the west.

Microbending

Minute but severe bends in fiber that result in light displacement and increased loss.

Mini NE Minila (Mini In-Line Amplifier)

A system NE that provides a minimum configuration, in-service, upgradable repeater or in-line amplifier.

Mini NE ROADM (Mini-ROADM)

A system NE that provides a minimum configuration, in-service, upgradable optical add-drop multiplexer..

Mini NE WXC (Mini-WXC)

A mini wavelength cross connect that provides a minimum configuration, in-service, upgradable network element which supports four bidirectional optical lines (lines 1E/1W/2E/2W), and comprises two co-joined fully equipped MINILA nodes with additional hardware to support optical channel mesh connections from one optical line to the other.

Mini_DUET (Limited Wavelength Dual End Terminal)

This network element supports the termination of two bi-directional DWDM lines and can be used as a single node extension from a MINI_WXC in a main system. Each DWDM line supports add/drop of any 16 of the 10G channels supported by the system.

MOADM (Mesh Ready Optical Add Drop Multiplexer)

See OD(MOADM) and OM(MOADM).

Modulation

A process that modifies the characteristic of one wave (the carrier) by another wave (the signal). Examples include amplitude modulation (AM), frequency modulation (FM), and pulse-coded modulation (PCM).

MPI (Multipath Interference)

Signal reflections and delayed signal images that interfere with the proper signal path. MPI is caused by reflections from dirty/damaged connectors, and return loss of the jumpers/patch cords. MPI may cause severe system degradation.

MS (Multiplex Section)

A maintenance entity between two MS TT functions.

MTBF (Mean Time Between Failures)

The expected average time between failures, usually expressed in hours.

MTC (Millisecond Transient Control)

It stops any high-speed, short duration increase or decrease impairment that is superimposed on a circuit every thousand of a second.

MTTR (Mean Time To Repair)

The average time that it takes until a failure is repaired, usually expressed in hours.

Multimode Fiber

An optical fiber that has a core large enough to propagate more than one mode of light. The typical diameter is 62.5 micrometers.

Multiplexing

The process that transmits two or more signals over a single communications channel. Examples include time-division multiplexing and wavelength-division multiplexing.

MUX (Multiplexer)

A device that combines two or more signals into a single output.

N NCDS (Network Controller Double Shelf)

See DS (Double Shelf).

NCTL (Network Element Controller) Circuit Pack

The NCTL provides control and user interfaces at the NE level.

NDF (New Data Flag)

NDF is used to set an arbitrary change of the pointer value if the change is due to a change of the payload.

NE (Network Element)

Processor-controlled entity of a telecommunications network that primarily provides switching and transport network functions and contains network operations functions.

Near Infrared

The part of the infrared near the visible spectrum, typically 700 nm to 1500 nm or 2000 nm.

Near-End Crosstalk

The optical power reflected from one or more input ports, back to another input port. Also known as isolation directivity.

NEBS (Network Equipment Building Systems)

Developed by Telcordia, standards that vendors must adhere to if they want to sell equipment to the Regional Bell Operating Companies (RBOCs) and the Competitive Local Exchange Carriers (CLECs).

NEC (National Electric Code)

A standard governing the use of electrical wire, cable, and fixtures installed in buildings; developed by the NEC Committee of the American National Standards Institute (ANSI), and sponsored by the National Fire Protection Association (NFPA).

NEMA (National Electrical Manufacturers Association)

NEMA, created in the fall of 1926 by the merger of the Electric Power Club and the Associated Manufacturers of Electrical Supplies, provides a forum for the standardization of electrical equipment, enabling consumers to select from a range of safe, effective, and compatible electrical products.

NF (Noise Figure)

The ratio (in dB) between the signal-to-noise ratio applied to the input of the microwave component and the signal-to-noise ratio measured at its output. NF indicates the amount of noise added to a signal by the component during normal operations. Lower noise figures indicate less degradation and better performance.

NFPA (National Fire Protection Association)

A not-for-profit organization that works with the U.S. Congress and federal agencies to promote the adoption and use of fire protection codes and standards, and to promote a uniform national approach to fighting the problem of fires.

NIM (Non-intrusive Monitor)

A kind of sink termination point function that does not touch SDH/SONET signals but monitors quality of service.

NRZ (Non-Return to Zero)

A binary encoding in which ones and zeroes are represented by opposite and alternating high and low voltages and where there is no return to a zero voltage between encoded bits.

NSAP (Network Service Access Point)

The access point where the Network Layer Services are available to network service users.

NVM (Non-Volatile Memory)

Memory that survives a shutdown or powerdown of the system such as a hard disk, floppy or tape. LambdaXtreme® Transport uses a PCMCIA card for NVM.

NZDSF (Non-Zero Dispersion Shifted Fiber)

Fiber that was designed to introduce a small amount of dispersion without the zero-point crossing being in the WDM passband. With this type of fiber you can eliminate, or at least greatly reduce the degradation due to four-wave mixing, a distortion mechanism that requires the spectral components to be phase-matched along the fiber. Examples are the TrueWave® fiber from Alcatel-Lucent and the LS fiber from Corning.

O OA (Optical Amplifier)

A device that amplifies an input optical signal without converting it into electrical form. The best OAs developed are optical fibers doped with the rare earth element, erbium.

OADM (Optical Add Drop Multiplexer) Terminal

A terminal capable of adding and dropping lower-rate signals from a higher-rate multiplexed signal without completely demultiplexing the signal.

OBA (Optical Booster Amplifier)

An optical amplifier with high output power.

OC-n (Optical Carrier-level n)

A carrier rate specified in the SONET standard.

OCWR (Optical Continuous Wave Reflectometer)

An instrument used to characterize a fiber optic link where an unmodulated signal is transmitted through the link, and the resulting light scattered and reflected back to the input is measured.

OD (MOADM - Mesh Ready Optical Add Drop Multiplexer)

OD (MOADM)s provide 64 channel 10G and 40G demultiplexing capability, with direct ports for 32 channels and a connection for 32 additional channels accessible by connecting the 100GHz offset OD to it.

OD (Optical Demultiplexer)

ODs extract individual wavelengths from the DWDM optical that is generated using an Optical Multiplexer (OM).

OGC (Optic Gate Controller)

The controller of an Optic Gate module. Its tasks are to control the components of the module and connect it to a circuit pack.

OLS (Optical Line System)

A lightwave transmission system that can multiplex to 8, 16, 80, or more wavelengths, transmit the resulting multiplexed signal, and then demultiplex the signal at the other

end.

OM (MOADM - Mesh Ready Optical Add Drop Multiplexer)

OM (MOADM) multiplexes the added 10G and 40G Gb/s channels at a ROADM terminal. Up to 64 channels can be added in 32 channel modularity. The channels are on a 100GHz grid, with 0 GHz offset.

OM (Optical Multiplexer)

The process that combines two or more wavelengths onto a single fiber.

OMON (Optical Monitor)

The OMON circuit pack scans the entire DWDM spectrum to provide Optical Spectrum Analysis (OSA) for up to 4 or 8 selected locations in an NE.

OOF (Out of Frame)

A state in which the frame alignment sequence of an SDH/SONET frame has not been found for several consecutive frames.

OOS (Out-of-Service)

A state in which the circuit pack is not providing its normal service function (removed from either the working or protection state) either because of a system problem or because the pack has been removed from service.

OP1P1

A circuit pack that implements a 1+1 optical channel protection switch feature.

Operational Recovery

A recovery with the intent to perform an operation, such as to activate a new software version. See also Error Recovery.

Optical Channel

An optical wavelength band for WDM optical communications.

Optical Channel Spacing

The wavelength separation between adjacent WDM channels.

Optical Channel Width

The optical wavelength range of a channel.

Optical Isolator

A component used to block out reflected and unwanted light. Used in laser modules, for example. Also called an isolator.

Optical Link Loss Budget

The range of optical loss allowed in order to meet all specifications when a fiber optical link operates. The loss is relative to the transmitter output power.

Optical Multiplex Section

A layer in the LambdaXtreme® Transport transmission hierarchy.

Optical Path Power Penalty

The additional loss budget required to account for degradations due to reflections, and the combined effects of dispersion resulting from intersymbol interference, mode-partition noise, and laser chirp.

Optical Power Meter

An instrument that measures the amount of optical power present at the end of a fiber or cable.

Orderwire

A section of the supervisory signal that is used for communication between sites.

ORL (Optical Return Loss)

The ratio (expressed in units of dB) of optical power reflected by a component or an assembly to the optical power incident on a component port when that component or assembly is introduced into a link or system.

OSA (Optical Spectrum Analyzer)

A device used to study light as electromagnetic waves. Conventional analyzers are primarily used to test optical fiber components, such as, lasers, light emitting diodes (LEDs) and the fiber itself.

OSC (Optical Supervisory Channel)

See SUPVY/SUP (Supervisory Channel).

OSI (Open System Interconnection)

The internationally accepted grouping of standards for communication between different systems made by different vendors.

OSNR (Optical Signal-to-Noise Ratio)

The ratio between the optical power of the data signal and the power of the optical noise signal.

OSP (Outside Plant)

Any part of the Local Exchange Carrier telephone network that is physically located outside of the LEC company building.

OT (Optical Transponders)

OTs do frequency adaptation between LambdaXtreme® Transport equipment and external equipment that are not optically compatible with LambdaXtreme® Transport. OTs also provide 3R functionality (retiming, reshaping, reamplification); and perform fault management and performance monitoring (non-intrusive monitoring) on the SONET/SDH and WaveWrapper signal.

OTDR (Optical Time-Domain Reflectometer)

An instrument that locates faults in optical fibers or infers attenuation by backscattered light measurements.

OTM (Optical Transport Module, G.709)

Provides bi-directional electrical/optical signal conversions in point-to-point applications. Optical signals propagate at two wavelengths over a single fiber.

OTUk (Optical Transport Unit, G.709)

G.709 OTUks perform frequency adaptation between LambdaXtreme® Transport equipment and optically incompatible external equipment. The OTU introduces a new dimension to optical networking by adding forward error correction (FEC) to the network elements, allowing operators to limit the number of required regenerators used in the network which, in turn, lowers its cost.

OXC (Optical Cross-connect)

A device that can switch optical signals between different optical fibers, without the need for conversion to electrical signals.

P Passive Branching Device

A device that divides an optical input into two or more optical outputs.

PCMCIA (Personal Computer Miniature Communications International Association)

An international standards body and trade association that establishes standards for Integrated Circuit cards and promotes interchangeability among mobile computers where ruggedness, low power, and small size are critical. PCMCIA publishes the PC Card standard, which contains all the physical, electrical, and software specifications for the PC card technology.

PCMCIA Adapter (Personal Computer Miniature Communications International Association) Adapter

A slot on the Network Controller or PC where the flash disk is inserted.

PD (Photodetector)

An optoelectronic transducer such as a PIN photodiode or avalanche photodiode.

PDL (Polarization Dependent Loss)

Loss of optical power that occurs during the polarization process. Polarized light waves are light waves in which the vibrations occur in a single plane. The process of transforming unpolarized light into polarized light is known as polarization (the orientation of the electric and magnetic field vectors of a propagating electro-magnetic wave).

PDU (Protocol Data Unit)

Used for the information exchange between equal protocol layers.

Peak Power Output

The output power averaged over that cycle of an electromagnetic wave having the maximum peak value that can occur under any combination of signals transmitted.

Phonons

Molecular vibrations that occur in a rigid crystal lattice.

Photodiode

A device that converts optical energy to electrical energy.

PID (Password Identification)

A word or character string recognized by automatic means that permits a user access to protected storage, files, or input or output devices.

Pigtail

A short optical fiber permanently attached to a source, detector, or other fiber optic device.

Plastic Clad Silica

Also called hard clad silica (HCS). A step-index fiber with a glass core and plastic or polymer cladding instead of glass.

Plenum

The air handling space between walls, under structural floors, and above drop ceilings that can be used to route intrabuilding cabling.

Plenum Cable

A cable whose flammability and smoke characteristics allow it to be routed in a plenum area without being enclosed in a conduit.

PLL (Phase Locked Loop)

An electronic circuit that controls an oscillator so that it maintains a constant phase angle relative to a reference signal.

PM (Performance Monitoring)

Measures the quality of service and identifies any degrading or marginally operating systems (before an alarm would be generated).

PMD (Polarization Mode Dispersion)

PMD is an inherent property of all optical media. It is caused by the difference in the propagation velocities of light in the orthogonal principal polarization states of the transmission medium. The net effect is that if an optical pulse contains both polarization components, then the different polarization components travel at different speeds and arrive at different times, smearing the received optical signal.

pN_EBC (Near-end Errored Block Count)

Every second the number of near-end errored blocks (N_Bs) within that second are counted as the Near-end Errored Block Count (pN_EBC). This counter is used to

determine the degraded defect and as an input for the performance monitoring process.

Point-to-Point Transmission

The transmission between two designated stations.

Polarization

The direction of the electric field in the lightwave.

POM (Passive Optical Multiplexer) Module

The POM module merges thru channels with added channels from mesh/ROADM channels and taps off power to MON and OMON ports.

Pre-Provisioning

The capability to provision a slot before installing a circuit pack.

Previous SW Generic (Previous Software Generic)

The previous SW generic is the software and data on the alternate partition to the currently executed SW/data of the PCMCIA card. It might be installed and activated per user command. After installation, previous and current SW generic are exchanged.

Provisioning

Placing and configuring hardware and software required to activate a telecommunications service for a customer. If the equipment is in place, provisioning may consist of creating or modifying a customer record in a database to activate the services.

Pulse Spreading

The dispersion of an optical signal as it propagates through an optical fiber.

Pump Laser

A laser used in an optical fiber amplifier.

Q QoS (Quality of Service)

A set of performance parameters that characterize the transmission quality over a given virtual connection.

R Raman Amplification

A technique that transforms part of the outside plant fiber (OSP) into an amplifier by emitting high-power laser light into the OSP.

Rayleigh Scattering

The scattering of light that results from small inhomogeneities of material density or composition.

RBOC (Regional Bell Operating Company)

One of the seven regional holding companies formed after the AT&T divestiture. These companies included Ameritech, Bell Atlantic, BellSouth, NYNEX, Pacific Telesis, Southwestern Bell, and U.S. West. Later on, Bell Atlantic and NYNEX merged and became Verizon; Ameritech, Pacific Telesis and Southwestern Bell merged and became SBC; and U.S. West was renamed Quest.

RCTL (Repeater Controller) Circuit Pack

RCTL performs the combined functions of the NCTL, SCTL, and SUPVY circuit packs for the Repeater Node.

RDI (Remote Defect Indication)

RDI signals convey the defect status of the trail signal at the trail destination (that is, at trail termination sink function) back to the trail origin (that is, trail termination source function). This mechanism allows alignment of the near-end and far-end performance monitoring processes.

RDS (Repeater Double Shelf)

See DS (Double Shelf).

Receiver

A terminal device that includes a detector and signal-processing electronics. It functions as an optical-to-electrical converter.

Receiver Overload

The maximum acceptable value of average received power for an acceptable BER or performance.

Receiver Sensitivity

The minimum acceptable value of received power needed to achieve an acceptable BER or performance. It takes into account power penalties caused by use of a transmitter with worst-case values of extinction ratio, jitter, pulse rise and fall times, optical return loss, receiver connector degradations, and measurement tolerances.

Refractive Index

This is a numerical expression comparing the speed of light in a transparent medium, like glass, with the speed of light in air. The higher the index number, the thinner a given lens will be.

Refractive Index Gradient

Used in collimators (light aligners) and other sub-components to couple light into and out of fibers.

Refractive Index Profile

The description of the value of the refractive index as a function of distance from the optical axis along an optical fiber diameter.

Regenerator

A device that receives an optical signal, converts it to electrical, regenerates the signal, converts it to optical, then transmits it.

REI (Remote Error Indication)

REI signals contain either the exact or truncated number of error detection code violations detected in the trail signal at the trail termination sink. This information is conveyed to the trail termination source. REI allows alignment of the near-end and far-end performance monitoring processes. Examples of REI signals are the FEBE bits in SDH signals.

Repeater

A receiver and transmitter set designed to amplify attenuated signals. Used to extend operating range.

Responsivity

The ratio of a photodetector's electrical output to its optical input in Amperes/Watt.

Ribbon Cable

Cable that contains many fibers embedded in a plastic material in parallel, forming a flat ribbon-like structure.

Rise Time

The time taken to make a transition from one state to another, usually measured between the 10% and 90% completion points of the transition. Alternatively the rise time may be specified at the 20% and 80% amplitudes. Shorter or faster rise times require more bandwidth in a transmission channel.

Riser Cable

High-strength cable used in vertical shafts between floors in multi-story buildings.

RJ (Random Jitter)

Random jitter is caused by thermal noise and may be modeled as a Gaussian process. The peak-to-peak value of RJ is of a probabilistic nature, and thus any specific value requires an associated probability.

RM (Registration Manager)

An application process that initiates the Registration Request Protocol, and communicates the DSA address and Name-prefix information to the Registration Agent.

ROADM (Reconfigurable Optical Add/Drop Multiplexer)

See OADM.

RP (Raman Pump)

In LambdaXtreme® Transport, RPs provide amplification/gain in the outside plant fiber by supplying a counterpropagating signal. The amplification is provided by pumping high-intensity wavelengths (that are lower than the signal wavelength) into the fiber that carries the incoming DWDM signal. (Also see RPG).

RPG (Growth Raman Pump)

In LambdaXtreme® Transport, RPGs provide amplification/gain in the outside plant fiber and internally in the Dispersion Compensation Module. RPGs are optional; they are used for channels above 188.45 THz. (Also see RP).

RXDS (Reconfigurable Repeater Double Shelf)

See DS (Double Shelf).

RXIO/RXIO2 (Repeater System Input/output) Circuit Pack

The main user interface to system Repeaters and Mini NEs. This circuit pack provides orderwire interface, as well as interface for office alarms, miscellaneous discretes, and remote start.

S SBS (Stimulated Brillion Scattering)

SBS occurs when the light launched into the fiber exceeds a threshold power level for each process.

SC (Subscription Channel Connector)

A push-pull type of optical connector that originated in Japan. Some of its features are high packing density, low loss, low back reflection, and low cost.

Scattering

The change of direction of light rays or photons after striking small particles. It may also be regarded as the diffusion of a light beam caused by the inhomogeneity of the transmitting material.

SCC (Serial Communications Channel)

Channel that transfers data one bit at a time. The speed of the serial data is most often expressed as bps or baud rate.

SCOT (Software Control of Transmission)

System software that controls the settings of EDFA pumps, VOAs, Raman pumps, DCM pumps, DGEFs, and blockers in the ROADMs.

SCTL (Shelf Controller) Circuit Pack

SCTL provides control at the double-shelf backplane level (half of a bay).

SDH (Synchronous Digital Hierarchy)

A family of digital transmission rates used outside of the U.S. and Japan from 51.84 Mb/s to 40 Gb/s that allows the interconnection of transmission products around the world.

SEC (SDH Equipment Clock)

A timing device (equipment) used to synchronize network equipment that operates according to the principles governed by SDH.

SEEPROM (Serial Electrically Erasable Programmable Read Only Memory)

A device which can be erased and reprogrammed.

SFTP (SSH File Transfer Protocol)

A network protocol that provides file transfer and manipulation functionality over any reliable data stream. It is typically used with the SSH-2 protocol to provide secure file transfer. *See also* **SSH (Secure Shell)**.

Shelf

A shelf is a mechanical facility that is in general a housing for circuit packs. Shelves are housed in Bays.

Simplex

Single element (for example, a simplex connector is a single-fiber connector).

Simplex Cable

A term sometimes used for a single-fiber cable.

Simplex Transmission

Transmission in one direction only.

SIO (System Input/Output) Circuit Pack

The SIO connects the NCTL to the SCTLs, provides the main interface to the system, provides LAN interfaces, provides orderwire interfaces, and provides performance monitoring interfaces.

SLM (Single Longitudinal Mode)

An injection laser diode which has a single dominant longitudinal mode.

Soliton

A localized wave that maintains its shape as it propagates and therefore can act as a single bit in a digital signal.

SONET (Synchronous Optical Network)

A North-American standard developed by Bellcore and adapted by ANSI for the optical long-distance networks.

Span

Fiber link between NEs that may be unidirectional or bidirectional, depending on network design.

Span Loss

Loss (in dB) of optical power due to the span transmission medium (includes fiber loss and splice losses).

Spectral Width

A measure of the extent of a spectrum. For a source, the width of wavelengths contained in the output at one half of the wavelength of peak power. Typical spectral widths are 50

to 160 nm for an LED and 0.1 to 5 nm for a laser diode.

Splice

A permanent connection of two optical fibers through fusion or mechanical means.

Splitting Ratio

The ratio of power emerging from two output ports of a coupler.

SPOT (Synchronous Partial Overhead Transparency)

Overhead bytes of SDH/SONET transmission signals that are sent together with payload although they are mapped into higher rate signals. The transparency feature is often used in combination with fiber shortage solutions.

SR (Short Reach)

Optical sections of 2 km or less.

SRS (Simulated Raman Scattering)

A broadband effect where power is transferred from a low-wavelength channel to a higher-wavelength channel. The short wavelength source acts as a pump.

SSH (Secure Shell)

A UNIX based command interface and protocol for securely accessing remote NEs. It contains three utilities: slogin, ssh, and scp. Their function is the secure equivalent of UNIX utilities rlogin, rsh, and rcp. SSH commands are encrypted.

SSMF (Standard Single-Mode Fiber)

This is the most common type of fiber deployed. This fiber was designed to provide zero chromatic dispersion at 1310 nm, to support the early long-haul transmission systems operating at this wavelength. It has a chromatic dispersion of at most 20 ps/(nm*km) in the 1550 nm wavelength range and usually around 17 ps/(nm*km).

ST (Straight tip connector)

Popular fiber optic connector that uses a bayonet-style coupling rather than a screw-on coupling.

Step-Index Fiber

Fiber that has a uniform index of refraction throughout the core.

Strength Member

The part of a fiber optic cable composed of aramid yarn, steel strands, or fiberglass filaments that increase the tensile strength of the cable.

STS, STS-n

The basic logical building block signal with a rate of 51.840 Mb/s for an STS-1 signal and a rate of n times 51.840 Mb/s for an STS-n signal.

SUPVY Pack (Supervisory Pack)

SUPVY circuit pack is a low-speed transmission pack that facilitates communication between LambdaXtreme® Transport NEs.

SUPVY/SUP (Supervisory Channels)

SUPVY/SUP supports the following communications: node-to-node, interworking, client LAN, and orderwire communication.

SW Generic (Software Generic)

The whole software and (static) data associated with a particular NE release. See also current and previous SW generic.

Synchronous Signal

A data signal that is sent along with a clock signal.

T T-Carrier

Generic designator for any of several digitally multiplexed telecommunications carrier systems.

Tap

The entry point into a system module.

Tap Loss

In a fiber optic coupler, the ratio of power at the tap port to the power at the input port.

Tap Port

In a coupler where the splitting ratio between output ports is not equal, the output port containing the lesser power.

TBOS (Telemetry Byte Oriented Serial) Protocol

A protocol used for transmitting alarms, status, and control points between an NE and the operating system.

TC (Tandem Connection)

An arbitrary series of contiguous link connections and/or subnetwork connections.

TCA (Threshold-Crossing Alert)

A condition set when a counter exceeds a user-selected high or low threshold. A TCA does not generate an alarm but is available on demand through the CIT.

TCP/IP (Transmission Control Protocol/Internet Protocol)

A suite of several networking protocols developed for the Internet that provides communication across interconnected networks, between computers with diverse hardware architectures, and various operating systems. Some examples are FTP, SMTP, and SNMP.

TDC (Tunable Dispersion Compensator)

A device that has negative chromatic dispersion where the amount of dispersion can be adjusted. It is used for compensation of the chromatic dispersion of the transmission fibers.

TE (Thermoelectric)

A phenomenon that occurs whenever electrical current flows through two dissimilar conductors; depending on the direction of current flow, the junction of the two conductors will either absorb or release heat.

TEC (Thermoelectric Cooler)

A solid-state heat pump used in applications where temperature stabilization, temperature cycling, or cooling below ambient is required.

Thermal Noise

Noise resulting from thermally induced random fluctuation in the receiver load resistance current.

Throughput Loss

In a fiber optic coupler, the ratio of power at the throughput port to the power at the input port.

TIA (Transimpedance Amplifier)

A device that converts optical signals into a voltage output or acts as a general-purpose low-noise wideband gain stage. The negative feedback provides a controlled gain and a high-speed operation.

TID (Target Identifier)

A provisionable parameter used to identify an NE within a TL1 command.

TL1 (Transaction Language 1)

An OS/NE machine-to-machine language. TL1 messages are expressed as ASCII strings. TL1 messages and syntax are defined by Telcordia requirements.

TMUX (Transmultiplexer)

A device that takes a group of analog voice channels and converts them directly into a T-1 1.544 Mbs bit stream without the need for demultiplexing the group down into individual channels, digitizing them, and bundling them up into a T-1 digital bit stream.

TOH (Transport Overhead)

The overhead added to the STS SPE (synchronous transport signal synchronous payload envelope) for transport purposes. Transport overhead consists of line and section overhead.

TrueWave® Fiber

Non-zero dispersion-shifted fiber manufactured by Alcatel-Lucent.

TSD (Trail Signal Degrade)

The TSD signal (generated by a trail termination sink function) informs the next function(s) of the "signal degrade" condition of the associated data signal.

TSF (Trail Signal Fail)

The TSF signal (generated by a trail termination sink function) informs the next downstream function(s) of the "signal fail" condition of the associated data signal [which contains, due to that "signal fail" condition, the all-ONES (AIS) pattern].

TT (Trail Termination)

An atomic function within a layer that generates, adds, and monitors information concerning the integrity and supervision of adapted information.

U **UART (Universal Asynchronous Receiver and Transmitter)**

A receiver/transmitter that converts incoming serial data from a port into parallel form.

UBOB (Universal Buildout Block)

Optional connector hardware used to interconnect single-mode connectors with or without attenuation.

UFAIS (Unframed AIS)

A pattern that is composed of ones only, and causes line-driver circuitry to consume the maximum amount of power. In a circuit with repeaters, this pattern will verify that the DC power is regulated correctly. When transmitted unframed, an all-ones pattern is defined in some networks as an Alarm Indication Signal (AIS). An unframed all-ones signal may also be referred to as a "Blue Alarm" and is sent forward by a device that has lost its input signal.

UFEC (Ultra Forward Error Correction)

An improved method to correct bit errors in a transmission signal. Additional information is put into the data signal to allow the correction of bit errors. There is no acknowledge information in the back direction.

UHC (Ultra High Capacity)

A 40G application for transmission of 64 channels for a capacity of 2.56 Tbps and a reach of up to 600 km. Payload (per channel) can be one OC-768/STM-256 or four OC-192/STM-64 signals.

UID (User Identification)

A CIT user code that comprises one to ten alphanumeric, case-sensitive characters. UID identifies a user when he/she logs into a system.

V **VCO (Voltage Controlled Crystal Oscillator)**

VCOs are used for clock recovery circuits and other applications where frequency stability and low phase noise is very important.

VMUX (Virtual Multiplexing Protocol)

A device that sits above several lower protocols, making them appear as a single protocol. VMUX makes very simple decisions about which protocol to use for each connection.

VOA (Variable Optical Attenuator)

A device that corrects the signal strength differences that occur in the transmission line.

VSR (Very Short Reach)

A SONET/SDH interface that provides a low-cost interconnection solution of less than 300 meters between routers, switches, and DWDM systems.

W WAN (Wide Area Network)

A network whose elements are separated by long distances.

Waveguide

A material medium that confines and guides a propagating electromagnetic wave.

Waveguide Coupler

A coupler that transfers light between planar waveguides.

Waveguide Dispersion

The part of chromatic dispersion arising from the different speeds that light travels in the core and cladding of a single-mode fiber (that is, from the fiber's waveguide structure).

Wavelength

The distance between points of corresponding phase of two consecutive cycles of a wave. The wavelength is related to the propagation velocity and the frequency.

Wavelength Growth

A type of growth in which all eight wavelengths are added to a single line before more lines are added.

WaveWrapper

WaveWrapper provides network management functions such as optical-layer performance monitoring, error correction, and ring protection on a per-wavelength basis.

WDM (Wavelength-Division Multiplexing)

Sending several signals through one fiber with different wavelengths of light.

WGR (Waveguide Grating Router)

Device used to take a mix of wavelengths and separate them into the component wavelengths.

WPS (Wavelength Protection Switch)

A switch, used in optical networks, that reroutes wavelengths when there is a system problem.

WTR time (Wait To Restore time)

The WTR time ensures that a previous failed synchronization source is only again considered as available by the selection process if it is fault-free for a certain time.

WXC (Wavelength Cross Connect)

A hybrid ROADM. See also ROADM.

X XFP

A pluggable optical transceiver module that combines transmitter and receiver functions in one compact, flexible, and low cost package format. Up to sixteen XFP modules can be arranged on a typical rack card, allowing for an unprecedented level of data density. XFP is protocol independent, and can support OC-192/STM-64, 10 Gigabit Ethernet, 10 Gigabit Fibre Channel, and G.709 data streams in routers, switches and network cards. Reaches ranging from Very Short Reach (VSR) to Long Reach (LR) can also be supported.

XT Crosstalk X-talk

Undesired coupling from a circuit, part of a circuit, or channel to another.

Y Y Coupler

A coupler that has three waveguide legs joined at the center in a "Y" shape which connects an input port to two output ports or two input ports to a single output port.

Z Zero DSF (Zero Dispersion Shifted Fiber)

DSF where the zero dispersion point is shifted from 1310 nm to 1550 nm. It is best suited for applications involving single-channel transmission at 1550 nm, providing the benefits of zero dispersion as well as taking advantage of the lower attenuation wavelength.

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