Lucent Technologies
Bell Labs Innovations

Metropolis® Enhanced Optical Networking (EON) (OLS 40G/80G)

Release 8.2

User Operations Guide (UOG)

365-575-559 R8.2
Issue 3
March 2002

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Metropolis® Enhanced Optical Networking (EON) Release 8.2 User Operations Guide

365-575-559 R8.2 Issue 3 Date: March 2002

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About this information product

Purpose

The information product (IP), *Metropolis*® Enhanced Optical Networking (EON), *User Operations Guide, 365-575-559* provides step-by-step information for use in daily system operations. The User Operations Guide (UOG) demonstrates how to perform system provisioning, operations, and administrative tasks by use of the CIT.

Reason for reissue

This document has been updated to reflect updates to the product Metropolis® Enhanced Optical Networking (EON), Release 8.2.

Safety labels

Working on the complex equipment and systems described in this IP requires special training of the personnel. For more information, please read Chapter 1, “Safety”.

Intended audience

The intended audience of this (IP) primarily consists of people who are responsible for the maintenance of network elements and for the supervision of transmission operation.

How to use this information product

This IP consists of reference chapters that describe Metropolis® EON operations.

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Assumptions

This information product assumes that readers have the following required skills.

- Basic principles of telecommunication transmission
- Common telecommunication and system terminology (a glossary is provided in this manual to assist you)
- Test sets and tools used in the telecommunication industry
- Local operations and functional procedures of your company
- Personal computer (PC) operation, common PC terminology, and navigational tasks in a Windows-style user interface.

Training

Prerequisite training that will allow you to become proficient in understanding and operating the Metropolis® EON is described in “Related training” (xix).

Information contained in this IP

The following table briefly describes the type of information found in each chapter.

Chapter	Description
About this information product	The preface • describes the guide's purpose, intended audience, and organization, • lists related documentation, • explains how to comment on this document.
Chapter 1, "Safety"	Contains a series of very important safety instructions concerning the handling of network elements.
Chapter 2, "Security Administration Tasks"	Allows the user to control access to the network element and to the CIT.
Chapter 3, "Management Communication Setup Tasks"	Covers setting up management communication.
Chapter 4, "Alarm Management Tasks"	Provides instructions for alarm management.
Chapter 5, "Traffic Provisioning Tasks"	Provides instructions such as setting up a path, creating low level cross connections, and modifying an existing path.
Chapter 6, "Performance Monitoring Tasks"	Enables the user to perform performance monitoring in order to detect flaws prior to alarms.
Chapter 7, "Software Upgrade Tasks"	Enables the user to determine software versions, download new software, and determine if the download was successful.
Chapter 8, "Periodic Tasks"	Describes the tasks that can be completed at regular intervals.
Chapter 9, "Supporting Tasks"	Describes tasks that are to referred to for more detailed information.

Chapter	Description
Chapter 10, “Using the Craft Interface Terminal”	Enables the user to operate the user interface.
Chapter 11, “Administration and Provisioning Concepts”	Contains conceptual information about administration and provisioning.
Chapter 12, “Performance Monitoring Concepts”	Contains conceptual information about performance monitoring.
Glossary	Defines telecommunication terms and expands common telecommunication abbreviations and acronyms.
Appendix A: Power Up/Power Down a Network Element	Provides instructions for powering up and powering down an optical network element.
Index	Lists specific subjects and their corresponding page numbers.

Conventions used

The following conventions are used throughout this IP.

Numbering

The chapters of this document are numbered consecutively. The page numbering restarts at ***1*** in each chapter. To facilitate identifying pages in different chapters, the page numbers are prefixed with the chapter number. For example, page 2-3 is the third page in chapter 2.

Cross references

Cross reference conventions are identical with those used for numbering (for example, the first number in a reference to a particular page refers to the corresponding chapter).

Block labels

This document contains so-called block labels to facilitate the location of specific text passages. The keyword blocks are placed to the left of the main text and indicate the contents of a paragraph or group of paragraphs.

Typographical conventions

Special typographical conventions apply to elements of the graphical user interface (GUI), filenames and system path information, keyboard entries, alarm messages etc.

- Elements of the graphical user interface (GUI), such as menu options, window titles, or push buttons:
  - **Provision…**, **Delete**, **Apply**, **Close**, **OK** (push buttons)
  - **Provision Timing/Sync** (window title)
  - **View Equipment Details…** (menu option)
  - **SECURITY.Enter.System** (sequence for invoking a window)
- Filenames and system path information:
  - *setup.exe*
  - *C:\Program Files\Lucent Technologies*
- Keyboard entries:
  - **F1**, **Esc X**, **Alt-F**, **Ctrl-D**, **Ctrl-Alt-Del** (simple keyboard entries)

    If keys appear connected by hyphens, press all keys at once. Otherwise, press the keys one at a time.
  - `copy abc xyz` (string)

    Type an entire string of characters.
- Alarms and other messages that could appear on the screen:
  - `STM Loss of Signal`
  - `Circuit Pack Failure`
  - `HPUNEQ, MSAIS, STMLOS, STMLOF`
  - `Not enough disk space available`

Abbreviations

Abbreviations used in this document can be found in the Glossary unless it can be assumed that the reader is familiar with the abbreviation.

Related documentation

This section briefly describes the documents that are included in the Metropolis® EON documentation set.

- The *Metropolis®* Enhanced Optical Networking (EON), *Applications and Planning Guide, 365-575-558* is for use by network planners, analysts and managers. It is also for use by the Lucent Account Team. It presents a detailed overview of the

system, describes its applications, gives planning requirements, engineering rules, ordering information, and technical specifications.

- The *Metropolis*® Enhanced Optical Networking (EON), *Alarm Messages and Trouble Clearing Guide, 365-575-560* gives detailed information on each possible alarm message. Furthermore, it provides procedures for routine maintenance, troubleshooting, diagnostics, and component replacement.
- The *Metropolis*® Enhanced Optical Networking (EON), *Operations Systems Engineering Guide, 365-575-561* gives detailed information on each TL1 command. Furthermore, it includes information on the Operations Interfaces.
- The *Metropolis*® Enhanced Optical Networking (EON), *Installation Guide, 365-575-562* is a step-by-step guide to system installation and setup. It also includes information needed for pre-installation site planning and post-installation acceptance testing.
- The *Metropolis*® Enhanced Optical Networking (EON), *Software Release Description (SRD), 365-575-563* is a description of procedural information required to upgrade the software to Release 8.2. It also includes a listing of Release 8.2 features, problems fixed, known problems, and other helpful information.
- The *Metropolis*® Enhanced Optical Networking (EON), *Provisioning Job Aid, 365-575-564* is a set of laminated job aid cards, containing detailed provisioning information, that are used for quick reference.
- The *Metropolis*® Enhanced Optical Networking (EON), *Threshold Crossing Alert (TCA) Parameters Provisioning Job Aid, 365-575-565* is a set of laminated job aid cards, containing detailed TCA parameter provisioning information, that are used for quick reference.

The following additional documents can be helpful for planning and ordering:

- *Toll Systems OLS Intercabinet Cables, ED7G028-22.*
- *Toll Systems Cable Assemblies OT Cabinet Framework, ED7G045-20.*
- *Toll Systems OT System Ordering and Installation Information for OT Cabinet, J69000-C-1.*

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How to comment

Customer comments on Metropolis® EON documents are welcome. A comment form can be found at the beginning of this document. The comment form can be faxed to **1-978-960-6835.**

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The Metropolis® EON documents can be ordered as individual paper copies or as a set on CD-ROM [*Metropolis*® Enhanced Optical Networking (EON), *365-575-ZZZ*] from the Customer Information Center (CIC).

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1 Safety

Overview

Purpose

This chapter provides important safety instructions for the Metropolis® EON.

Contents

This chapter contains the following sections.

General notes on safety	1 - 2
Laser safety	1 - 5
Laser product classification	1 - 8
Automatic Power Shutdown and Restart (APSD)	1 - 10
Electrostatic discharge	1 - 15
Important safety instructions	1 - 16

General notes on safety

Overview

The present chapter on safety ***must*** be read by the responsible technical personnel before carrying out relevant work on the system. The valid version of this document must always be kept close to the equipment.

Not only must the general instructions in this chapter on safety be observed, but also the specific safety instructions in the individual chapters.

The Metropolis® EON equipment has been developed in line with the present state-of-the-art and fulfils the current national and international safety requirements. It is provided with a high degree of operational safety resulting from many years of development experience and continuous stringent quality checks in our company.

Potential sources of danger

The equipment is safe in normal operation. There are, however, some potential sources of danger that cannot be completely eliminated. In particular, these arise during the

- opening of housings or equipment covers,
- manipulation of any kind within the equipment, even if it has been disconnected from the power supply,
- disconnection of optical or electrical connections,

through possible contact with.

- live parts,
- laser light,
- hot surfaces,
- sharp edges, or
- components sensitive to electrostatic discharge.

Structure of safety instructions

All safety instructions include a ***warning symbol*** and a ***signal word*** that classify the danger and a ***text block*** that contains descriptions of the type and cause of the danger, the consequences of ignoring the safety instruction and the measures that can be taken to minimize the danger.

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Example:

DANGER

Arcing on removing or inserting a live power supply plug.

Arcing can cause serious burns to the hands and damage to the eyes.

Ensure that the line circuit-breaker on the Rack Connection Panel (RCP) is in the "OFF" position before removing or inserting the power supply plug.

Danger classification

There are three classes of safety instructions: ***Danger***, ***Warning*** and ***Caution***. The class depends on the consequences of ignoring the safety instruction.

DANGER	Death or serious injury is definite or likely.
WARNING	Death or serious injury is possible.
CAUTION	Minor injury is definite, likely or possible, or material damage to the product or in the product environment is definite or likely.

Special safety instructions

The aspects of ***laser safety*** and ***handling of components sensitive to electrostatic discharge (ESD)*** are of vital importance for the equipment. Therefore, the key safety instructions for these subjects are summarized in the sections "Laser safety" (1-5) and "Electrostatic discharge" (1-15).

General safety requirements

In order to keep the technically unavoidable residual risk to a minimum, it is imperative to observe the following rules.

- Transport, storage and operation of the unit/system must be under the ***permissible conditions only***.

  See accompanying documentation and information on the unit/system.
- Installation, configuration and disassembly must be carried out only by ***expert personnel*** and ***with reference to the respective documentation***.

  Due to the complexity of the unit/system, the personnel requires ***special training***.

- The unit/system must be operated by ***expert and authorized users only***.

  The user must operate the unit/system only after having ***read and understood*** the chapter on safety and the parts of the documentation relevant to operation. For complex systems, additional training is recommended. Any obligatory training for operating and service personnel must be carried out and documented.

- The unit/system must not be operated unless it is in perfect working order.

  Any faults and errors that might affect safety must be reported ***immediately*** by the user to a person in responsibility.

- The unit/system must be operated only with the connections and under the environmental conditions as described in the documentation.

- Any conversions or changes to the system or parts of the system (including the software) must be carried out by qualified Lucent Technologies personnel or by expert personnel authorized by Lucent Technologies.

  All changes carried out by other persons lead to a ***complete exemption from liability***.

  No components/spare parts must be used other than those recommended by the manufacturer and those listed in the procurement documents.

- The removal or disabling of safety facilities, the clearing of faults and errors, and the maintenance of the equipment must be carried out by ***specially qualified personnel only***.

  The respective parts of the documentation must be strictly observed. The documentation must also be consulted during the selection of measuring and test equipment.

- Calibrations, special tests after repairs and regular safety checks must be carried out, documented and archived.

- Non-system software is used at one's ***own risk***. The use/ installation of non-system software can adversely affect the normal functioning of the unit/system.

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Laser safety

System design

The Lucent Technologies system complies with FDA/CDRH 21 CFR 1040.10 and 1040.11 as a Class I and with IEC 60825-1 as a Class 1 Optical Fiber Telecommunication laser product. The system has been designed to ensure that the operating personnel is not endangered by laser radiation during normal system operation. The safety measures specified in the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations and the international standards IEC-60825 or DIN/EN 60825 are met. Please also refer to "Laser product classification" (1-8).

Potential sources of danger

Beware of the following potential sources of danger which will remain despite all safety measures taken.

- Laser radiation can cause damage to the skin and eyes.
- Laser radiation from optical transmission systems is in a wavelength range that is invisible to the human eye.

Laser classes

The maximum output power of laser radiation depends on the type of laser diode used. The international standards IEC-60825 or DIN/EN 60825 define the maximum output power of laser radiation for each laser class in accordance with the wavelength.

Laser class	Wavelength	Maximum output power of laser radiation
1	1310 nm	8.85 mW
	1550 nm	10 mW
3A	1310 nm	24 mW
	1550 nm	50 mW
3B	1310 nm	0.5 W
	1550 nm	0.5 W

Laser warning labels

The laser warning labels indicate either only the laser class or both the laser class and the maximum output power of laser radiation.

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The following figure shows different types of laser warning labels and their characteristics.

Legend

Legend to the different types of laser warning labels.

1. Laser warning symbol.
2. This laser warning label is mounted on the front cover outside. It always refers to normal operation.
3. This laser warning label is affixed inside the subrack.

Laser safety instructions

Observe the following instructions to avoid exposing yourself and others to risk.

- Read the relevant descriptions in the manuals before taking equipment into operation or carrying out any installation and maintenance work on the optical port units, and follow the instructions. Ignoring the instructions can result in exposure to dangerous radiation.

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- Do not view directly into the laser beam with optical instruments such as a fiber microscope, because viewing of laser emission in excess of Class 1 limits significantly increases the risk of eye damage.
- Never look into the end of an exposed fiber or an open connector as long as the optical source is still switched on.
- Ensure that the optical source is switched off before disconnecting optical fiber connectors.
- In the event of doubt, check that the optical source is switched off by measuring with an optical power meter.

□

Laser product classification

Standards compliance

The Metropolis® EON product complies with both IEC standards and the Food and Drug Administration's Center for Devices and Radiological Health (FDA/CDRH) regulations.

FDA/CDRH regulations

Laser products are classified in accordance with the FDA/CDRH - 21 CFR 1010 and 1040. The classification scheme is based on the ability of the laser emission to cause injury to eye or skin during normal operating conditions.

In the United States, lasers and laser systems in the infrared wavelength range (greater than 700 nm) are assigned to one of the following classes.

- Class I,
- Class IIIb, or
- Class IV.

Laser classification is dependent upon operating wavelength, output power and fiber modefield diameter (core diameter).

IEC requirements

The International Electro-Technical Commission (IEC) establishes standards for the electrical and electronic industries. IEC-60825 has been established for the worldwide safety of laser products.

According to the IEC classification, lasers and laser systems in the infrared wavelength range (greater than 700 nm) are assigned to one of the following classes.

- Class 1,
- Class 3A,
- Class 3B, or
- Class 4.

There are some major differences between the FDA/CDRH regulations and IEC.

1. The Accessible Emission Limits (AEL) are different.
2. Class 3A applies to all wavelengths.
3. Class 3B requires strict engineering controls.
4. Classification is under single fault conditions.

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Hazard level assignment

Hazard level refers to the potential hazard from laser emission at any location in an end-to-end optical fiber communication system that may be accessible during service or in the event of a failure. The assignment of hazard level uses the AELs for the classes.

Hazard levels for optical transmission equipment are assigned in either of the following two ways.

- actual output power from the connector or fiber cut.
- if automatic power reduction is used, output power at the connector or fiber cut at one second after automatic power reduction takes place provided that maximum output and restart conditions are met.

Classification of optical telecommunication equipment

Optical telecommunication equipment is generally classified as IEC Class 1 or FDA/CDRH Class I, because under normal operating conditions, the transmitter ports terminate on optical fiber connectors. These are covered by a front panel to ensure protection against emissions from any energized, unterminated transmitter.

The circuit packs themselves, however, may be IEC Class 1 or 3A or FDA/CDRH Class I or IIIb.

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Automatic Power Shutdown and Restart (APSD)

Overview

Metropolis® EON utilizes APSD as an equipment safety mechanism. The APSD feature protects against optical surges and possible human exposure to powerful Metropolis® EON output by reducing power to Hazard Level 1on the optical line between adjacent offices.

Timing requirements

APSD timing requirements are as follows:

- Shutdown = < 3 seconds
- Restart = < 5 seconds.

Important! The link between an OA and the ODU at the receive-end OA should be protected as well. In this case, an LBO needs to be installed during system installation to ensure that power levels never exceed IEC Class 3A).

Two-OA operation

The following information describes various network reliability scenarios in which the APSD feature can be used for two-OA operation.

Scenario 1 (Shutdown): Protection on an optical line link between Metropolis® EON ***terminals.***

In the following figure, if a fiber cut occurs in a span between two Metropolis® EON End Terminals or Repeaters, “OA2” in the downstream Metropolis® EON detects a loss of optical power and starts operating in a 0 channel setting. The downstream Metropolis® EON sends an APSD-FE message to the upstream terminal to inform it of the condition. Upon detecting the message, the upstream terminal powers down “OA1” below 10 dBm. Powering down of “OA1” and “OA3” to Class 1 levels is completed within 3 seconds of the fiber cut.

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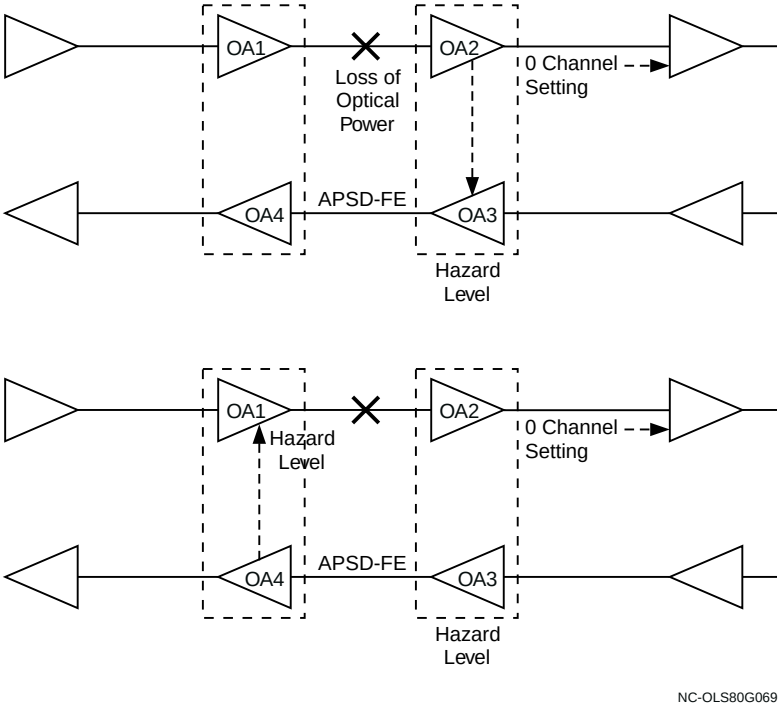
Figure 1-1 APSD for Optical Line Failure Between Terminals (Two-OA)

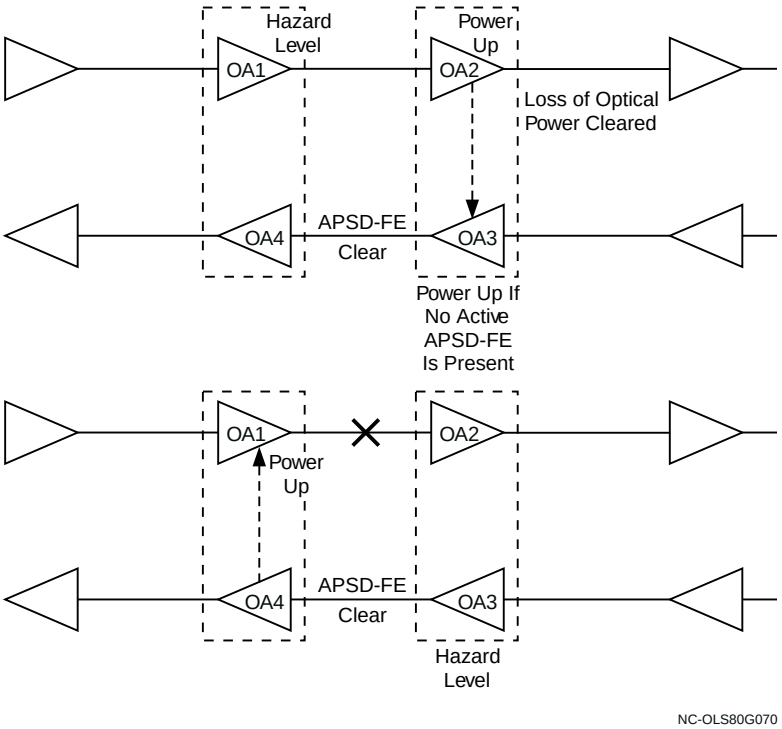


Loss of optical power is declared when the OA detects a loss of all channels (including the telemetry channel) and the telemetry circuit pack detects an incoming SUPR LOS. The OAs downstream from “OA2” also experience channel loss. These amplifiers operate in 0 channel power configuration within one second of a fiber cut occurring. The OAs downstream from “OA4” experience a decrease in incoming power and may or may not declare loss of channels. Simultaneously, the OAs upstream from “OA1” and “OA3” continue to operate in normal mode.

Scenario 2: Restarting on an optical line link between terminals.

In the following figure, when the link between “OA1” and “OA2” is restored, the downstream Metropolis® EON clears the power loss condition and then notifies the upstream terminal of the correction. The upstream terminal then reverts “OA1” back to normal power. Provided there are no failures upstream, the downstream terminal also turns “OA3” back up. “OA1” and “OA3” adjust to normal power within one second of start-up.

Figure 1-2 Restart on an Optical Line Link Between Terminals (Two-OA)



Single-OA operation

The following information describes various network reliability scenarios in which the APSD feature can be used for single-OA operation.

Scenario 1: Protection on an optical line link between terminals

The following figure shows protection on an optical line link between terminals in a single-OA configuration. Here, optical line LOS stems from supervisory LOS detected by the TLM circuit pack. This could result in false APSD triggers due to failures in the upstream TLM. However, these false triggers do not adversely affect overall network reliability.

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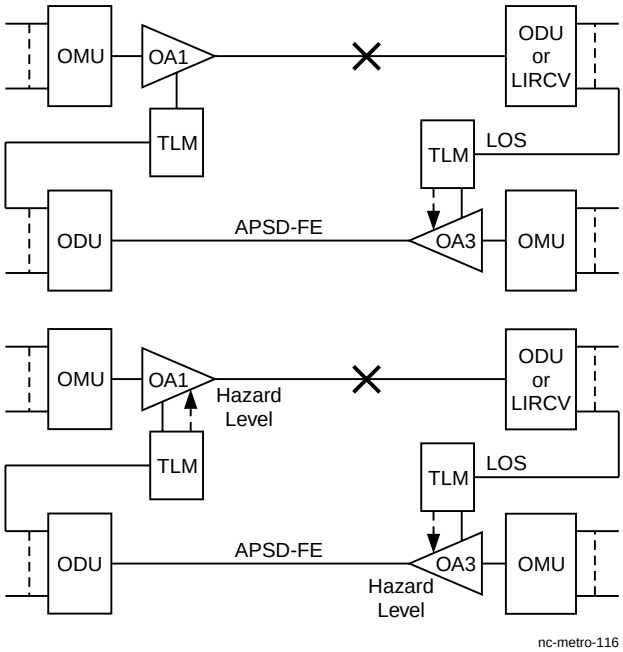
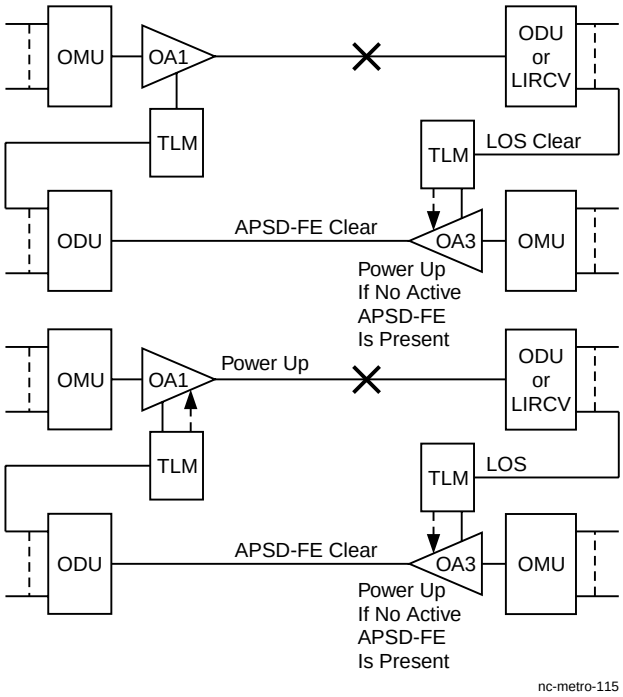
Figure 1-3 APSD from Optical Line Failure (Single-OA)



Scenario 2: Restarting on an optical line link between terminals.

The restart procedure for single-OA configuration is almost identical to Scenario 3. When the link between "OA1" and the ODU is restored, the telemetry circuit pack clears the LOS condition. It also clears the APSD-FE message on the supervisory output. The upstream Metropolis® EON detects the clearing of the message and instructs "OA1" to power up. Provided there is no active APSD-FE message from upstream, the downstream terminal powers up "OA3." The following figure illustrates restarting in a single-OA configuration.

Figure 1-4 Restarting on an Optical Link Between Terminals (Single-OA)



Double failure contingencies

The following double failure contingencies exist with the APSD feature:

- If an incoming supervisory channel failure exists at an upstream Metropolis® EON, APSD cannot be activated.
- If an incoming supervisory channel with an active RDI condition fails, APSD cannot resume normal operation when it is activated. However, manual resumption of normal operation is possible.

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Electrostatic discharge

Overview

Electrostatic discharge (ESD) (for example, caused by touching with the hand) can destroy semiconductor components. The correct operation of the complete system is then no longer assured.

All semiconductor components are basically sensitive to electrostatic discharge. The electrostatic discharge can also affect the components indirectly using contacts or conductor tracks.

Barred-hand symbol

Circuit packs containing components that are especially sensitive to electrostatic discharge are identified by warning labels bearing the barred-hand symbol.

ESD instructions

Observe the following ESD instructions to avoid damage to electrostatic-sensitive components.

- Wear working garment made of 100% cotton to avoid electrostatic discharge.
- Touch the circuit packs at the edges or the insertion and removal facilities only.
- Ensure that the rack is grounded.
- Wear conductively connected wrist straps and connect them to the rack ESD bonding point.
- Work in an area which is protected against electrostatic discharge. Use conducting floor and bench mats which are conductively connected to the rack ESD bonding point.
- Conductively connect all test equipment and trolleys to the rack ESD bonding point.
- Store and ship circuit packs and components in their shipping packing. Circuit packs and components must be packed and unpacked only at workplaces suitably protected against build-up of charge.

□

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Important safety instructions

Instructions

Especially observe the following safety instructions, they are of particular importance for Metropolis® EON systems.

Invisible laser radiation

DANGER

Injury to eyes caused by invisible laser radiation.

Metropolis® EON operates with invisible laser radiation. Laser radiation can cause considerable injuries to the eyes.

Never look into the end of an exposed fiber or plug-in optical connectors as long as the optical source is switched on. Always observe the laser warning instructions (cf. "Laser safety" (1-5)).

Power supply plug

DANGER

Arcing on removing or inserting a live power supply plug.

Arcing can cause serious burns to the hands and damage to the eyes.

Shielded 10BaseT LAN cables

DANGER

Risk of electrical shock and/or serious injury

There is a risk of electrical shock and/or serious injury if shielded 10BaseT LAN cables are used, and the applicable national safety requirements have not been met.

*The usage of **shielded** 10BaseT LAN cables is only allowed if the applicable national safety requirements have been met by*

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the user. Otherwise, there is a risk of electrical shock and/or serious injury.

Electrostatic discharge (ESD)

CAUTION

Destruction of components by electrostatic discharge.

Electronic components can be destroyed by electrostatic discharge.

Plug-in units must therefore always be kept in antistatic covers. Use the original packaging if possible. Always observe the ESD instructions (cf. “Electrostatic discharge” (1-15)).

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2 Security Administration Tasks

Overview

Purpose

This chapter includes tasks that affect administration of security for the network. These tasks cover how to enter, change, or delete a user login in addition to login and password aging.

User privilege

These tasks can only be performed by one of two privileged users. Privileged users cannot change their own login. (LT01 and LT02 are the original factory names.)

Contents

This chapter contains the following information.

Change a User Login	2 - 2
Delete a User Login	2 - 3
Enable/Disable Login and/or Password Aging	2 - 4
Enter a User Login	2 - 6
Enter/Edit a User Password	2 - 8

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Change a User Login

Purpose This task covers changing a user login.

User privilege This task requires a privilege level of “Privileged” or higher.

Supporting tasks This task refers to the following supporting tasks.

- “DLP-501: Connect and Condition Craft Interface Terminal (CIT)” (9-11)

Task The following task changes the login.

1 If required, connect and condition the craft interface terminal (CIT).

Reference: “DLP-501: Connect and Condition Craft Interface Terminal (CIT)” (9-11)

2 At the CIT, select **SECURITY.Edit.User.Security** for the specified user login to be changed.

3 Select the appropriate input parameter (**User Identifier**, **New User Identifier**, **New Private Identifier**, **User Access Privilege**, **Temporary Login Type**, **Expiration Date**), make the change, and select execute to make change(s).

4 At the CIT, select **SECURITY.Retrieve.User.Security** to obtain the ***Login Provisioning*** report and verify that the user login has been changed.

END OF STEPS

□

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Delete a User Login

Purpose This task covers deleting a user login.

User privilege This task requires a privilege level of “Privileged” or higher.

Supporting tasks This task refers to the following supporting tasks.

- “DLP-501: Connect and Condition Craft Interface Terminal (CIT)” (9-11)

Task The following task deletes a login.

1 If required, connect and condition the craft interface terminal (CIT).

Reference: “DLP-501: Connect and Condition Craft Interface Terminal (CIT)” (9-11)

2 At the CIT, select **SECURITY.Delete.User.Security** for the specified user's login to be deleted and click on execute to make change(s).

3 At the CIT, select **SECURITY.Retrieve.User.Security** to obtain the ***Login Provisioning*** report and verify that the user login has been deleted.

END OF STEPS

□

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Enable/Disable Login and/or Password Aging

Purpose This task covers how to enable/disable login and password aging.

User privilege This task requires a privilege level of "Privileged" or higher.

Supporting tasks This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

Task The following task will toggle login and password aging (enable/disable).

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 At the CIT, select the command **SECURITY.Enter.Network_Element.Security** to gain access to the global security parameters for the system.

3 Select the appropriate input parameter, enter a value, and press the **Enter** key (or the function key, **F9**).

Reference: The following values are valid for the respective parameters.

- Allow User Identifier= [**Yes**, **No**] If **No**, all non Privileged users will be immediately disconnected.
- Password Aging= [**0**, **7** through **999**] A **0** (zero) will disable.
- Login Aging= [**0**, **7** through **999**] A **0** (zero) will disable.

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4 At the CIT, select **SECURITY.Retrieve.Network_Element.Security** to obtain report and verify the correct parameter value(s).

END OF STEPS

Enter a User Login

Purpose This task covers entering a user login.

User privilege This task can only be performed by one of two privileged users. Privileged users cannot change their own login. (LT01 and LT02 are the original factory names.)

Supporting tasks This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

Task The following task enters a login.

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

Important! Each network element may have up to 98 non privileged users.

2 At the CIT, select **SECURITY.Enter.User.Security** and enter the User Identifier, New User Identifier, New Private Identifier, User Access Privilege, Temporary Login Type, Expiration Date (from six to ten characters with one number and with one symbolic character except the @, #, and =).

3 Assign security level 1 through 4 for privileged (4), general (3), basic (2), reports (1) for each management category to the user login. Also, at this time, a visitor's login along with an expiration date may be entered.

4 Press the **Enter** key.

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5 At the CIT, select **SECURITY.Retrieve.User.Security** to obtain the ***Login Provisioning*** report and verify that the user's login has been entered.

6 The login and initial password may be given to the person working on the network element.

END OF STEPS

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Enter/Edit a User Password

Purpose This task covers how to enter and edit a password.

User privilege This task can only be performed by one of two privileged users. Privileged users cannot change their own login. (LT01 and LT02 are the original factory names.)

Supporting tasks This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

Task The following task will enter and/or edit a password.

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 At the CIT, select **SECURITY.Edit.Private_Identifier**. Make password change(s) as needed.

END OF STEPS

□

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3 Management Communication Setup Tasks

Overview

Purpose This chapter covers setting up management communication.

Contents This chapter is divided into the following sections.

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Delete Customer Maintenance Signal (CMS) from an In-Service Metropolis® EON	3 - 12
Establish Modem Network Access	3 - 15
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Perform Provisioning	3 - 26
Provision a LAN Companion (COMPANION_TID)	3 - 28

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Change a DSNE

Purpose

Use this task to change which network element (NE) is designated as the Directory Services NE. There must be one and only one DSNE per network. The DSNE maps the network element names (TIDs) to NSAP addresses for all of the NEs in a network. This allows you to log into or send commands to an NE using its TID and then the system translates that TID into an NSAP address to find the target NE.

User privilege

This task requires a privilege level of "Privileged" or higher.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)
- "Login/Logout to a Network Element Using CenterLink" (3-22)

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into a network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select **FAULT.Retrieve.Condition.All** command and execute for a report.

4 Is either the DS-NE not reachable or multiple DS-NEs defined condition listed in the report?

If	Then
YES	refer to *Alarm Messages and Trouble Clearing Guide, 365-575-560* to clear these conditions before continuing with this procedure.

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If	Then
NO	Continue with Step 5.

5 At the CIT, select the command **CONFIGURATION.Retrieve.Map.Network** and execute to obtain a report.

6 Verify DCCSTATUS is ***good*** for all nodes in the network. A failed DCC condition must be cleared before proceeding with this task.

Reference: *Alarm Messages and Trouble Clearing Guide, 365-575-560.*

7 From the report obtained in Step 5, identify which node (TID) is the current DSNE.

8 If necessary, remote login to the node that is currently the DSNE.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

9 At the CIT, select the command **SECURITY.Enter.System** and execute for an input screen.

10 At the field for DSNE, change **YES** to **NO** and press **ENTER**.

Result: The TOHCTL circuit pack reboots.

11 Wait 20 minutes for the TOHCTL circuit pack to reboot. Wait an additional 30 to 50 minutes because the more nodes in a network, the longer it takes for them to be updated. Do not proceed until the system is stabilized.

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12 Log into the node to be designated as the new DSNE (you can remote login to that node from any other node except from the node where DSNE was just deleted).

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

13 At the CIT, select the command **SECURITY.Enter.System** and execute for an input screen.

14 At the field for DSNE, change **NO** to **YES** and press **ENTER**.

Result: The TOHCTL circuit pack reboots.

15 Wait 20 minutes for the TOHCTL circuit pack to reboot. Wait an additional 30 to 50 minutes because the more nodes in a network, the longer it takes for them to be updated and to stabilize the network.

END OF STEPS

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Change the TID

Purpose

This task covers changing the target identifier (TID).

Supporting tasks

This task refers to the following tasks.

- "Login/Logout to a Network Element Using CenterLink" (3-22)
- "Login/Logout to a Network Element Using CenterLink" (3-22)

Task

CAUTION

Communication Loss

When the TID is changed using CenterLink, NE name inconsistency at the Navis™ Optical Element Management System may occur, and this may cause a loss of association with the Navis™ Optical EMS. To avoid this problem, delete the node association before changing the TID and then create it again after changing the TID.

If Navis™ Optical EMS is used as the element manager and CenterLink as the local craft interface, you can only change the TID from CenterLink. To achieve this, continue with the following procedure.

1 If Navis™ Optical EMS is being used on this network, delete the node association from Navis™ Optical EMS.

2 Log into the network element with CenterLink.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 Select the command **Security.Enter.System**.

Result: The corresponding screen appears, and it includes the parameter **NEW_TID**.

4 Click into the NEW_TID box and type the new TID.

5 Click on the **Enter** button to change the TID.

Result: CenterLink terminates your session. (If this does not happen, there is a problem communicating with the DSNE. To resolve it, refer to the *Alarm Messages and Trouble Clearing Guide, 365-575-560.*)

6 To confirm that the new TID is functioning, use CenterLink to log on to the affected network element using the new TID.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

7 If Navis™ Optical EMS is being used on this network, restore the node associations from Navis™ Optical EMS.

END OF STEPS

□

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Create a DSNE

Purpose

Use this task to designate a network element (NE) to be the Directory Services NE for the subnetwork. There must be one and only one DSNE per network. The DSNE maps the network element names (TIDs) to NSAP addresses for all of the NEs in a network. This allows you to log into or send commands to an NE using its TID and then the system translates that TID into an NSAP address to find the target NE.

User privilege

This task requires a privilege level of "Privileged" or higher.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)
- "Login/Logout to a Network Element Using CenterLink" (3-22)

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 This procedure can only be performed for a new DSNE. Log into the network element to be designated as the DSNE.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **FAULT.Retrieve.Condition.All** for a report.

4 Do any alarms besides ***DS-NE not reachable*** appear in the report?

If	Then
YES	refer to *Alarm Messages and Trouble Clearing Guide, 365-575-560* to clear these conditions before continuing with this procedure.

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If	Then
NO	Continue with Step 5.

5 At the CIT, select the command **SECURITY.Enter.System** and execute for an input screen.

6 At the field for DSNE, change **NO** to **YES** and press **ENTER**.

Result: The TOHCTL circuit pack reboots.

7 Wait 20 minutes for the TOHCTL circuit pack to reboot. Wait an additional 30 to 50 minutes because the more nodes in a network, the longer it takes for them to be updated and to stabilize the network.

8 At the CIT, select command **CONFIGURATION.Retrieve.Map.Network** and execute to obtain a report.

9 Verify DCCSTATUS is ***good*** for all nodes in the network. A failed DCC condition must be cleared before proceeding with this task.

Reference: *Alarm Messages and Trouble Clearing Guide, 365-575-560.*

END OF STEPS

□

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Delete a DSNE

Purpose

Use this task to change a network element (NE) so that it is no longer the Directory Services NE for a subnetwork. There must be one and only one DSNE per network. The DSNE maps the network element names (TIDs) to NSAP addresses for all of the NEs in a network. This allows you to log into or send commands to an NE using its TID and then the system translates that TID into an NSAP address to find the target NE.

User privilege

This task requires a privilege level of "Privileged" or higher.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)
- "Login/Logout to a Network Element Using CenterLink" (3-22)

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into a network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **FAULT.Retrieve.Condition.All** and execute for a report.

4 Is either the ***DS-NE not reachable*** or ***multiple DS-NEs defined*** condition listed in the report?

If	Then
YES	refer to *Alarm Messages and Trouble Clearing Guide, 365-575-560* to clear these conditions before continuing with this procedure.
NO	Continue with Step 5.

5 At the CIT, select the command **CONFIGURATION.Retrieve.Map.Network** and execute for a report.

6 Verify DCCSTATUS is good for all nodes in the area. A failed DCC condition must be cleared before proceeding with this task.

Reference: *Alarm Messages and Trouble Clearing Guide, 365-575-560.*

7 From the report obtained in Step 5, identify which node (TID) is the current DSNE.

8 If necessary, remote login to the node where the DSNE is being deleted.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

9 At the CIT, select the command **SECURITY.Enter.System** and execute for an input screen.

10 At the field for DSNE, change **YES** to **NO** and press **ENTER**.

Result: The TOHCTL circuit pack reboots.

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11 Wait 20 minutes for the TOHCTL circuit pack to reboot. Wait an additional 30 to 50 minutes because the more nodes in a network, the longer it takes for them to be updated and to stabilized the network.

END OF STEPS

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Delete Customer Maintenance Signal (CMS) from an In-Service Metropolis® EON

Purpose

This task is used to delete a Customer Maintenance Signal (CMS) from an in-service Metropolis® EON. The task is written from the local elements perspective although action is required at the other Metropolis® EON network elements.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)
- "Delete OCHAN( ) from an In-Service Metropolis® EON" (5-56)
- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

Required test equipment

The following test equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap
- Optical power set or equivalent

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WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

Task The following task is used to delete a CMS from an in-service Metropolis® EON.

1 Obtain the circuit order instructions and note which optical line is associated with the CMS to be deleted.

2 Open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

3 Connect the craft interface terminal (CIT) and log in to the local Metropolis® EON network element.

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

4 Locate and remove the appropriate optical connections from the CM IN and CM OUT ports on the TLM circuit pack as specified per the circuit order.

Important! Each repeater contains two TLM circuit packs per optical line whereas an end terminal contains one TLM circuit pack per optical line. The TLM circuit pack provides optical terminations for the customer maintenance (CM) signal.

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

5 Repeat Step 1 through Step 4 for any remaining CMSs to be deleted in this cabinet or shelf.

6 Close the cabinet door or install the shelf cover.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

7 At the CIT, select command **CONFIGURATION.Update.System** to reflect the existing hardware and incoming signals in the system database. The port is now in the OOS-MA-AS state (use the command **FAULT.Retrieve.State** to verify.)

8 Repeat Step 1 through Step 7 for the remaining network element(s).

9 Wait until the NE ACTY LED indicator is not lighted (approximately 5 minutes).

Result: The CMS is deleted.

END OF STEPS

□

Establish Modem Network Access

Purpose

This task is used to access a distant Metropolis® EON network element (NE) from a local craft interface terminal (CIT). Some of the more common CIT access configurations are shown in "Hybrid network configuration" (3-18) and "Null modem internal wiring connections" (3-19). Other configurations exist with access gained through local company procedures. Once access is gained, the Metropolis® EON network element responds to any CIT selections just as if you were physically connected to it.

Quick check for compatible modems (both locations)

Important! Modems at the CIT and Metropolis® EON NE locations must be compatible. Quick check/setup of the modem parameters and connections are given in this procedure for the Metropolis® EON NE location first, then for the CIT location.

The manufacturer's manuals may be referred to for specific instructions on setting the modem parameters. For example, when using a *Penril*® modem, the speed conversion parameter must be set to off.

Additional information on using a modem for remote access is available in the "Operations Interfaces" chapter of the *Operations Systems Engineering Guide, 365-575-561*. Also, refer to *Installation Guide, 365-575-562*.

CenterLink does not provide any procedures of its own for installing a modem. To install a modem for use by CenterLink, use the *Microsoft*® Windows modem installation procedures. Any modem correctly installed under Windows can be used by CenterLink since CenterLink uses Windows for accessing the modem.

The following task is used to ensure compatible modems at both locations.

1 Verify the generic parameters of the modem are set using the following values.

- Modem baud rate (AT&T 4024 or 2224 CEO modems at 2400, AT&T 2292 modem at 9600) for CIT (DCE) port. This port and the CIT automatically select the highest usable baud rate up to 9600.

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- Full duplex
- 8 data bits
- No parity bits
- 1 start bit
- 1 stop bit
- No flow control.

END OF STEPS

Metropolis® EON network element location

CAUTION

Electrostatic Discharge

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

Important! It is assumed the PC and AT command compatible modem are powered, and the PC is loaded with communications software.

The following task completes a quick check/setup for the modem at the Metropolis® EON NE location.

1 Set the modem to answer incoming calls.

Example: If you are using an AT&T 2224 CEO modem, do the following to program the modem.

1. Set all front panel switches to DOWN (factory default) for AT command mode.
2. Connect PC serial port to the modem RS-232C port using modem cable (“Pin connections at CIT (DTE) connector” (3-19)) or using a null modem adapter (“Null modem internal wiring connections” (3-19).
3. Establish communications between the PC and modem using the communications software set for the generic parameters in “Quick check for compatible modems (both locations)” (3-15)

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4. At the prompt, enter the AT commands listed in the table in "AT commands" (3-19)
5. Remove the connector at the PC serial port and plug into the CIT (DTE) connector at the interconnection panel (Low Speed Shelf - System Controller) of the Metropolis® EON network element. Dial-up access to the network element using a 2400-baud modem is now ready. See "Hybrid network configuration" (3-18) and "Null modem internal wiring connections" (3-19) for the DTE port connection.

2 Verify the telephone line is plugged into the modem.

3 This completes the quick check/setup for the modem at the Metropolis® EON NE location. Continue with "CIT-PC location" (3-17).

END OF STEPS

CIT-PC location

1 Is the modem installed internally (card) or a stand-alone (external).

If	Then
Internal modem	Continue with Step 2
External modem	Continue with Step 3

2 Verify the telephone line is plugged into the internal modem of the CIT-PC and go to Step 5 to continue.

3 Verify the external modem is connected to the CIT-PC, using the appropriate modem cable. "Pin connections for modem using DB-25 cable" (3-20) and "Pin connections for modem using DB-9 cable" (3-21) list the pins for the DB-25 connector and DB-9 connector, respectively.

4 Verify the telephone line is plugged into the external modem and the modem is powered.

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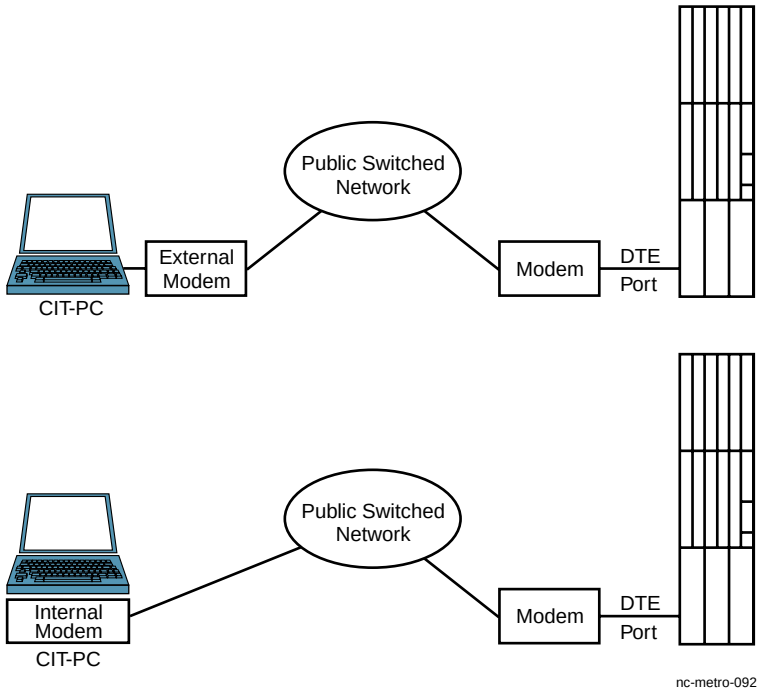
5 This completes the quick check/setup for the external modem at the CIT-PC location.

END OF STEPS

Hybrid network configuration

The following figure illustrates a hybrid network configuration.



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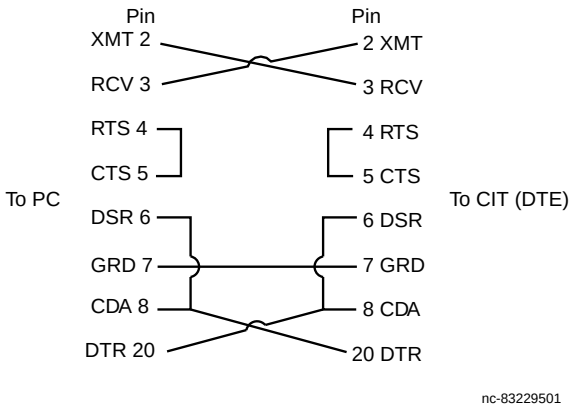
Null modem internal wiring connections

The following figure illustrates the internal wiring connections for a null modem.



AT commands

The following table lists the AT commands.

PC	Response	Comment
ATH	OK	#hang-up (on-hook)
AT&F	OK	#resets to factory defaults
AT&C1	OK	#data carrier is present when on
ATS0=2	OK	answer on 2 rings
AT&W	OK	wait for second dial tone

Pin connections at CIT (DTE) connector

The following table lists the pin connections at the CIT (DTE) connector.

CIT (DTE) Connector (Note)	Metropolis® EON Network Element
Pin 1 - Protective Ground	Protective frame ground.
Pin 2 - Transmit Data	Transmits data to the modem.
Pin 3 - Receive Data	Receives data from the modem.
Pin 4 - Request to Send	Metropolis® EON network element notifies the modem that it is ready to send data.
Pin 5 - Clear to Send	Modem notifies the Metropolis® EON network element that it is clear to send its data.
Pin 6 - Data Set Ready	Modem notifies the Metropolis® EON network element that the modem is connected and ready to receive data.

CIT (DTE) Connector (Note)	Metropolis® EON Network Element
Pin 7 - Signal Ground	Signal ground.
Pin 8 - Receive Line Signal Detected	This modem has detected carrier from the remote modem.
Pin 20 - Data Terminal Ready	Metropolis® EON network element notifies the modem that it is connected.

Notes:

1. All remaining pins are not connected.

Pin connections for modem using DB-25 cable

The following table lists the pin connections for a modem using a DB-25 cable.

PC DB-25 Connector (Note)	CIT
Pin 1 - Protective Ground	Protective frame ground.
Pin 2 - Transmit Data	Transmits data to the modem
Pin 3 - Receive Data	Receives data from modem
Pin 4 - Request to Send	CIT is requesting clearance from the modem so it can send data.
Pin 5 - Clear to Send	Modem notifies the CIT that it is clear to send data.
Pin 6 - Data Set Ready	Modem notifies the CIT that the modem is connected.
Pin 7 - Signal Ground	Signal ground
Pin 8 - Carrier Detect	This modem detects carrier from the remote modem.
Pin 20 - Data Terminal Ready	CIT notifies the modem that it is connected.

Notes:

1. All remaining pins are not connected.

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Pin connections for modem using DB-9 cable

The following table lists the pin connections for a modem using a DB-9 cable.

PC DB-9 Connector	CIT
Pin 1 - Carrier Detect	This modem detects carrier from the remote modem.
Pin 2 - Receive Data	Receives data from modem
Pin 3 - Transmit Data	Transmits data to the modem
Pin 4 - Data Terminal Ready	CIT notifies the modem that it is connected
Pin 5 - Signal ground	Signal ground
Pin 6 - Data Set Ready	Modem notifies the CIT that the modem is connected and ready to receive data.
Pin 7 - Request to Send	CIT is requesting clearance from the modem so it can send data.
Pin 8 - Clear to Send	Modem notifies the CIT that it is clear to send.
Pin 9 - Ring indicator	Modem notifies the CIT that ring signal is present when the modem is in an auto-answer mode.

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Login/Logout to a Network Element Using CenterLink

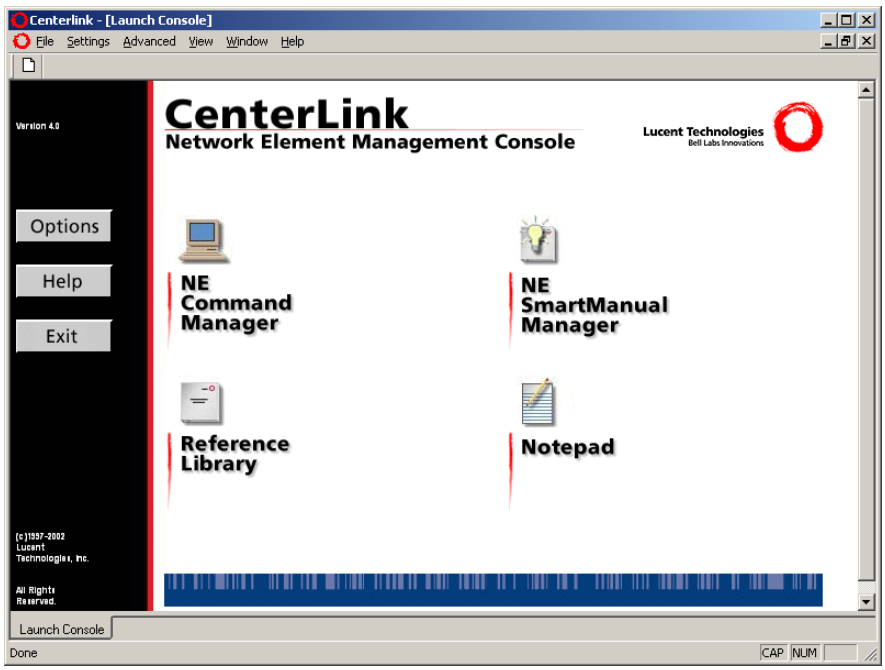
Purpose This task is used to login to or logout from a network element (NE) using CenterLink.

Login

1 If required, connect and condition the craft interface terminal (CIT).

> **Reference:** "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 If you see the Launch Console, as shown below, continue with Step 3.



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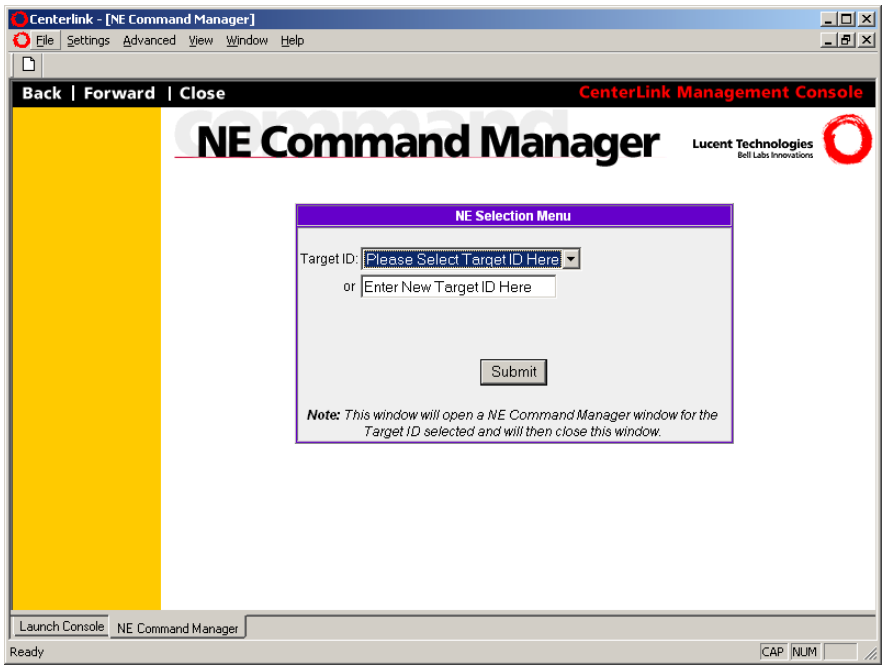
If you do not see the Launch Console but you do see a taskbar icon like the one below at the bottom of your screen, click on the icon and then continue with Step 3.

If you do not see either the Launch Console or the taskbar icon, click on the CenterLink shortcut icon shown below and then continue with Step 3.

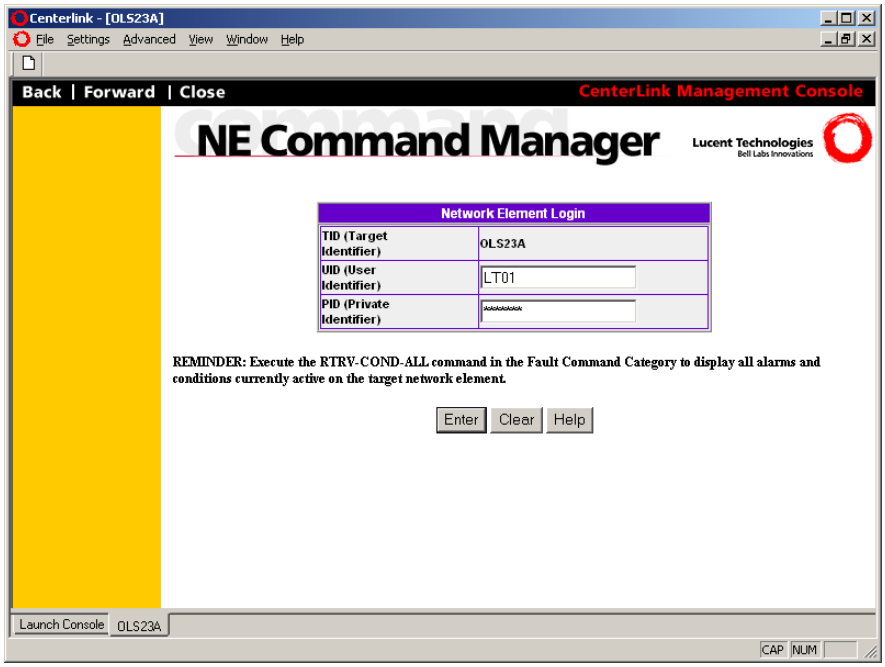
3 At the CenterLink Launch Console, select **NE Command Manager**.

You see the following screen:



4 Select a **Target ID** or enter a new Target ID and select **Submit**.

You see the following screen:

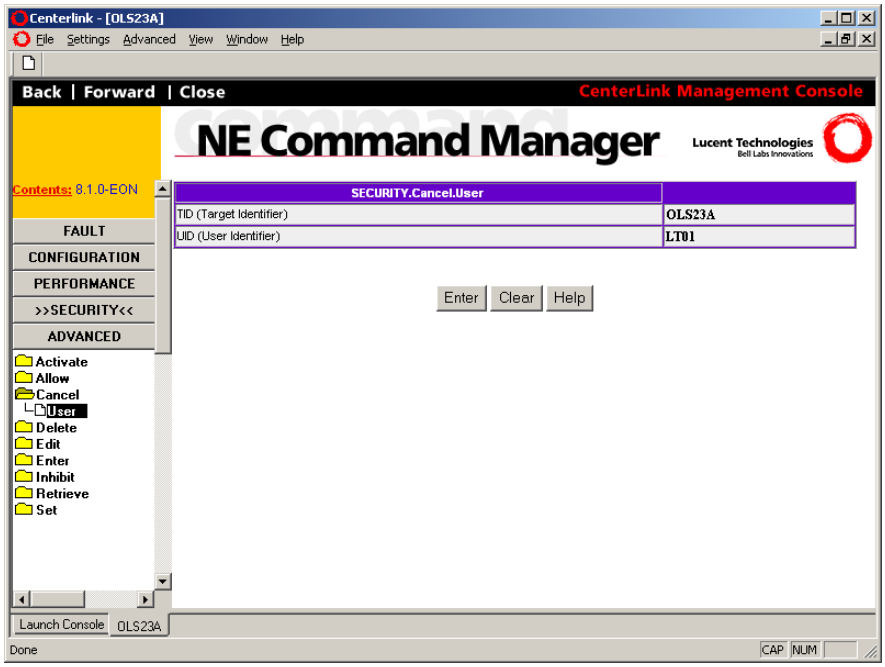


5 Enter a valid UID and PID, and then select **Enter**.

END OF STEPS

Logout

1 Select the command **SECURITY.Cancel.User** as shown below.



2 Select **Enter** to execute.

Perform Provisioning

Purpose This task is used to provision the circuit packs or units.

Task

Important! The Metropolis® EON does not have manual or switch-settable options on its circuit packs or units. Information about Metropolis® EON provisioning is provided in Chapter 3, "Management Communication Setup Tasks". Other helpful information is the CIT tutorial and command tables (by release), which are located in Chapter 10, "Using the Craft Interface Terminal".

- *Metropolis®* EON *Provisioning Job Aid, 365-575-564*
- *Metropolis®* EON *Threshold Crossing Alert (TCA) Parameters Provisioning Job Aid, 365-575-565*

1 At the CIT select the category **CONFIGURATION**, **PERFORMANCE**, **FAULT**, **SECURITY**, or **ADVANCED** and the appropriate inputs [***verb*** and ***modifier(s)***]. Inputs are also referred to as ***commands***.

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2 Did the appropriate report show that provisioning has been done?

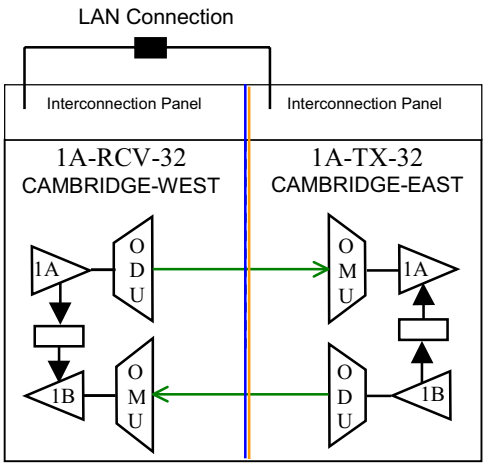
If	Then
YES	STOP! YOU HAVE COMPLETED THIS TASK.
NO	**Important!** For example, obtain a report using the command **CONFIGURATION.Retrieve.Attribute.Alarm**. Another example is obtain a report using the command **CONFIGURATION.Retrieve.Supervisory**. 1. Refer the problem to the group that did the original provisioning, and/or 2. Compare the report with the original work order and correct the provisioning discrepancy. Provisioning job aids are available; see Step 1 for the specific equipment references.

END OF STEPS

Provision a LAN Companion (COMPANION_TID)

Purpose Full add/drop capability in a 32-channel ring node requires 2 OMU slots and 2 ODU slots for each direction of transmission. For this reason, you need 2 separate NEs to form a single node. These "companion" NEs are often called ***east*** and ***west***. One way to allow east and west to share operations communication is to make a LAN connection between east and west and provision east as the companion of west and west as the companion of east.

Example In the example below, you would provision the **COMPANION_TID** of CAMBRIDGE-WEST to be ***CAMBRIDGE-EAST*** and you would provision the **COMPANION_TID** of CAMBRIDGE-EAST to be ***CAMBRIDGE-WEST***.



Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into one of the companion network elements.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

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3 Select the command **SECURITY.Enter.System**.

Result: The corresponding screen appears and one of the parameters is **COMPANION_TID**.

Important! CenterLink only checks the TID for valid syntax. It has no way of checking whether the TID you type belongs to the correct network element.

4 Click into the COMPANION_TID box and type the TID for the network element that is serving as a LAN companion to the one you are logged into.

5 Repeat the steps above for the other companion network element.

4 Alarm Management Tasks

Overview

Purpose

This chapter covers provisioning alarms according to the needs of the user. For information on the meaning and clearing of various alarms, see the *Alarm Messages and Trouble Clearing Guide, 365-575-560.*

Contents

This chapter includes the following section.

Set the OLINE LOS Alarm Severity (Notification Code)	4 - 2
Set the OTPS LOS Alarm Severity (Notification Code)	4 - 3
Set the UBB Data Rate Mismatch Alarm Severity (Notification Code)	4 - 4

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Set the OLINE LOS Alarm Severity (Notification Code)

Purpose You can provision the alarm severity, also know as ***notification code***, for an optical line loss of signal alarm, using the **SECURITY.Enter.System** command.

User privilege This task requires a privilege level of "General" or higher.

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into a network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **SECURITY.Enter.System** and click the **Enter** button to execute.

Result: The corresponding screen appears, and includes parameters **NTFCNCDE (Notification Code)**.

Important! This procedure affects how alarms are reported to CenterLink and other interfaces. Click on the **Help** button to see an explanation of the notification codes.

4 Select a notification code from the **NTFCNCDE** drop-down.

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Set the OTPS LOS Alarm Severity (Notification Code)

Purpose

You can provision the alarm severity, also know as ***notification code***, for a loss of signal alarm on an optical translator port signal (OTPS), using the **CONFIGURATION.Enter.OT_Port_Signal** command.

User privilege

This task requires a privilege level of "General" or higher.

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into a network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **CONFIGURATION.Enter.OT_Port_Signal** and click the **Enter** button to execute.

Result: The corresponding screen appears, and includes parameters **NTFCNCDE (Notification Code)**.

Important! This procedure affects how alarms are reported to CenterLink and other interfaces. Click on the **Help** button to see an explanation of the notification codes.

4 Select a notification code from the **NTFCNCDE** drop-down.

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Set the UBB Data Rate Mismatch Alarm Severity (Notification Code)

Purpose You can provision the alarm severity, also know as ***notification code***, for a data rate mismatch alarm on an optical translator port signal (OTPS), using the **CONFIGURATION.Enter.OT_Port_Signal** command.

User privilege This task requires a privilege level of "General" or higher.

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into a network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **CONFIGURATION.Enter.OT_Port_Signal** and click the **Enter** button to execute.

Result: The corresponding screen appears, and includes parameters **NTFCNCDE (Notification Code)** and **UBBDRMNC (UBB Data Rate Mismatch Notification Code)**.

Important! This procedure affects how alarms are reported to CenterLink and other interfaces. Click on the **Help** button to see an explanation of the notification codes.

4 Select a notification code from the **UBBDRMNC** drop-down.

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5 Traffic Provisioning Tasks

Overview

Purpose

This chapter provides instructions for adding, maintaining, and deleting traffic. These tasks fall into the three major categories, as shown in the table of contents below. Each section has its own table of contents that lists each individual task.

Contents

This chapter is divided into the following parts.

Physical Connection Tasks	5 - 2
Optical Translator Installation and Deletion	5 - 67
Provisioning Tasks	5 - 85

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Physical Connection Tasks

Overview

Purpose

This section assumes that the network element is already carrying some wavelengths (channels) and you want to add more. If this is not the case, please refer to the *Installation Guide, 365-575-562*. This section provides specific procedures related to connecting customer traffic as DWDM wavelengths at a Metropolis® EON End Terminal in any of the following configurations:

- Directly from (add) or to (drop) Metropolis® EON-compatible customer terminal equipment.
- Through OTU/OTPM units from (add) or to (drop) customer terminal equipment.
- Through OUPSR units as add and drop connections.
- Directly from a companion Metropolis® EON End Terminal (pass-through) in a Ring Terminal configuration.

OUPSR configurations

There are three basic OUPSR configurations. All configurations protect against loss of signal. Some configurations give additional protection. See "Protection Switching" in Chapter 2 of the *Alarm Messages and Trouble Clearing Guide, 365-575-560* for full details. An add or drop OTU is considered protected if there are two add or drop OTUs – one for the 1A direction and one for the 1B direction. The add and drop procedures in this chapter are based on whether the add and/or drop OTU is protected. Sometimes a single add or drop procedure works for more than one OUPSR configuration.

General considerations

Important! No more than 25% of the channels on a network element can be from ELSBB circuit packs.

Consider the following before performing any traffic-related procedures:

- The customer-designated engineer shall specify and order all the optical fibers and LBO kits; and shall provide the installer or operator with an optical fiber list and fiber routing information for each shelf.

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- An approved ESD wrist strap, connected to the ESD ground jack on the User Panel or Fuse Panel, must be worn when handling circuit packs or touching the equipment.
- Connectors on the shelf Interconnection Panels are equipped with protective ESD covers. These covers should be left in place on any connector that is not being immediately cabled so that ESD protections are maintained.
- Do not remove the shelf backplane cover.
- The optical fiber information provided in this chapter is the latest information available at the time of the issue. To verify current information, refer to the appropriate application schematics (SD-6G156-01 and SD-6G157-01).
- Carefully place optical fibers in a protective tube, channel or duct when routing the optical fibers between shelves or the customer's terminating equipment.
- Carefully place optical fibers in a customer-designated duct or cable rack with nothing on top of them.
- Always maintain a minimum of 1.5-inch bend radius when routing optical fibers.
- Some optical fiber connections between Metropolis® EON circuit packs will use LC-type fiber connectors. Other optical fiber connections may have ST, FC or LC-type fiber connectors as specified by the customer.

Contents

This part of the chapter contains the following tasks plus one reference section.

Add Protected Signals with Optical Translation	5 - 5
Add Protected Signals from Compatible Optics	5 - 11
Add Signals Using OUPSR with Protected OTUs	5 - 15
Add Signals Using OUPSR with Unprotected Add OTU	5 - 22
Connect Direct Pass-Through Signals	5 - 29
Connect Pass-Through Signals with Regeneration	5 - 33
Drop Protected Signals with Optical Translation	5 - 38
Drop Protected Signals with Compatible Optics	5 - 42
Drop Signals Using OUPSR with Protected Drop OTUs	5 - 44

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Drop Signals Using OUPSR with Unprotected OTUs	5 - 50
Delete OCHAN( ) from an In-Service Metropolis® EON	5 - 56
Reference	5 - 62

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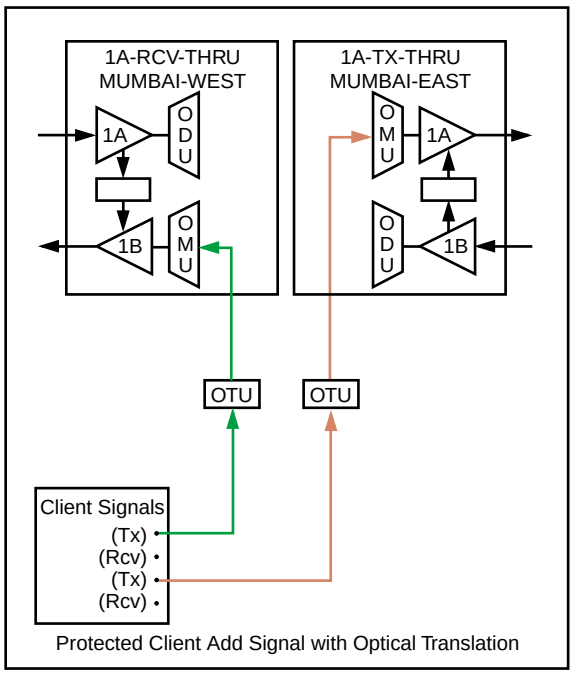
Add Protected Signals with Optical Translation

Overview

Customer terminal transmitters that are not Metropolis® EON-compatible are required to connect to the Metropolis® EON system through an add OTU or OTPM unit. The OTU/OTPM translates the optical wavelength of the customer's traffic signal to a Metropolis® EON system wavelength and provides a tone recognition signal for wavelength (optical channel) identification. This procedure is for adding customer signals that do not require protection at the DWDM level, but they do need optical translation to enter DWDM.

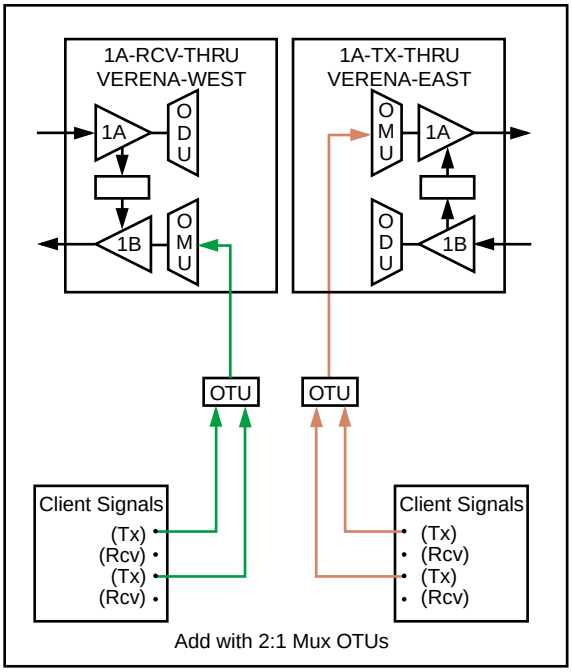
Connection Concept

The following figures shows two examples with companion NEs acting as 32-channel ring node. The first is an example with ordinary OTU/OTPMs and the second is an example with a 2:1 multiplexing OTU. Your configuration may differ. The purpose of the figure is to show the connections needed. The add connections are customer terminal to OTU/OTPM to OMU.



Protected Client Add Signal with Optical Translation

nc-metro-189



nc-metro-193

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Add Connection (Customer Terminal to OTU/OTPM to OMU)

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

1 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The optical fiber should not be connected to the OTU/OTPM at this time.

2 Clean and connect the assigned optical fiber to the transmitter output port at the customer's terminal equipment.

3 Clean the optical fiber to be connected at the OTU/OTPM. Measure the optical power in this fiber from the customer's terminal equipment. Compare the measurement to the table below.

Add OTU/OTPM Code	Input Power Range
41A/C/D(1-16), OC-48	-27 dBm to -11 dBm
41F(1-16), GbE	-27 dBm to -11 dBm
41H(1-32)A, OC-192	-14 dBm to -1 dBm
41M(1-32), 2DM25	See "2DM25 Inputs" (5-64).

42A(1-16)B, OC-12	-28 dBm to -11 dBm
43A(1-16)B, OC-3	-33 dBm to -11 dBm
44A(1-16), LSBB	-28 dBm to -11 dBm
44C(1-16)B, ELSBB	-28 dBm to -11 dBm
46A(1-32), OC-48	-28.6 dBm to -11 dBm
47A(1-32), UBB	-25 dBm to -11 dBm

4 Adjust the optical power level to meet the requirement of Step 3 by selecting an LBO value and installing it at the input port of the OTU/OTPM.

5 Connect the fiber to the OTU/OTPM input port.

6 Measure the optical power level at the output of the OTU/OTPM.

Result: Starting with Release 8.2, every OTU/OTPM has an LBO installed on its OUT port at the factory so that its output meets the target input for a 5.5 dBm loss OMU. You may need to change the LBO if you have older equipment, a higher loss OMU, or some other reason. You are directed to do that in Step 9 and Step 10, rather than here, in case of additional loss through the fiber between the OTU/OTPM and the OMU.

7 If you are connecting a 2:1 multiplexing OTU, repeat Step 1 through Step 6 for the second customer signal.

8 Verify that the optical fiber assigned between the OTU/OTPM output port and the OMU input port has been installed and labeled. The optical fiber should not be connected to the OMU at this time.

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9 Clean and connect the assigned optical fiber to the OTU/OTPM output port. Measure the optical power at the other end of this fiber to be connected to the OMU.

Result: The optical power shall meet the appropriate target in the table below.

OMU Input Targets (+/- 1dBm) with 32-Channel OA (LEA207 or higher) for Signal Rate = R			
OMU Insertion Loss	**R > = 1 Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
5.5 dBm (507B, 508B)	-15.5	-18.5	-21.5
8 dBm (506B, 507A, 508A)	-13	-16	-19

Reference: For 16-channel systems, refer to "16-Channel OMU Inputs" (5-64).

10 If necessary, adjust the optical power level to meet the requirement of Step 8 by selecting an LBO value and installing it at the OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for connection to the Metropolis® EON system.

11 After meeting the OMU input power requirement, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis® EON system.

12 Log into the CIT at the End Terminal and verify that the Metropolis® EON system recognizes this wavelength as In-Service (IS) by using the following command:

CONFIGURATION > Retrieve > Optical_Channel

13 Compare the relative signal power (RELSPR_C) for this channel (wavelength) to the other channels by using the following command:

PERFORMANCE> Retrieve > Relative_Signal_Power

14 The ideal goal is for the RELSPR_C for all of the channels to be the same (except for the channel that is 100). Adjust the optical power to come as close as possible to this goal by selecting an LBO value and installing the LBO at the customer's terminal equipment.

15 It is recommended that you enter an association between each OTU/ OTPM and the corresponding optical channel (OCHAN).

Reference: "Enter/Delete/Change OTPS Associations" (5-86)

16 Repeat Step 1 through Step 15 for each customer traffic wavelength connection through add OTU/OTPM units.

END OF STEPS

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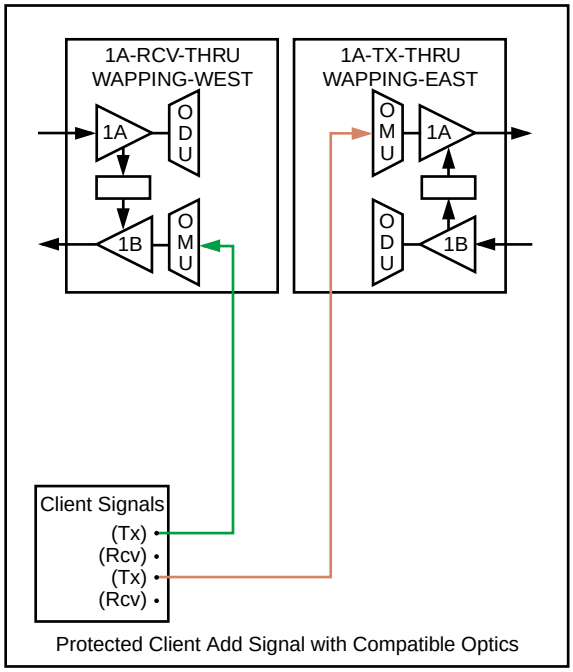
Add Protected Signals from Compatible Optics

Overview

A Metropolis® EON-compatible customer terminal transmitter operates at the Metropolis® EON wavelengths and is not required to connect through an add OTU. These customer traffic signals may be connected directly to an OMU in an End Terminal. This procedure is for adding customer signals from compatible optics equipment that do not require protection at the DWDM level.

Connection Concept

The following figure shows an example with companion NEs acting as 32-channel ring node. Your configuration may differ. The purpose of the figure is to show the connections needed. The add connections are customer terminal to OMU.



Protected Client Add Signal with Compatible Optics

nc-metro-190

Add Connection (Customer Terminal to OMU)

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

1 Verify that the transmitter at the customer's terminal equipment is compatible with the Metropolis® EON system.

Reference: "Metropolis® EON-Compatible Outputs" (5-62)

2 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the OMU at this time.

3 Clean and connect the assigned optical fiber to the transmitter output port at the customer's terminal equipment.

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4 Clean the optical fiber to be connected at the OMU. Measure the optical power in this fiber from the customer's terminal equipment.

Result: The optical power shall meet the appropriate target in the table below.

OMU Input Targets (+/- 1dBm) with 32-Channel OA (LEA207 or higher) for Signal Rate = R			
OMU Insertion Loss	**R > = 1 Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
5.5 dBm (507B, 508B)	-15.5	-18.5	-21.5
8 dBm (506B, 507A, 508A)	-13	-16	-19

Reference: For 16-channel systems, refer to "16-Channel OMU Inputs" (5-64).

5 Adjust the optical power level to meet the requirement of Step 4 by selecting an LBO value and installing it at the customer's terminal equipment. Label the customer's terminal equipment to note the change in LBO value for connection to the Metropolis® EON system.

Important! If an LBO cannot be installed at the customer's terminal equipment - or if the proper value LBO is not available, it is permissible to change the LC-type LBO at the channel input port on the OMU. Note this change to the customer and save the LBO removed from the OMU for future reuse at the OMU.

6 After meeting the OMU input power requirement, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis® EON system.

7 Log into the CIT at the End Terminal and verify that the Metropolis® EON system recognizes this wavelength as In-Service (IS) by using the following command:

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CONFIGURATION > Retrieve > Optical_Channel

8 Compare the relative signal power (RELSPR_C) for this channel (wavelength) to the other channels by using the following command:

PERFORMANCE > Retrieve > Relative_Signal_Power

9 The ideal goal is for the RELSPR_C for all of the channels to be the same (except for the channel that is 100). Adjust the optical power to come as close as possible to this goal by selecting an LBO value and installing the LBO at the customer's terminal equipment.

> **Important!** If an LBO cannot be installed at the customer's terminal equipment - or if the proper value LBO is not available, it is permissible to change the LC-type LBO at the channel input port on the OMU. Note this change to the customer and save the LBO removed from the OMU for future reuse at the OMU.

10 Repeat Step 1 through Step 9 for each direct Metropolis® EON-compatible wavelength connection.

END OF STEPS

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Add Signals Using OUPSR with Protected OTUs

Overview

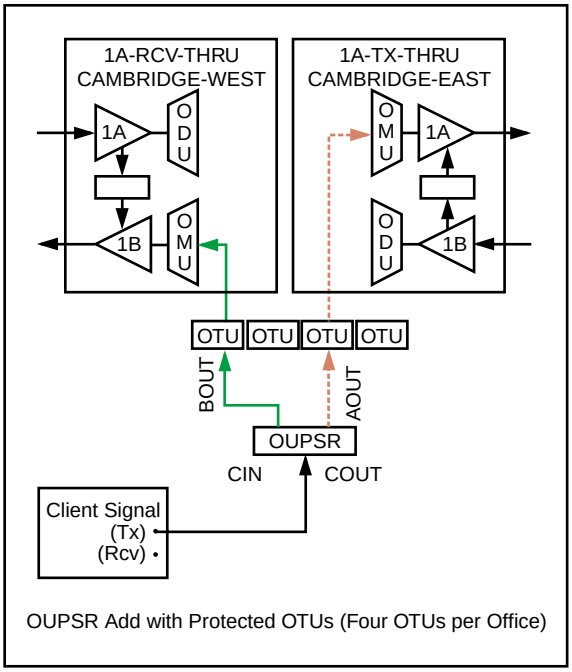
Customer signals may be routed through OUPSR units to provide path protection. At the receive end, the OUPSR switch selects and routes the best of two input signals to the customer terminal receiver. This procedure is for adding customer signals using OUPSR with protected OTUs. This option supports switching on loss of signal (LOS), signal degrade (SD), alarm indication signal (AIS), and loss of frame (LOF). It also protects against a single OTU failure for both the add and drop signals.

OUPSR location

The OUPSR has a default transmission path (A side) to carry traffic if power is lost to the shelf. The default path should be fibered to the OTU in another shelf/system. For example, the OUPSR is located in the east system and the east receiver is connected to the B path. The west OTU would continue to carry traffic if all power is lost on the east side.

Connection Concept

The following figure shows an example of OUPSR with protected OTUs. Each OTU must be in the same NE as the OMU or ODU it is connected to. The purpose of the figure is to show the connections needed. The add connections are customer terminal to OUPSR to OTU/ OTPM to OMU.



OUPSR Add with Protected OTUs (Four OTUs per Office)

nc-metro-185

Note: The OUPSR port that is labeled “SIG IN” on the circuit pack has an AID of “CIN” and the port labeled “SIG OUT” has an AID of “COUT”.

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Add Connection (Customer Terminal to OUPSR to OTU/ OTPM to OMU)

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

1 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The optical fiber should not be connected to the OUPSR at this time.

2 Clean and connect the assigned optical fiber to the transmitter output port at the customer's terminal equipment.

3 Clean the optical fiber to be connected to the SIG IN port at the OUPSR. Measure the optical power in this fiber from the customer's terminal equipment.

Result: The optical power for a single wavelength into an OUPSR shall be greater than -18 dBm.

4 If the requirement of Step 3 is met, clean and connect the optical fiber with the customer's traffic signal to the SIG IN port of the OUPSR.

5 Verify that the optical path connection between the OUPSR A OUT and B OUT ports and the associated OTU/OTPM units have been installed and labeled. These optical fibers should not be connected to the OTU/OTPM units at this time.

6 Clean and connect the assigned optical fiber to the A OUT or B OUT port of the OUPSR. Measure the optical power at the other end of this fiber to be connected to the OTU/OTPM. Compare the measurement to the table below.

Add OTU/OTPM Code	Input Power Range
41A/C/D(1-16), OC-48	-27 dBm to -11 dBm
41F(1-16), GbE	-27 dBm to -11 dBm
41H(1-32)A, OC-192	-14 dBm to -1 dBm
41M(1-32), 2DM25	See “2DM25 Inputs” (5-64).
42A(1-16)B, OC-12	-28 dBm to -11 dBm
43A(1-16)B, OC-3	-33 dBm to -11 dBm
44A(1-16), LSBB	-28 dBm to -11 dBm
44C(1-16)B, ELSBB	-28 dBm to -11 dBm
46A(1-32), OC-48	-28.6 dBm to -11 dBm
47A(1-32), UBB	-25 dBm to -11 dBm

7 Adjust the optical power level to meet the requirement of Step 6 by selecting an LBO value and installing it at the input port of the OTU/OTPM.

8 Measure the optical power level at the output of each OTU/OTPM after a valid customer traffic signal has been connected from the OUPSR.

Result: Starting with Release 8.2, every OTU/OTPM has an LBO installed on its OUT port at the factory so that its output meets the target input for a 5.5 dBm loss OMU. You may need to change the LBO if you have older equipment, a higher loss OMU, or some

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other reason. You are directed to do that in Step 9 and Step 10, rather than here, in case of additional loss through the fiber between the OTU/OTPM and the OMU.

9 Verify that the optical fiber assigned between each OTU/OTPM output and its associated OMU input has been installed and labeled. These optical fibers should not be connected to the OMUs at this time.

Important! The OMUs associated with an OUPSR are most likely located in separate End Terminals.

10 Clean and connect the assigned optical fiber to the OTU/OTPM output port. Measure the optical power at the other end of this fiber to be connected to the OMU.

Result: The optical power shall meet the appropriate target in the table below.

OMU Input Targets (+/- 1dBm) with 32-Channel OA (LEA207 or higher) for Signal Rate = R			
OMU Insertion Loss	**R > = 1 Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
5.5 dBm (507B, 508B)	-15.5	-18.5	-21.5
8 dBm (506B, 507A, 508A)	-13	-16	-19

Reference: For 16-channel systems, refer to “16-Channel OMU Inputs” (5-64).

11 Adjust the optical power level to meet the requirement of Step 10 by selecting an LBO value and installing it at the OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for connection to the Metropolis® EON system.

12 After meeting the OMU input power requirement, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis® EON system.

13 Log into the CIT at the End Terminal and verify that the Metropolis® EON system recognizes this wavelength as In-Service (IS) by using the following command:

CONFIGURATION > Retrieve > Optical_Channel

14 Compare the relative signal power (RELSPR_C) for this channel (wavelength) to the other channels by using the following command:

PERFORMANCE > Retrieve > Relative_Signal_Power

15 The ideal goal is for the RELSPR_C for all of the channels to be the same (except for the channel that is 100). Adjust the optical power to come as close as possible to this goal by selecting an LBO value and installing the LBO at the customer's terminal equipment.

16 Repeat Step 10 through Step 15 for the other OMU associated with the OUPSR.

17 To ensure proper protection switching, associations are required. For each added signal, there must be an association between the OUPSR and the add OTU and an association between the add OTU and the optical channel (OCHAN). Refer to the procedures listed below to retrieve existing associations and to enter new ones if necessary.

> **Reference:** See "Retrieve OTPS Associations" (5-92) and "Enter/ Delete/Change OTPS Associations" (5-86).

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18 Repeat Step 1 through Step 16 for each customer traffic wavelength connection to an OUPSR unit.

END OF STEPS

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Add Signals Using OUPSR with Unprotected Add OTU

Overview

Customer signals may be routed through OUPSR units to provide path protection. At the receive end, the OUPSR switch selects and routes the best of two input signals to the customer terminal receiver. This procedure is for adding customer signals using OUPSR with an unprotected add OTU. This procedure could be used with either of two OUPSR configurations:

- ***Protected drop OTUs (3 OTUs per office)***

  This option supports switching on signal degrade (SD), alarm indication signal (AIS), and loss of frame (LOF). It also protects against a single OTU failure for the drop signal but not for the add signal.

- ***Unprotected OTUs (2 OTUs per office)***

  This option is not supported when using older OAs (OAs with an LEA number lower than 200). This option does not support switching on signal degrade (SD), alarm indication signal (AIS), or loss of frame (LOF). It also does not protect against an OTU failure.

OUPSR Location - Protected Drop OTUs

The OUPSR has a default transmission path (A side) to carry traffic if power is lost to the shelf. The default path should be fibered to the OTU in another shelf/system. For example, the OUPSR is located in the east system and the east receiver is connected to the B path. The west OTU would continue to carry traffic if all power is lost on the east side.

Connection Concept - Protected Drop OTUs

The following figure shows an example of OUPSR with protected drop OTUs. The OUPSR may be placed in either NE and each OTU may be placed in either NE. The purpose of the figure is to show the connections needed. The add connections are customer terminal to OTU/OTPM to OUPSR to OMU.

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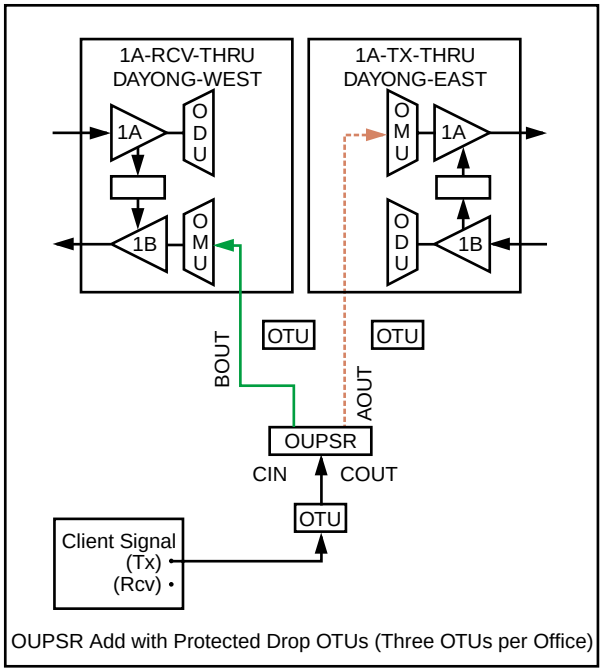

OUPSR Add with Protected Drop OTUs (Three OTUs per Office)

Note: The OUPSR port that is labeled “SIG IN” on the circuit pack has an AID of “CIN” and the port labeled “SIG OUT” has an AID of “COUT”.

OUPSR Location - Unprotected OTUs

Because the OTU is not protected, the OUPSR can be located in the same system (east or west) as the OTU, or they can be located in different systems.

Connection Concept - Unprotected OTUs

The following figure shows two examples of OUPSR with unprotected OTUs. The first example is with an ordinary OTU/OTPM and the second is with a 2:1 multiplexing OTU. The OUPSR may be placed in either NE and each OTU may be placed in either NE. The purpose of the figure is to show the connections needed. The add connections are customer terminal to OTU/OTPM to OUPSR to OMU.

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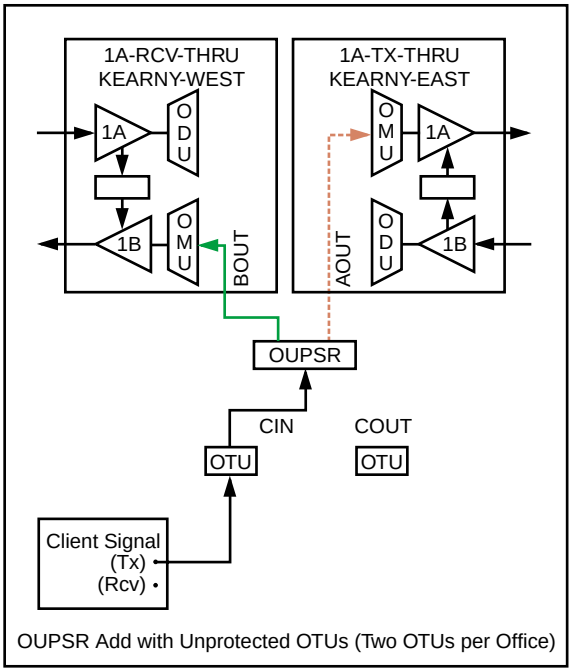
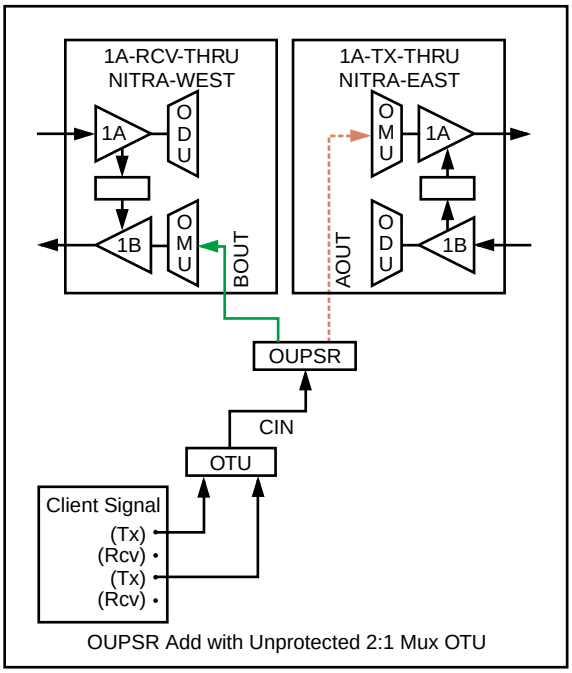


OUPSR Add with Unprotected OTUs (Two OTUs per Office)

nc-metro-187



OUPSR Add with Unprotected 2:1 Mux OTU

nc-metro-188

Note: The OUPSR port that is labeled “SIG IN” on the circuit pack has an AID of “CIN” and the port labeled “SIG OUT” has an AID of “COUT”.

Add Connection (Customer Terminal to OTU/OTPM to OUPSR to OMU)

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

1 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The optical fiber should not be connected to the OTU/OTPM at this time.

2 Clean and connect the assigned optical fiber to the transmitter output port at the customer's terminal equipment.

3 Clean the optical fiber to be connected at the OTU/OTPM. Measure the optical power in this fiber from the customer's terminal equipment. Compare the measurement to the table below.

Add OTU/OTPM Code	Input Power Range
41A/C/D(1-16), OC-48	-27 dBm to -11 dBm
41F(1-16), GbE	-27 dBm to -11 dBm
41H(1-32)A, OC-192	-14 dBm to -1 dBm

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41M(1-32), 2DM25	See “2DM25 Inputs” (5-64).
42A(1-16)B, OC-12	-28 dBm to -11 dBm
43A(1-16)B, OC-3	-33 dBm to -11 dBm
44A(1-16), LSBB	-28 dBm to -11 dBm
44C(1-16)B, ELSBB	-28 dBm to -11 dBm
46A(1-32), OC-48	-28.6 dBm to -11 dBm
47A(1-32), UBB	-25 dBm to -11 dBm

4 Adjust the optical power level to meet the requirement of Step 3 by selecting an LBO value and installing it at the input port of the OTU/OTPM.

5 Connect the fiber to the OTU/OTPM input port.

6 If you are connecting a 2:1 multiplexing OTU, repeat Step 1 through Step 5 for the second customer signal.

7 Verify that the optical path connection between the OTU/OTPM and the OUPSR SIG IN port has been installed and labeled. This optical fiber should not be connected at this time.

8 Clean and connect the assigned optical fiber to the OTU/OTPM output port. Measure the optical power at the other end of this fiber to be connected to the OUPSR.

Result: The optical power for a single wavelength into an OUPSR shall be greater than -18 dBm.

9 If the requirement of Step 8 is met, clean and connect the optical fiber with the customer’s traffic signal to the SIG IN port of the OUPSR.

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10 Verify that the optical fibers assigned between the AOUT and BOUT ports of the OUPSR and their associated OMU inputs have been installed and labeled. These optical fibers should not be connected at this time.

Important! OUPSR is usually used with two NEs acting together as a ring node, so that the OMU associated with AOUT is in one NE and the OMU associated with BOUT is in the other NE.

Important! Steps 11-16 are performed first for AOUT and then BOUT, or the reverse.

11 Clean and connect the assigned optical fiber to the AOUT/BOUT port on the OUPSR. Measure the optical power at the other end of this fiber to be connected to the associated OMU.

Result: The optical power shall meet the appropriate target in the table below.

OMU Input Targets (+/- 1dBm) with 32-Channel OA (LEA207 or higher) for Signal Rate = R			
OMU Insertion Loss	**R > = 1 Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
5.5 dBm (507B, 508B)	-15.5	-18.5	-21.5
8 dBm (506B, 507A, 508A)	-13	-16	-19

Reference: For 16-channel systems, refer to “16-Channel OMU Inputs” (5-64).

12 Adjust the optical power level to meet the requirement of Step 11 by selecting an LBO value and installing it at the AOUT/BOUT port of the OUPSR.

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13 After meeting the OMU input power requirement, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis® EON system.

14 Log into the CIT at the End Terminal and verify that the Metropolis® EON system recognizes this wavelength as In-Service (IS) by using the following command:

CONFIGURATION > Retrieve > Optical_Channel

15 Compare the relative signal power (RELSPR_C) for this channel (wavelength) to the other channels by using the following command:

PERFORMANCE > Retrieve > Relative_Signal_Power

16 The ideal is for the RELSPR_C for all of the channels to be the same (except for the channel that is 100). Adjust the LBO at AOUT/BOUT on the OUPSR to come as close as possible to this ideal.

17 Repeat Step 11 through Step 16 for the other OUPSR output port and associated OMU.

18 To ensure proper protection switching, associations are required. For each added signal, there must be an association between the add OTU and the OUPSR and an association between the OUPSR and the optical channel (OCHAN). Refer to the procedures listed below to retrieve existing associations and to enter new ones if necessary.

> **Reference:** See “Retrieve OTPS Associations” (5-92) and “Enter/ Delete/Change OTPS Associations” (5-86).

19 Repeat Step 1 through Step 16 for each customer traffic wavelength connection to an OUPSR with unprotected OTUs.

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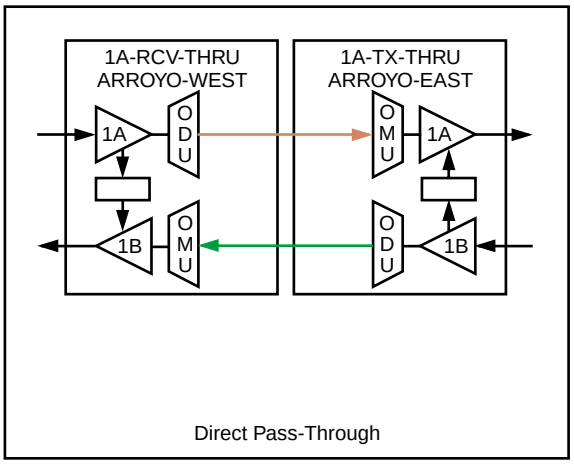
Connect Direct Pass-Through Signals

Overview

When the engineering rules allow it, a wavelength on the Metropolis® EON system may be connected directly from the ODU at one End Terminal of a Ring Terminal configuration to the OMU at the other End Terminal. This wavelength connection is referred to as a direct pass-through. This procedure is for passing signals directly from one NE to another, ODU to OMU, with no regeneration.

Connection Concept

The following figure shows an example of a direct pass-through from one companion NE to another. These NEs would most likely be connected as LAN companions or connected with telemetry feed-through. The purpose of the figure is to show the traffic connections needed.



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Connect Direct Pass-Through

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

1 Log into the CIT at the receiving End Terminal to verify that this wavelength has been added upstream and the Metropolis® EON system recognizes this wavelength as In-Service (IS) by using the following command:

CONFIGURATION > Retrieve > Optical_Channel

2 Verify that the optical path connection between the ODU in one End Terminal and the OMU in the other End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the OMU at this time.

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3 Clean and connect the assigned optical fiber to the ODU output port. Measure the optical power at the other end of this fiber to be connected to the OMU.

Result: The optical power shall meet the appropriate target in the table below.

OMU Input Targets (+/- 1dBm) with 32-Channel OA (LEA207 or higher) for Signal Rate = R			
OMU Insertion Loss	**R > = 1 Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
5.5 dBm (507B, 508B)	-15.5	-18.5	-21.5
8 dBm (506B, 507A, 508A)	-13	-16	-19

Reference: For 16-channel systems, refer to "16-Channel OMU Inputs" (5-64).

4 Adjust the optical power level to meet the requirement of Step 3 by selecting an LBO value and installing it at the ODU output port. Label the ODU output port to note the change in LBO value for connection to the Metropolis® EON system.

5 After meeting the OMU input power requirement, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis® EON system.

6 Log into the End Terminal and verify that the Metropolis® EON system recognizes this wavelength as In-Service (IS) by using the following command:

CONFIGURATION > Retrieve > Optical_Channel

7 Compare the relative signal power (RELSPR_C) for this channel (wavelength) to the other channels by using the following command:

PERFORMANCE > Retrieve > Relative_Signal_Power

8 The ideal goal is for the RELSPR_C for all of the channels to be the same (except for the channel that is 100). Adjust the optical power to come as close as possible to this goal by selecting an LBO value and installing the LBO at the designated ODU output port.

9 Repeat Step 1 through Step 8 for each customer traffic pass-through wavelength connection.

END OF STEPS

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Connect Pass-Through Signals with Regeneration

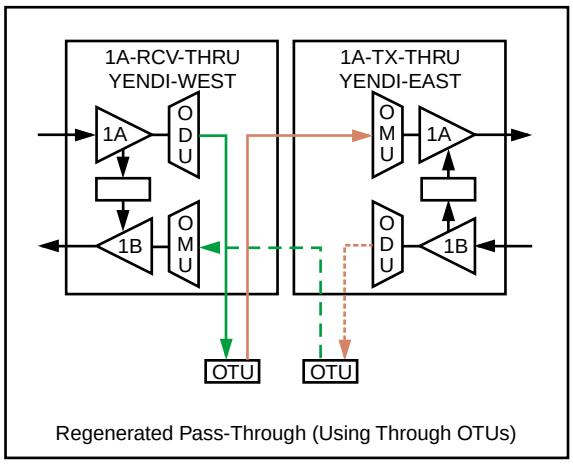
Overview

When the engineering rules allow it, a wavelength on the Metropolis® EON system may be connected directly from the ODU at one End Terminal of a Ring Terminal configuration to the OMU at the other End Terminal. This wavelength connection is referred to as a direct pass-through. When a direct pass-through is not allowed, an add or through OTU must be used.

This procedure is for passing signals from one NE to another, ODU to through OTU/OTPM to OMU, regenerating the signal between NEs. This procedure is similar to dropping and adding, except that a single OTU/OTPM receives from the ODU and transmits to the OMU.

Connection Concept

The following figure shows an example of a pass-through with regeneration from one companion NE to another. These NEs would most likely be connected as LAN companions or connected with telemetry feed-through. The purpose of the figure is to show the traffic connections needed.



Regenerated Pass-Through (Using Through OTUs)

nc-metro-191

Connect Pass-Through with Regeneration

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

1 Log into the CIT at the receiving End Terminal to verify that this wavelength has been added upstream and the Metropolis® EON system recognizes this wavelength as In-Service (IS) by using the following command:

CONFIGURATION > Retrieve > Optical_Channel

2 Verify that the optical path connection between the ODU and the through OTU/OTPM has been installed and labeled. The assigned optical fiber should not be connected at this time.

3 Clean and connect the assigned optical fiber to the ODU output port. Measure the optical power in this fiber.

Add or Through OTU/OTPM Code	Input Power Range
41H1C-41H32C, 10G	-22 dBm to -11 dBm
41A/C/D(1-16), OC-48	-27 dBm to -11 dBm

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41F(1-16), GbE	-27 dBm to -11 dBm
41H(1-32)A, OC-192	-14 dBm to -1 dBm
41M(1-32) OC-48	-28.6 dBm to -11 dBm
42A(1-16)B, OC-12	-28 dBm to -11 dBm
43A(1-16)B, OC-3	-33 dBm to -11 dBm
44A(1-16), LSBB	-28 dBm to -11 dBm
44C(1-16)B, ELSBB	-28 dBm to -11 dBm
46A(1-32), OC-48	-28.6 dBm to -11 dBm
47A(1-32), UBB	-25 dBm to -11dBm

4 Adjust the optical power level to meet the requirement of Step 3 by selecting an LBO value and installing it at the input port of the through OTU/OTPM.

5 After meeting the through OTU input power requirement, connect the fiber to the through OTU input port.

6 Verify that the optical path connection between the through OTU and the OMU has been installed and labeled. The assigned optical fiber should not be connected at this time.

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7 Clean and connect the assigned optical fiber to the through OTU output port. Measure the optical power at the other end of this fiber to be connected to the OMU.

Result: The optical power shall meet the appropriate target in the table below.

OMU Input Targets (+/- 1dBm) with 32-Channel OA (LEA207 or higher) for Signal Rate = R			
OMU Insertion Loss	**R > = 1 Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
5.5 dBm (507B, 508B)	-15.5	-18.5	-21.5
8 dBm (506B, 507A, 508A)	-13	-16	-19

Reference: For 16-channel systems, refer to “16-Channel OMU Inputs” (5-64).

8 Adjust the optical power level to meet the requirement of Step 7 by selecting an LBO value and installing it at the through OTU output port. Label the through OTU output port to note the change in LBO value for connection to the Metropolis® EON system.

9 After meeting the OMU input power requirement, clean and connect the optical fiber to the assigned port on the OMU to add the wavelength to the Metropolis® EON system.

10 Log into the End Terminal and verify that the Metropolis® EON system recognizes this wavelength as In-Service (IS) by using the following command:

CONFIGURATION > Retrieve > Optical_Channel

11 Compare the relative signal power (RELSPR_C) for this channel (wavelength) to the other channels by using the following command:

PERFORMANCE > Retrieve > Relative_Signal_Power

12 The ideal goal is for the RELSPR_C for all of the channels to be the same (except for the channel that is 100). Adjust the optical power to come as close as possible to this goal by selecting an LBO value and installing the LBO at the designated ODU output port.

13 Repeat the steps above for each customer traffic pass-through wavelength connection that requires regeneration.

END OF STEPS

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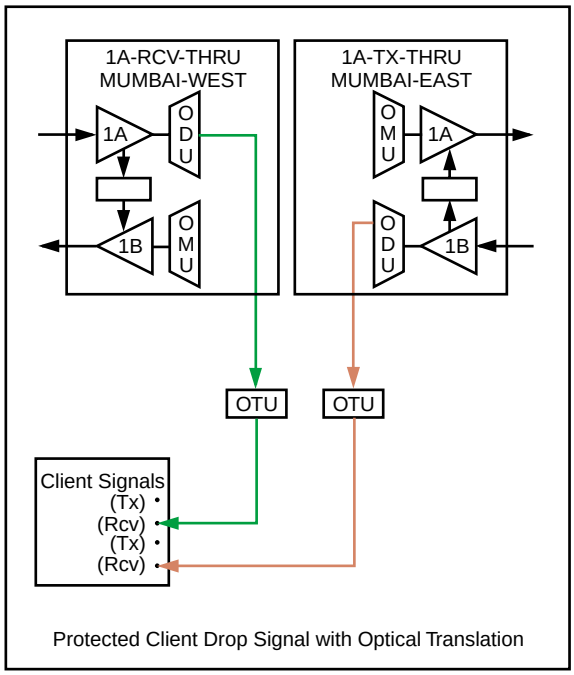
Drop Protected Signals with Optical Translation

Overview

This procedure is for dropping customer signals that do not require protection at the DWDM level, but they do need optical translation to exit DWDM.

Connection Concept

The following figures shows two examples with companion NEs acting as 32-channel ring node. The first is an example with ordinary OTU/ OTPMs and the second is an example with a 2:1 multiplexing OTU. Your configuration may differ. The purpose of the figure is to show the connections needed. The drop connections are ODU to OTU/OTPM to customer terminal.



Protected Client Drop Signal with Optical Translation

nc-metro-182

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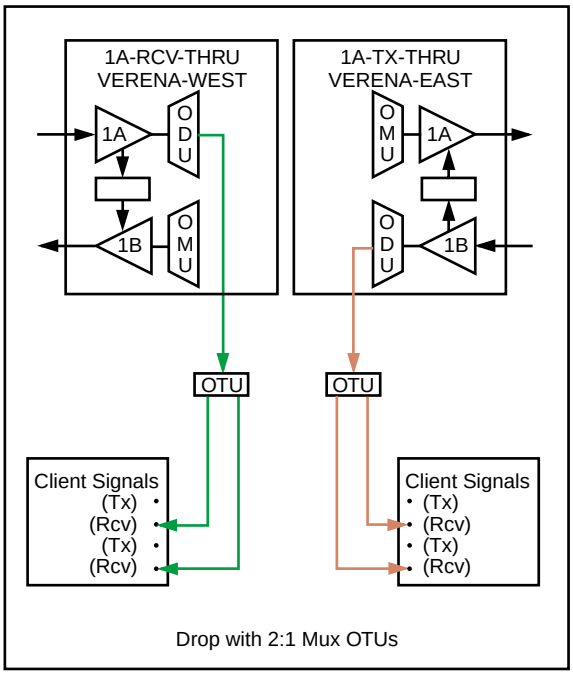

nc-metro-184

Drop Connection (ODU to OTU/OTPM to Customer Terminal)

1 Verify the input optical power specification limits of the customer's terminal equipment receiver.

2 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the drop OTU/OTPM output port or to the customer terminal receiver at this time.

3 Verify that the optical fiber between the designated drop OTU/OTPM and the ODU in the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the drop OTU/OTPM input port or to the ODU at this time.

4 Clean and connect the assigned optical fiber to the designated ODU output port at the End Terminal.

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5 Clean the assigned optical fiber to be connected to the input port of the drop OTU/OTPM. Measure the optical power in this fiber from the ODU output port.

Result: The target input range for all drop OTUs/OTPMs is -22 dBm to -13 dBm.

Reference: The ranges of input power the drop OTUs can accept are broader than the target. See “Drop OTU Inputs” (5-66).

6 Adjust the optical power level to meet the requirement of step 5 by selecting an LBO value and installing the LBO at the input port of the designated drop OTU/OTPM.

7 Connect the assigned fiber to the input port of the drop OTU/OTPM.

8 Measure the optical power level at the output of the OTU/OTPM after the customer signal from the ODU has been connected. Verify that the measured power falls within the appropriate range below.

Drop OTU/OTPM Code	Output Power Range (2-OA Span Type)
41BB (2.5G)	-2.0 dBm to +2.5 dBm
41HB (10G)	-3.0 dBm to -1.0 dBm
41G (GbE)	-2.0 dBm to +2.5 dBm
41M(1-32) (2DM25)	See “2DM25 Outputs” (5-65)
42B (OC-12/STM-4)	-2.5 dBm to +2.0 dBm
43B (OC-3/STM-1)	-7.0 dBm to 0 dBm
44B/BC (LSBB/ELSBB)	-2.5 dBm to +2.0 dBm
46B (2.5G OTPM)	-2.0 dBm to +2.5 dBm
47B (UBB)	-2.0 dBm to +2.5 dBm

9 Clean and connect the assigned optical fiber to the designated OTU/OTPM output port at the End Terminal.

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10 Clean the optical fiber to be connected at the customer's terminal receiver. Measure the optical power in this fiber from the OTU/OTPM in the End Terminal.

Reference: The optical power of a single wavelength into the customer's terminal receiver shall be within the limits verified in Step 1.

11 If necessary, adjust the optical power to meet the requirement of Step 10 by selecting an LBO value and installing the LBO at the designated OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for the Metropolis® EON system.

12 After meeting the customer's terminal receiver input power requirement, clean and connect the assigned optical fiber to the designated port on the customer's terminal receiver.

13 Verify with the customer that their terminal equipment is receiving an acceptable signal from the Metropolis® EON system.

14 If you are dropping through a 2:1 multiplexing OTU, repeat Step 12 through Step 13 for the second customer signal.

15 It is recommended that you enter an association between each OTU/OTPM and the corresponding optical channel (OCHAN).

Reference: "Enter/Delete/Change OTPS Associations" (5-86)

16 Repeat Step 1 through Step 14 for each OTU/OTPM drop wavelength connection.

END OF STEPS

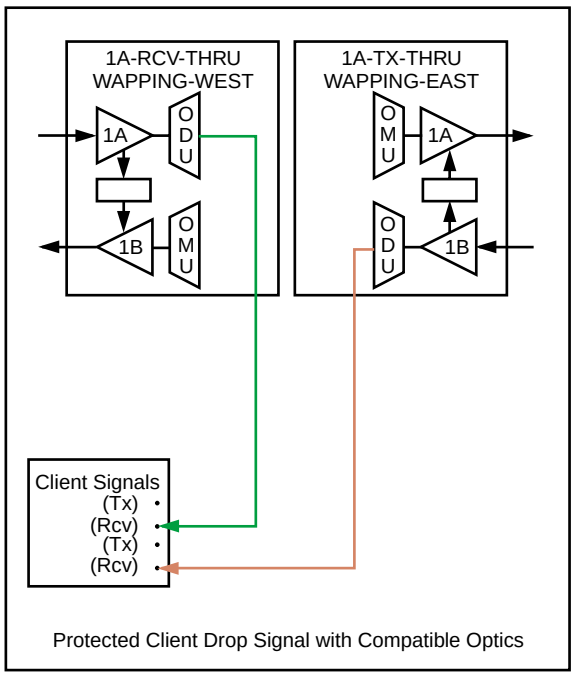
Drop Protected Signals with Compatible Optics

Overview

This procedure is for dropping customer signals to compatible optics equipment that do not require protection at the DWDM level.

Connection Concept

The following figure shows an example with companion NEs acting as 32-channel ring node. Your configuration may differ. The purpose of the figure is to show the connections needed. The add connections are customer terminal to OMU.



nc-metro-183

Drop Connection (ODU to Customer Terminal)

1 Verify that the receiver at the customer's terminal equipment is compatible with the Metropolis® EON system and verify the input optical power specification limits of the receiver, as provided by the customer.

2 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The

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assigned optical fiber should not be connected to the ODU or to the customer terminal receiver at this time.

3 Clean and connect the assigned optical fiber to the designated ODU output port at the End Terminal.

4 Clean the optical fiber to be connected at the customer's terminal receiver. Measure the optical power in this fiber from the ODU in the End Terminal.

> **Reference:** The optical power of a single wavelength into the customer's terminal receiver shall be within the limits verified in Step 1.

5 If necessary, adjust the optical power to meet the requirement of Step 4 by selecting an LBO value and installing the LBO at the designated ODU output port. Label the ODU output port to note the change in LBO value for the Metropolis® EON system.

6 After meeting the customer's terminal receiver input power requirement, clean and connect the assigned optical fiber to the designated port on the customer's terminal receiver.

7 Verify with the customer that their terminal equipment is receiving an acceptable signal from the Metropolis® EON system.

8 Repeat Step 1 through Step 7 for each Metropolis® EON-compatible wavelength connection.

END OF STEPS

Drop Signals Using OUPSR with Protected Drop OTUs

Overview

Customer signals may be routed through OUPSR units to provide path protection. At the receive end, the OUPSR switch selects and routes the best of two input signals to the customer terminal receiver. This procedure is for dropping customer signals using OUPSR with a protected drop OTU. This procedure could be used with either of two OUPSR configurations:.

- ***Protected OTUs (4 OTUs per office)***

  This option supports switching on signal degrade (SD), alarm indication signal (AIS), and loss of frame (LOF). It also protects against a single OTU failure for both the add and drop signals.

- ***Protected drop OTUs (3 OTUs per office)***

  This option supports switching on signal degrade (SD), alarm indication signal (AIS), and loss of frame (LOF). It also protects against a single OTU failure for the drop signal but not for the add signal.

OUPSR Location

The OUPSR has a default transmission path (A side) to carry traffic if power is lost to the shelf. The default path should be fibered to the OTU in another shelf/system. For example, the OUPSR is located in the east system and the east receiver is connected to the B path. The west OTU would continue to carry traffic if all power is lost on the east side.

Connection Concept

The following figure shows an example of OUPSR with protected OTUs. The OUPSR may be placed in either NE. Each OTU must be in the same NE as the OMU or ODU it is connected to. The purpose of the figure is to show the connections needed. The add connections are customer terminal to OUPSR to OTU/OTPM to OMU.

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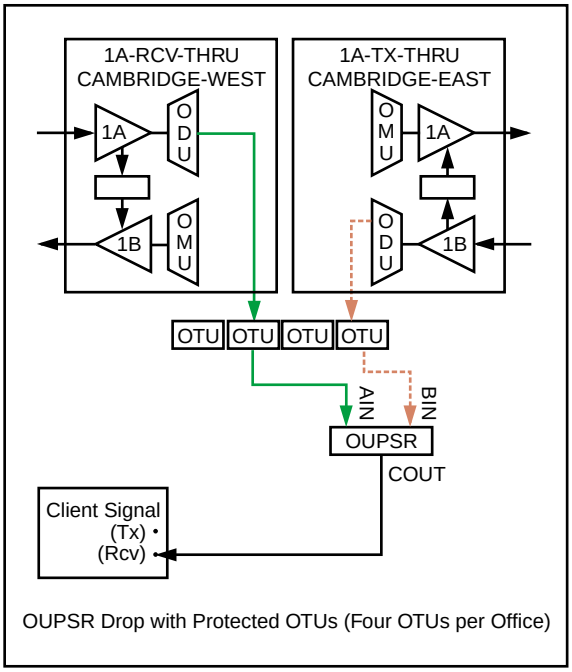
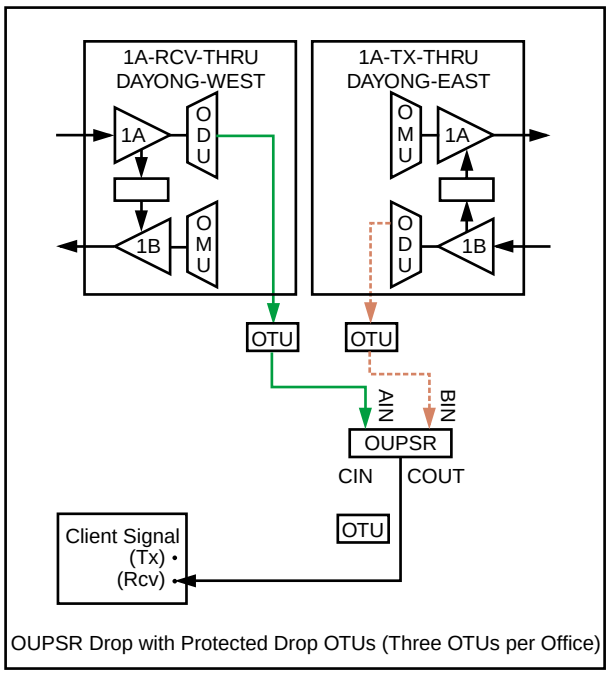


OUPSR Drop with Protected OTUs (Four OTUs per Office)

nc-metro-178



OUPSR Drop with Protected Drop OTUs (Three OTUs per Office)

nc-metro-179

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Drop Connection (OUPSR to OTU/OTPM to Customer Terminal)

1 Verify the input optical power specification limits of the customer's terminal equipment receiver.

2 Verify that the optical path connection between the customer's terminal equipment and the End Terminal has been installed and labeled. The assigned optical fiber should not be connected to the OUPSR SIG OUT port or to the customer terminal receiver at this time.

3 Verify that the optical fibers between both of the designated drop OTUs/OTPMs and the ODUs in the End Terminals have been installed and labeled. The assigned optical fibers should not be connected to the drop input port of the OTUs/OTPMs or to the ODUs at this time.

Important! Perform Step 4 through Step 10 first for the A IN path and then the B IN path.

4 Clean and connect the assigned optical fiber to the designated ODU output port at the End Terminal that is associated with the OUPSR A IN or B IN optical path.

5 Clean the assigned optical fiber to be connected to the input port of the drop OTU/OTPM. Measure the optical power in this fiber from the ODU output port to determine whether it falls within the appropriate range below.

Result: The target input range for all drop OTUs/OTPMs is -22 dBm to -13 dBm.

Reference: The ranges of input power the drop OTUs can accept are broader than the target. See "Drop OTU Inputs" (5-66).

6 Adjust the optical power level to meet the requirement of Step 5 by selecting an LBO value and installing the LBO at the input port of the designated drop OTU/OTPM.

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7 Connect the assigned fiber from the ODU to the drop OTU/OTPM.

8 Measure the optical power level at the output of the OTU/OTPM after the customer signal from the ODU has been connected. Verify that the measured power falls within the appropriate range below.

Drop OTU/OTPM Code	Output Power Range (2-OA Span Type)
41BB (2.5G)	-2.0 dBm to +2.5 dBm
41HB (10G)	-3.0 dBm to -1.0 dBm
41G (GbE)	-2.0 dBm to +2.5 dBm
41M(1-32) (2DM25)	See “2DM25 Outputs” (5-65)
42B (OC-12/STM-4)	-2.5 dBm to +2.0 dBm
43B (OC-3/STM-1)	-7.0 dBm to 0 dBm
44B/BC (LSBB/ELSBB)	-2.5 dBm to +2.0 dBm
46B (2.5G OTPM)	-2.0 dBm to +2.5 dBm
47B (UBB)	-2.0 dBm to +2.5 dBm

9 Clean and connect the assigned optical fiber between the designated OTU/OTPM output port and the OUPSR A IN or B IN port. (Note that the OUPSR may be located in the other End Terminal.)

10 Measure and record the optical power from the OUPSR SIG OUT port.

Reference: The optical power at SIG OUT should be within 1 dB of the input optical power measured in Step 8.

11 Remove the optical fiber connection from the A IN port. Repeat Step 4 through Step 10 for the B IN optical fiber connections.

12 Clean and reconnect the optical fiber to the A IN port on the OUPSR so that both the A IN and B IN optical fibers are connected.

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13 Monitor the optical power at the OUPSR SIG OUT port. Remove the optical fiber from the B IN port. Observe that the optical power is at the same level as previously measured with only the A IN optical fiber connected. Reconnect the optical fiber to the B IN port. Remove the optical fiber from the A IN port. Observe that the optical power is a the some level as previously measured with only the B IN optical fiber connected. Reconnect the optical fiber to the A IN port.

14 Clean and connect the assigned optical fiber to the designated OUPSR SIG OUT port at the End Terminal.

15 Clean the optical fiber to be connected at the customer's terminal receiver. Measure the optical power in this fiber from the OTU/OTPM in the End Terminal.

Reference: The optical power of a single wavelength into the customer's terminal receiver shall be within the limits verified in Step 1.

16 If necessary, adjust the optical power to meet the requirement of Step 10 by selecting LBO values and installing the LBOs at the designated OTU/OTPM output port. Label the OTU/OTPM output port to note the change in LBO value for the Metropolis® EON system.

Important! The optical power from both OTU/OTPM inputs to the OUPSR must be adjusted. Remove the optical fiber from the B IN port when adjusting the optical power in the A IN path; and remove the optical fiber from the A IN port when adjusting the optical power in the B IN path.

17 After meeting the customer's terminal receiver input power requirement, clean and connect the assigned optical fiber to the designated port on the customer's terminal receiver.

18 Verify with the customer that their terminal equipment is receiving an acceptable signal from the Metropolis® EON system.

19 To ensure proper protection switching, associations are required. For each dropped signal, there must be an association between the optical channel (OCHAN) and the drop OTU and an association between the drop OTU and the OUPSR. Refer to the procedures listed below to retrieve existing associations and to enter new ones if necessary.

Reference: See “Retrieve OTPS Associations” (5-92) and “Enter/ Delete/Change OTPS Associations” (5-86).

20 Repeat Step 1 through Step 18 for each OUPSR drop wavelength connection with protected drop OTUs.

END OF STEPS

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Drop Signals Using OUPSR with Unprotected OTUs

Overview

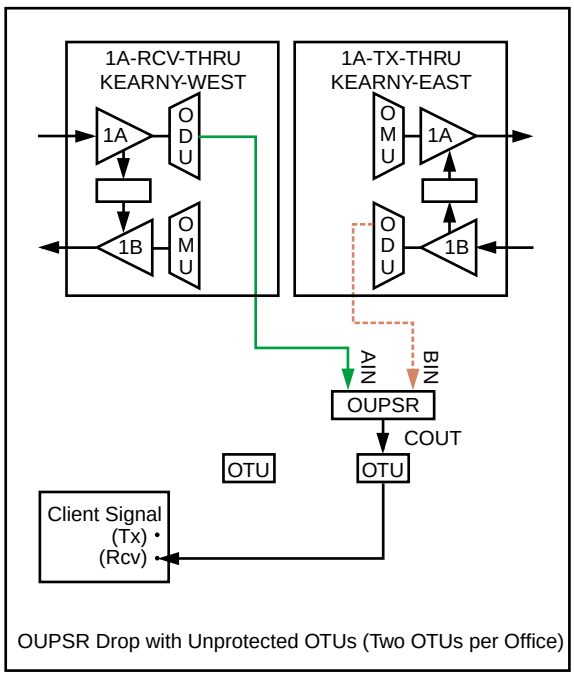
Customer signals may be routed through OUPSR units to provide path protection. At the receive end, the OUPSR switch selects and routes the best of two input signals to the customer terminal receiver. This procedure is for dropping customer signals using OUPSR with an unprotected drop OTU. Since it is assumed that customers will not want to protect the add OTU without protecting the drop OTU, this translates to “unprotected OTUs”. This procedure could be used with an ordinary OTU/OTPM or a multiplexing OTU.

OUPSR Location

Because the OTU is not protected, the OUPSR can be located in the same system (east or west) as the OTU, or they can be located in different systems.

Connection Concept

The following figure shows two examples of OUPSR with unprotected OTUs. The first configuration uses an ordinary OTU/OTPM and the second uses a 2:1 multiplexing OTU. The OUPSR and OTUs may be placed in either NE. The purpose of the figures is to show the connections needed. The drop connections are ODU to OUPSR to OTU/OTPM to customer terminal.



OUPSR Drop with Unprotected OTUs (Two OTUs per Office)

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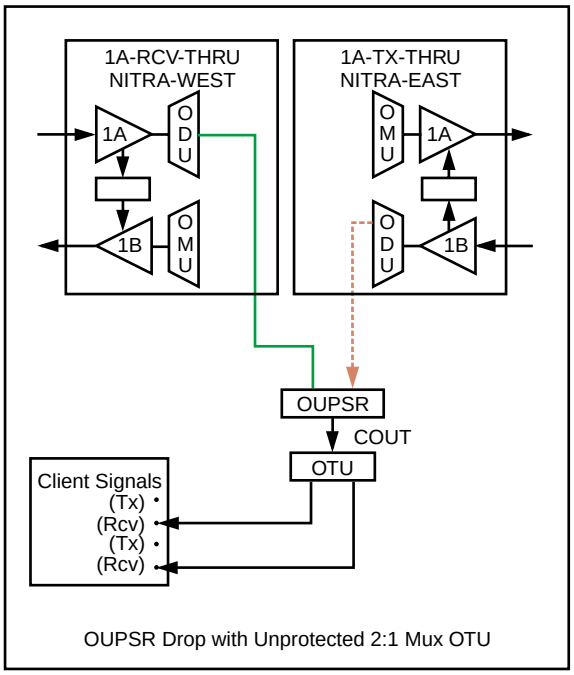

OUPSR Drop with Unprotected 2:1 Mux OTU

nc-metro-181

Drop Connection (ODU to OUPSR to OTU/OTPM to Customer Terminal)

1 Verify the input optical power specification limits of the customer's terminal equipment receiver.

2 Verify that the optical path connection between the customer's terminal equipment and the OTU/OTPM has been installed and labeled. The assigned optical fiber should not be connected to the OTU/OTPM output port or to the customer terminal receiver at this time.

3 Verify that the optical fibers between both the A IN and B IN ports of the OUPSR their associated ODUs in the End Terminals have been installed and labeled. The assigned optical fibers should not be connected to the OUPSR or to the ODUs at this time.

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4 Clean and connect the assigned optical fiber to the designated ODU output port at the End Terminal that is associated with the OUPSR A IN optical path.

5 Clean the assigned optical fiber to be connected to the A IN port of the OUPSR. Measure the optical power in this fiber from the ODU port to determine whether it falls within the range below.

Reference: The optical power for a single wavelength into an OUPSR shall be greater than -18 dBm.

6 Adjust the optical power level to meet the requirement of Step 5 by selecting an LBO value and installing the LBO at the output port of the ODU.

7 After meeting the OUPSR input power requirement, clean and connect the fiber from the ODU to the A IN port of the OUPSR.

8 Measure the optical power from the OUPSR SIG OUT port to determine whether it falls within the appropriate range below.

Result: The target input range for all drop OTUs/OTPMs is -22 dBm to -13 dBm.

Reference: The ranges of input power the drop OTUs can accept are broader than the target. See “Drop OTU Inputs” (5-66).

9 Adjust the optical power level to meet the requirement of Step 8 by selecting an LBO value and installing the LBO at the output port of the ODU associated with the A IN path.

10 Measure the output of the drop OTU/OTPM to verify that the requirements of Step 1 are met and record this measurement so that it can be compared with the output when the B IN fiber is supplying the signal.

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11 Compare the relative signal power (RELSPR_C) for this channel (wavelength) to the other channels by using the following command:

PERFORMANCE> Retrieve > Relative_Signal_Power

12 The ideal goal is for the RELSPR_C for all of the channels to be the same (except for the channel that is 100). Adjust the optical power to come as close as possible to this goal by selecting an LBO value and installing the LBO at the customer's terminal equipment.

13 Disconnect the fiber from the A IN port of the OUPSR and place a protective cover on the end.

14 Clean the assigned optical fiber to be connected to the B IN port of the OUPSR. Measure the optical power in this fiber from the ODU port to determine whether it falls within the range below.

> **Reference:** The optical power for a single wavelength into an OUPSR shall be greater than -18 dBm.

15 Adjust the optical power level to meet the requirement of Step 14 by selecting an LBO value and installing the LBO at the output port of the ODU.

16 After meeting the OUPSR input power requirement, clean and connect the fiber from the ODU to the B IN port of the OUPSR.

17 Measure the optical power from the OUPSR SIG OUT port to determine whether it matches the output that you measured in Step 10 when you connected the A IN fiber.

18 Adjust the optical power level to match the measurement from Step 10 by selecting an LBO value and installing the LBO at the output port of the ODU associated with the B IN path.

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19 Perform a manual OUPSR switch to path A by using the following command:

FAULT.Operate.Protection_Switch.OUPSR

20 Compare the relative signal power (RELSPR_C) for this channel (wavelength) to the other channels by using the following command:

PERFORMANCE> Retrieve > Relative_Signal_Power

21 The ideal goal is for the RELSPR_C for all of the channels to be the same (except for the channel that is 100). Adjust the optical power to come as close as possible to this goal by selecting an LBO value and installing the LBO at the customer's terminal equipment.

22 Perform a manual OUPSR switch to path B by using the following command:

FAULT.Operate.Protection_Switch.OUPSR

23 Repeat the process of checking relative signal power and adjusting, as in Step 20 and Step 21.

24 Release the protection switch by using the following command:

FAULT.Release.Protection_Switch.OUPSR

25 Clean and connect the assigned optical fiber between the drop OTU/ OTPM and the customer terminal.

26 Verify with the customer that their terminal equipment is receiving an acceptable signal from the Metropolis® EON system.

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27 To ensure proper protection switching, associations are required. For each dropped signal, there must be an association between the optical channel (OCHAN) and the OUPSR and an association between the OUPSR and the drop OTU. Refer to the procedures listed below to retrieve existing associations and to enter new ones if necessary.

Reference: See “Retrieve OTPS Associations” (5-92) and “Enter/ Delete/Change OTPS Associations” (5-86).

28 Repeat Step 1 through Step for each OUPSR drop wavelength connection with unprotected OTUs.

END OF STEPS

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Delete OCHAN( ) from an In-Service Metropolis® EON

Overview

This task provides a list of actions required to delete an optical channel from an in-service Metropolis® EON. The optical fiber jumpers are removed first for the channel being deleted, then all network elements are updated and initialized.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)
- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)
- "Login/Logout to a Network Element Using CenterLink" (3-22)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)
- "DLP-512: Install/Remove Lightguide Buildout" (9-44)

Required test equipment

The following test equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap
- Optical power set or equivalent

Task

CAUTION

Eye Damage

Unterminated optical connectors may emit invisible laser radiation. Eye damage may occur if the beam is viewed

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directly or with improper optical instruments. Avoid direct exposure to beam.

CAUTION

Electrostatic Discharge

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

CAUTION

Signal Loss

Use care in locating the optical line and assigned ports to avoid possible service interruption.

CAUTION

Signal Degrade

DO NOT DELETE more than one channel at a time. When more than one optical channel is deleted simultaneously, degradation of the other in-service channels is likely to occur.

1 Obtain the circuit order instructions to delete an optical channel and note the associated optical line and assigned channels. The channel is assumed to be bidirectional.

2 If applicable, open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

3 Locate the specific channel to be deleted at the OMU and ODU (optical fiber pair).

> **Reference:** "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

4 Connect the CIT and log in.

> **Reference:** "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

5 At the CIT, select the command **FAULT.Retrieve.Alarm.Network** to obtain a report.

6 Are there any alarm or status conditions other than for the channel being deleted listed in the report?

If	Then
NO	continue with Step 7.
YES	refer to *Alarm Messages and Trouble Clearing Guide, 363-365-560*.

7 Disconnect the incoming optical fiber to the OMU OCHAN( ) IN connector for the channel being deleted from service on the optical line(s) specified in the circuit order instructions.

8 Place protector caps over the end of the incoming optical fiber and over the OMU OCHAN( ) IN connector.

9 Disconnect the outgoing optical fiber from the ODU OCHAN( ) OUT connector for the channel being deleted from service on the optical line(s) specified in the circuit order instructions.

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10 Place protector caps over the end of the outgoing optical fiber and over the ODU OCHAN( ) OUT connector.

Important! At The (Far End) End Terminal

You may travel to the other end terminal or obtain assistance at that terminal.

11 Repeat Step 1 through Step 10 at the other end terminal (far end).

12 At the CIT, select the command **CONFIGURATION.Update.System** and execute to update the equipment database.

13 At the CIT, select the command **PERFORMANCE.Initialize.Register.Optical_Line** and execute to baseline certain optical parameters on the optical line.

14 Verify that the slot address indicates that the OCHAN( ) was not inadvertently left in the OOS state (use the command **FAULT.Retrieve.State**).

Important! Step 12 through Step 14 must be performed at both end terminals.

15 Repeat Step 12 through Step 14 at the far end (end terminal).

16 Does the optical line carrying the deleted channel have any repeaters?

If	Then
YES	continue with Step 17.
NO	continue with Step 22.

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17 Initiate a login to the repeater.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

18 At the CIT, select the command **CONFIGURATION.Update.System** and execute to update the equipment database.

19 At the CIT, select the command **PERFORMANCE.Initialize.Register.Optical_Line** and execute to baseline certain optical parameters on the optical line.

20 Terminate the login session with the repeater.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

21 Repeat Step 17 through Step 20 for any remaining repeaters in the Metropolis® EON.

22 At the CIT, select the command **FAULT.Retrieve.Alarm.Network** to obtain a report.

23 From the report, verify that there are no system alarms.

24 Close the cabinet doors or install the shelf cover.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

25 Retrieve and record all associations for the optical channel you just deleted.

Reference: "Retrieve OTPS Associations" (5-92)

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26 Delete all associations found in the previous step.

Reference: "Enter/Delete/Change OTPS Associations" (5-86)

END OF STEPS

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Reference

0-OA End Terminal - Add Traffic Connections

A Metropolis® EON End Terminal configured for 0-OA operation will not be equipped with a transmitting optical amplifier. The output from the required 507B OMU will be connected through the Line Transmit Unit directly to the outside plant path. LBO attenuation will be removed from OTU/OTPM outputs to allow the available optical power to be connected through the OMU to the optical line.

Follow the procedures for adding customer traffic signals for Metropolis® EON-compatible direct connections, OTU/OTPM connections or OUPSR connections - with the exception that the target optical power levels into the 507B OMU are:

- -4 dBm for OC-48 (STM-16) and 1 Gb Ethernet signals
- -7 dBm for OC-12 and LSBB signals
- -10 dBm for OC-3 signals

Metropolis® EON-Compatible Outputs

The following two tables list high speed and low speed Metropolis® EON-compatible output levels

OC-48/STM-16/1-Gb Ethernet Transmitter and OTU Output Levels

FT-2000 ADR Transmitters	FT-2000 LCT Transmitters	41-Type or 46-Type OTU	Output Connector Power Level
739E1/739G1	739D1/739F1	Wavelength 1	-5.0 to -3.0 dBm
739E2/739G2	739D2/739F2	Wavelength 2	-6.3 to -4.3 dBm
739E3/739G3	739D3/739F3	Wavelength 3	-7.5 to -5.5 dBm
739E4/739G4	739D4/739F4	Wavelength 4	-8.2 to -6.2 dBm
739E5/739G5	739D5/739F5	Wavelength 5	-8.7 to -6.7 dBm
739E6/739G6	739D6/739F6	Wavelength 6	-9.2 to -7.2 dBm
739E7/739G7	739D7/739F7	Wavelength 7	-9.0 to -7.0 dBm
739E8/739G8	739D8/739F8	Wavelength 8	-7.5 to -5.5 dBm
739E9/739G9	739D9/739F9	Wavelength 9	-1.0 to -3.0 dBm
739E10/739G10	739D10/739F10	Wavelength 10	-3.6 to -5.6 dBm

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FT-2000 ADR Transmitters	FT-2000 LCT Transmitters	41-Type or 46-Type OTU	Output Connector Power Level
739E11/739G11	739D11/739F11	Wavelength 11	-4.8 to -6.8 dBm
739E12/739G12	739D12/739F12	Wavelength 12	-5.8 to -7.8 dBm
739E13/739G13	739D13/739F13	Wavelength 13	-6.4 to -8.4 dBm
739E14/739G14	739D41/739F14	Wavelength 14	-6.9 to -8.9 dBm
739E15/739G15	739D15/739F15	Wavelength 15	-7.1 to -9.1 dBm
739E16/739G16	739D16/739F16	Wavelength 16	-6.2 to -8.2 dBm

Low Speed OTPM Output Levels

Tx Channel	Output Connector Power Levels		
	42-Type OTU	43-Type OTU	44-Type OTU
Wavelength 1	-8.0 to -6.0 dBm	-11.0 to -9.0 dBm	-8.0 to -6.0 dBm
Wavelength 2	-9.3 to -7.3 dBm	-12.3 to -10.3 dBm	-9.3 to -7.3 dBm
Wavelength 3	-10.5 to -8.5 dBm	-13.5 to -11.5 dBm	-10.5 to -8.5 dBm
Wavelength 4	-11.2 to -9.2 dBm	-14.2 to -12.2 dBm	-11.2 to -9.2 dBm
Wavelength 5	-11.7 to -9.7 dBm	-14.7 to -12.7 dBm	-11.7 to -9.7 dBm
Wavelength 6	-12.2 to -10.2 dBm	-15.2 to -13.2 dBm	-12.2 to -10.2 dBm
Wavelength 7	-12.0 to -10.0 dBm	-15.0 to -13.0dBm	-12.0 to -10.0 dBm
Wavelength 8	-10.5 to -8.5 dBm	-13.5 to -11.5 dBm	-10.5 to -8.5 dBm
Wavelength 9	-6.0 to -4.0 dBm	-9.0 to -7.0 dBm	-6.0 to -4.0 dBm
Wavelength 10	-8.6 to -6.6 dBm	-11.6 to -9.6 dBm	-8.6 to -6.6 dBm
Wavelength 11	-9.8 to -7.8 dBm	-12.8 to -10.8 dBm	-9.8 to -7.8 dBm
Wavelength 12	-10.8 to -8.8 dBm	-13.8 to -11.8 dBm	-10.8 to -8.8 dBm
Wavelength 13	-11.4 to -9.4 dBm	-14.4 to -12.4 dBm	-11.4 to -9.4 dBm
Wavelength 14	-11.9 to -9.9 dBm	-14.9 to -12.9 dBm	-11.9 to -9.9 dBm
Wavelength 15	-12.1 to -10.1 dBm	-15.1 to -13.1 dBm	-12.1 to -10.1 dBm
Wavelength 16	-11.2 to -9.2 dBm	-14.2 to -12.2 dBm	-11.2 to -9.2 dBm

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16-Channel OMU Inputs

If the network element has a 16-channel OA (model number below LEA207), then you should use the targets in the table below. (This assumes you will be using an 506A OMU, with insertion loss of 14 dBm. If you are using a 506B subtract 6 dBm from the target in the table.)

Table 5-1 16-Channel OMU Input Targets

OMU Input Targets (±1.0 dBm) with 32-Channel OA, for Signal Rate = R				
Channel	**Wavelength (nm)**	**R >= 1Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
1	1549.32	-4.0	-7.0	-10.0
2	1550.92	-5.3	-8.3	-11.3
3	1552.52	-6.5	-9.5	-12.5
4	1554.13	-7.2	-10.2	-13.2
5	1555.75	-7.7	-10.7	-13.7
6	1557.37	-8.2	-11.2	-14.2
7	1558.98	-8.0	-11.0	-14.0
8	1560.61	-6.5	-9.5	-12.5
9	1548.52	-2.0	-5.0	-8.0
10	1550.12	-4.6	-7.6	-10.6
11	1551.72	-5.8	-8.8	-11.8
12	1553.33	-6.8	-9.8	-12.8
13	1554.94	-7.4	-10.4	-13.4
14	1556.56	-7.9	-10.9	-13.9
15	1558.17	-8.1	-11.1	-14.1
16	1559.79	-7.2	-10.2	-13.2

2DM25 Inputs

2DM25 Input Signal Type	Input Target Range
GbE 1310nm SM	-20 to -3
GbE 850nm MM	-17 to 0
FICON 1310nm SM	-25 to -3
FICON 850nm MM	-13 to +1.3
Fibre Channel 1310nm SM	-25 to -3
Fibre Channel 850nm MM	-13 to +1.3
ESCON 1310nm SM	-29 to -14.5
ESCON 1310nm MM	-28 to -3

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2DM25 Input Signal Type	Input Target Range
ISC-2 1310nm SM	-20 to -3
ISC-2 850nm MM	-15 to +1.3

2DM25 Outputs

2DM25 Output Signal Type	Output Range
GbE 1310nm SM	-11.5 to -3
GbE 850nm MM	-9.5 to 0
FICON 1310nm SM	-9 to -3
FICON 850nm MM	-7 to +1.3
Fibre Channel 1310nm SM	-9 to -3
Fibre Channel 850nm MM	-7 to +1.3
ESCON 1310nm SM	-8 to -4
ESCON 1310nm MM	-20.5 to -15
ISC-2 1310nm SM	-11 to -3
ISC-2 850nm MM	-5 to +1.3

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Drop OTU Inputs

Bit Rate	Pack Code	Receive Power Range		Target Power Range	
		Min.	Max.	Min.	Max.
10G	41HB	-27	-10	-22	-13
2.5G	46B	-28.6	-10	-22	-13
	41BB	-27	-10	-22	-13
OC-12/STM-4	42B	-30.5	-8	-22	-13
OC-3/STM-1	43B	-34	-7	-22	-13
LSBB/ELSBB	44B/44BC	-30.5	-8	-22	-13
GbE	41G	-27	-10	-22	-13
UBB	47B	-28.6	-10	-22	-13
2DM25 (HS IN)	41M(1-32)	-28.6	-10	-22	-13

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Optical Translator Installation and Deletion

Overview

Purpose This section provides instructions for adding and deleting units related to optical translation: optical translator units (OTUs), optical translator port modules (OTPMs), and quad OTPM carriers (QOTUs).

Contents This part of the chapter contains the following tasks.

Add Optical Translator Port Module (OTPM) for Service	5 - 68
Add Quad Optical Translator Unit (QOTU) for Service	5 - 72
Add Optical Translator Unit (OTU) for Service	5 - 70
Delete Optical Translator Unit (OTU) or Optical Translator Port Module (OTPM) from Service	5 - 74
Delete Quad Optical Translator Unit (QOTU) from Service	5 - 77
Install or Remove an SFP Module	5 - 80

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Add Optical Translator Port Module (OTPM) for Service

Purpose

This task adds an optical translator port module (OTPM) to an in-service quad optical translator unit (QOTU) and may require action at a Metropolis® EON end terminal in determining the lightguide buildout values.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)
- "DLP-514: Install/Remove Circuit Pack" (9-50)

Required equipment

The following equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap
- Optical power set or equivalent

CAUTION

Electrostatic Discharge

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

Task

The following task adds an OTPM to an in-service QOTU.

1 Obtain the circuit order instructions to add an OTPM.

2 Open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

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3 Locate the assigned QOTU and port number (of the OTPM being added.)

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

4 Install the OTPM circuit pack (includes LBOs and connecting fibers) into the assigned port of the QOTU.

Reference: "DLP-514: Install/Remove Circuit Pack" (9-50)

5 Is the OTPM FAULT LED indicator lighted continuously?

If	Then
YES	refer to TAP-148 in the *Alarm Messages and Trouble Clearing Guide, 365-575-562.*
NO	continue with Step 6.

6 As required, close the cabinet doors or install the shelf cover.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

7 The OTPM circuit pack is now ready for service.

END OF STEPS

Add Optical Translator Unit (OTU) for Service

Overview

This task adds an optical translator unit (OTU) to an in-service Optical Translator (OT) and may require action at a Metropolis® EON end terminal in determining the lightguide buildout values.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)
- "DLP-514: Install/Remove Circuit Pack" (9-50)

Required equipment

The following equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap

Task

CAUTION

Electrostatic Discharge

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

1 Obtain the circuit order instructions to add an OTU circuit pack

2 Open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

3 Locate the assigned slot of the OTU circuit pack being added.

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

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4 Install an OTU circuit pack (includes LBOs and connecting fibers) into the assigned slot.

Reference: "DLP-514: Install/Remove Circuit Pack" (9-50)

5 Is the OTU FAULT LED indicator lighted continuously?

If	Then
YES	refer to *Alarm Messages and Trouble Clearing Guide, 365-575-562*.
NO	continue with Step 6

6 As required, repeat Step 3 through Step 5 for the other direction of transmission.

7 Close the cabinet doors or install the shelf cover, as required.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

8 The optical translator unit is now ready for service.

END OF STEPS

□

Add Quad Optical Translator Unit (QOTU) for Service

Purpose

This task adds a quad optical translator unit (QOTU) to an in-service Optical Translator (OT).

Supporting tasks

This task refers to the following supporting tasks.

- "Add Optical Translator Port Module (OTPM) for Service" (5-68)
- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)
- "DLP-514: Install/Remove Circuit Pack" (9-50)

Required equipment

The following equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap

CAUTION

Electrostatic Discharge

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

1 Obtain the circuit order instructions to add a QOTU.

2 Open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

3 Locate the assigned slots (pair) of the QOTU being added.

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

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4 Install the QOTU into the assigned slot pair.

Important! The QOTU must be installed so that it accesses the even-numbered connector on the shelf (OT slot pair).

Reference: "DLP-514: Install/Remove Circuit Pack" (9-50)

5 Is the QOTU FAULT LED indicator lighted continuously?

If	Then
YES	refer to *Alarm Messages and Trouble Clearing Guide, 365-575-562.*
NO	continue with Step 6.

6 Is the QOTU to be equipped with an OTPM at this time.

If	Then
YES	go to "Add Optical Translator Port Module (OTPM) for Service" (5-68)
NO	continue with Step 7

7 As required, close the cabinet doors or install the shelf cover.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

8 The QOTU is now ready for service.

END OF STEPS

Delete Optical Translator Unit (OTU) or Optical Translator Port Module (OTPM) from Service

Overview

This procedure removes an optical translator unit (OTU) or optical translator port module (OTPM) from an Optical Translator (OT) that is in service.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)
- "DLP-512: Install/Remove Lightguide Buildout" (9-44)
- "DLP-514: Install/Remove Circuit Pack" (9-50)
- "DLP-525: Connect/Disconnect Optical Fibers at OTU/ OTPM" (9-88)

Required equipment

The following equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap

CAUTION

Electrostatic Discharge

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

CAUTION

Signal Loss

Use care in locating the OTU or OTPM and assigned slots to avoid possible service interruption.

1 Obtain the circuit order instructions to delete an OTU or OTPM and note the assigned slots or ports.

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2 Open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

3 Locate the specific slot of the OTU or OTPM being deleted.

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

4 Disconnect the optical fibers at the OTU or OTPM.

Reference: "DLP-525: Connect/Disconnect Optical Fibers at OTU/OTPM" (9-88)

5 If required, remove the Lightguide Buildout (LBO) and insert plugs at the OTU or OTPM.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

6 Is the OTU or OTPM to remain in the shelf?

If	Then
NO	continue with Step 8.
YES	continue with Step 7

7 Disengage the OTU or OTPM from the shelf and then go to Step 9. For an OTU to remain in the shelf, close the latches and gentle slide the OTU back in until it touches the shelf. For an OTPM to remain in the shelf, slide it out about 1/2 inch.

8 Remove the OTU or OTPM from the shelf.

Reference: "DLP-514: Install/Remove Circuit Pack" (9-50)

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9 As required, repeat Step 2 through Step 8 for the other direction of transmission.

10 At the CIT, select the command **CONFIGURATION.Update.System** and execute.

11 Install an apparatus blank into any slot left empty by this procedure. This is essential to ensure proper air flow and cooling.

Reference: "DLP-509: Install/Remove Apparatus (Circuit Pack) Blank" (9-32)

12 Close the cabinet doors or install the shelf cover, as required.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

END OF STEPS

□

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Delete Quad Optical Translator Unit (QOTU) from Service

Overview

This procedure removes a quad optical translator unit (QOTU) from an Optical Translator (OT) that is in service.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)
- "DLP-514: Install/Remove Circuit Pack" (9-50)

Required equipment

The following equipment is required to complete this task.

- Wrist Strap

Task

CAUTION

Electrostatic Discharge

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

CAUTION

Signal Loss

Use care in locating the QOTU and assigned slots to avoid possible service interruption.

CAUTION

Signal Loss

All service must be removed from the QOTU (equipped with OTPMs) before it is deleted from the OT or service interruptions will occur.

The following task removes a QOTU from an OT that is in service.

1 Obtain the circuit order instructions to delete a QOTU and note the assigned slots.

2 Open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

3 Locate the specific slot of the QOTU being deleted.

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

4 Is the QOTU to remain in the shelf?

If	Then
YES	continue with Step 5.
NO	continue with Step 6.

5 Disengage the QOTU from the shelf, close the latches and gently slide the QOTU back in until it touches the shelf, and then go to Step 7.

6 Remove the QOTU from the shelf.

Reference: "DLP-514: Install/Remove Circuit Pack" (9-50)

7 At the CIT, select the command **CONFIGURATION.Update.System** and execute.

8 Install an apparatus blank into any slot left empty by this procedure. This is essential to ensure proper air flow and cooling.

Reference: "DLP-509: Install/Remove Apparatus (Circuit Pack) Blank" (9-32)

9 Close the cabinet doors or install the shelf cover, as required.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

END OF STEPS

□

Install or Remove an SFP Module

Overview

A Small Form Factor Pluggable (SFP) module is a device that plugs into a multiplexing OTU to provide client ports. You can install different types of modules to transmit and receive different client wavelengths/modes. If the module's wavelength/mode does not match the wavelength/mode provisioned for the circuit pack, then a ***module/prov mode inconsistent*** alarm appears.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)
- "Set the Client Mode and Wavelength for the 2:1 Multiplexing OTU (CW2DM25)" (5-95)

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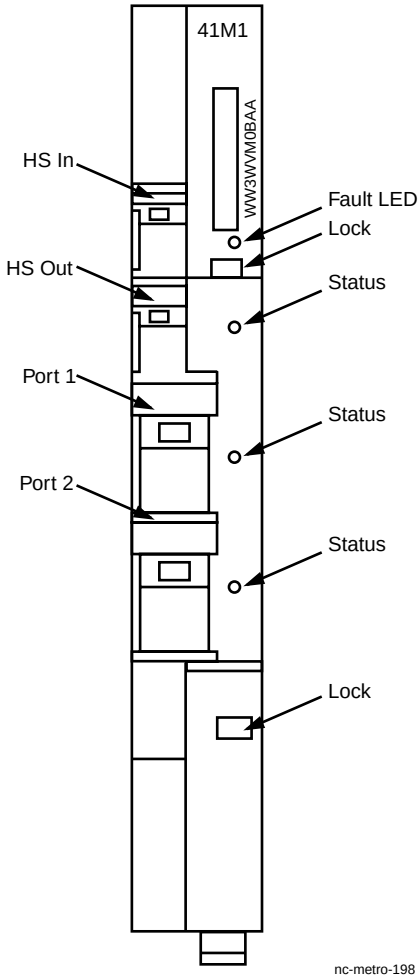
2DM25 faceplate

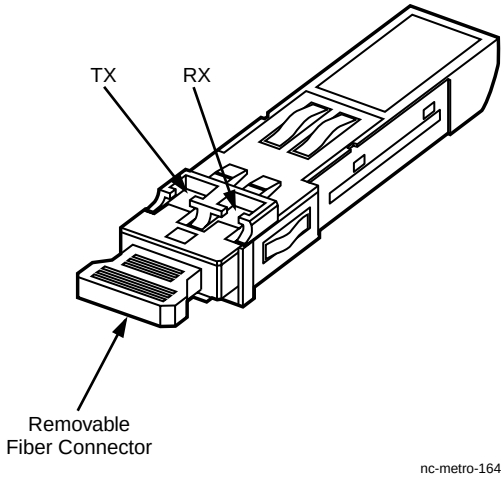
SFP modules plug into the 2DM25 to provide Port 1 and Port 2, as shown in the following figure.

Figure 5-1 2DM25 Circuit Pack Faceplate



SFP module The following figure shows an SFP module.

Figure 5-2 Small Form Factor Pluggable (SFP) Module



Required equipment The following equipment is required to complete this task.

- Wrist Strap

Task

CAUTION
Electrostatic Discharge

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

Use the following procedure to remove or install an SFP module.

1 If the circuit pack that holds or will hold the SFP module is installed, determine the location of the circuit pack. If you are responding to a module/prov mode inconsistent alarm, the alarm report includes the AID for the pack. Also you may use the procedure referenced below.

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

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2 Open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

3 Are you removing or installing an SFP module?

If	Then
REMOVING	continue with Step 4.
INSTALLING	continue with Step 8.

4 If necessary, disconnect any fibers connected to the SFP module and place dust covers onto both the fiber and port connectors.

Reference: "DLP-525: Connect/Disconnect Optical Fibers at OTU/OTPM" (9-88)

5 Depress the black plastic tab beneath the optical port.

6 Grip the side of the LC ports and pull the module out.

7 If you are replacing the SFP module, continue. Otherwise you have completed the procedure.

8 If you have not already done so, determine whether the SFP module you plan to install matches the provisioned client wavelength/mode.

Reference: Use the CenterLink command **CONFIGURATION.Retrieve.OT_Port_Signal** and look for the parameter ***CW2DM25***.

9 If necessary, provision the correct wavelength/mode.

Reference: "Set the Client Mode and Wavelength for the 2:1 Multiplexing OTU (CW2DM25)" (5-95)

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10 Insert the SFP module, electrical interface first, into the Port 1 or Port 2 slot of the circuit pack.

11 Close the cabinet doors or install the shelf cover, as required.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

END OF STEPS

□

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Provisioning Tasks

Overview

Purpose This section provides instructions for electronic traffic provisioning.

Contents This part of the chapter contains the following tasks.

Enter/Delete/Change OTPS Associations	5 - 86
Provision a Test Loopback for the 2:1 Multiplexing OTU	5 - 91
Retrieve OTPS Associations	5 - 92
Set Broadband Data Rates	5 - 93
Set the Expected Input Data Rate for the 2:1 Multiplexing OTU (CEXP2DM25)	5 - 97
Set the Client Mode and Wavelength for the 2:1 Multiplexing OTU (CW2DM25)	5 - 95
Set the Expected Input and Output Signal Formats for the 10G OTU	5 - 99

Enter/Delete/Change OTPS Associations

Purpose

Optical Translator Port Signal (OTPS) associations are used to associate the following:

- an OTU/OTPM port with an optical channel (OCHAN)
- an OUPSR with an OTU/OTPM
- an OUPSR with an OCHAN

Associations are recommended for any channel that passes through an OTU, and are required for any channel that passes through an OUPSR.

When deleting a channel, deleting the associations is recommended.

For OUPSR applications, OUPSR associations between OUPSR ports and OTPMs/OTUs (and/or between OUPSR ports and OCHANs) are required to ensure proper protection switching behavior. The associations must be entered at the NE that houses the OUPSR circuit pack. For more details about protection switching, please refer to Chapter 2 of the *Alarm Messages and Trouble Clearing Guide, 365-575-560*.

Three examples of associations are illustrated, beginning with "OUPSR with protected OTUs (four OTUs per office)" (5-88).

Task

Important! OUPSR does not support ETR or CLO signal types. For this reason, the software will deny any attempt to enter an association between an OTPM and an OUPSR if the OTPM has been provisioned with an LSBBRATE of ***ETR_CLO*** or a UBBRATE of ***ETR*** or ***CLO***. Conversely, once an association is established between an OUPSR and an OTPM, the software will deny any attempt to provision an LSBBRATE of ***ETR_CLO*** or a UBBRATE of ***ETR*** or ***CLO***.

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Perform the following steps to complete this task.

1 Do you want to enter, delete, or change an association?

If	Then
Enter	select the command **CONFIGURATION.Enter.Association.OT_Port_Signal**
Delete	select the command **CONFIGURATION.Delete.Association.OT_Port_Signal**
Change	select the command **CONFIGURATION.Delete.Association.OT_Port_Signal**, follow the steps below, then select the command **CONFIGURATION.Enter.Association.OT_Port_Signal**, then follow the steps below.

Result: The corresponding screen appears and includes an **Association Type** drop-down menu.

2 Select an **Association Type** from the drop-down menu. For information about Association Types, click on the **Help** button and look for the parameter ***assoc***.

Important! For OUPSR-OCHAN associations, if a channel is on the 1A line, it must be associated with AIN or AOUT. If a channel is on the 1B line it must be associated with BIN or BOUT.

3 Fill in the other fields according your configuration. Illustrated examples of the three available OUPSR configurations begin with "OUPSR with protected OTUs (four OTUs per office)" (5-88). Note that the OUPSR ports with AIDs ***CIN*** and ***COUT*** are labeled ***SIG IN*** and ***SIG OUT*** on the OUPSR circuit pack.

END OF STEPS

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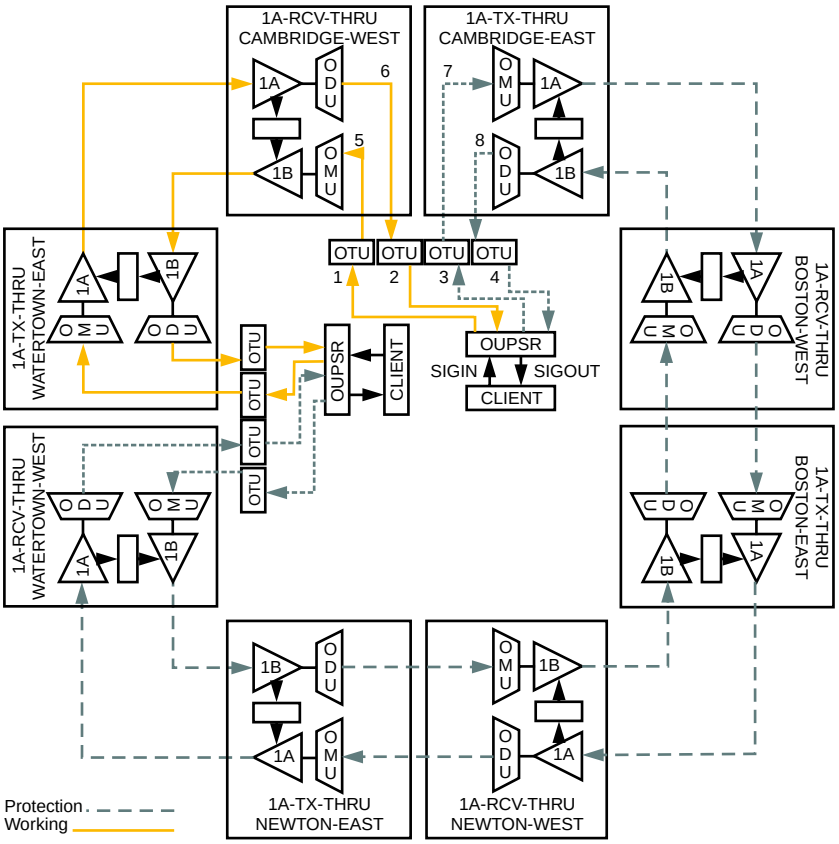
OUPSR with protected OTUs (four OTUs per office)



CAMBRIDGE-EAST Associations

Label in Figure	Connection Type	Source TID	Source AID	Destination TID	Destination AID
1	XADD	CAMBRIDGE-EAST	OUPSR-1-10-BOUT	CAMBRIDGE-WEST	OTU-1-1-1
2	XDROP	CAMBRIDGE-WEST	OTU-1-2-1	CAMBRIDGE-EAST	OUPSR-1-1-10-AIN
3	ADD	n/a	OUPSR-1-10-AOUT	n/a	OTU-1-1-1
4	DROP	n/a	OTU-1-2-1	n/a	OUPSR-1-10-BIN
7	ADD	n/a	OTU-1-1-1	n/a	OCHAN-1A-1
8	DROP	n/a	OCHAN-1B-1	n/a	OTU-1-2-1

CAMBRIDGE-WEST Associations

Label in Figure	Connection Type	Source TID	Source AID	Destination TID	Destination AID
5	ADD	n/a	OTU-1-1-1	n/a	OCHAN-1B-1
6	DROP	n/a	OCHAN-1A-1	n/a	OTU-1-2-1

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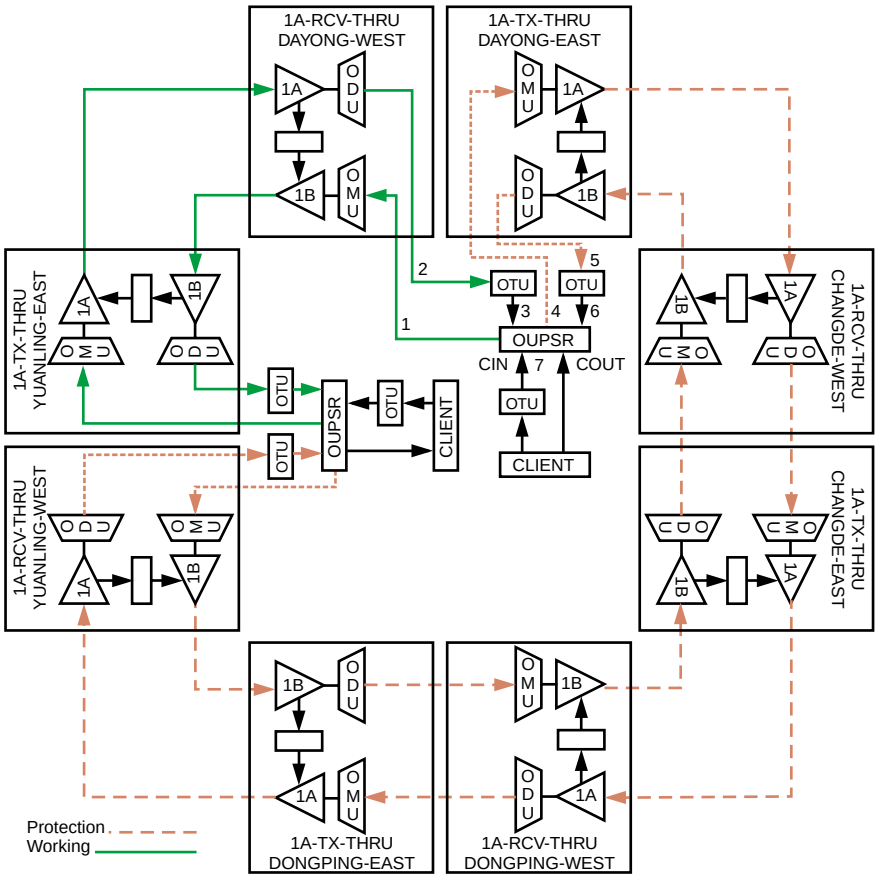
OUPSR with Protected Drop OTUs (three OTUs per office)



Associations Created at DAYONG-EAST

Label in Figure	Connection Type	Source TID	Source AID	Destination TID	Destination AID
1	XADD	DAYONG-EAST	OUPSR-1-10-BOUT	DAYONG-WEST	OCHAN-1B-23
4	ADD		OUPSR-1-10-AOUT		OCHAN-1A-23
5	DROP		OCHAN-1B-23		OTU-1-8-1
6	DROP		OTU-1-8-1		OUPSR-1-10-BIN
7	ADD		OTU-1-7		OUPSR1-10-CIN

Associations Created at DAYONG-WEST

Label in Figure	Connection Type	Source TID	Source AID	Destination TID	Destination AID
2	DROP		OCHAN-1A-23		OTU-1-8-1
3	XDROP	DAYONG-WEST	OTU-1-8-1	DAYONG-EAST	OUPSR-1-10-AIN

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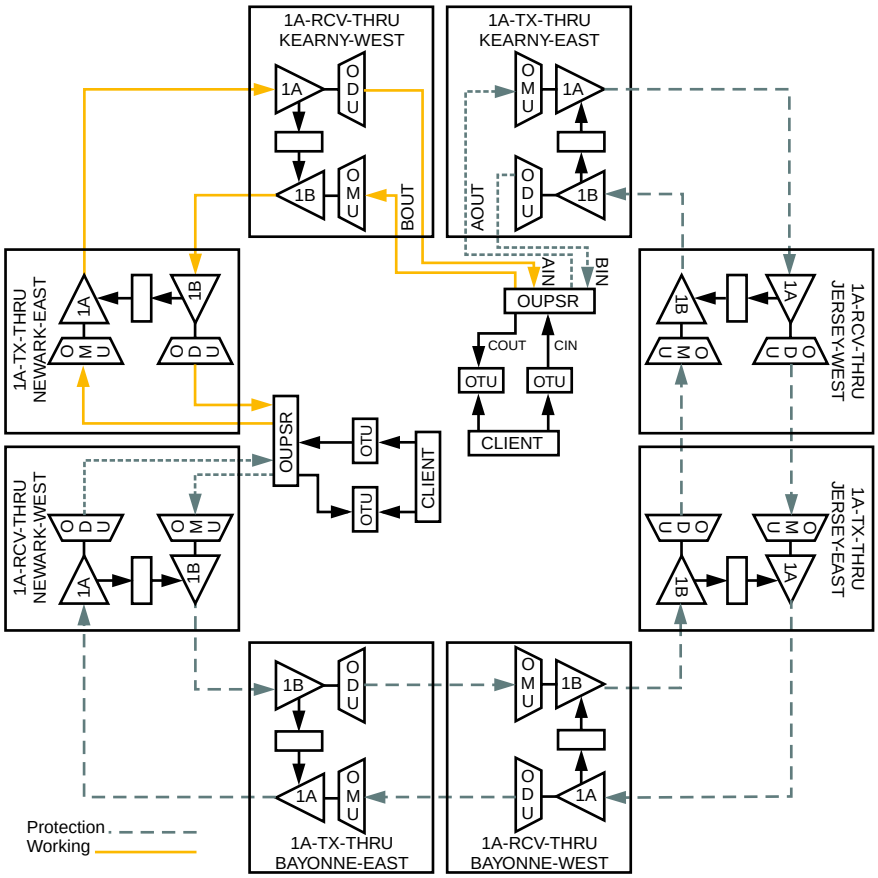
OUPSR with Unprotected OTUs (two OTUs per office)



Associations Created at KEARNY-EAST

Label in Figure	Connection Type	Source TID	Source AID	Destination TID	Destination AID
CIN	ADD		OTU-1-5-1		OUPSR-1-10-CIN
AOUT	ADD		OUPSR-1-10-AOUT		OCHAN-1A-13
BOUT	XADD	KEARNY-EAST	OUPSR-1-10-BOUT	KEARNY-WEST	OCHAN-1B-13
BIN	DROP		OCHAN-1B-13		OUPSR-1-10-BIN
AIN	XDROP	KEARNY-WEST	OCHAN-1A-13	KEARNY-EAST	OUPSR-1-10-AIN
COUT	DROP	KEARNY-EAST	OUPSR-1-10-COUT	KEARNY-WEST	OTU-2-5-1

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Provision a Test Loopback for the 2:1 Multiplexing OTU

Purpose

This task allows you to provision the test mode for the 2:1 multiplexing OTU or "2DM25" circuit pack to test the low-speed (client) side, test the high-speed side, or return to normal transmission of traffic.

User privilege

This task requires a privilege level of "General" or higher.

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into the network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **FAULT.Test.Loopback** and click the **Enter** button to execute.

Result: The corresponding screen appears, and includes the parameters **AID** and **MODE**.

4 Click on the **AID** drop-down menus to select the AID.

5 Click on the **MODE** drop-down menu to select **LS_SIDE** to test the low-speed side, HS_SIDE to test the high-speed side or **NORMAL** to allow normal transmission of traffic. For more information, click on the **Help** button and look for the ***MODE*** parameter.

6 Click on the **Enter** button to execute.

END OF STEPS

□

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Retrieve OTPS Associations

Purpose Optical Translator Port Signal (OTPS) associations are used to associate the following:

- an OTU/OTPM port with an optical channel (OCHAN)
- an OUPSR with an OTU/OTPM
- an OUPSR with an OCHAN

Retrieving associations can be helpful for record keeping and for clearing alarm conditions.

Task Perform the following steps to complete this task.

1 Select the CenterLink command **CONFIGURATION.Retrieve.Association.OT_Port_Signal.**

Result: The corresponding screen appears and includes an **Access Identifier** drop-down menu

2 From the **Access Identifier** drop-down menu, select **ALL** for all associations on this network element or select an AID in the one of the following formats, where x is the bay number, y is the port number, and z is the slot number.

- `OTU-x-y-1`
- `OTPM-x-y-z-1`
- `OUPSR-x-y-{AIN,AOUT}`
- `OUPSR-x-y-{BIN,BOUT}`
- `OUPSR-x-y-{CIN,COUT}`
  Note that CIN and COUT may be labeled SIG IN and SIG OUT on the circuit pack.

Result: A report appears, listing all associations for the AID entered.

END OF STEPS

□

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Set Broadband Data Rates

Purpose

This task allows you to set the data rate for the UBB circuit pack (UBBRATE), and the LSBB and ELSBB circuit packs (LSBBRATE). The default setting for UBBRATE is ***UNKNOWN***. The default setting for LSBBRATE is ***High_Band***. The UBB circuit pack reports a ***Data Rate Mismatch*** alarm if the data rate of the signal received is different than the provisioned rate.

> **Important!** OUPSR does not support ETR or CLO signal types. For this reason, the software will deny any attempt to provision an LSBBRATE of ***ETR_CLO*** or a UBBRATE of ***ETR*** or ***CLO*** on an OTPM with an OUPSR association. Conversely, once an LSBBRATE of ***ETR_CLO*** or a UBBRATE of ***ETR*** or ***CLO*** is provisioned for an OTPM, the software will deny any attempt to enter an OUPSR association.

User privilege

This task requires a privilege level of "General" or higher.

Task

1 If required, connect and condition the craft interface terminal (CIT).

> **Reference:** "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into the network element.

> **Reference:** "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **CONFIGURATION.Enter.OT_Port_Signal** and click the **Enter** button to execute.

> **Result:** The corresponding screen appears, and includes the parameters **UBBRATE** and **LSBBRATE**.

4 If you wish to set the UBB data rate, click on the **UBBRATE** drop-down and select the desired rate. (For information about the different rates, click on the **Help** button and look for the ***UBBRATE*** parameter.)

5 If you wish to set the LSBB data rate, click on the LSBBRATE drop-down and select the desired rate. (For information about the different rates, click on the **Help** button and look for the ***LSBBRATE*** parameter.)

6 If desired, use this same screen to set the **UBBDRMNC (UBB Data Rate Mismatch Notification Code)**, which determines the severity of the ***Data Rate Mismatch*** alarm. (Click on **Help** for more information.)

END OF STEPS

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Set the Client Mode and Wavelength for the 2:1 Multiplexing OTU (CW2DM25)

Purpose

The 2:1 multiplexing OTU (2DM25) has two "client" or "low-speed" ports. The client port is identified in the right-most field of the AID as ***P1*** or ***P2***. This task allows you to set the expected input mode and wavelength, ***CW2DM25***, for P1 and P2. P1 and P2 can have the same or different settings for CW2DM25. The default setting is ***MM850nm***, meaning a multimode fiber carrying an 850 nm signal. If the SFP module for the port carries a mode or wavelength different from its CW2DM25 setting, then a ***module/prov mode inconsistent*** alarm appears.

User privilege

This task requires a privilege level of "General" or higher.

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into the network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **CONFIGURATION.Enter.OT_Port_Signal** and click the **Enter** button to execute.

Result: The corresponding screen appears, and includes the parameter **CW2DM25**.

4 Select the AID for the port.

Reference: The AID format is 2DM25-{1,2}-{1-32}-{P1, P2}.

5 Click on the **CW2DM25** drop-down and select the desired rate.

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6 If desired, use this same screen to set the **CEXP2DM25** (2DM25 expected input rate). For more information, click on the **Help** button and look for the ***CEXP2DM25*** parameter or refer to the task below.

Reference: "Set the Expected Input Data Rate for the 2:1 Multiplexing OTU (CEXP2DM25)" (5-97).

7 Click on the **Enter** button to execute.

END OF STEPS

□

Set the Expected Input Data Rate for the 2:1 Multiplexing OTU (CEXP2DM25)

Purpose

The 2:1 multiplexing OTU (2DM25) has two "client" or "low-speed" ports. The client port is identified in the right-most field of the AID as ***P1*** or ***P2***. This task allows you to set the expected input rate parameter, ***CEXP2DM25***, for P1 and P2. P1 and P2 can have the same or different settings for CEXP2DM25. The default setting is ***UNEQPT***, meaning no signal is expected. If a port receives a rate different from its CEXP2DM25 setting, then a ***payload type mismatch*** alarm appears.

User privilege

This task requires a privilege level of "General" or higher.

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into the network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **CONFIGURATION.Enter.OT_Port_Signal** and click the **Enter** button to execute.

Result: The corresponding screen appears, and includes the parameter **CEXP2DM25**.

4 Select the AID for the port.

Reference: The AID format is 2DM25-{1,2}-{1-32}-{P1, P2}.

5 Click on the **CEXP2DM25** drop-down and select the desired rate. (For information about the different rates, click on the **Help** button and look for the ***CEXP2DM25*** parameter.)

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6 If desired, use this same screen to set the **CW2DM25** (2DM25 client mode and wavelength). For more information, click on the **Help** button and look for the ***CW2DM25*** parameter or refer to the task below.

Reference: "Set the Client Mode and Wavelength for the 2:1 Multiplexing OTU (CW2DM25)" (5-95).

7 Click on the **Enter** button to execute.

8 Repeat the steps above for the other client port.

END OF STEPS

Set the Expected Input and Output Signal Formats for the 10G OTU

Purpose

This task allows you to set the expected input and output signal formats for the 10G OTU circuit pack. The parameters for these signal formats are called ***OC192IN*** and ***OC192OUT***. The default setting for OC192IN is ***DEFAULT***. The default setting for OC192OUT is ***OC192.*** For an explanation of the different rates, see the *Operations Systems Engineering Guide*, command ***ent-otps***, or click on the **Help** button in the CenterLink screen for **CONFIGURATION.Enter.OT_Port_Signal**.

User privilege

This task requires a privilege level of "General" or higher.

Task

1 If required, connect and condition the craft interface terminal (CIT).

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log into the network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

3 At the CIT, select the command **CONFIGURATION.Enter.OT_Port_Signal** and click the **Enter** button to execute.

Result: The corresponding screen appears, and includes the parameters **OC192IN** and **OC192OUT**.

4 Click on the **OC192IN** drop-down and select the desired format. (For information about the different formats, click on the **Help** button and look for the ***OC192IN*** parameter.)

5 Click on the **OC192OUT** drop-down and select the desired format. (For information about the different formats, click on the **Help** button and look for the ***OC192OUT*** parameter.)

6 Click on the **Enter** button to execute.

END OF STEPS

□

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6 Performance Monitoring Tasks

Overview

Purpose

This chapter instructs how to perform performance monitoring in order to detect flaws before alarms arise.

Contents

This chapter includes the following tasks.

Set an OLINE Baseline	6 - 4
Set an OLINE Threshold	6 - 6
Update the System	6 - 8

Set an OCHAN Threshold

Purpose

Use this task to set the threshold for one optical channel (OCHAN) or for all optical channels on a line or for all optical channels on all lines. You set the threshold depending on how much you want to allow the performance to vary from the baseline before a threshold crossing alert appears.

A threshold crossing alert (TCA) is a performance monitoring message that alerts you to performance that has deteriorated somewhat, but not enough to create an alarm. One such TCA that can appear is for the signal power received for an optical channel (SPR-C). The ***threshold*** is the amount above or below the baseline that the value can move to before a TCA appears. You set the ***baseline*** of an optical channel by setting the baseline for the optical line that contains that channel. You set the baseline of an optical line to match the current value when you know it is at, or very close to, the target level as determined by the SmartManual for the OA type, system type and current channel loading factor (CLF).

Task

Perform the following steps to complete this task.

1 Select the CenterLink command **PERFORMANCE.Set.Threshold.Optical_Channel**.

2 Select the AID of the optical channel(s) for which you want to set the threshold.

3 Select **SPR-C**.

4 Select the threshold level. Click on the **Help** button for details. The numbers in the drop-down menu can be translated into decibel levels as outlined under the ***thlev*** parameter in the help pages.

5 Select the time period.

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6 Select **ENABLE** if you want TCAs to appear, or **DISABLE** if you do not want TCAs to appear.

7 Select **Enter** to execute the command.

END OF STEPS

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Set an OLINE Baseline

Purpose Use this task to set the baseline for threshold crossing alerts for one optical line (OLINE) or for all optical lines.

A threshold crossing alert (TCA) is a performance monitoring message that alerts you to performance that has deteriorated somewhat, but not enough to create an alarm. One such TCA that can appear is for the total power received (TOPR) for an optical line (OLINE). The ***threshold*** is the amount above or below the baseline that the value can move to before a TCA appears. You set the ***baseline*** to match the current value when you know it is at, or very close to, the target level as determined by the SmartManual for the OA type, system type and current channel loading factor (CLF).

One reason for setting the baseline is that you are performing one of the following actions:

- deleting an optical channel
- replacing an lightguide buildout (LBO)
- replacing an optical amplifier

Task Perform the following steps to complete this task.

1 Select the CenterLink command **PERFORMANCE.Initialize.Register.Optical_Line**.

2 Select the AID of the optical line(s) for which you want to set the baseline.

3 Select a reason for setting the baseline.

4 If you selected OCHAN_DROPPED as the reason, then select the AID of the dropped channel.

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5 Select **Enter** to execute the command.

END OF STEPS

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Set an OLINE Threshold

Purpose

Use this task to set the threshold for one optical line (OLINE) or for all optical lines. You set the threshold depending on how much you want to allow the performance to vary from the baseline before a threshold crossing alert appears.

A threshold crossing alert (TCA) is a performance monitoring message that alerts you to performance that has deteriorated somewhat, but not enough to create an alarm. One such TCA that can appear is for the total power received (TOPR) for an optical line (OLINE). The ***threshold*** is the amount above or below the baseline that the value can move to before a TCA appears. You set the ***baseline*** to match the current value when you know it is at, or very close to, the target level as determined by the SmartManual for the OA type, system type and current channel loading factor (CLF).

Task

Perform the following steps to complete this task.

1 Select the CenterLink command **PERFORMANCE.Set.Threshold.Optical_Line**.

2 Select the AID of the optical line(s) for which you want to set the threshold.

3 Select **TOPR-OL** if you want to set the threshold for total power received, or select **TOPT-OL** if you want to set the threshold for total power transmitted.

4 Select the threshold level. Click on the **Help** button for details. The numbers in the drop-down menu can be translated into decibel levels as outlined under the ***thlev*** parameter in the help pages.

5 Select the time period.

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6 Select **ENABLE** if you want TCAs to appear, or **DISABLE** if you do not want TCAs to appear.

7 Select **Enter** to execute the command.

END OF STEPS

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Update the System

Purpose Use this task to set any optical channels with no signal to the auto state for performance monitoring. One reason to do this is that you have deleted an optical channel and want to avoid threshold crossing alerts (TCAs).

Task Perform the following steps to complete this task.

1 Select the CenterLink command **CONFIGURATION.Update.System.**

2 Select **Enter** to execute the command.

END OF STEPS

□

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7 Software Upgrade Tasks

Overview

Purpose This chapter instructs the user how to determine the software version and down load new software.

Contents This chapter is divided into the following sections.

Copy Software from One Network Element to Another Network Element	7 - 2
Install Software into CIT and Network Element	7 - 4

Copy Software from One Network Element to Another Network Element

Purpose

This task is used to copy the software in one Metropolis® EON network element to another Metropolis® EON network element through the data communications channel (DCC) residing in the supervisory signal. All of the Metropolis® EON network elements must be running the same software release. This task can be completed while the Metropolis® EON is in service.

Supporting tasks

This task refers to the following supporting task.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

Required test equipment

The following test equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap

Task

Follow the steps below to copy software from one NE to another NE.

1 If required, connect the craft interface terminal (CIT) to the local Metropolis® EON network element and condition it.

> **Reference:** "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log in to the CIT.

3 Verify that there are no active alarms or status conditions by selecting the **FAULT.Retrieve.Condition.All**. Review the report and clear any conditions before proceeding with this procedure.

4 At the CIT select the command, **CONFIGURATION.Retrieve.Map.Network** to obtain the Network Map Report and verify the DCC status is good. An example of this report

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with a description of the output parameters is provided in Chapter 10, “Using the Craft Interface Terminal”.

Important! The *Software Release Description* is shipped with the software and includes software loading and copying instructions.

5 Refer to the following Table for the software release and perform the remote (DCC) download task.

Item	COMCODE
R8.2 Software Release Description (SRD)	109204131
Initial installation	109204081 (CD-ROM)
Upgrade from R8.0	109204107 (CD-ROM)
Upgrade from R3.x or R6.x	109204115 (CD-ROM)
Spare	109204123 (CD-ROM)

END OF STEPS

Install Software into CIT and Network Element

Purpose

This task is used to install the software into the CIT and Metropolis® EON network element. All of the Metropolis® EON network elements must be running the same software release.

Supporting tasks

This task refers to the following supporting task.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

Required test equipment

The following test equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap

CAUTION

When installing software, the CIT-PC software must be the same release or a higher release than the software currently running in the Metropolis® EON network element.

1 Verify that the software package consists of the documentation and applicable CD-ROM listed in the following Table.

Item	COMCODE
R8.2 Software Release Description (SRD)	109204131
Initial installation	109204081 (CD-ROM)
Upgrade from R8.0	109204107 (CD-ROM)
Upgrade from R3.x or R6.x	109204115 (CD-ROM)
Spare	109204123 (CD-ROM)

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2 Refer to and perform the software download procedure (initial installation/ upgrade/change) per the *Software Release Description* that was shipped with the software.

END OF STEPS

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8 Periodic Tasks

Overview

Purpose This chapter instructs the user how to perform routine tasks at specified intervals.

Contents This chapter is divided into the following sections.

Check Network Element Operation	8 - 2
Test LED Indicators on Front Panel and Circuit Packs	8 - 7
Test Miscellaneous Discrete Telemetry	8 - 9
Test Parallel Telemetry	8 - 12
Verify Network Elements Are Connected	8 - 13
Replace Fan Filter	8 - 6

Check Network Element Operation

Purpose

This task is recommended to be performed on a daily basis (preferably each morning). A check of each network element will verify proper operation and that all network elements are responding. Also, this check will detect if any SYSCTL or SYSMEM circuit pack failures or removals have occurred over the past twenty-four hours.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)
- "Login/Logout to a Network Element Using CenterLink" (3-22)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)
- "Login/Logout to a Network Element Using CenterLink" (3-22)

Required test equipment

The following test equipment is required to complete this task.

- Craft Interface Terminal (CIT)
- Wrist Strap

Task

The following task checks each network element to verify proper operation and that all network elements are responding

1 If required, connect the craft interface terminal (CIT) to the local Metropolis® EON network element and condition it.

Reference: "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11)

2 Log in to the network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

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3 Was login successful?

If	Then
YES	continue with Step 4.
NO	continue with Step 13

4 At the CIT, select the command **CONFIGURATION.Retrieve.Map.Network** and execute to obtain a report. Another command that may be used is **CONFIGURATION.Retrieve.Map.Ring**.

5 From the report, does DCCSTATUS indicate ***good*** for all network elements (TIDs)?

If	Then
YES	continue with Step 6.
NO	continue with Step 13. **Important!** The DCCSTATUS indicates both DCC directions (incoming and outgoing). Therefore, if the outgoing DCC is bad, the DCCSTATUS indicates FAIL. **Reference:** "Login/Logout to a Network Element Using CenterLink" (3-22) and "Login/Logout to a Network Element Using CenterLink" (3-22)

6 Log out of the network element.

Reference: "Login/Logout to a Network Element Using CenterLink" (3-22)

7 Close the CenterLink window.

8 Select **NE Command Manager**, select another TID (network element) from the pull-down menu or enter another TID and select **Submit**.

9 Log in to the network element.

> **Reference:** "Login/Logout to a Network Element Using CenterLink" (3-22) and "Login/Logout to a Network Element Using CenterLink" (3-22)

10 Was login successful?

If	Then
YES	continue with Step 11.
NO	continue with Step 13.

11 Log out of the network element.

> **Reference:** "Login/Logout to a Network Element Using CenterLink" (3-22)

12 Repeat Step 7 through Step 11 for each network element. After every network element has been successfully checked, you may STOP this procedure.

13 At the network element (not responding or with DCCSTATUS=FAIL), open the cabinet doors or remove the shelf cover, as required.

> **Reference:** "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

14 Are the SYSCTL and SYSMEM circuit packs are installed?

If	Then
YES	Continue with Step 15.

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If	Then
NO	Install the SYSCTL and/or SYSMEM circuit packs, then continue with Step 15. **Reference:** "DLP-514: Install/Remove Circuit Pack" (9-50)

15 Is the problem gone? (Network element is now responding or DCCSTATUS=FAIL has cleared.)

If	Then
YES	STOP! You have completed this task.
NO, the NE is not responding	Refer to "TAP-128: Clear Trouble in CIT" in the *Alarm Messages and Trouble Clearing Guide*.
NO, there is still a DCCSTATUS=FAIL	Select the command **FAULT.Retrieve.Condition.All** and then refer to TAP-102 in the *Alarm Messages and Trouble Clearing Guide* to clear alarm(s) or condition(s).

END OF STEPS

Replace Fan Filter

Purpose Use this procedure:

- Every 6 months, as part of routine fan maintenance
- When instructed to do so as part of a trouble-clearing task.

Task Complete the following steps to replace a fan filter.

1 Obtain a replacement fan filter.

2 Remove the fan filter by grasping the two pull tabs and pulling the fan filter out of the shelf.

3 On the pull tab end of the replacement fan filter, notice that there are arrows stamped into the metal and labeled **Air Flow**.

4 Insert the replacement fan filter into the shelf so that **Air Flow** arrows point upward and the two pull tabs are positioned at the front of the shelf.

5 Replace the shelf cover.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

6 Discard the dirty fan filter.

END OF STEPS

□

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Test LED Indicators on Front Panel and Circuit Packs

Purpose

Use this task to test the LED indicators on the front panel and circuit packs for normal operation.

Supporting tasks

This task refers to the following supporting task.

- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

Task

1 Open the cabinet doors or remove shelf cover. All LED indicators are visible from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

2 Using the CIT select the command, **FAULT.Test.LED.All** and execute.

Result: All LED indicators are lighted for 10 seconds, off for 10 seconds, and then return to their normal condition.

3 Did the LED indicator(s) of interest operate as required?

If	Then
YES	Continue with Step 4.
NO	Continue with Step 6.

4 Close the cabinet doors or install the shelf cover.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

5 STOP! YOU HAVE COMPLETED THIS TASK.

6 Notify the installation personnel to correct the LED indicator trouble before returning to this task.

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7 Close the cabinet doors or install the shelf cover.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

END OF STEPS

□

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Test Miscellaneous Discrete Telemetry

Purpose This task tests the user setable miscellaneous discrete environmental (input) points and control (output) points of the Metropolis® EON.

Task

1 Contact the remote operations center and request their help to observe the environmental points and to activate the control points during this test.

2 At the remote operations center, disable, if desired, the alarm threshold level for the points being tested.

> **Important!** When an external device connected to the Metropolis® EON network element causes a contact closure to appear as an environmental input to the network element, a corresponding environmental point is activated at the remote operations center.

3 Operate the first external device connected to the Metropolis® EON network element in such a way as to cause a closed contact to appear at the network element's environmental input.

4 Was the corresponding environmental point activated at the remote operations center?

If	Then
YES	Continue with Step 5.
NO	Report the trouble to the installation personnel.

5 Operate the first external device connected to the Metropolis® EON network element in such a way as to cause an open contact to appear at the network element's environmental input.

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6 Was the corresponding environmental point deactivated at the remote operations center?

If	Then
YES	Continue with Step 7.
NO	Report the trouble to the installation personnel.

7 Repeat Step 3 through Step 6 for any remaining environmental points to be tested.

Important! When a control point is activated at the remote operations center, it results in a contact closure at the corresponding control output of the Metropolis® EON network element which, in turn, can operate an external device connected to the network element.

8 Ask the personnel at the remote operations center to activate the first control point being tested.

9 Was the corresponding external device connected to the network element operated correctly? (For example, was the power turned ***On***?)

If	Then
YES	Continue with Step 10.
NO	Report the trouble to the installation personnel.

10 Ask the personnel at the remote operations center to deactivate the first control point being tested.

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11 Was the corresponding external device connected to the network element operated correctly? (For example, was the power turned ***Off***?)

If	Then
YES	Continue with Step 12.
NO	Report the trouble to the installation personnel.

12 Repeat Step 8 through Step 11 for any remaining control points to be tested.

13 At the remote operations center, enable the alarm threshold level for the points being tested, if disabled in Step 2.

END OF STEPS

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Test Parallel Telemetry

Purpose

This task is used to test all the parallel telemetry points for proper operation. Perform this task during the acceptance of the Metropolis® EON network elements when they are out of service and is performed only during this time.

Task

1 Contact the remote operations center and request their assistance in monitoring the parallel telemetry points during this test.

2 At the remote operations center, disable the alarm threshold level for the telemetry points being tested.

3 At the local CIT, select the command **FAULT.Test.Telemetry.Parallel** and execute.

Result: All parallel telemetry points are simultaneously turned on for 20 seconds, then off for 20 seconds before reverting to normal operation.

4 Does the test pass as monitored from the remote operations center?

If	Then
YES	Continue with Step 5.
NO	Refer to the Installation Guide to correct the problem or contact the group who did the installation.

5 At the remote operations center, enable the alarm threshold level for the points being tested, if disabled in Step 2.

END OF STEPS

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Verify Network Elements Are Connected

Purpose This task is used to verify that all network elements are connected in a Metropolis® EON.

Task

Important! CIT-PC reports are used to verify Metropolis® EON connectivity.

1 At the CIT, select the command **FAULT.Retrieve.Condition.All** to obtain a report. This report indicates if any trouble conditions are present on the local Metropolis® EON network element.

2 Are there any trouble conditions listed in the ***CONDDSCR*** column of the report?

If	Then
NO	Continue with Step 3.
YES	Refer to TAP-102 in the *Alarm Messages and Trouble Clearing Guide* to clear indicated conditions and then continue with Step 3.

3 At the CIT, select the command **FAULT.Retrieve.Alarm.Network** to obtain a report for the Metropolis® EON. This report indicates if any conditions are present in the Metropolis® EON.

4 Are there any alarms listed in the ***NTFCNCDE*** column of the report?

If	Then
NO	Continue with Step 5.
YES	Notify personnel at the remote site to correct the trouble condition(s) before proceeding.

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5 At the CIT, select the command **CONFIGURATION.Retrieve.Map.Network** to obtain a report.

6 Verify that the TIDs, DSNE, DCC status, and FBRCONN from the report agree with the engineered documentation.

END OF STEPS

□

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9 Supporting Tasks

Overview

Purpose This chapter contains supporting tasks, also known as Detailed Level Procedures (DLPs). These tasks are often referenced in other tasks as a way to provide details for those who need them while keeping the other tasks shorter for those who do not need the details.

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Contents This section includes the following tasks.

DLP-500: Select LBOs between Add OT OUT and Drop OT IN	9 - 3
DLP-501: Connect and Condition Craft Interface Terminal (CIT)	9 - 11
DLP-503: Locate Circuit Pack/Fiber Connections	9 - 13
DLP-504: Test Office Alarm Operation	9 - 27
DLP-507: Identify Source of Incoming Signal	9 - 29
DLP-509: Install/Remove Apparatus (Circuit Pack) Blank	9 - 32
DLP-510: Inspect and Clean Optical Fiber Connectors	9 - 34
DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover	9 - 41
DLP-512: Install/Remove Lightguide Buildout	9 - 44
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DLP-524: Select an LBO at the OTU/OTPM IN	9 - 81
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DLP-500: Select LBOs between Add OT OUT and Drop OT IN

Purpose

This task allows you to select the correct LBO for one of the following situations:

- an optical channel fiber connection between the add OTU/OTPM output and the drop OTU/OTPM input
- an optical line fiber connection at an OA

To select an LBO at the add OTU/OTPM input, see DLP-524.

Required equipment

You will need the following required test equipment.

- Craft interface terminal (CIT)
- Wrist strap
- Optical power meter

Supporting tasks

This task refers to the following supporting tasks.

- “DLP-503: Locate Circuit Pack/Fiber Connections” (9-13)
- “DLP-510: Inspect and Clean Optical Fiber Connectors” (9-34)
- “DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover” (9-41)
- “DLP-512: Install/Remove Lightguide Buildout” (9-44)

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Task

DANGER

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

1 If necessary, open the cabinet doors or remove the shelf cover. All connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41).

2 Are you adding or trouble clearing an optical line, optical channel, supervisory channel, customer maintenance (CM) signal, or replacing an end terminal OA?

If	Then
Optical line	continue with Step 3.
Optical channel	continue with Step 9.
Replacing end terminal receive OA	continue with Step 3.
Supervisory channel	continue with Step 20.

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DANGER

Eye Damage

Always unseat an OA before disconnecting the output fiber.

CAUTION

Optical Amplifier Damage

Before connecting to the OUT port on the OA3 (LEA307), always clean the OUT port connector on the OA3 and the fiber you are about to connect. See DLP-510 for details. When disconnecting an output fiber from an OA3, always place dust covers on the fiber and in the OUT port connector.

3 Remove the protector caps and clean the receive optical fiber.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34).

4 Connect the receive optical fiber to an optical power meter and obtain an optical power measurement.

5 Using the power level measurement obtained in Step 4 and the SmartManual, determine the LBO value for the receive OA circuit pack.

Use the SmartManual to determine the LBO value by:

1. Open NE SmartManual Manager from the CenterLink launch console screen.
2. Use the Standard option unless instructed otherwise. Select the task, **Select Line Build Out for OA input**.
3. Enter parameters as requested.

6 Clean the IN connector of the receive OA circuit pack, clean the LBO and install the LBO.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44).

7 Close the cabinet door or install the shelf cover.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41).

8 STOP! YOU HAVE COMPLETED THIS TASK.

9 Are you making connections to an OMU or ODU?

If	Then
OMU	continue with Step 10.
ODU	continue with Step 16.

10 Remove the protector cap and clean the fiber coming from the OTU/ OTPM circuit pack or compatible optics transmitter for the channel being added.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34).

11 Connect the optical power meter to the fiber coming from the OTU/ OTPM circuit pack or compatible optics transmitter for the channel being added and obtain an optical power measurement.

12 Compare the optical power measurement obtained in Step 11 with the requirement listed in the table in "Add OT output/OMU Input" (9-9) for the channel being added.

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13 Can you adjust the LBO to meet the requirements?

If	Then
NO	continue with Step 14.
YES	Replace the LBO on the OMU IN port. STOP! YOU HAVE COMPLETED THIS TASK.

14 Measure at the OTU/OTPM or compatible optics transmitter out connector (for that channel) and compare the results with the table in "Add OT output/OMU Input" (9-9). If in specification, investigate fiber and connections between OTU/OTPM or compatible optics and OMU. If out of specification, replace the OTU/OTPM or compatible optics circuit pack.

15 STOP! YOU HAVE COMPLETED THIS TASK.

16 At the OTU/OTPM or compatible optics, if required, remove the protector cap at the IN connector and clean the fiber coming from the ODU for the channel being dropped or passed through at this NE.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34).

17 At the OTU/OTPM or compatible optics, connect the optical power meter to the fiber coming from the ODU and obtain an optical power measurement.

18 Determine the LBO value.

1. Open the NE SmartManual Manager from the CenterLink launch console.
2. Use the Standard option unless instructed otherwise. Select the task, **Select Line Build Out (LBO) for RCVR input**.
3. Complete the task by following the steps displayed on the screen.

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19 STOP! YOU HAVE COMPLETED THIS TASK.

20 Remove fiber from the IN connector of the TLM circuit pack being tested.

21 Connect the optical power meter to the TLM OUT fiber and obtain an optical power measurement.

> **Reference:** "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13).

22 Using the power level reading obtained in Step 27 and the table in "TLM circuit pack input power" (9-8), determine if the power level was correct.

END OF STEPS

TLM circuit pack input power

The following table lists input power for the TLM circuit pack.

Maximum Power (dBm)	Minimum Power (dBm)
–10.5	–30.0

LBO Information

The following figure provides a depiction of LBO usage in an End Terminal.

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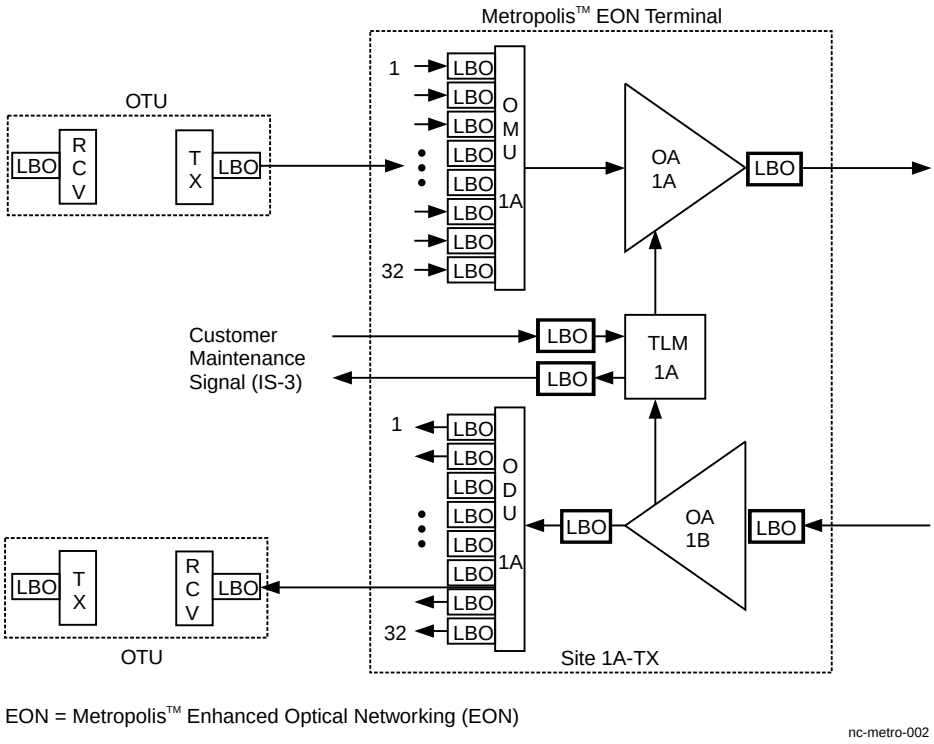
Figure 9-1 LBO Location in an End Terminal



EON = Metropolis™ Enhanced Optical Networking (EON)

Add OT output/OMU Input

The targets you should use depend on whether you have a 16-channel or 32-channel optical amplifier.

32-Channel Systems

If the network element has a 32-channel OA (LEA207 or higher), then you should use the targets in the table below.

Table 9-1 32-Channel Add OT Output/OMU Input Targets

OMU Input Targets (+/- 1dBm) with 32-Channel OA, for Signal Rate = R			
OMU Insertion Loss	**R >= 1Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
5.5 dBm (507B)	-15.5	-18.5	-21.5
8 dBm (506B/ 507A/508A)	-13	-16	-19

16-Channel Systems

If the network element has a 16-channel OA (model number below LEA207), then you should use the targets in the table below. (This assumes you will be using an 506A OMU, with insertion loss of 14 dBm. If you are using a 506B subtract 6 dBm from the target in the table.)

Table 9-2 16-Channel OMU Input Targets

OMU Input Targets (±1.0 dBm) with 32-Channel OA, for Signal Rate = R				
Channel	**Wavelength (nm)**	**R >= 1Gb/s**	**500 Mb/s <= R < 1 Gb/s**	**R < 500 Mb/s**
1	1549.32	-4.0	-7.0	-10.0
2	1550.92	-5.3	-8.3	-11.3
3	1552.52	-6.5	-9.5	-12.5
4	1554.13	-7.2	-10.2	-13.2
5	1555.75	-7.7	-10.7	-13.7
6	1557.37	-8.2	-11.2	-14.2
7	1558.98	-8.0	-11.0	-14.0
8	1560.61	-6.5	-9.5	-12.5
9	1548.52	-2.0	-5.0	-8.0
10	1550.12	-4.6	-7.6	-10.6
11	1551.72	-5.8	-8.8	-11.8
12	1553.33	-6.8	-9.8	-12.8
13	1554.94	-7.4	-10.4	-13.4
14	1556.56	-7.9	-10.9	-13.9
15	1558.17	-8.1	-11.1	-14.1
16	1559.79	-7.2	-10.2	-13.2

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DLP-501: Connect and Condition Craft Interface Terminal (CIT)

Purpose

This task provides instructions to verify proper connections between a network element and a personal computer (PC). The PC will be running CenterLink software or CIT-PC software.

Supporting tasks

This task refers to the following supporting tasks.

- "Establish Modem Network Access" (3-15)

Task

Important! The PC must meet the minimum requirements.

1 Verify the PC is safely positioned on a cart or table.

2 Verify the cable connections at the PC.

To summarize, check the following.

- The appropriate 9- or 25-pin cable or equivalent interface cable is connected between the CIT (DCE) female connector on the user panel and a serial male connector on the PC.
- If required, a printer with the appropriate printer cable is connected to the PC per the instructions provided with the printer.
- If required, a modem (internal or external) is connected per the instructions provided with the modem. Many modem configurations exist and operate over the public switched network or a data communications network.

Reference: "Establish Modem Network Access" (3-15) and *Installation Guide, 365-575-562*

Important! The browser and NE server software are considered parts of the CenterLink software.

3 Turn the PC power switch to ON, if necessary.

Important! The CenterLink software has been loaded on the PC and Microsoft® Windows95®, Windows2000®, WindowsNT®, or

Windows98® is running on the PC. If you encounter difficulty in the following steps, a CIT tutorial is available in Chapter 11, "Craft Interface Terminal Usage."

4 At the PC desktop screen, double click on the **CenterLink** icon.

5 NE Server will automatically start up, along with the CenterLink Launch Console screen.

6 Select **NE Command Manager** to advance to the next screen.

7 Select TID to be logged into from the drop down menu or type in the NE TID and then click **Submit**.

8 Complete the **Network Element Login** window and enter your previously obtained UID (user identifier) and PID (private identifier), then select **Enter** to log into a network element.

Result: A ***Completed*** message is displayed.

END OF STEPS

□

DLP-503: Locate Circuit Pack/Fiber Connections

Purpose This task shows the physical location of the circuit packs and fiber connections in a Metropolis® EON network element. More detailed information on fiber connections is presented in the *Installation Guide, 365-575-562*.

Task

CAUTION

Electrostatic Discharge

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

1 Select the CenterLink command **SECURITY.Retrieve.System**.

Result: The ***dirn*** field tells you the direction of transmission and whether there is telemetry feed-through.

Important! For a repeater the value displayed in the ***dirn*** field is a "-".

2 Use the value of the ***dirn*** field to find the diagram under "Metropolis® EON shelf types" (9-14) that corresponds to your network element.

3 If you know the AID for the circuit pack, it may also help to refer to "AIDs and shelves" (9-23).

4 Locate the circuit pack, using the information from the previous steps and the following hints:

- Each network element contains only one SYSCTL, one SYSMEM, and one TOHCTL.
- If you are responding to an alarm, the circuit pack you are looking for may be displaying a red LED.

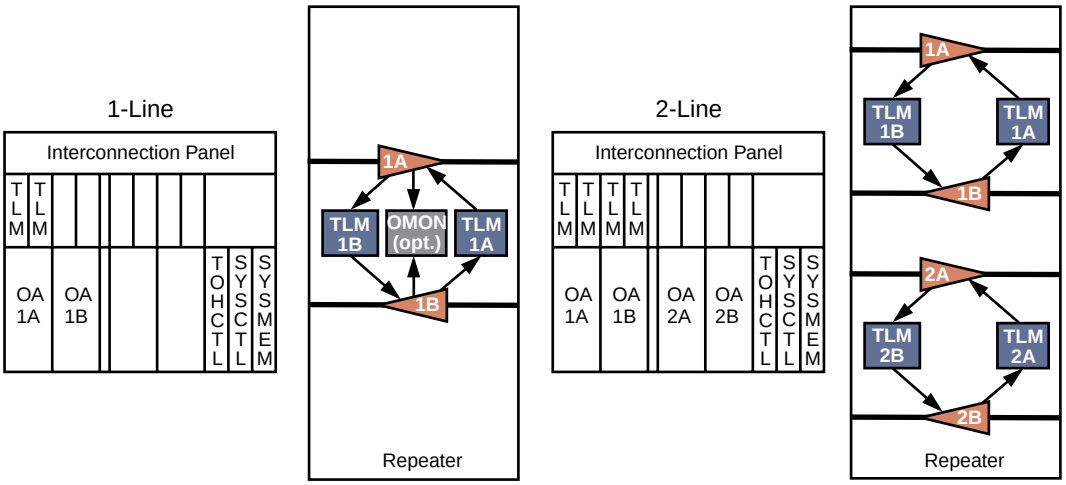
- Circuit packs are labeled with the type, such as OMU, OA, OTU, or OTPM (QOTUs are labeled “OTU”).
- Circuit packs are also labeled with a code that can tell you more about the pack, such as what type of signal an OT pack can carry. For a list of these codes see “Circuit Pack, Carrier, and DCM codes” (9-25).

END OF STEPS

Metropolis® EON shelf types

The following figures show the Metropolis® EON shelf types available. Note that OMON will be available in later releases.

Figure 9-2 Repeater



nc-metro-075

Figure 9-3 1A-TX

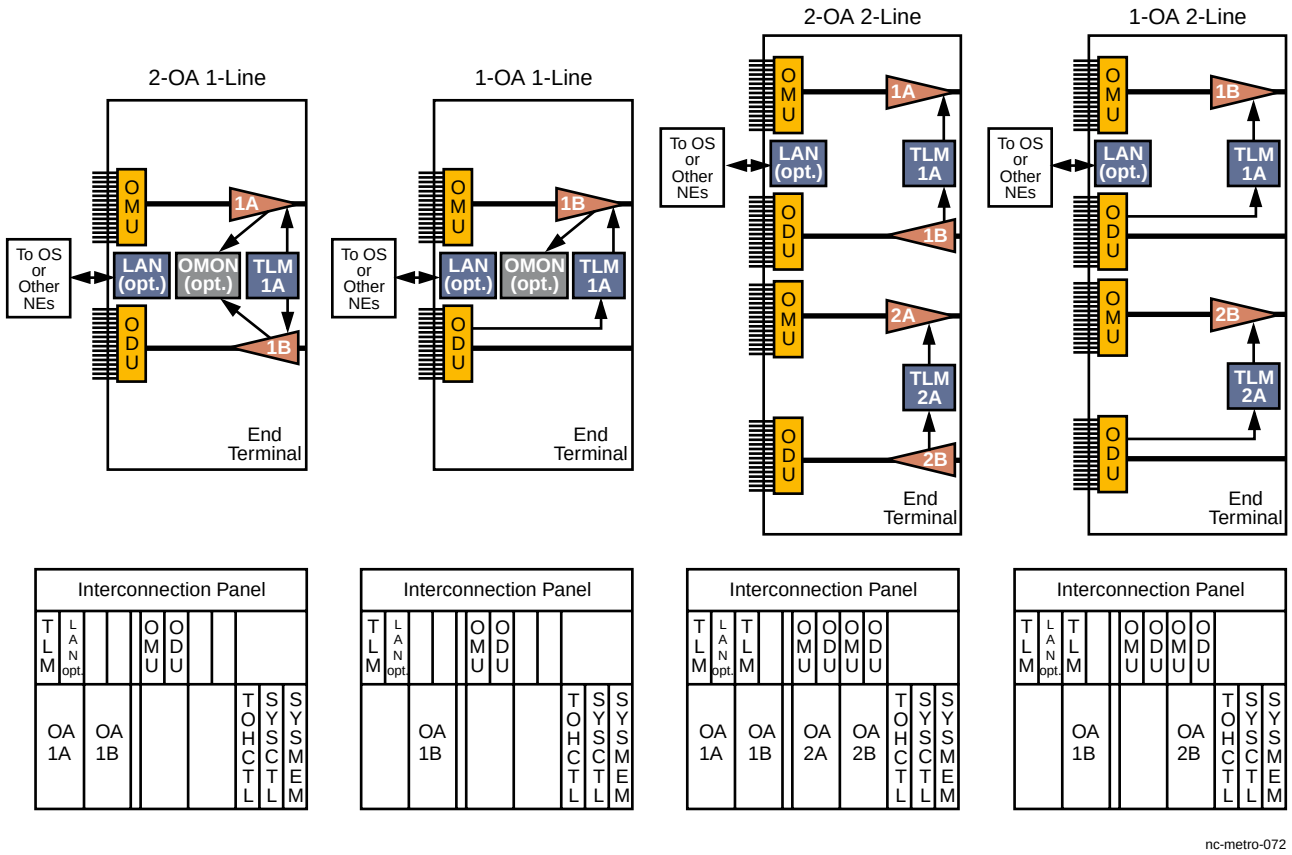


Figure 9-4 1A-TX-32

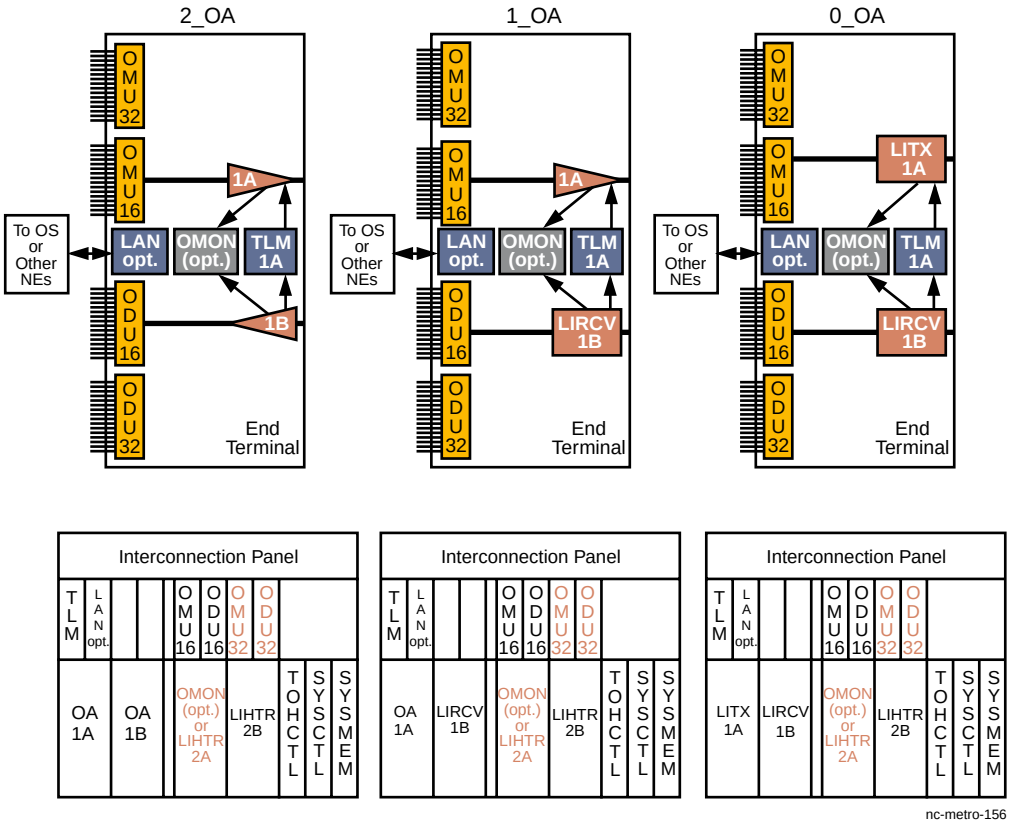


Figure 9-5 1A-TX-THRU

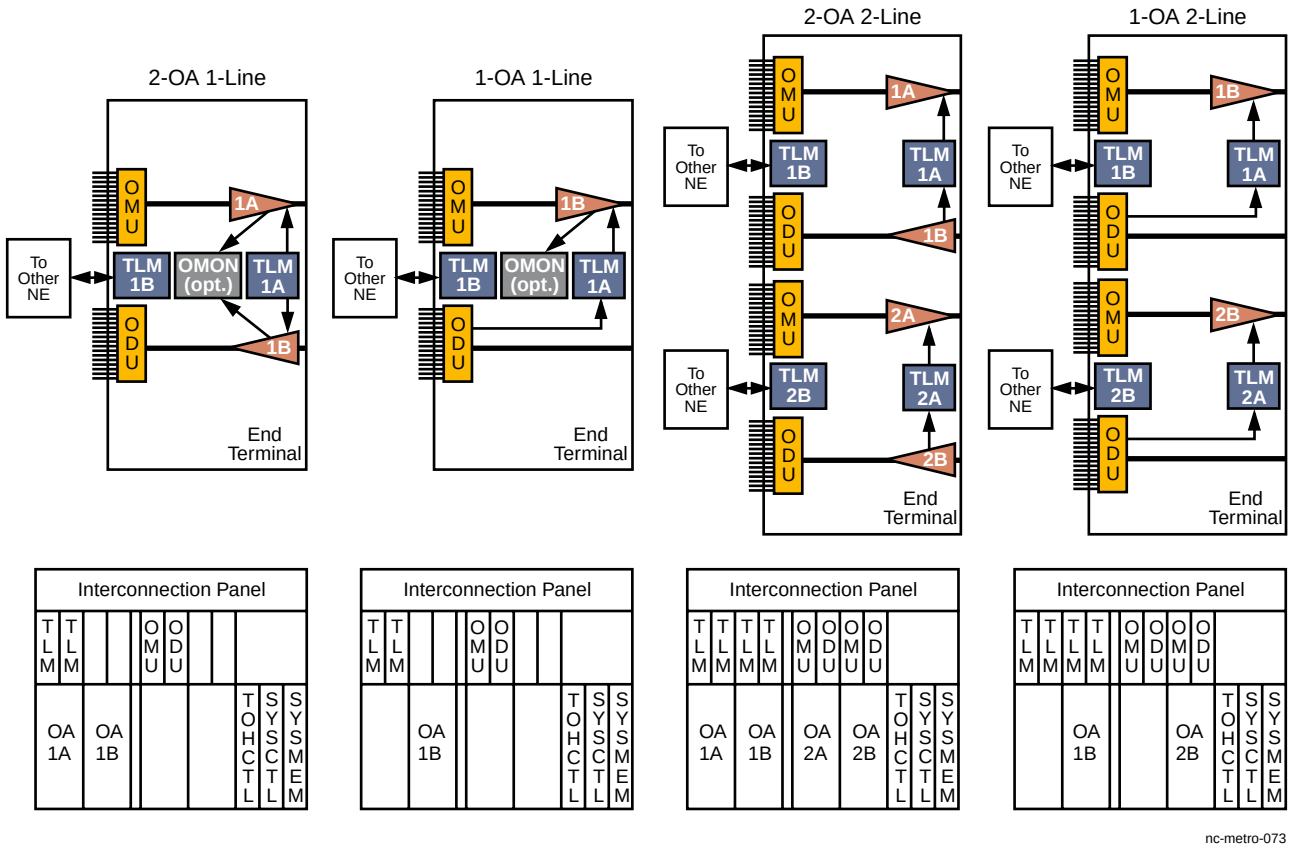


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Figure 9-6 1A-TX-THRU-32

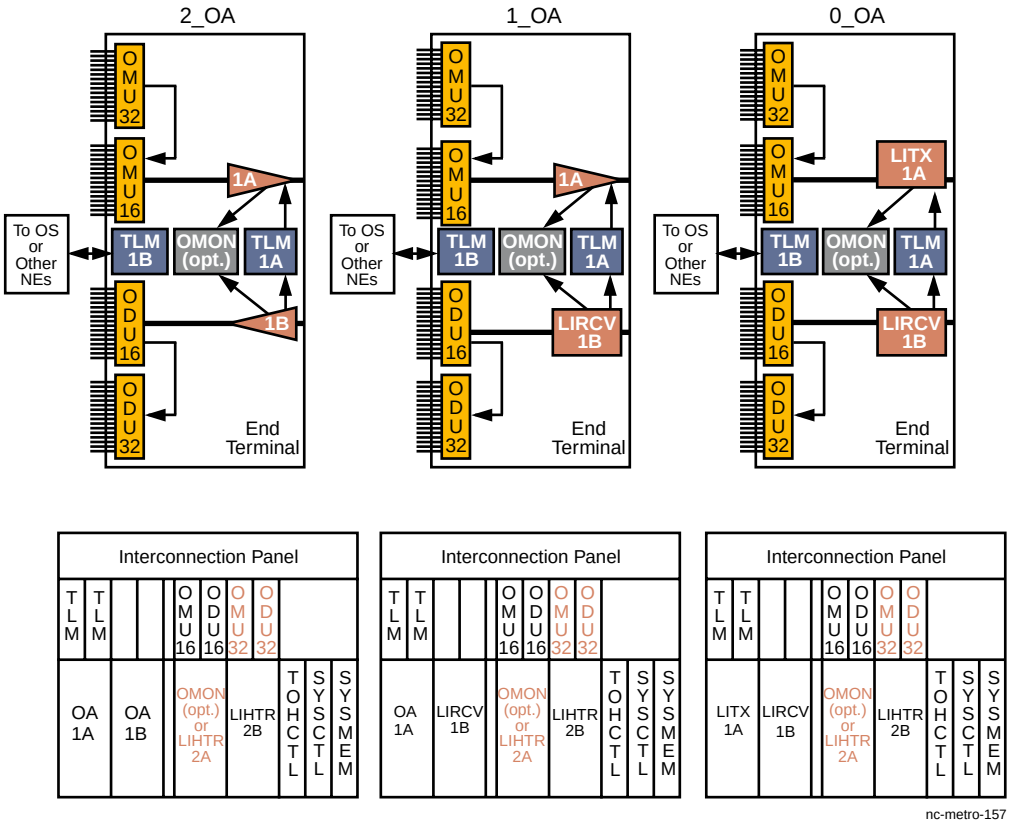

Figure 9-7 1A-RCV

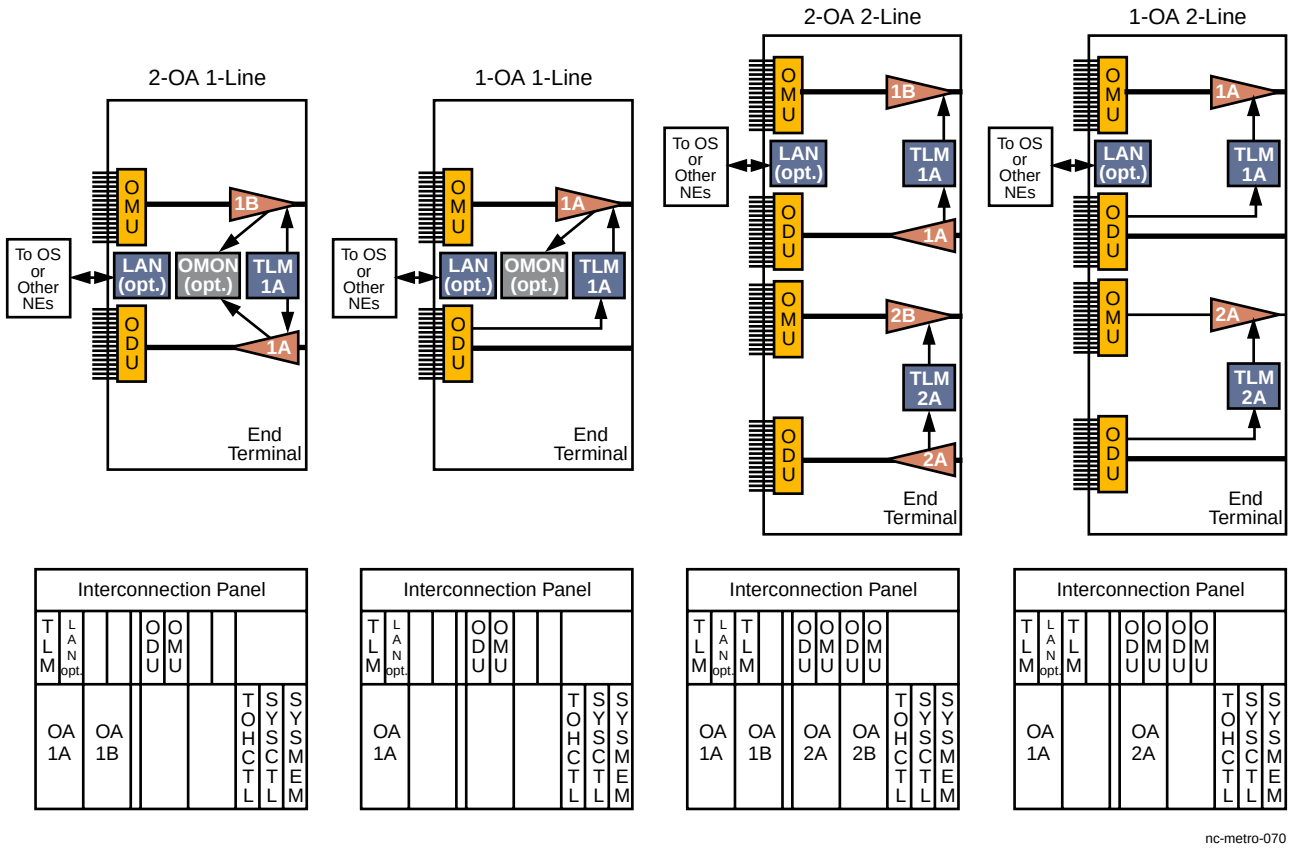

Figure 9-8 1A-RCV-32

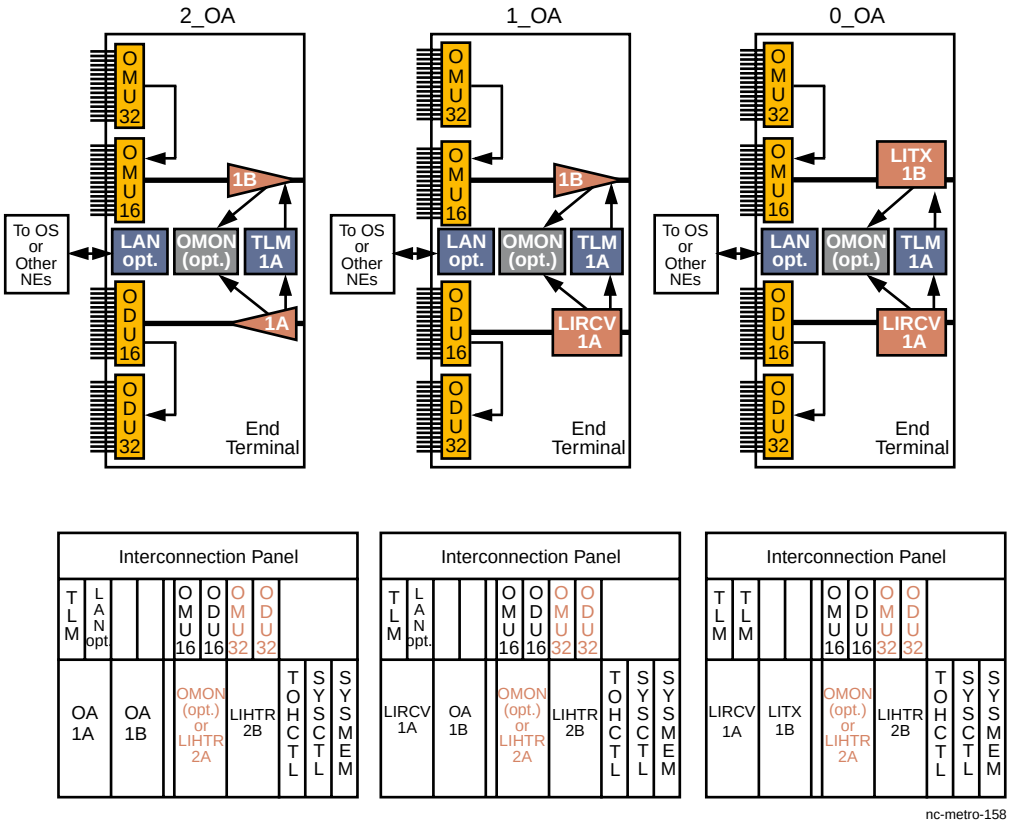

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Figure 9-9 1A-RCV-THRU

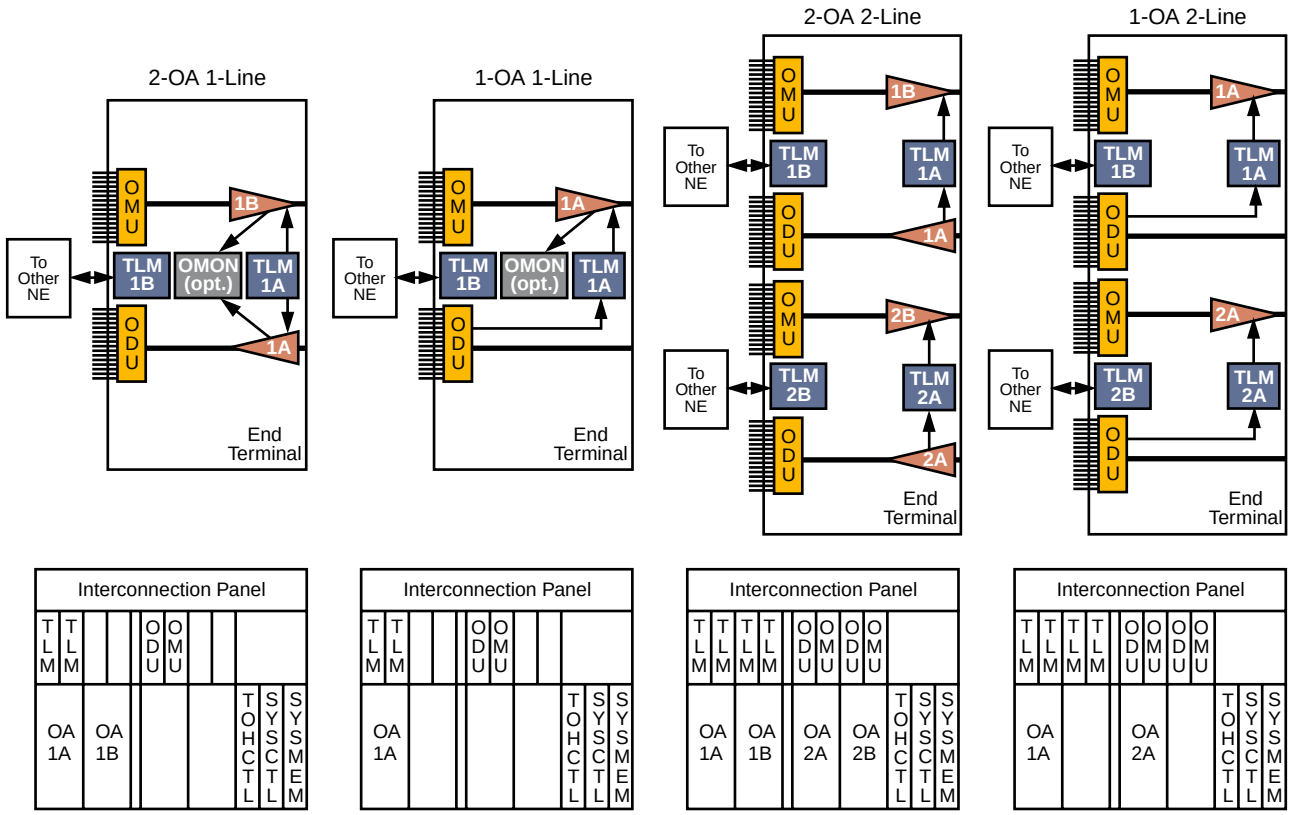


Figure 9-10 1A-RCV-THRU-32

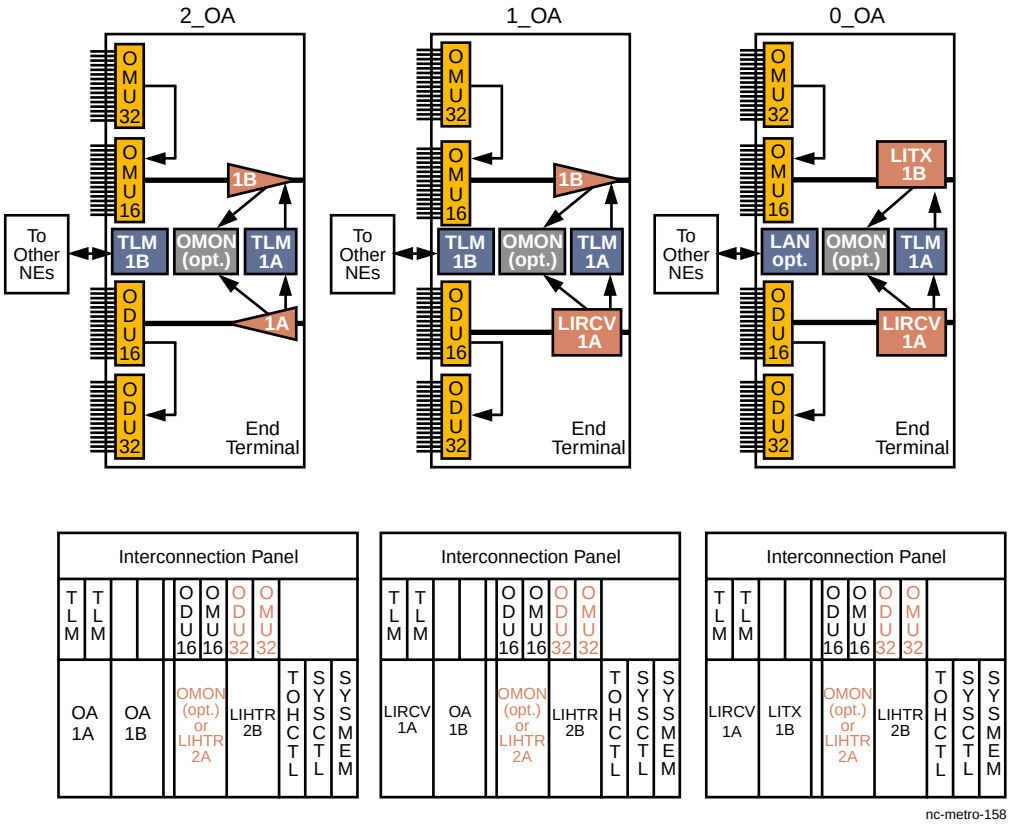
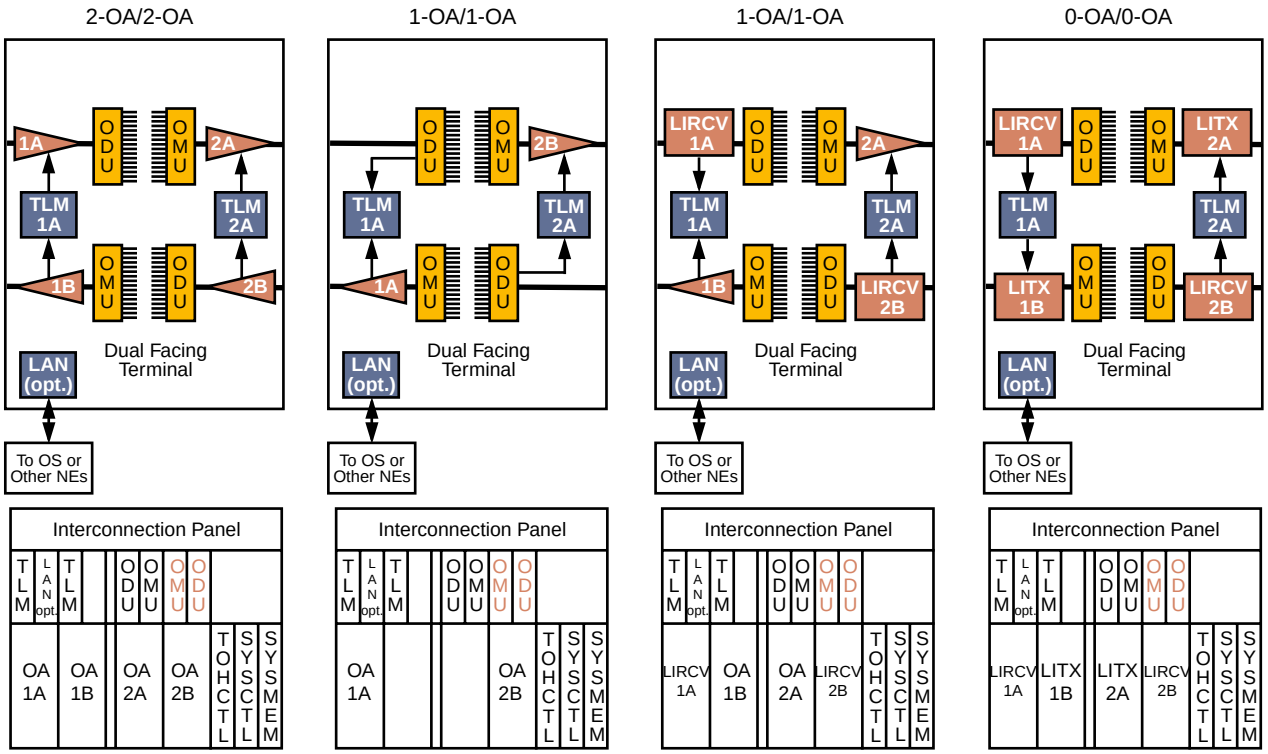


Figure 9-11 DUAL



AIDs and shelves

The following table lists circuit pack AIDs in alphabetical order and indicates which shelf or shelves that circuit pack could be in.

AID	Possible Shelf Location(s)			
	EON in End or Ring Terminal	Repeater	OT – 1st Set	OT – 2nd Set
lan	Yes	Yes	No	No
oa-{1a,1b,2a,2b}	Yes	Yes	No	No
otpm-1-{1,3,5,...,31}-{1-4}	No	No	Yes	No
otpm-2-{1,3,5,...,31}-{1-4}	No	No	No	Yes
otu-1-{1-32}-{1-4}	No	No	Yes	No
otu-2-{1-32}-{1-4}	No	No	No	Yes
ou-{1a,1b,2a,2b}	Yes	No	No	No
oupsr-1-{1-32}	No	No	Yes	No
oupsr-2-{1-32}	No	No	No	Yes

AID	Possible Shelf Location(s)			
	EON in End or Ring Terminal	**Repeater**	**OT – 1st Set**	**OT – 2nd Set**
sysctl	Yes	Yes	No	No
sysmem	Yes	Yes	No	No
tlm-{1a,1b,2a,2b}	Yes	Yes	No	No
tohctl	Yes	Yes	No	No

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Circuit Pack, Carrier, and DCM codes

The following table lists pack types, functions, and codes.

Pack Type	Pack Function	Code Pattern (xx = channel no.) (yy = kilometers)
2DM25	2:1 MUX Add/Drop OTU	41Mxx
DCM	Dispersion Compensation	EONDCMyy
ELSBB	Add OTPM	44Cxx
ELSBB	Drop OTPM	44BC
Gb-E	Add OTU	41Fxx
Gb-E	Drop OTU	41G
LSBB	Add OTPM	44Axx
LSBB	Drop OTPM	44B
OC-12/STM-4	Add OTPM	42Axx
OC-12/STM-4	Drop OTPM	42B
OC-192/STM-64/ OCh10G	Add OTU	41HxxA
OC-192/STM-64/ OCh10G	Through OTU	41HxxC
OC-192/STM-64/ OCh10G	Through OTU	41HB
OC-3/STM-1	Add OTPM	43Axx
OC-3/STM-1	Drop OTPM	43B
OC-48/STM-16	Add OTPM	46Axx
OC-48/STM-16	Add OTU	41AxxC 41CxxC
OC-48/STM-16	Drop OTPM	46B
OC-48/STM-16	Drop OTU	41B
OC-48/STM-16	Drop OTU	41HB
QOTU	carries up to four OC-3, OC-12, LSBB, or ELSBB OTPMs	41S

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Pack Type	Pack Function	Code Pattern (xx = channel no.) (yy = kilometers)
QOTU25	carries up to four OC-48/STM-16 OTPMs	41T
QOTUUB	carries up to four UBB OTPMs	41U
UBB	Add OTPM	47Axx
UBB	Drop OTPM	47B
UBB	Through OTPM	47Cxx

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DLP-504: Test Office Alarm Operation

Purpose This task is used to test the operation of the office alarm.

Task Follow the steps below to test the alarm.

Important! Each step has a four-second duration.

1 At the CIT, select **FAULT.Test.Alarm** and **Mode:All** with **Repeat:1**.

2 Verify the CR, MJ, and MN visual LED indicators are sequentially ***lighted*** for four seconds and then remain ***off*** per the sequence listed in the table in "Sequence chart" (9-27). The NE ACTY LED indicator will be lighted for the duration of the test. The FE ACTY and ABN LED indicators are not lighted during this test. Also, the office audible alarms should be activated during this test.

3 Did the office alarms operate as described?

If	Then
YES	STOP! YOU HAVE COMPLETED THIS TASK.
NO	Refer problem to the group that installed the equipment.

END OF STEPS

Sequence chart

Important! Each step has a four-second duration.

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The following table lists the sequence in which the CR, MJ/PROMPT, and MN/DEFR LED indicators are ***lighted*** for four seconds and then remain ***off***.

Step	Alarm LED Indicators at User Panel					
	CR	**MJ/ PROMPT**	**MN/ DEFR**	**NE ACTY/ INFO-N**	**ABN**	**FE ACTY/ INFO-F**
1	Off	Off	Off	***Lighted***	Off	Off
2	***Lighted***	Off	Off	***Lighted***	Off	Off
3	Off	***Lighted***	Off	***Lighted***	Off	Off
4	Off	Off	***Lighted***	***Lighted***	Off	Off
5	Off	Off	Off	***Lighted***	Off	Off
6	Off	Off	Off	Off	Off	Off

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DLP-507: Identify Source of Incoming Signal

Purpose Use this task to identify the signal source associated with an incoming signal condition so that you can issue a Trouble Report to the personnel at that location.

Task

1 Find the condition to be reported in the following table and continue with the indicated step.

If this condition	Then go to
Incoming CMS SD (signal degrade)	Step 2
Incoming CMS SF (signal failure)	Step 2
Incoming optical channel LOS (loss of signal)	Step 4
Incoming optical line LOS (loss of signal)	Step 7
Incoming supr chnl fail	Step 7
Incoming supr chnl SD (signal degrade)	Step 7
Incoming supr chnl SF (signal failure)	Step 7
Incoming {signal type} failure	Step 9
Incoming {signal type} LOS	Step 9

Important! The source of the incoming signal condition is at the upstream network element, meaning the transmit location for the incoming signal.

2 From office records, determine the location of the customer provided equipment and send a Trouble Report to the personnel responsible for maintaining that site.

3 STOP! YOU HAVE COMPLETED THIS TASK.

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4 Is this incoming optical channel LOS (loss of signal) in the receive line direction or transmit line direction?

If	Then
Transmit direction	Continue with Step 5.
Receive direction	Continue with Step 7.

Important! The source of the incoming signal condition is the OTU/OTPM or compatible optics.

5 From office records, determine the location of the OTU/OTPM or compatible optics associated with this channel and send a Trouble Report to the personnel responsible for maintaining that site.

6 STOP! YOU HAVE COMPLETED THIS TASK.

Important! The source of the incoming signal condition is the upstream network element in the direction of the incoming signal.

7 From office records, determine the location of the upstream network element and send a Trouble Report to the personnel responsible for maintaining that site.

8 STOP! YOU HAVE COMPLETED THIS TASK.

Important! The source of the incoming signal condition is the upstream network element. Upstream network element meaning the transmit location for the incoming signal.

9 From office records, determine the location of the upstream network element associated with this OTU/OTPM and send a Trouble Report to

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the personnel responsible for maintaining that site.

END OF STEPS

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DLP-509: Install/Remove Apparatus (Circuit Pack) Blank

Purpose

This task is used to install and/or remove the apparatus blank.

Task

1 Is an apparatus blank to be installed or removed?

To be	Then
Installed	Continue with Step 2.
Removed	Continue with Step 7.

2 Position the apparatus blank vertically with its white painted surface towards you and its two extended protrusions away from you and on the right side.

3 Insert the extended protrusion of the bottom of the apparatus blank into the bottom of the circuit pack slot and snap its spring-clip notch over the bottom shelf cross-support channel.

4 Carefully bend the apparatus blank so that it is slightly bowed towards you in the middle, insert its top protrusion into the top of the circuit pack slot, and snap its spring-clip notch over the top shelf cross-support channel.

5 Push the center of the apparatus blank inwards to fully seat it and to eliminate any residual bowing.

6 STOP! YOU HAVE COMPLETED THIS TASK.

7 Is there a vacant slot adjacent to the apparatus blank to be removed?

If	Then
YES	Continue with Step 8.

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If	Then
NO	Continue with Step 12.

8 Carefully bend the apparatus blank so that it is slightly bowed towards you in the middle, unsnap its spring-clip notch from the top shelf cross-support channel, and remove its top protrusion from the top of the circuit pack slot.

9 Unsnap the spring-clip notch of the apparatus blank from the bottom shelf cross-support channel and remove the bottom extended protrusion from the bottom of the circuit pack slot.

10 Lift the apparatus blank from the slot.

11 STOP! YOU HAVE COMPLETED THIS TASK.

12 Use a flat-bladed screwdriver against the bottom shelf cross-support channel to pry the apparatus blank's bottom edge upward and forward.

13 Lift the apparatus blank from the slot.

END OF STEPS

DLP-510: Inspect and Clean Optical Fiber Connectors

Overview

This procedure describes the Lucent recommended method for the cleaning and inspection of optical connectors using specific tools and materials that have been proven to be effective in the assembly and testing of optical transmission equipment. It is critical that the connector endfaces are clean and free from particular contamination to assure proper performance and reliability of lightwave systems. With the modern high speed, high power and wider bandwidth optical transmission systems, clean connectors along the optical path are absolutely essential for successful operation.

Equipment required

For proper cleaning, the following equipment and materials are recommended:

Product	Model	Comcode	ITE #	Installation Order #
Optical Fiber Scope	Noyes OFS 300-200X	408197028	ITE-7129	33712900
2.5mm Universal adapter cap	for use with Noyes OFS 300-200X	408197044	ITE-7129D1	33712901
1.25mm Universal adapter cap	for use with Noyes OFS 300-200X	408197069	ITE-7129D2	33712902
SC angled adapter	for use with Noyes OFS 300-200X	408376812	ITE-7129D3	33712903
Individual pre-saturated alcohol wipes	99% pure isopropyl alcohol	901375147	ITE-7136	33713600
CLETOP Cleaning Cassette	Type A Reel	901375154	ITE-7137	33713700
CLETOP Cleaning Cassette Replacement Reel	Type A Reel	901375014	ITE-7137 D1	33713701
Luminex Stick port cleaners	1.25 mm	901375030	ITE-7134	33713400
Luminex Stick port cleaners	2.5 mm	901375022	ITE-7135	33713500

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Product	Model	Comcode	ITE #	Installation Order #
Luminex Cloth	5.5” x 5.5”	408201226	R6033	23603300
Video Optical Fiber Inspection Microscope	Noyes VFS-1	408356830	ITE-7146	41714600
FC adapter	for use with Noyes VFS-1	408356863	ITE-7146D3	33714603
1.25 mm adapter	for use with Noyes VFS-1	408356848	ITE-7146D1	33714601
2.5 mm adapter	for use with Noyes VFS-1	408356855	ITE-7146D2	33714602
LC adapter	for use with Noyes VFS-1	408356889	ITE-7146D4	33714604
SC adapter	for use with Noyes VFS-1	408356954	ITE-7146D5	33714605
ST adapter	for use with Noyes VFS-1	408356962	ITE-7146D6	33714606

The equipment and material listed above has been tested and is proven effective when used in conjunction with this procedure. Substitution of equipment or materials is at the discretion of the user and is not recommended by Lucent.

Safety instructions

Never view an energized optical cable with the naked eye or with an optical magnifying instrument. Disconnected or separated optical connectors may emit invisible laser radiation and direct exposure can severely injure the eye. If inspecting the endface of a connector with a fiberscope, be absolutely certain that the system is deactivated.

Alcohol is flammable and is harmful if swallowed, inhaled or absorbed through the skin. Keep alcohol away from heat, sparks, or flame. Avoid contact with eyes, skin and clothing.

Optical fiber connectors

The procedure that follows utilizes the “Wet/Dry” method for connector cleaning. This method first applies a “wet” solvent (high purity alcohol) to the connector endface to dissolve/remove any organic particulate or oily films, followed by a “dry” double clean wipe using the CLETOP cleaning cassette.

This procedure is recommended for connector ferrules 2.5 mm and 1.25 mm in diameter associated with ST, SC, FC, and LC connectors. The ferrule of a fiber optic connector consists of a ceramic or stainless steel cylinder with a hole located longitudinally down the center of its axis, allowing enough tolerance for a fiber to pass through.

All optical connectors should be cleaned prior to connectorization. Keep the protective ferrule dust cap in place on the connector until initiating the cleaning process.

Clean optical fiber connectors

The following cleaning procedure is acceptable for field service/ installation activities.

1 Remove the dust cap from the connector ferrule exposing the endface of the connector.

2 Open an individual foil packet of pre-saturated isopropyl alcohol (99% pure) wipe. Grasp the connector housing and place the connector ferrule endface perpendicular to the alcohol wipe. Drag it against the wipe three (3) times in a figure eight pattern. This action applies the alcohol solvent to the endface and initially loosens and scrubs away organic/solid contaminants.

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3 If a CLETOP cassette cleaner is not available, proceed with Step 7. Otherwise, hold the CLETOP cassette cleaner in the palm of your hand with the cassette shutter door facing up. Rotate the cassette lever all the way down with your thumb. Do not release the lever. The lever advances the “dry” Luminex cleaning cloth inside the case and simultaneously opens the shutter. The CLETOP cassette shutter door is now open and ready for cleaning the connector.

4 Insert and press the connector ferrule endface perpendicular against the cleaning cloth in the first of two slots of the cleaner. Drag it down in the direction indicated by the arrows on the cleaner. Do not release the lever of the cassette.

5 Lift the connector from the first slot and rotate it 90 degrees and repeat the wiping procedure using the second slot. Be sure the ferrule is pressed snug against the cleaning cloth while dragging the ferrule to assure the proper cleaning action.

6 Release the cassette lever allowing the shutter door to close to its initial position. Continue with Step 8.

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7 Wrap a Luminex cleaning cloth around the ferrule and rotate the connector housing, cleaning the outside periphery of ferrule. Follow this by folding an unused portion of the cloth over the end of the ferrule endface and then with light pressure from the thumb, slightly drag the cloth from the center of the ferrule to the edge while rotating the connector 360 degrees. If the Luminex cleaning cloth is not available, a lint free cleanroom optic wipe can be used. The Luminex cleaning cloth is washable and can be used multiple times. The optic wipes are single use and disposable.

8 Inspect the connector for cleanliness. If necessary, repeat the cleaning process.

END OF STEPS

Inspect Connectors

After cleaning the connector, inspect the ferrule endface to ensure that it is free from significant particulate contamination using an optical fiber inspection scope of at least 200X magnification. When using an optical fiber scope (for example, the Noyes OFS 300-200X) exercise extreme caution to assure fiber being examined is de-energized.

Important! Use an optical power meter to verify the connector and fiber to be cleaned has been de-energized/deactivated before viewing.

1 Follow the instructions in the manual provided with the Optical Fiber Scope to view the ferrule endface of the fiber under inspection.

2 The visual area of the ferrule endface (ferrule and fiber) as observed by the inspection system/scope should be free of any contaminants (see the following figure).

Result: No fixed type of contamination (contaminants which after 3 wet-dry cleaning operations remain at the same location on the connector endface), regardless of size, is allowed in the restricted area of the glass fiber endface as determined after 3 successive wet-dry cleaning attempts. The restricted area is defined as ~66 micron (mm) diameter for both single-mode and multimode fibers. Chips,

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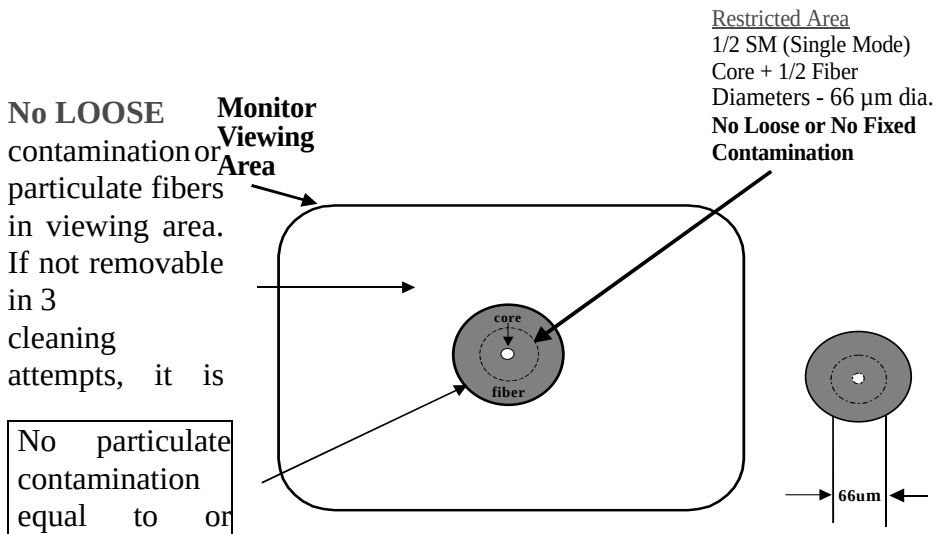
cracks, and scratches are not allowed near the core of the glass fiber endface. No large floating (loose) contaminants are allowed on the glass fiber and ceramic ferrule endface. If after 3 successive wet-dry cleaning attempts, particulate that is less than 8 mm in size remains fixed on the ceramic ferrule endface and outside the defined restricted area on the fiber glass endface, it will be acceptable.

Figure 9-12 Acceptability Criteria: Single-Mode and Multimode Fibers



3 After the connector has been verified to be cleaned, it should be immediately inserted into the adapter buildout of the optical component. This will assure maximum cleanliness and effectiveness of the connector.

4 If the cleaned connector can not be “connectorized” with a corresponding adapter, the connector ferrule must be protected with a connector dust cap. Before placing the cap on the ferrule, make sure the cap is clean. This can be accomplished by inserting a CLETOP stick cleaner (swab) of the same inside diameter as the cap (either 2.5 or 1.25 mm) and rotate the stick 360 degrees three (3) times. Following this

procedure, carefully place the cap over the ferrule. When the cleaned connector is ready for assembly, it should be re-inspected for cleanliness prior to connectorization.

END OF STEPS

Clean optical fiber adapters and circuit pack connectors

During testing and/or trouble shooting activities it may be necessary to clean the optical buildout adapter and the circuit pack connector. The following procedure is recommended.

Important! Do not attempt to clean ports equipped with yellow lightguide buildout (LBO) attenuators. Attenuators contain a thin glass lens that is extremely fragile and would be damaged by cleaning by a mechanical means. Discard any contaminated LBOs.

1 Using the appropriate CLETOP stick cleaner (2.5 mm for SC, ST, and FC connectors, 1.25 mm for LC connectors) dampen the stick cleaner with Ethyl alcohol using the alcohol wipe. Insert the stick cleaner into the adapter rotating the stick 360 degrees while inserting. Push/rotate stick until the stick cleaner makes contact with the ferrule end face. Apply slight pressure upon contact and rotate stick 360 degrees at least three (3) times.

2 Remove the stick cleaner rotating it upon removal.

3 Using a dry CLETOP stick cleaner of appropriate diameter, repeat the above cleaning procedure. This procedure will clean the sidewalls of the adapter and the endface of the circuit pack connector.

END OF STEPS

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DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover

Purpose

This task is used to open/close the cabinet doors or to install/remove the shelf cover.

Supporting tasks

This task refers to the following supporting task.

- "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

CAUTION

Electrostatic Discharge

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

Determine cabinet installation

1 Is the network element cabinet installed or miscellaneously mounted?

If	Then
Cabinet installed	Continue with "Open cabinet doors" (9-42).
Miscellaneously mounted	Continue with Step 2.

2 Locate the appropriate shelf cover.

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

3 Is the cover being installed or removed?

If	Then
Removed	Continue with "Remove cover" (9-42).
Installed	Continue with "Install cover" (9-42).

END OF STEPS

Remove cover

1 At the top of each cover, locate a latch at each corner.

2 Unlatch the cover, swing toward you three inches and lift the cover from the shelf frame.

END OF STEPS

Install cover

1 Place the cover bottom into the shelf frame.

2 Close the cover until both top corners latch.

3 STOP! YOU HAVE COMPLETED THIS TASK.

4 Locate the appropriate cabinet.

Reference: "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

5 Are the doors being opened or closed?

If	Then
Opened	Continue with "Open cabinet doors" (9-42).
Closed	Continue with "Close cabinet doors" (9-43).

END OF STEPS

Open cabinet doors

1 At the center of the right door, locate the latch release push button and press in and release. The latch handle will pop out.

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2 Grasp the latch handle and open the door, now the left-hand door can be opened.

END OF STEPS

Close cabinet doors

1 Close the left-hand door first.

2 Close the right-hand door and press down on the latch handle.

END OF STEPS

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DLP-512: Install/Remove Lightguide Buildout

Purpose This task is used to install and/or remove the lightguide buildout.

Task

CAUTION

Electrostatic Discharge

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

Important! The table on "LBO types (maximum reflectance = −30 dB)" (9-48) lists the color and values of LBOs. The green LBOs must be used when adding channels because of their finer granularity. If yellow LBOs are already installed, you do not need to go back and replace with green LBOs.

1 Is the buildout being installed or removed (see "ST, block, and buildouts" (9-46))?

To	Then
Install	Continue with "Install buildout" (9-44).
Remove	Continue with "Remove buildout" (9-45).

END OF STEPS

Install buildout

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

1 Remove the protector caps and plugs (if equipped) from the buildout and buildout block and store them in a clean container.

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2 Align the buildout with the slot in the buildout block, push in, and rotate clockwise until locked into position. Refer to the appropriate figure ("ST, block, and ST buildout" (9-46), "ST, block, and FC buildout" (9-47), "ST, block, and SC buildout" (9-47), or "LC connector" (9-47)) for the specific buildout type.

END OF STEPS

Remove buildout

CAUTION

Locking beam must only be pushed along a line perpendicular to buildout body in direction towards the buildout in order to avoid damage to the locking beam.

1 Depress the locking beam on the buildout, rotate counterclockwise, and separate from the buildout block by sliding apart. Refer to the appropriate figure ("ST, block, and ST buildout" (9-46), "ST, block, and FC buildout" (9-47), "ST, block, and SC buildout" (9-47), or "LC connector" (9-47)) for the specific buildout type.

END OF STEPS

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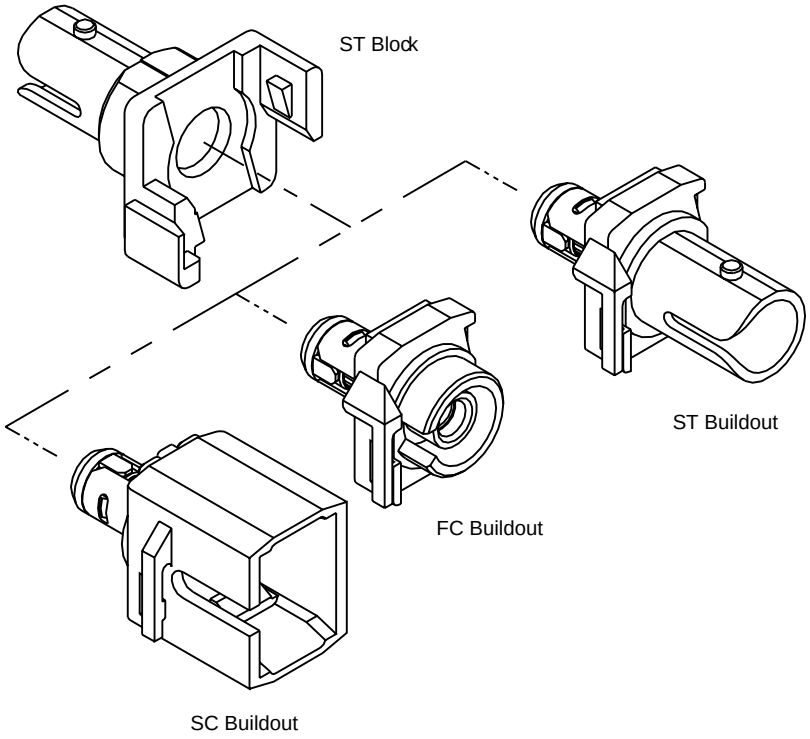
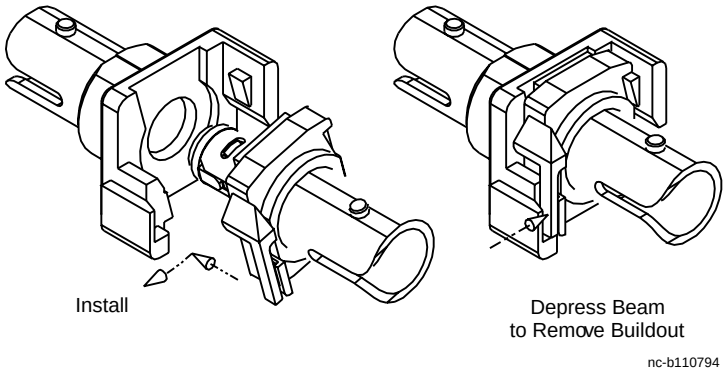
ST, block, and buildouts The following figure illustrates the ST, block, and buildouts.



ST, block, and ST buildout The following figure illustrates the ST, block, and ST buildout.



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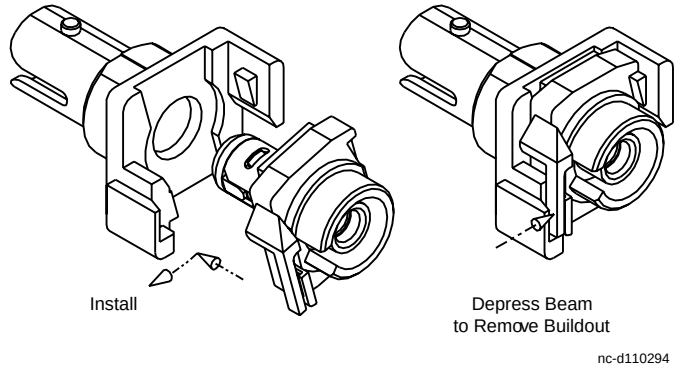
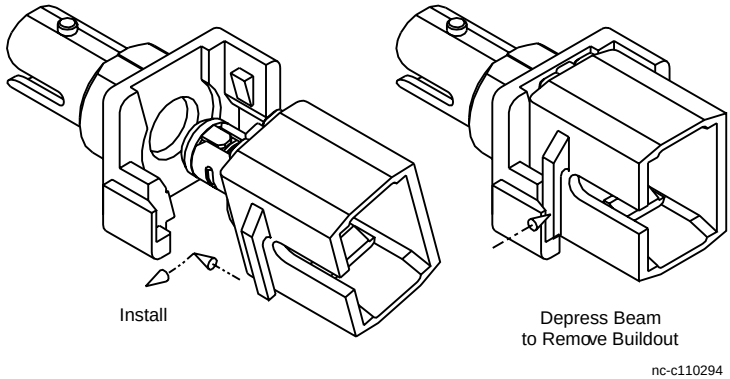
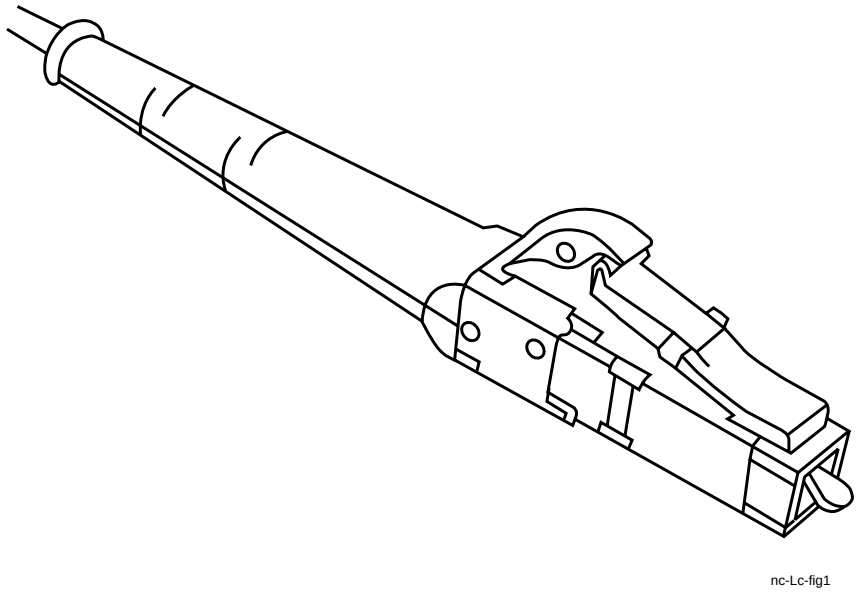
ST, block, and FC buildout The following figure illustrates the ST, block, and FC buildout.



ST, block, and SC buildout The following figure illustrates the ST, block and SC buildout.



LC connector The following figure illustrates the LC connector.



LBO types (maximum reflectance = –30 dB)

The following table lists the LBO types and associated parameter values.

LBO Color	Fiber Use[1]	Attenuation Values	Connectors Supported	Wavelength at Nominal Attenuation (nm)	Attenuator Element (dB)	Optical Power Limits (dBm)[2]
	SM-SM	0				
	SM-MM		ST and FC	No restriction	—	Connector limited
White	MM-MM					
	MM-MM	5, 10, 15, 17.5	ST	1310	Clear for 5	≤20
					Tinted for 10, 15, 17.5	≤5
	SM-SM					
	SM-MM	0	SC	No restriction	—	Connector limited
Blue	MM-MM					
	MM-MM	5, 10, 15, 17.5	SC	1310	Clear for 5	≤20
					Tinted for 10, 15, 17.5	≤5
Yellow	SM-SM	3, 5, 7, 10, 15, 20	ST, FC, and SC	1310 to 1550[3]	Clear for ≤10	≤20
					Tinted for >15	≤5
Green[4]	SM-SM	3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 16, 18, 20	ST and FC	1550	Clear	≤20
		3, 3.5, 4, 4.5, 5 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10	SC	1550	Clear	≤20
Gray[5]	SM-MM	5, 7, 10, 12, 15, 17, 20	ST and FC	1550	Tinted	≤5

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Notes:

1. SM – Single-mode fiber, MM – Multi-mode fiber.
2. These optical power values are conservative estimates.
3. The Yellow LBOs have nominal values appropriate to both 1310 and 1550 nm. Worst case tolerance on attenuation is ±15% of nominal attenuation.
4. Green LBOs are highly recommended for 16 wavelength systems due to their finer granularity. These LBOs have nominal values appropriate to 1550 nm. Tolerance is ±0.3 dB of nominal attenuation for 3 to 15 dB values, and ±1 dB for 18 or 20 dB values. Use at the IN and OUT connectors of the OC48/STM16 OTU. Use at the OUT connectors of the transmit OTPMs (toward line).
5. Use at the IN connector of ALL drop-side OTPMs and ALL Lucent OC-3, OC-12, and LSBB receivers that are used directly with Metropolis® EON without drop-side OTPMs.

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DLP-514: Install/Remove Circuit Pack

Purpose This task is used to install and/or remove a circuit pack.

Supporting tasks This task refers to the following supporting tasks.

- "DLP-509: Install/Remove Apparatus (Circuit Pack) Blank" (9-32)
- "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)
- "DLP-512: Install/Remove Lightguide Buildout" (9-44)
- "DLP-524: Select an LBO at the OTU/OTPM IN" (9-81)
- "DLP-525: Connect/Disconnect Optical Fibers at OTU/ OTPM" (9-88)

Task

CAUTION

Electrostatic Discharge

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

CAUTION

Data Loss

Do not remove the SYSCTL circuit pack unless instructed to by the task that sent you here. If the SYSCTL circuit pack is removed, provisioning data could be lost.

Important! Verify that all fibers are labeled to prevent possible service interruption.

1 Are you to install or remove a circuit pack?

If	Then
Install	continue with Step 2.
Remove	continue with Step 3.

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2 What type of circuit pack is being installed?

If	Then continue with
DCM	“Install DCM” (9-61).
IAOLRP circuit pack	“Install IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL” (9-56).
LIRCV circuit pack	“Install OA, LITX, LIRCV, or LIHTR” (9-56).
LITX circuit pack	“Install OA, LITX, LIRCV, or LIHTR” (9-56).
OA circuit pack	“Install OA, LITX, LIRCV, or LIHTR” (9-56).
OTCTL circuit pack	“Install IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL” (9-56).
OTPM circuit pack	“Install OTPM” (9-67).
OTU circuit pack	“Install OTU or OUPSR” (9-65).
OUPSR circuit pack	“Install OTU or OUPSR” (9-65).
QOTU circuit pack	“Install QOTU” (9-68).
SYSCTL circuit pack	“Install IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL” (9-56).
SYSMEM circuit pack	“Install IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL” (9-56).
TLM circuit pack	“Install TLM” (9-60).
TOHCTL circuit pack	**Important!** Incomplete retrieve reports will be obtained if sufficient time has not elapsed as indicated in the Mini Reset Waiting Time table of the task that sent you here. “Install IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL” (9-56).

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3 What type of circuit pack is being removed?

If	Then continue with
DCM	"Remove DCM" (9-62).
IAOLRP circuit pack	"Remove IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL" (9-55).
LIRCV circuit pack	"Remove OA, LITX, LIRCV, or LIHTR" (9-52).
LITX circuit pack	"Remove OA, LITX, LIRCV, or LIHTR" (9-52).
OA circuit pack	"Remove OA, LITX, LIRCV, or LIHTR" (9-52).
OTCTL circuit pack	"Remove IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL" (9-55).
OTPM circuit pack	"Remove OTPM" (9-63).
OTU circuit pack	"Remove OTU or OUPSR" (9-62).
OUPSR circuit pack	"Remove OTU or OUPSR" (9-62).
QOTU circuit pack	"Remove QOTU" (9-64).
SYSCTL circuit pack	"Remove IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL" (9-55).
SYSMEM circuit pack	"Remove IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL" (9-55).
TLM circuit pack	"Remove TLM" (9-54).
TOHCTL circuit pack	"Remove IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL" (9-55).

END OF STEPS

Remove OA, LITX, LIRCV, or LIHTR

CAUTION

Optical Amplifier Damage

The OA3 (LEA307) amplifier can be damaged by a dirty fiber, adapter, or OUT port connector. When disconnecting an

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output fiber from an OA3, always place dust covers on the fiber and in the OUT port connector.

1 Remove any optical fibers from the guide below the shelf for the circuit pack being removed.

DANGER

Eye Damage

Unseat the circuit pack from the backplane before removing the output optical connector.

2 Disengage the circuit pack from the shelf.

3 Remove the incoming fiber from the IN optical connector of the circuit pack and install a protector cap on the fiber and a protector plug on the connector.

4 Remove the outgoing fiber from the OUT optical connector of the OA circuit pack and install a protector cap on the fiber and a protector plug on the connector.

5 Remove the optical fibers from the TLM IN and/or TLM OUT connectors of the circuit pack and install protector caps on the fibers and protector plugs on the connectors.

6 If this is an OA3 pack, remove the optical fibers from the DCM IN and DCM OUT connectors of the circuit pack and install protector caps on the fibers and protector plugs on the connectors.

7 Remove any buildouts from the circuit pack and store for future use.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

Important! DO NOT ROCK THE CIRCUIT PACK BACK AND FORTH.

8 Remove the circuit pack from the shelf by carefully sliding the circuit pack out of the slot guides to remove it from the shelf.

9 Are you to install another circuit pack in this slot?

If	Then
YES	continue with "Install OA, LITX, LIRCV, or LIHTR" (9-56).
NO	Install an apparatus blank to ensure proper air flow and cooling. **Reference:** "DLP-509: Install/Remove Apparatus (Circuit Pack) Blank" (9-32)

END OF STEPS

Remove TLM

1 Remove the optical fibers from the slot guide on the shelf. This is to prevent damage to the fiber when the circuit pack is removed.

2 Remove the incoming fiber from the IN optical connector of the TLM circuit pack and install a protector cap on the fiber.

3 Remove the outgoing fiber from the OUT optical connector of the TLM circuit pack and install a protector cap on the fiber.

4 Which TLM circuit pack is being removed?

If	Then
LDA1	continue with Step 4.

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If	Then
LDA4	**Important!** The LDA4 Telemetry circuit pack does not have a Customer Maintenance Signal. continue with Step 5.

5 Remove the optical fibers from the CM IN and CM OUT connectors of the TLM circuit pack and install protector caps on the fibers.

6 Remove any LBOs from the TLM circuit pack and store for future use.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

7 Install an apparatus blank into any slots left empty by this procedure. This is essential to ensure proper air flow and cooling.

Reference: "DLP-509: Install/Remove Apparatus (Circuit Pack) Blank" (9-32)

END OF STEPS

Remove IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL

Important! Do not rock the circuit pack back and forth.

1 Remove the circuit pack from the shelf.

1. Push up on the locking clips to unlock the circuit pack latches.
2. Unseat the circuit pack by carefully and continuously pulling out on the circuit pack latches.
3. Carefully slide the circuit pack out of the slot guides to remove it from the shelf.

2 Are you to install another circuit pack in this slot?

If	Then
YES	continue with "Install IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL" (9-56).
NO	Install an apparatus blank to ensure proper air flow and cooling. **Reference:** "DLP-509: Install/Remove Apparatus (Circuit Pack) Blank" (9-32)

END OF STEPS

Install IAOLRP, OTCTL, TOHCTL, SYSMEM, or SYSCTL

1 Install the circuit pack into the slot.

1. If necessary, close both latches on the circuit pack.
2. Place the circuit pack into the slot guides and slowly slide it into the shelf until the latches touch the shelf. DO NOT ROCK THE CIRCUIT PACK OR UNIT BACK AND FORTH.
3. Open the latches and push the circuit pack until it engages the connector pins.
4. With a thumb on each latch, continue sliding the circuit pack with one firm, continuous motion until the latches are fully engaged (the clips are in the locked position).

END OF STEPS

Install OA, LITX, LIRCV, or LIHTR

Note: An OA3 can be used with zero, one, or two DCMs.

1 Is the circuit pack being installed either an end terminal receive circuit pack or a single OA configuration transmit circuit pack?

If	Then
NO	continue with Step 11.
YES	continue with Step 2.

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DANGER

Eye Damage

Do not seat the OA until you have connected the output fiber.

2 Install the circuit pack into the slot as follows:

1. If necessary, close both latches on the circuit pack.
2. Place the circuit pack into the slot guides and slowly slide it into the shelf until the latches touch the shelf, but do not seat the pack.

CAUTION

Optical Amplifier Damage

The OA3 (LEA307) amplifier can be damaged by a dirty fiber, connector, or LBO. Before connecting to the OUT port on the OA3, always clean the OUT port connector on the OA3 and the fiber you are about to connect. See DLP-510 for details.

3 Clean and connect the outgoing optical fiber to the OUT connector of the circuit pack.

4 Clean and connect the TLM IN and/or OUT optical fibers to their proper locations.

5 Are you connecting zero, one, or two DCMs to this OA?

If	Then
Zero	If this is an OA3, connect a fiber jumper from DCM OUT to DCM IN on the OA. Otherwise, no action is required.

If	Then
One	Connect a fiber jumper from the DCM OUT port on the OA to the IN port on the DCM. Then connect a fiber jumper from the OUT port on the DCM to the DCM IN port on the OA. **Reference:** "Install DCM" (9-61)
Two	Connect a fiber jumper from the DCM OUT port on the OA to the IN port on the first DCM. Then connect a fiber jumper from the OUT port on the first DCM to the IN port on the second DCM. Then connect a fiber jumper from the OUT port on the second DCM to the DCM IN port on the OA. **Reference:** "Install DCM" (9-61)

DANGER

Eye Damage

Keep in mind that as soon as you seat the OA, the other end of the output fiber emits a dangerous level of optical power.

6 Seat the circuit pack into the shelf as follows:

1. Open the latches and push the circuit pack until it engages the connector pins.
2. With a thumb on each latch, continue sliding the circuit pack with one firm, continuous motion until the latches are fully engaged (the clips are in the locked position).

7 Wait until the ***OMU/ODU warmup in progress*** condition clears or wait 15 minutes for the ODU temperature to stabilize.

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8 If required, clean and install the lightguide buildout to the IN connector of the receive circuit pack.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

9 Clean the incoming optical line fiber and connector and make the connection to the IN connector.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

10 STOP! YOU HAVE COMPLETED THIS TASK.

Important! Do not rock the circuit pack back and forth.

11 Install the circuit pack into the slot.

1. If necessary, close both latches on the circuit pack.
2. Place the circuit pack into the slot guides and slowly slide it into the shelf until the latches touch the shelf.

12 If required, install the LBO at the IN and OUT connectors of the circuit pack.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

13 Clean the optical fibers and connectors that will connect to the IN and OUT connectors.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

14 Connect the optical fibers to the LBOs and/or optical connectors at the circuit pack.

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15 Connect the remaining optical fiber(s) to their proper location(s).

16 Seat the circuit pack into the shelf.

1. Open the latches and push the circuit pack until it engages the connector pins.
2. With a thumb on each latch, continue sliding the circuit pack with one firm, continuous motion until the latches are fully engaged (the clips are in the locked position).

END OF STEPS

Install TLM

1 Install the circuit pack.

1. Open the latch on the circuit pack.
2. Place the circuit pack into the slot guides and slowly slide it into the shelf until latch engages the shelf.
3. With a thumb on the latch, continue sliding the circuit pack with one firm, continuous motion until latch is fully engaged (locking clip is in locked position.)

2 Which TLM circuit pack are you installing?

If	Then
installing an LDA1	continue with Step 3.
installing an LDA4	**Important!** The LDA4 Telemetry circuit pack does not have a Customer Maintenance Signal. continue with Step 4

3 If required, install LBOs at the CM IN and CM OUT connectors of the TLM circuit pack.

Reference: “DLP-512: Install/Remove Lightguide Buildout” (9-44)

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4 Clean the optical fibers and connectors.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

5 Connect the optical fibers to the LBOs and/or optical connectors at the TLM circuit pack.

6 Connect the remaining optical fibers to their proper locations.

END OF STEPS

Install DCM

An OA can be used with zero, one, or two DCMs. If using one DCM, connect DCM OUT on the OA to IN on the DCM, then connect OUT on the DCM to DCM IN on the OA. If using two DCMs, connect DCM OUT on the OA to IN on the first DCM, then connect OUT on the first DCM to IN on the second DCM, then connect OUT on the second DCM to DCM IN on the OA.

1 Orient and insert the new DCM into the shelf tray.

2 Tighten the screws holding the DCM in place by turning the screws clockwise.

3 Clean the optical fibers and connectors.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

4 Connect the IN and OUT fibers.

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Remove DCM

1 Identify the OA to which this DCM is connected

> **Reference:** "DLP-503: Locate Circuit Pack/Fiber Connections" (9-13)

2 Locate the correct fiber jumpers to the DCM(s) from the assigned OA. Record on a piece of paper the correct jumper assigned to the DCM IN and OUT connections. Note that an OA can be connected to two DCMs.

3 Remove the fiber jumpers from the IN and OUT connections of the DCM. Place protective caps on the fiber ends and protective plugs on the DCM connectors.

4 Drape the removed fibers so as not to interfere with the DCM removal.

5 Loosen the two screws holding the DCM in place by turning them counterclockwise with a flat bladed screwdriver.

6 Remove the DCM.

Remove OTU or OUPSR

1 Remove the optical fibers from the slot guide on the shelf.

2 Remove the optical fiber(s) from the OUT connector(s) of the circuit pack and install a protector cap on the fiber. (The OUPSR pack has SIG OUT, A OUT, and B OUT connectors.)

3 Remove the optical fiber(s) from the IN connector(s) of the circuit pack and install a protector cap on the fiber. (The OUPSR pack has SIG IN, A IN, and B IN connectors.)

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4 If required, remove any LBOs from the circuit pack and store for future use.

Important! ***Do not rock the circuit pack back and forth***. If the circuit pack being removed is in the left- or right-most slot of the self, the gasket material around the shelf may interfere. Remove the pack carefully, and if the gasket material is dislodged, then replace the gasket material after the replacement pack has been inserted.

5 Remove the circuit pack from the shelf.

1. Push up on the bottom and down on the top metal locking clips to unlock the circuit pack latches.
2. Unseat the circuit pack by carefully and continuously pulling out equally on the top and bottom latches.
3. Carefully slide the circuit pack out of the slot guides to remove it from the shelf.

6 Are you to install another circuit pack in this slot?

If	Then
YES	continue with "Install OTU or OUPSR" (9-65).
NO	Install an apparatus blank to ensure proper air flow and cooling. **Reference:** "DLP-509: Install/Remove Apparatus (Circuit Pack) Blank" (9-32)

END OF STEPS

Remove OTPM

1 Remove the optical fiber from the OUT connector of the OTPM circuit pack and install a protector cap on the fiber.

2 Remove the optical fiber from the IN connector of the OTPM circuit pack and install a protector cap on the fiber.

3 If required, remove any LBOs from the OTPM circuit pack and store for future use.

Important! Do not rock the circuit pack back and forth.

4 Remove the OTPM circuit pack from the QOTU.

1. Unscrew both thumb screws on the OTPM to be removed.
2. Unseat the OTPM by carefully and continuously pulling out equally on the top and bottom thumb screws.
3. Carefully slide the OTPM out of the slot guides to remove it from the QOTU.

5 Are you to install another OTPM circuit pack in this slot?

If	Then
YES	continue with “Install OTPM” (9-67).
NO	Install an apparatus blank to ensure proper air flow and cooling. **Reference:** “DLP-509: Install/Remove Apparatus (Circuit Pack) Blank” (9-32)

END OF STEPS

Remove QOTU

1 Remove the optical fibers from the slot guide on the shelf.

2 Remove the optical fiber from the OUT connectors of each OTPM circuit pack and install a protector cap on the fiber.

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3 Remove the optical fiber from the IN connectors of each OTPM circuit pack and install a protector cap on the fiber.

Important! ***Do not rock the circuit pack back and forth.***

4 Remove the QOTU circuit pack from the shelf.

1. Push up on the bottom and down on the top metal locking clips to unlock the circuit pack latches.
2. Unseat the circuit pack by carefully and continuously pulling out equally on the top and bottom latches.
3. Carefully slide the circuit pack out of the slot guides to remove it from the shelf.

5 Are you to install another QOTU circuit pack in this slot?

If	Then
YES	continue with “Install QOTU” (9-68).
NO	Install apparatus blanks to ensure proper air flow and cooling. **Reference:** “DLP-509: Install/Remove Apparatus (Circuit Pack) Blank” (9-32)

END OF STEPS

Install OTU or OUPSR

CAUTION
Signal Loss

The replacement must have the same circuit pack code or traffic could be interrupted.

Important! ***Do not rock the circuit pack back and forth.***

If the circuit pack being installed is in the left-most or right-most slot of the shelf, the gasket material around the shelf may interfere. Install the pack carefully, and if the gasket material is

dislodged, then replace the gasket material after the circuit pack has been inserted.

1 Install the circuit pack.

1. If necessary, close both latches on the circuit pack.
2. Place the circuit pack into the slot guides and slowly slide it into the shelf until the latches touch the shelf.
3. Open the latches and push the circuit pack until it engages the connector pins.
4. With a thumb on each latch, continue sliding the circuit pack with one firm, continuous motion until the latches are fully engaged (the metal clips are in the locked position).

2 If required, determine value of LBO required for the IN connector(s). (The OUPSR has SIG IN, A IN, and B IN connectors.)

Reference: "DLP-524: Select an LBO at the OTU/OTPM IN" (9-81)

3 Clean optical fibers and connectors.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

4 If required, install LBO at the IN and OUT connectors of the circuit pack. (The OUPSR has SIG IN/OUT, A IN/OUT, and B IN/OUT connectors.)

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

5 Connect the optical fiber to the IN and OUT connectors for the OTU circuit pack. (The OUPSR has SIG IN/OUT, A IN/OUT, and B IN/OUT connectors.)

END OF STEPS

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Install OTPM

CAUTION
Signal Loss

The replacement OTU must have the same circuit pack code or traffic could be interrupted.

Important! ***Do not rock the circuit pack back and forth.***

1 Install the OTPM.

1. Place the OTPM into the slot guides and slowly slide it into the QOTU until the screws touch the frame.
2. Tighten the screws until they are snug. Do not over tighten with a screwdriver.

2 If required determine value of LBO required for the IN connector.

Reference: "DLP-524: Select an LBO at the OTU/OTPM IN" (9-81)

3 Clean optical fibers and connectors.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

4 If required, install LBO at the IN and OUT connectors of the OTPM circuit pack.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

5 Connect the optical fiber to the IN and OUT connectors of the OTPM circuit pack.

Reference: "DLP-525: Connect/Disconnect Optical Fibers at OTU/OTPM" (9-88)

END OF STEPS

Install QOTU

Important! ***Do not rock the circuit pack back and forth.***

1 Install the QOTU.

1. If necessary, close both latches on the circuit pack.
2. Place the circuit pack into the slot guides and slowly slide it into the shelf until the latches touch the shelf.
3. Open the latches and push the circuit pack until it engages the connector pins.
4. With a thumb on each latch, continue sliding the circuit pack with one firm, continuous motion until the latches are fully engaged (the metal clips are in the locked position).

END OF STEPS

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DLP-515: Replace Fuse in Power Distribution and Fuse Panel or User Panel

Purpose This task is used to replace a blown 10A fuse (red lamp is lighted) in the power distribution and fuse panel or in the user panel.

Task

1 Obtain a replacement 10A fuse (Comcode 405749920).

2 Unsnap and lift the latch (from bottom to top) that is around the red lens cap.

3 Push in and down at the top of the red lens cap. Release slowly because the lens cap/fuse should spring forward.

4 Remove the lens cap/fuse from the fuse socket.

5 Remove the blown 10A fuse from the lens cap/fuse and replace with the replacement 10A fuse.

> **Important!** The fuse cap lamp is a fuse status indicator. The cap lamp works correctly when it is fully engaged and the fuse retainer is locked in place. If the lamp lights in any other position, it may incorrectly indicate a bad fuse.

6 Install the lens cap/fuse into the fuse socket by pushing in and up at the bottom of the lens cap.

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7 Lower the latch (from top to bottom) around the red lens cap and snap into place.

END OF STEPS

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DLP-517: Inspect (Repair) Optical Fiber(s)

Purpose

This task is used to correct an input or output fiber problem such as a damaged or disconnected fiber. This task uses fiber in a general sense to refer to the IS-3 fiber, optical channel fiber jumper, or optical line fiber, as appropriate.

Supporting tasks

This task refers to the following supporting task.

- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

Task

1 If required, open the cabinet doors or remove the appropriate shelf cover.

- Interconnection panel cover for low-speed (IS3) fibers.
- Upper shelf cover for IS3 and fiber jumpers
- Lower shelf cover for optical line fibers.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

2 Verify the fibers are properly connected.

3 Visually inspect the fiber, starting at the connector on the local network element and going as far as practical (usually to an interconnection bay or to a cross-connect panel).

4 Correct any problems with the fiber, following local procedures.

5 Close the cabinet doors or replace the cover that was removed in Step 1.

END OF STEPS

□

DLP-521: Install an OMU or ODU

Purpose This task is used to install an OMU or ODU.

Supporting tasks This task refers to the following supporting tasks.

- "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)
- "DLP-512: Install/Remove Lightguide Buildout" (9-44)

Task

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Loss of Signal

This task has the potential to affect transmission and should be performed only under the direction of the maintenance support organization.

Important! ***Do not rock the unit back and forth!***

1 Verify that the top and bottom screws have not been placed back in the shelf, (see "Screw locations" (9-74)).

2 Place the OMU/ODU into the slot guides and slowly slide it into the shelf until it meets the rear shelf connectors.

3 Continue sliding the OMU/ODU with one firm and continuous motion until the OMU/ODU is fully engaged.

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4 Use a Phillips screwdriver to install the top and bottom OMU/ODU screws to mount the unit to the shelf, (see “Screw locations” (9-74)).

5 Install any required LBOs at the OMU/ODU connectors.

Reference: “DLP-512: Install/Remove Lightguide Buildout” (9-44)

6 Clean the optical fibers and connectors.

Reference: “DLP-510: Inspect and Clean Optical Fiber Connectors” (9-34)

7 Connect the optical fibers to the LBOs and/or optical connectors at the OMU/ODU.

8 At the CIT, select the command **CONFIGURATION.Initialize.System:TID:AID(All):PH(3)** and execute so the system will recognize the change.

END OF STEPS

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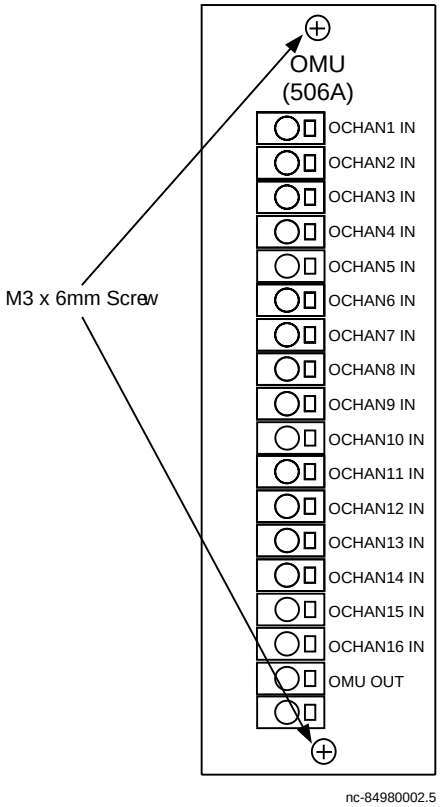
Screw locations The following figure shows the screw locations in a 506A. Other OMUs and ODUs have similar screw locations.



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DLP-522: Replace Power Line Filter

Purpose This task is used to the replace the power line filter.

Task

DANGER

Electric Shock

Do not allow the metal portion of the red or gray lead to touch any metal part of the bay. Do not allow the screws to fall into the bay.

1 Remove the two plastic snap-on fuse guards.

2 Remove the screws from the faceplate of the User Panel or Fuse Panel using a flat-bladed screwdriver.

3 Gently push up and remove the bracket that's for mounting the bottom of the faceplate.

4 Look at the back of the panel and identify the correct power filter to be removed.

- For Metropolis® EON, the top filter is for feeder A and bottom filter is for feeder B.
- For OT, the left mounted filter is for feeder A and the right mounted filter is for feeder B.

5 Make a voltage measurement from the rear of the appropriate fuse, if desired.

- Fuse A — measure between red wire and chassis
- Fuse B — measure between gray wire and chassis.

Result: Voltage between –42.75 and –60 V DC.

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6 Remove any cabling tie down or slid up out of the way, if required.

7 Label and remove the three power leads connected to the power line filter.

8 Loosen the screw holding the filter in place.

9 Remove the defective filter by gently pulling and sliding out the filter.

10 Orient and insert the new filter.

11 Tighten the screw holding the filter in place.

12 Reconnect the three power leads that were removed in Step 7.

13 Attach a cabling tie down on the power leads or slid tie down, if required.

14 Gently insert the faceplate bracket and push down into place.

15 Screw in the faceplate screws.

END OF STEPS

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Filter A power connections

The following table lists the power connections for filter A.

Power Connections for Filter A		
	Red wire	–48A
Black wire		
	Black wire	–48AR

Filter B power connections

The following table lists the power connections for filter B.

Power Connections for Filter B		
	Gray wire	–48B
Black wire		
	Slate wire	–48BR

DLP-523: Replace OT Power Line Filter

Purpose This task is used to replace the OT power line filter.

Task

DANGER

Electric Shock

Do not allow the metal portion of the red or gray lead to touch any metal part of the bay. Do not allow the screws to fall into the bay.

1 Remove the two plastic snap-on fuse guards.

Important! Access to the A filter does not require removal of the faceplate.

2 Remove the screws from the faceplate of the User Panel or Fuse Panel using a flat-bladed screwdriver and remove the faceplate. This will provide access to the B filter.

3 Look at the bracket holding the filter and identify the correct power filter to be removed (left mounted filter, located in bay, is for feeder A and right mounted filter, located in bay, is for feeder B).

4 Make a voltage measurement from the rear of the appropriate fuse, if desired.

- Fuse A — measure between red wire and chassis
- Fuse B — measure between gray wire and chassis.

Result: Voltage between –42.75 and –60 V DC.

5 Remove any cabling tie down or slide up out of the way, if required.

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6 Label and remove the three power leads connected to the power line filter.

7 Loosen the screw holding the filter in place.

8 Remove the defective filter by gently pulling and sliding out the filter.

9 Orient and insert the new filter.

10 Tighten the screw holding the filter in place.

11 Reconnect the three power leads that were removed in Step 7

12 Attach a cabling tie down on the power leads or slide tie down, if required.

13 Gently insert the faceplate bracket and push down into place.

14 Screw in the faceplate screws.

END OF STEPS

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Filter A power connections

The following table lists the power connections for filter A.

Power Connections for Filter A		
–48VR	Black wire	Black wire
–48A	Black wire	

Left Bay Location

Filter B power connections

The following table lists the power connections for filter B.

Power Connections for Filter B		
	Grey wire	–48B
Black wire		
	Slate wire	–48VR

Right Bay Location

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DLP-524: Select an LBO at the OTU/OTPM IN

Purpose

When connecting an input fiber to an OTU or OTPM it is often necessary to install an LBO to bring the signal power down to an acceptable level. This task allows you to select an appropriate LBO, depending on the measured power and the OTU/OTPM type.

Required test equipment

This task requires the following test equipment.

- Wrist strap
- Optical power meter

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)
- "DLP-512: Install/Remove Lightguide Buildout" (9-44)
- "DLP-511: Open/Close Cabinet Doors or Install/Remove Shelf Cover" (9-41)

Task

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

CAUTION

Electrostatic Discharge

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

1 If necessary, open the cabinet doors or remove the shelf cover. All

connections can be accessed from the front.

Reference: "DLP-511: Open/Close Cabinet Doors or Install/ Remove Shelf Cover" (9-41)

2 Are you adding or trouble clearing an optical translator unit (OTU) or optical translator port module (OTPM)?

If	Then
Adding	continue with Step 3.
Trouble clearing	continue with Step 14.

3 Is the OTU/OTPM input fiber jumper coming from a Metropolis® EON or some other type of equipment?

If	Then
Metropolis® EON	continue with Step 9.
Other	continue with Step 4.

4 Remove the protector cap and clean the OTU/OTPM input fiber.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

5 Connect the optical power meter to the OTU/OTPM input fiber cleaned in Step 4 and obtain an optical power measurement.

6 Using the power level reading obtained in Step 5 and "OTU/OTPM input power and LBO selection" (9-85), determine the correct LBO for the IN connector of the OTPM.

7 Install the LBO into the IN connector of the OTU/OTPM.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

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8 STOP! YOU HAVE COMPLETED THIS TASK.

Important! Each OCHAN (1-16) has a different required power level.

9 Determine the required LBO value for the IN connector of the OTU/OTPM.

10 At the OTU/OTPM, if required, remove the protector caps at the IN connector, and clean the fiber coming from the ODU for the channel being added.

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

11 At the OTU/OTPM, connect the optical power meter to the fiber coming from the ODU and obtain an optical power measurement.

12 Determine the LBO value.

1. Open the NE SmartManual Manager from the CenterLink launch console.
2. Use the Standard option unless instructed otherwise. Select **Select Line Build Out (LBO) for RCVR input** task.
3. Complete the task by following the steps displayed on the screen.

13 STOP! YOU HAVE COMPLETED THIS TASK.

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CAUTION

Signal Loss

Make sure the protection tributaries (in 2-fiber) or protection line (in 4-fiber) is available or that the troubled OC-48 on this OT has been manually switched to protection.

Make sure incoming fibers are not carrying service.

14 Remove the fiber jumper connected to the IN connector of the OTU or OTPM involved in this trouble.

15 Connect the optical power meter to the fiber jumper removed from the IN connector of the OTU/OTPM in the previous step and obtain an optical power measurement.

16 Is the input fiber jumper coming from a Metropolis® EON or some other type of equipment?

If	Then
Metropolis® EON	continue with Step 19.
Other	continue with Step 17.

17 Using the power level reading obtained in Step 15 and the appropriate row listed in the table of "OTU/OTPM Input" (9-85), determine if the power level is within range.

18 STOP! YOU HAVE COMPLETED THIS TASK.

19 Determine the LBO value.

1. Open the **NE SmartManual Manager** from the CenterLink launch console.
2. Use the Standard option unless instructed otherwise. Select **Select Line Build Out (LBO) for RCVR input** task.

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3. Complete the task by following the steps displayed on the screen.

END OF STEPS

OTU/OTPM input power and LBO selection

The following table lists OTPM input power and LBO selection.

Measured Input Power (dBm)	IN Port LBO
P < –12 dBm	0
–12 dBm <= P < –08 dBm	5
–08 dBm <= P < –04 dBm	10
–04 dBm <= P < +01 dBm	15
+01 dBm <= P <	20

OTU/OTPM Input

The following tables show input power levels for add and drop OTUs/ OTPMs.

Add OTU Input

Bit Rate	Pack Code	Input Fiber Type	Receive Power Range	
			Min.	Max.
2.5G	41[A,C] xx	SM	-27	-11
OC-48/STM-16	46Ax	SM	-28.6	-11
OC-12/STM-4	42Ax	MM	-28	-11
OC-3/STM-1	43Ax	MM	-33	-11
LSBB 16-750Mb/s	44Ax	MM	-28	-11
GbE	41Fxx	SM	-27	-11
UBB 16M-2.5G	47Ax	MM	-25	-11
	47Cx	SM	-28.6	-11
10G	41HxA	SM	-14	-1
	41HxC	SM	-22	-11
2DM25	41Mx	GbE 1310nm SM	-20	-3

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Bit Rate	Pack Code	Input Fiber Type	Receive Power Range	
			Min.	Max.
		GbE 850nm MM	-17	0
		FICON 1310nm SM	-25	-3
		FICON 850nm MM	-13	+1.3
		FibreChannel 1310nm SM	-25	-3
		FibreChannel 850nm MM	-13	1.3
		ESCON 1310nm SM	-29	-14.5
		ESCON 1310nm MM	-28	-3
		ISC-2 1310nm SM	-20	-3
		ISC-2 850nm MM	-15	+1.3

Drop OTU Input

Bit Rate	Pack Code	Receive Power Range		Target Power Range	
		Min.	Max.	Min.	Max.
10G	41HB	-27	-10	-22	-13
2.5G	46B	-28.6	-10	-22	-13
	41BB	-27	-10	-22	-13
OC-12/STM-4	42B	-30.5	-8	-22	-13
OC-3/STM-1	43B	-34	-7	-22	-13
LSBB/ELSBB	44B/44BC	-30.5	-8	-22	-13
GbE	41G	-27	-10	-22	-13
UBB	47B	-28.6	-10	-22	-13
2DM25 (HS IN)	41M(1-32)	-28.6	-10	-22	-13

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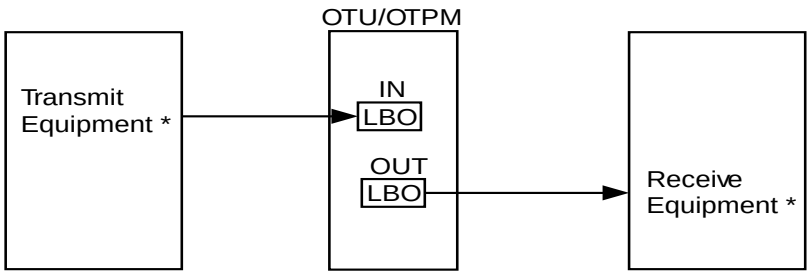
Location of LBOs at OTU (one direction)

The following figure illustrates the location of LBOs at the OTU (one direction).



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DLP-525: Connect/Disconnect Optical Fibers at OTU/OTPM

Purpose

This task is used to connect and/or disconnect optical fibers at the OTU/OTPM.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)
- "DLP-512: Install/Remove Lightguide Buildout" (9-44)
- "DLP-524: Select an LBO at the OTU/OTPM IN" (9-81)

CAUTION

Electrostatic Discharge

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

Task

Important! Verify that all fibers are labeled to prevent possible service interruption.

1 Are you to connect or disconnect the optical fibers at the OTU/OTPM?

If	Then
Connecting	Continue with Step 8.
Disconnecting	Continue with Step 2.

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

2 Disconnect the optical fiber(s) from the lightguide buildouts (LBOs) and/or optical connector(s) at the OTU/OTPM circuit pack.

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3 If required, place protector caps over the ends of the optical fibers.

4 If required, remove the LBOs from the connector(s) on the OTU/OTPM circuit pack.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

5 If required, place plugs in the OTU/OTPM IN/OUT connectors.

6 Remove the optical fiber from the slot guide on the shelf. This is to prevent damage to the fiber when the OTU/OTPM is removed.

7 STOP! YOU HAVE COMPLETED THIS TASK.

8 If required, remove the protective caps and/or plugs from the fibers and LBOs.

9 If required, determine the LBO values for the IN connector for the OTU/OTPM circuit pack.

Reference: "DLP-524: Select an LBO at the OTU/OTPM IN" (9-81)

10 Clean the optical fiber(s) and connector(s).

Reference: "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)

11 If required, install an LBO in the IN connector.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

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12 Connect the optical fiber(s) to the LBOs on the OTU/OTPM circuit pack.

Receive fiber ?	OTU/OTPM (IN connector)
Transmit fiber ?	OTU/OTPM (OUT connector)

13 Wait 1 minute for the OTU/OTPM circuit pack to accept an incoming signal.

14 Place the optical fiber in the shelf guide to prevent damaging it when closing the cabinet doors or replacing the shelf cover.

END OF STEPS

□

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DLP-532: Remove an OMU or ODU

Purpose

This task is used to remove an OMU or ODU.

Supporting tasks

This task refers to the following supporting tasks.

- "DLP-510: Inspect and Clean Optical Fiber Connectors" (9-34)
- "DLP-521: Install an OMU or ODU" (9-72)
- "DLP-512: Install/Remove Lightguide Buildout" (9-44)

Task

CAUTION

Loss of Signal

This task has the potential to affect transmission and should be performed only under the direction of the maintenance support organization.

CAUTION

Electrostatic Discharge

Use a static ground wrist strap whenever handling units or working on a network element to prevent electrostatic discharge damage to sensitive components.

1 Remove the OMU/ODU optical fibers from the slot guide on the shelf. This is to prevent damage to the fiber when the unit is removed.

WARNING

Eye Damage

Unterminated optical connectors may emit invisible laser radiation that could damage your eyes. Do not view the beam directly or with optical instruments.

Important! Verify that all fibers are labeled to prevent mix-ups.

2 Remove one optical fiber at a time and install a protector cap on the fiber.

3 Remove any LBOs from the OMU/ODU and install protector caps and/or plugs.

Reference: "DLP-512: Install/Remove Lightguide Buildout" (9-44)

Important! ***Do not rock the unit back and forth!***

4 Using a *Phillips*® screwdriver, extract the top and bottom screws holding the unit to the shelf.

5 Unseat the OMU/ODU from the shelf by continuously pulling out on the unit.

6 Carefully slide the OMU/ODU out of the slot guides to remove it completely from the shelf.

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7 Are you to install another unit in this slot?

If	Then
YES	Refer to “DLP-521: Install an OMU or ODU” (9-72)
NO	STOP! YOU HAVE COMPLETED THIS TASK.

END OF STEPS

□

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10 Using the Craft Interface Terminal

Overview

Purpose

This chapter covers the following information.

- CenterLink NE Command Manager Introduction
- Inputs (Commands)
- Help
- Browser
- Tool Bar
- Task Bar
- Other CenterLink Features
- Outputs
- Examples of Reports
- CenterLink Tutorial.

The user should be familiar with the information in this chapter before using the tasks located in this guide.

CenterLink Functions

CenterLink functions include the following:

- NE Command Manager — lists the commands by management category. Click on the category and then on the command verb (for example, Operate, Release, Enter, Retrieve, Test, etc.)

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- NE SmartManual Manager — supports line build out (LBO) selection from tasks such as ‘RCVR Input Line Build Out Selection’ and ‘Optical amplifier Input Line Build Out Selection.’
- Software Installation Manager — allows different versions of Metropolis® EON software to be installed.
- Reference Library — lists references documents associated with the product.
- Notepad — allows the user to record information (Edit) and to View all notes (from an index).
- Options — allows the user to select the Target ID that will be deleted from a node.

  Help — contains CenterLink information in the following categories:

  – What's New — explains new features and improvements.
  – Using CenterLink — explains CenterLink's purpose and layout, application plug-ins, and other useful information.
  – How To... — provides help to optimize the display area.
  – Troubleshooting — provides information on frequently asked questions.
  – About Plug-ins — displays lists the plug-in components that are installed in this version of CenterLink.
  – About CenterLink — displays legal page of CenterLink license.
- Exit — removes CenterLink as a window on the CIT.

Task Bar The browser Task Bar is located across the bottom of the screen and shows the current status, or an address when the cursor passes over a hyperlink area.

Contents This chapter contains the following sections.

CenterLink NE Command Manager	10 - 3
Reports	10 - 10
Using CenterLink Software	10 - 34

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CenterLink NE Command Manager

Overview

Purpose

CenterLink is a web-based browser interface that is user-friendly, menu-driven and can be used with the Metropolis® EON. CenterLink software runs on a Microsoft® Windows95®, Windows98®, Windows2000®, or WindowsNT® compatible personal computer (PC) The PC and CenterLink software together make up the craft interface terminal (CIT). The CIT connects to a Metropolis® EON network element (NE). The NE Command Manager allows a connection to be established to an NE. Once established, commands are sent and the resulting reports are displayed at the CIT (web browser).

Contents

This section contains the following information.

Inputs (Commands)	10 - 4
Outputs	10 - 9

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Inputs (Commands)

Description

Inputs to CenterLink consist of a series of selections from menus and parameter inputs followed by selecting **Enter**. This sequence of selecting and executing can be called an ***input*** or a ***command***.

Some inputs are potentially service-affecting which cause a CAUTION or explanation box to appear on the screen. This alerts the user to the possible consequences of executing this command.

The input **Clear** removes all data that was entered in the fields of the form.

You can also clear a field by placing the pointer in the field (at end of text) and backspacing over the information.

> **Important!** Two or more commands to the same network element (at approximately the same time) may cause inappropriate responses to be displayed as indicated by a NETO error code. For example, if one command is entered over an X.25 link and the other command via CenterLink, the X.25 response may be inappropriately displayed by CenterLink because both are using the TL1 interface. To correct, wait a short time and enter the command again.

Help

Help is available during the entering of data and during the responses (output process). Help in the output process causes the Adobe Acrobat Reader to be launched (activated), thus displaying the command page from the Operation Systems Engineering Guide (OSEG).

Help may also be used to search for a particular text string from either the input or output screen. Highlighted words or CTL-C sends you to the Reader (OSEG page) where the “FIND” feature in Reader is used to locate all occurrences of the text string. Help takes you to the OSEG command page.

Inputs menu

The inputs (commands) menu consists of five submenus, or management categories:

- **FAULT**
- **CONFIGURATION**
- **PERFORMANCE**

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- **SECURITY**
- **ADVANCED**

FAULT The following table shows the FAULT management category.

Management Category	Verb	First Modifier	Second Modifier	Security Level
		Alarm_Cutoff	All	Reports
	Operate	External	Control	General
		Protection_Switch	OUPSR	General
		External	Control	General
	Release	Protection_Switch	OUPSR	General
		Alarm	All	Reports
			Common	Reports
			Customer_ Maintenance_Signal	Reports
			Environment	Reports
			Equipment	Reports
			Network	Reports
			OT_Port_Signal	Reports
			Optical_Channel	Reports
			Optical_Line	Reports
Fault			Supervisory	Reports
	Retrieve	Condition	All	Reports
			Common	Reports
			Customer_ Maintenance_Signal	Reports
			Equipment	Reports
			OT_Port_Signal	Reports
			Optical_Channel	Reports
			Optical_Line	Reports
			Supervisory	Reports
		Header		Reports
		Log		Reports
		State		Reports
		Alarm		Reports
		Auto	Local	Privileged
	Test	LED		Reports
		Loopback		Privileged
		Telemetry	Parallel	General

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CONFIGURATION The following table shows the CONFIGURATION management category.

Management Category	Verb	First Modifier	Second Modifier	Security Level
	Copy	Program		Privilege
		Association	OT_Port_Signal	General
	Delete	Target_Identifier _Address_Map		Privilege
	Edit	Date and Time		Privilege
		Association	OT_Port_Signal	General
		Customer_ Maintenance_ Signal		Privilege
	Enter	OT_Port_Signal		General
		Optical_Channel		Privilege
		Section_Trace		Privilege
		Supervisory		Privilege
	Initialize	System		General
		All		Reports
		Association	OT_Port_Signal	Reports
		Attribute	Alarm	Reports
Configuration			Control	Reports
			Environment	Reports
		Customer_ Maintenance_ Signal		Reports
	Retrieve	Date		Reports
		Equipment		Reports
		Map	Network	Reports
			Ring	Reports
		OT_Port_Signal		Reports
		Optical_Channel		Reports
		Optical_Line		Reports
		Protection_Group		
		Section_Trace		Reports
		Supervisory		Reports
		Attribute	Alarm	Privilege
	Set		Control	Privilege
			Environment	Privilege
	Update	System		General

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PERFORMANCE The following table shows the PERFORMANCE management category.

Management Category	Verb	First Modifier	Second Modifier	Security Level
Performance	Initialize	Register	All	General
			Optical_Line	General
	Retrieve	Baseline		Reports
		Performance_ Monitoring	All	Reports
			OT_Port_Signal	Reports
			Optical_Channel	Reports
			Optical_Line	Reports
			Start_Time	Reports
			Supervisory	Reports
		Relative_Signal_ Power		Reports
		Threshold	All	Reports
			OT_Port_Signal	Reports
			Optical_Channel	Reports
			Optical_Line	Reports
			Supervisory	Reports
	Set	Performance_ Monitoring	Start_Time	General
		Threshold	Optical_Channel	General
			Optical_Line	General
			OT_Port_Signal	General
			Supervisory	General

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SECURITY The following table shows the SECURITY management category.

Management Category	Verb	First Modifier	Second Modifier	Security Level
Security	Activate	User		Reports
	Allow	Message	Equipment	Privileged
	Cancel	User		Reports
		User	Security	Privileged
	Delete	IPMAP		Privileged
	Edit	Private_Identifier		Reports
		User	Security	Privileged
	Enter	Channel_Identifier	Security	Privileged
		Far_End_ Communications		Privileged
		Network_Element	Security	Privileged
		IPMAP		Privileged
		OSI		Privileged
		System		Privileged
		TCPIP		Privileged
		User	Security	Privileged
	Inhibit	Message	Equipment	Privileged
	Retrieve	Channel_Identifier	Security	Reports
		Far_End_ Communications		Reports
		Network_Element	Security	Reports
		IPMAP		Reports
		OSI		Reports
		System		Reports
		TCPIP		Reports
		User	Security	Reports
	Set	Source_ Identification		Privileged

ADVANCED The following table shows the ADVANCED management category.

Management Category	Verb	First Modifier	Second Modifier	Security Level
Advanced	Upgrade_Software			
	Line_Mode_TL1			
	Monitors			

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Outputs

Description

Every CenterLink input that is executed will result in an output on the screen. The output is either completed or denied with each displaying slightly different information. A green completed output displays the ***Target ID***, ***Command***, ***Date***, and ***Time***. A red denied output (Error) displays the ***Target ID***, ***Date***, ***Time***, ***Error Code***, and ***Description***. Another form of a denied output (Warning) displays the ***Error Code***, and ***Description***. An ***Error Code*** consists of four-letters followed by a description of the error code.

- ***Completed*** indicates that the action requested by the input was completed. The output may include a report if the verb `Retrieve` was used in the command.
- ***Error*** indicates that the input was denied. The output includes a four-letter error code along with a description of the code.

The following reports were obtained by using the verb (***Retrieve***). Each report is shown by an example. An example is introduced by its heading which shows the CenterLink input that produced the report. For an explanation of the column headings and parameters, refer to the command pages by selecting **Help.**

Note that vertical and horizontal scroll bars appear for reports that are too large to fit on a page.

□

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Reports

Overview

Purpose

A report is the output generated by a **Retrieve** command. **Retrieve** commands are available under all of the categories except for **ADVANCED**. Examples of reports appear in the order of **CONFIGURATION**, **FAULT**, **PERFORMANCE**, and **SECURITY**. These are only examples and are not meant to present a complete list of reports.

Contents

This section contains the following information.

Configuration	10 - 11
Fault	10 - 21
Performance	10 - 25
Security	10 - 29

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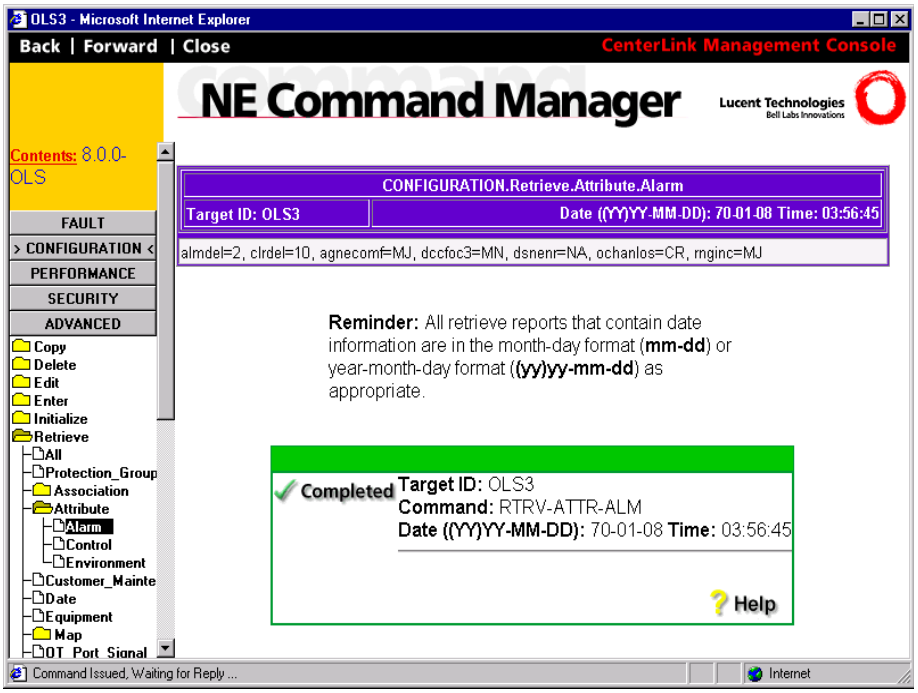
Configuration

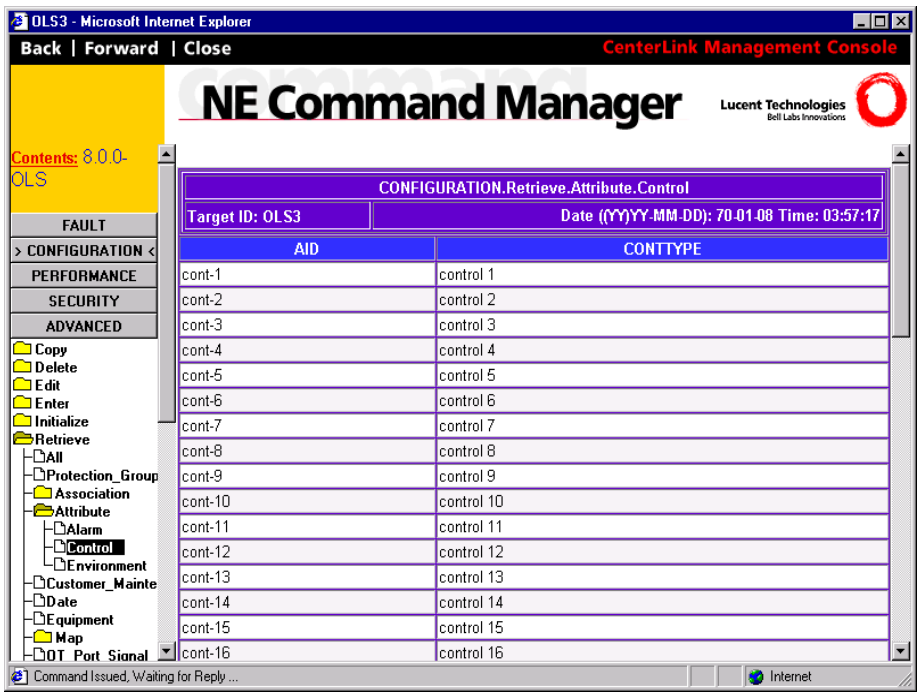
Alarm attributes

The following example illustrates the report for the command, **CONFIGURATION.Retrieve.Attribute.Alarm**.



Control attributes

The following example illustrates the report for the command, **CONFIGURATION.Retrieve.Attribute.Control**.



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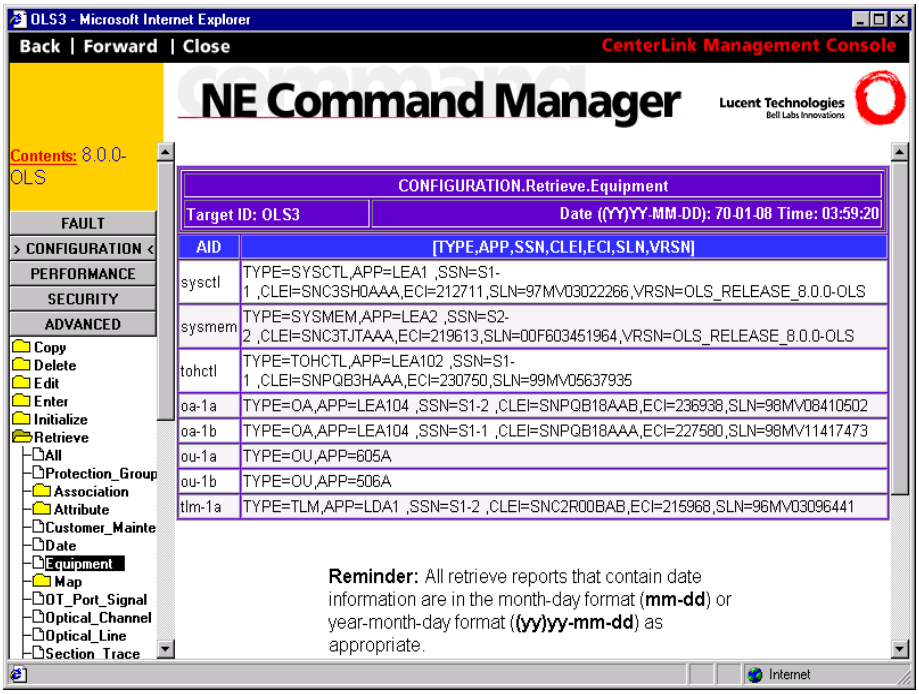
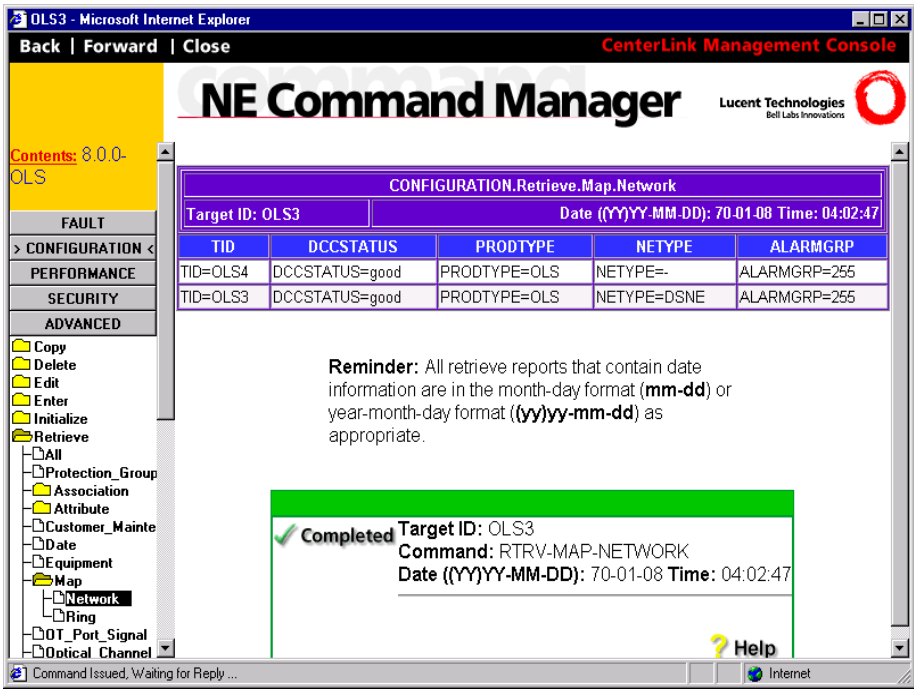
Equipment The following example illustrates the report for the command, **CONFIGURATION.Retrieve.Equipment**.



Network map

The following example illustrates the report for the command, **CONFIGURATION.Retrieve.Map.Network**.



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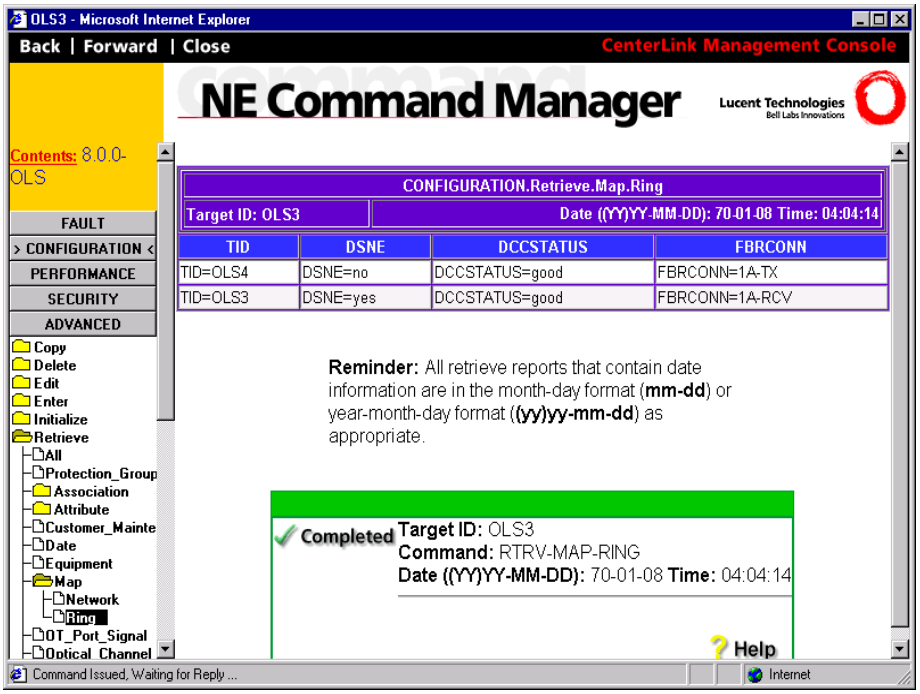
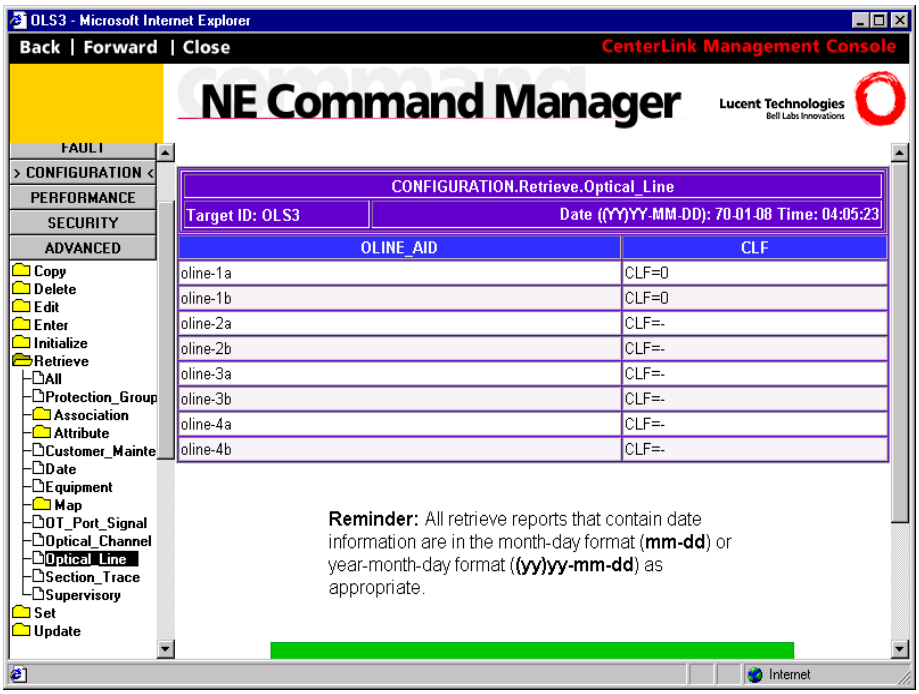
Ring map

The following example illustrates the report for the command, **CONFIGURATION.Retrieve.Map.Ring**.



Optical line

The following example illustrates the report for the command, **CONFIGURATION.Retrieve.Optical_Line**.



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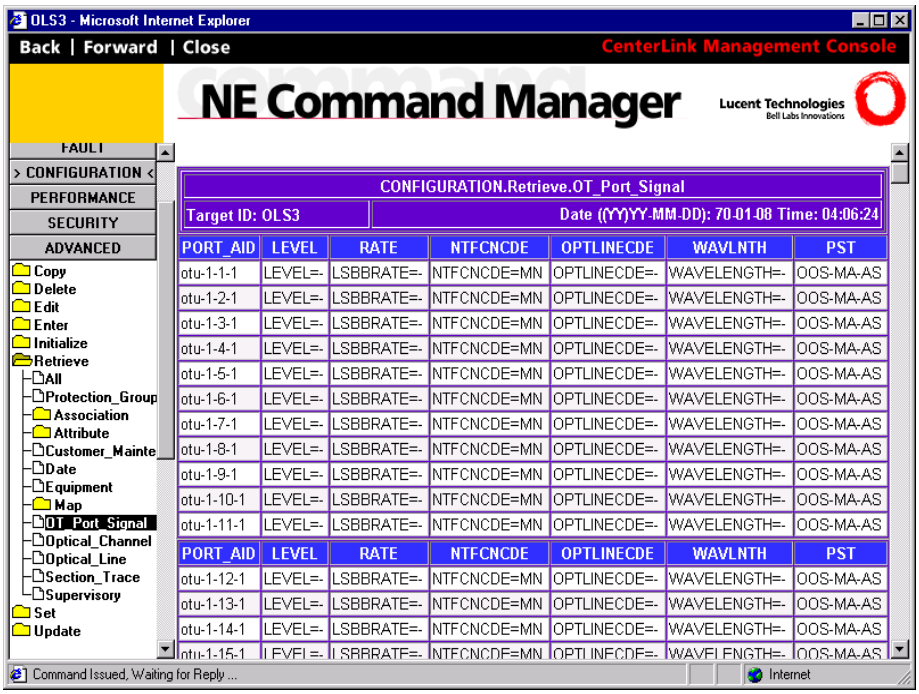
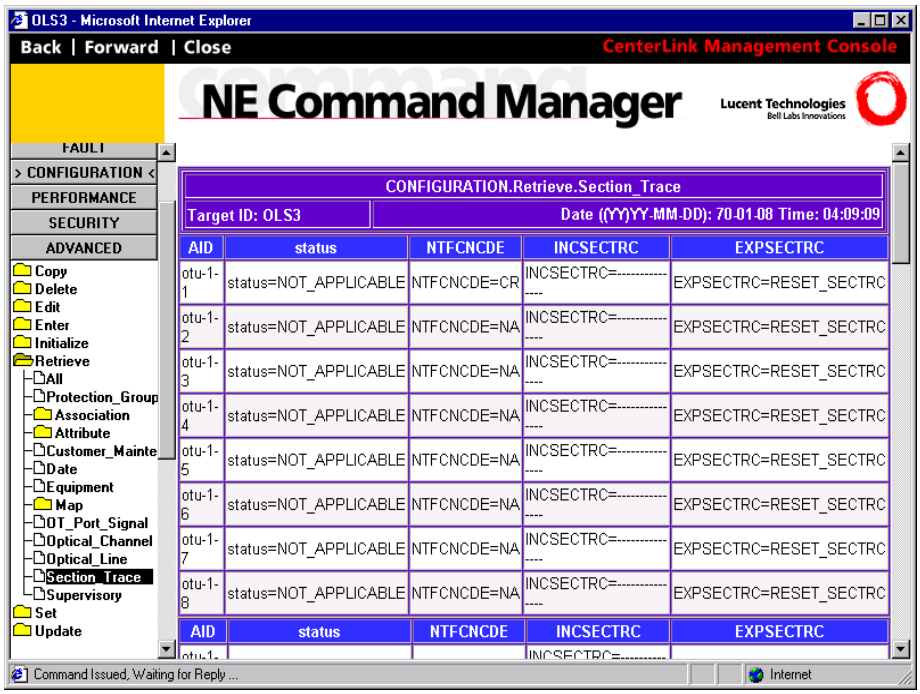
OTPS The following example illustrates the report for the command, **CONFIGURATION.Retrieve.OT_Port_Signal**.



Section trace The following example illustrates the report for the command, **CONFIGURATION.Retrieve.Section_Trace**.



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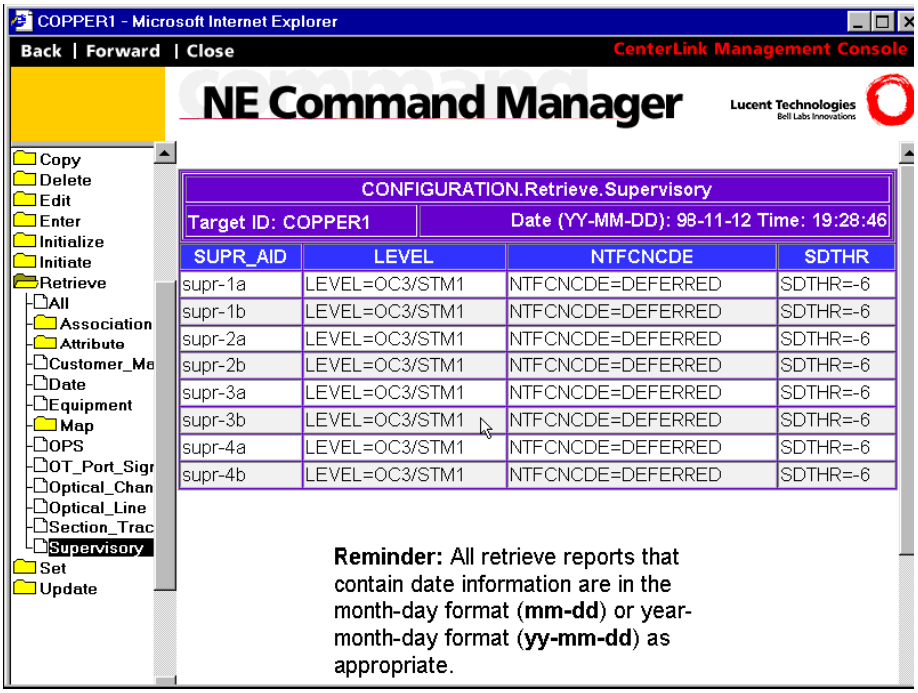
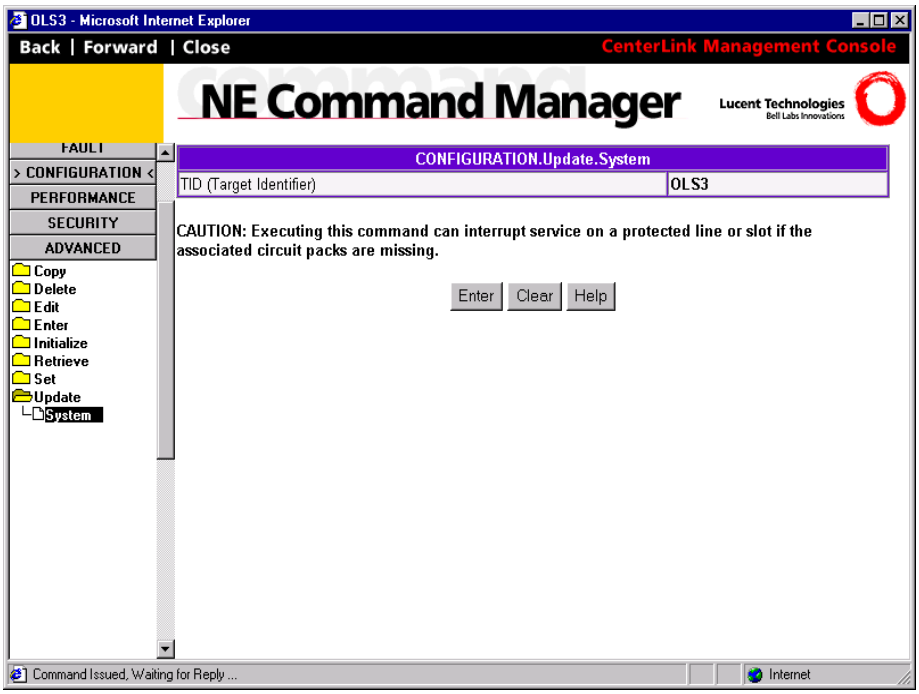
Supervisory

The following example illustrates the report for the command, **CONFIGURATION.Retrieve.Supervisory**.



Update system

The following example illustrates the report for the command, **CONFIGURATION.Update.System**.



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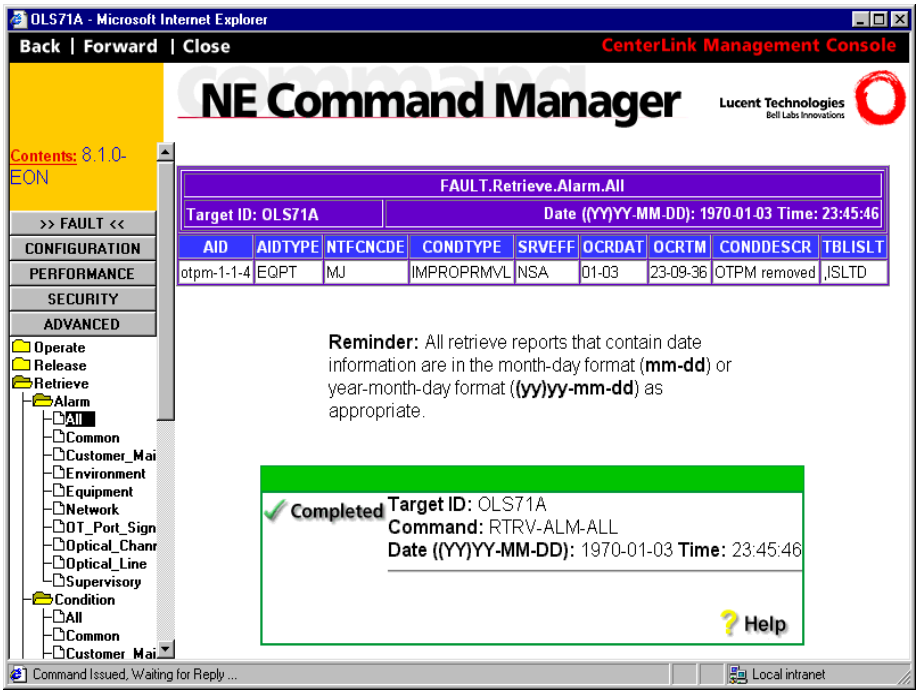
Fault

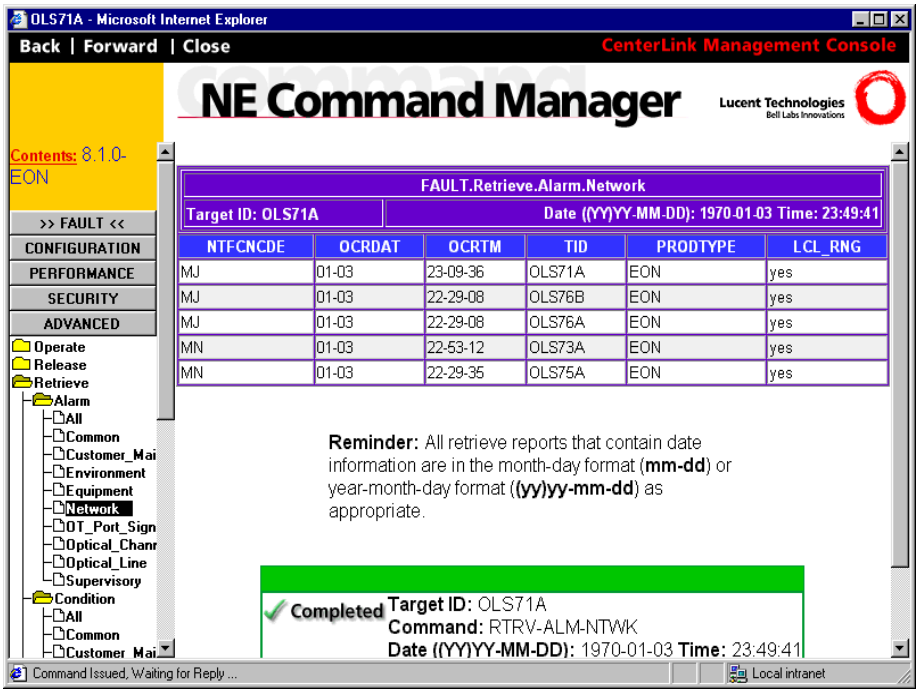
All alarms

The following example illustrates the report for the command, **FAULT.Retrieve.Alarm.All**.



Network alarms

The following example illustrates the report for the command, **FAULT.Retrieve.Alarm.Network**.



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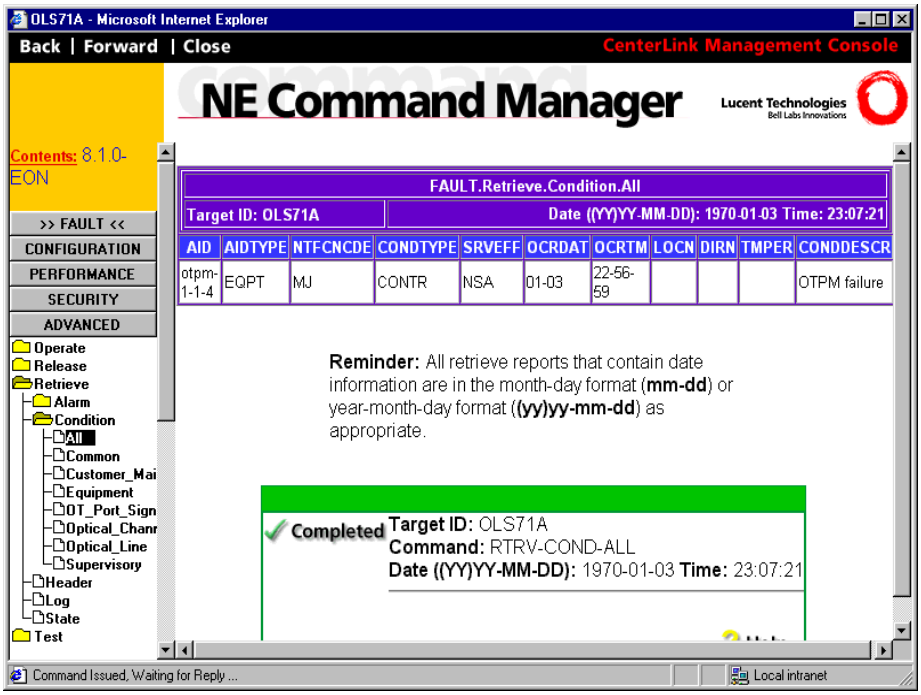
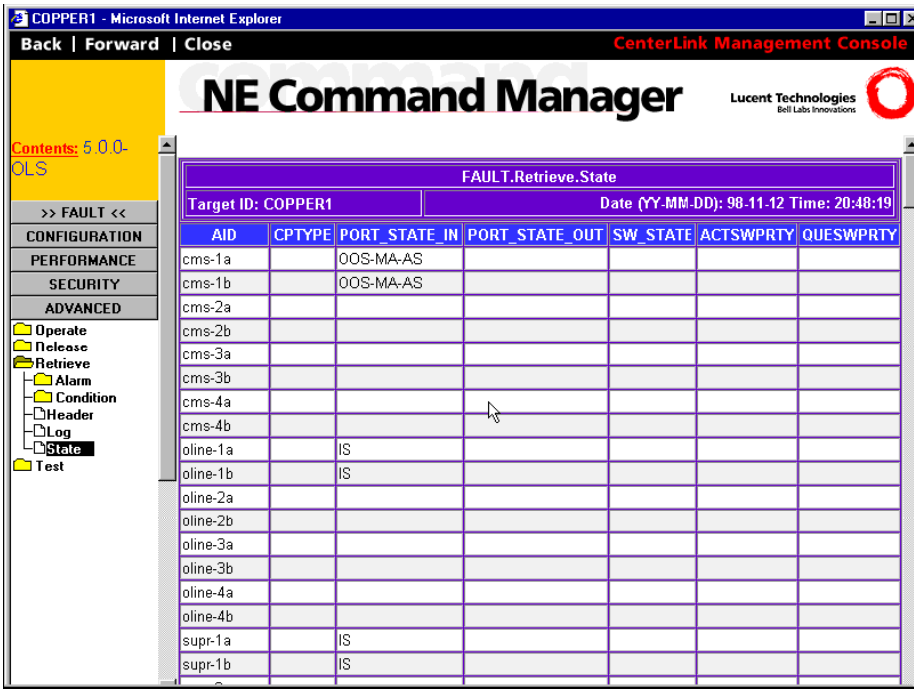
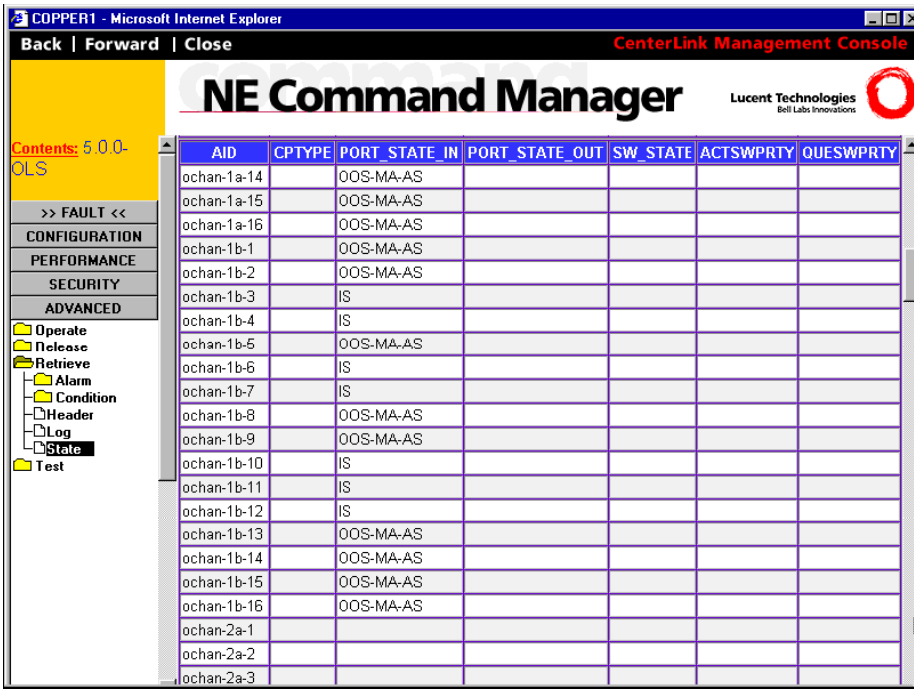
All conditions

The following example illustrates the report for the command, **FAULT.Retrieve.Condition.All**.



States The following two examples illustrate the report for the command, **FAULT.Retrieve.Condition.State**.





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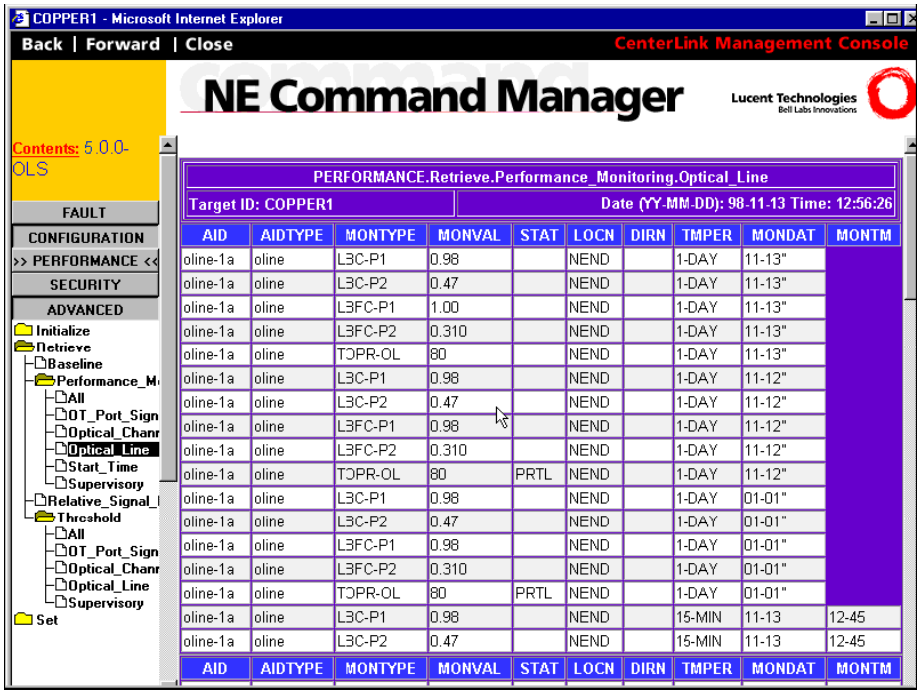
Performance

OLINE performance monitoring

The following example illustrates the report for the command, **PERFORMANCE.Retrieve.Performance_Monitor.Optical_Line**



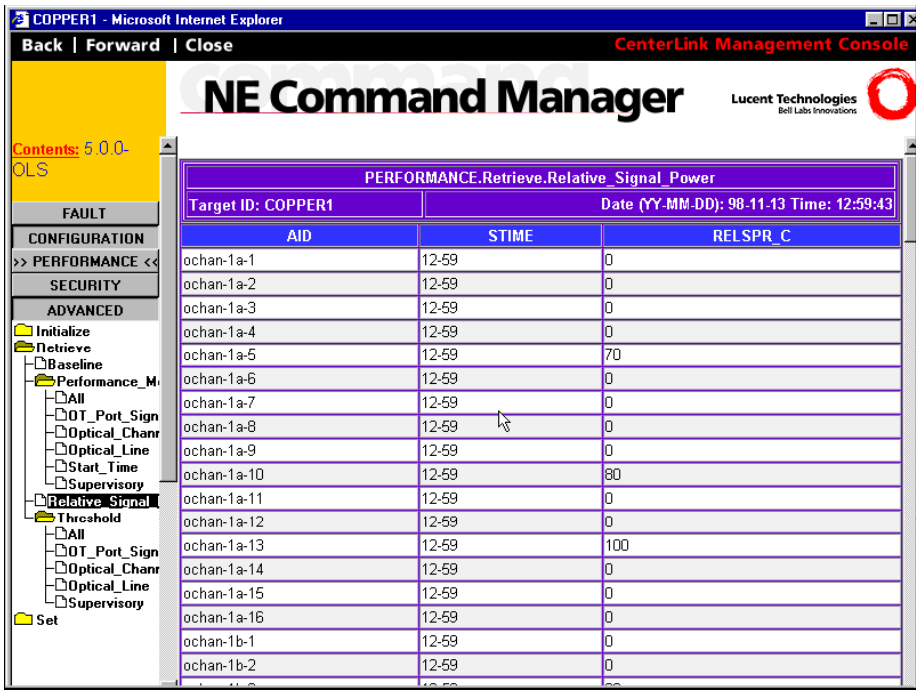
PERFORMANCE.Retrieve.Performance_Monitoring.Optical_Line

Target ID: COPPER1 Date (YY-MM-DD): 98-11-13 Time: 12:56:26

AID	AIDTYPE	MONTYPE	MONVAL	STAT	LOCN	DIRN	TMPER	MONDAT	MONTM
oline-1a	oline	L3C-P1	0.98		NEND		1-DAY	11-13"	
oline-1a	oline	L3C-P2	0.47		NEND		1-DAY	11-13"	
oline-1a	oline	L3FC-P1	1.00		NEND		1-DAY	11-13"	
oline-1a	oline	L3FC-P2	0.310		NEND		1-DAY	11-13"	
oline-1a	oline	TOPR-OL	80		NEND		1-DAY	11-13"	
oline-1a	oline	L3C-P1	0.98		NEND		1-DAY	11-12"	
oline-1a	oline	L3C-P2	0.47		NEND		1-DAY	11-12"	
oline-1a	oline	L3FC-P1	0.98		NEND		1-DAY	11-12"	
oline-1a	oline	L3FC-P2	0.310		NEND		1-DAY	11-12"	
oline-1a	oline	TOPR-OL	80	PRTL	NEND		1-DAY	11-12"	
oline-1a	oline	L3C-P1	0.98		NEND		1-DAY	01-01"	
oline-1a	oline	L3C-P2	0.47		NEND		1-DAY	01-01"	
oline-1a	oline	L3FC-P1	0.98		NEND		1-DAY	01-01"	
oline-1a	oline	L3FC-P2	0.310		NEND		1-DAY	01-01"	
oline-1a	oline	TOPR-OL	80	PRTL	NEND		1-DAY	01-01"	
oline-1a	oline	L3C-P1	0.98		NEND		15-MIN	11-13	12-45
oline-1a	oline	L3C-P2	0.47		NEND		15-MIN	11-13	12-45
AID	AIDTYPE	MONTYPE	MONVAL	STAT	LOCN	DIRN	TMPER	MONDAT	MONTM

Relative signal power

The following example illustrates the report for the command, **PERFORMANCE.Retrieve.Relative_Signal_Power**.



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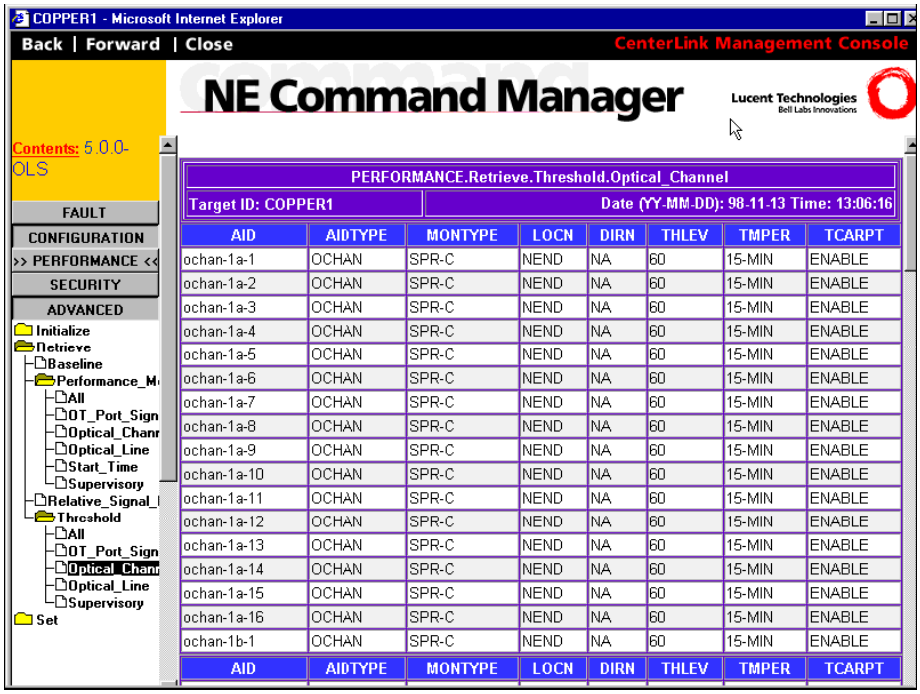
OCHAN thresholds

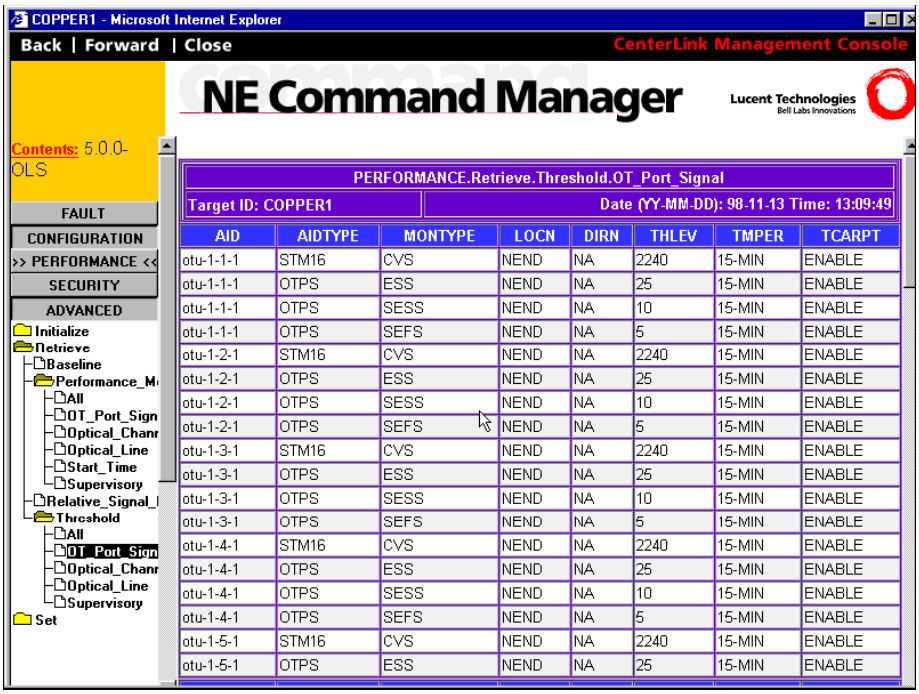
The following example illustrates the report for the command, **PERFORMANCE.Retrieve.Threshold.Optical_Channel**.



AID	AIDTYPE	MONTYPE	LOCN	DIRN	THLEV	TMPER	TCARPT
ochan-1a-1	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-2	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-3	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-4	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-5	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-6	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-7	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-8	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-9	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-10	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-11	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-12	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-13	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-14	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-15	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1a-16	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
ochan-1b-1	OCHAN	SPR-C	NEND	NA	60	15-MIN	ENABLE
AID	AIDTYPE	MONTYPE	LOCN	DIRN	THLEV	TMPER	TCARPT

OTPS thresholds

The following two examples illustrate the report for the command, **PERFORMANCE.Retrieve.Threshold.OT_Port_Signal**.



AID	AIDTYPE	MONTYPE	LOCN	DIRN	THLEV	TMPER	TCARPT
otu-1-1-1	STM16	CVS	NEND	NA	2240	15-MIN	ENABLE
otu-1-1-1	OTPS	ESS	NEND	NA	25	15-MIN	ENABLE
otu-1-1-1	OTPS	SESS	NEND	NA	10	15-MIN	ENABLE
otu-1-1-1	OTPS	SEFS	NEND	NA	5	15-MIN	ENABLE
otu-1-2-1	STM16	CVS	NEND	NA	2240	15-MIN	ENABLE
otu-1-2-1	OTPS	ESS	NEND	NA	25	15-MIN	ENABLE
otu-1-2-1	OTPS	SESS	NEND	NA	10	15-MIN	ENABLE
otu-1-2-1	OTPS	SEFS	NEND	NA	5	15-MIN	ENABLE
otu-1-3-1	STM16	CVS	NEND	NA	2240	15-MIN	ENABLE
otu-1-3-1	OTPS	ESS	NEND	NA	25	15-MIN	ENABLE
otu-1-3-1	OTPS	SESS	NEND	NA	10	15-MIN	ENABLE
otu-1-3-1	OTPS	SEFS	NEND	NA	5	15-MIN	ENABLE
otu-1-4-1	STM16	CVS	NEND	NA	2240	15-MIN	ENABLE
otu-1-4-1	OTPS	ESS	NEND	NA	25	15-MIN	ENABLE
otu-1-4-1	OTPS	SESS	NEND	NA	10	15-MIN	ENABLE
otu-1-4-1	OTPS	SEFS	NEND	NA	5	15-MIN	ENABLE
otu-1-5-1	STM16	CVS	NEND	NA	2240	15-MIN	ENABLE
otu-1-5-1	OTPS	ESS	NEND	NA	25	15-MIN	ENABLE

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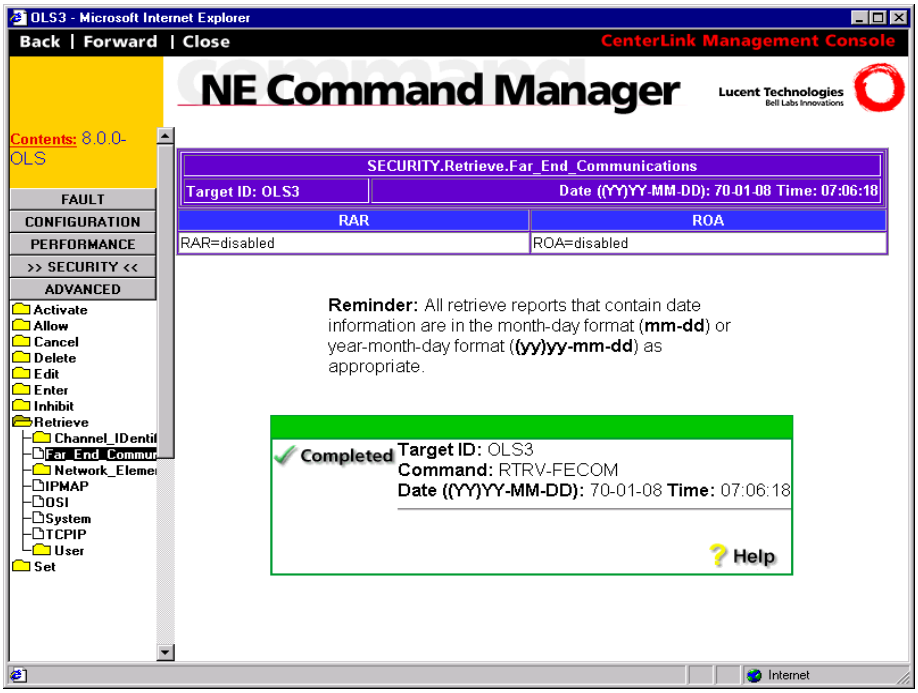
Security

FE communications

The following example illustrates the report for the command, **SECURITY.Retrieve.Far_End_Communications**.



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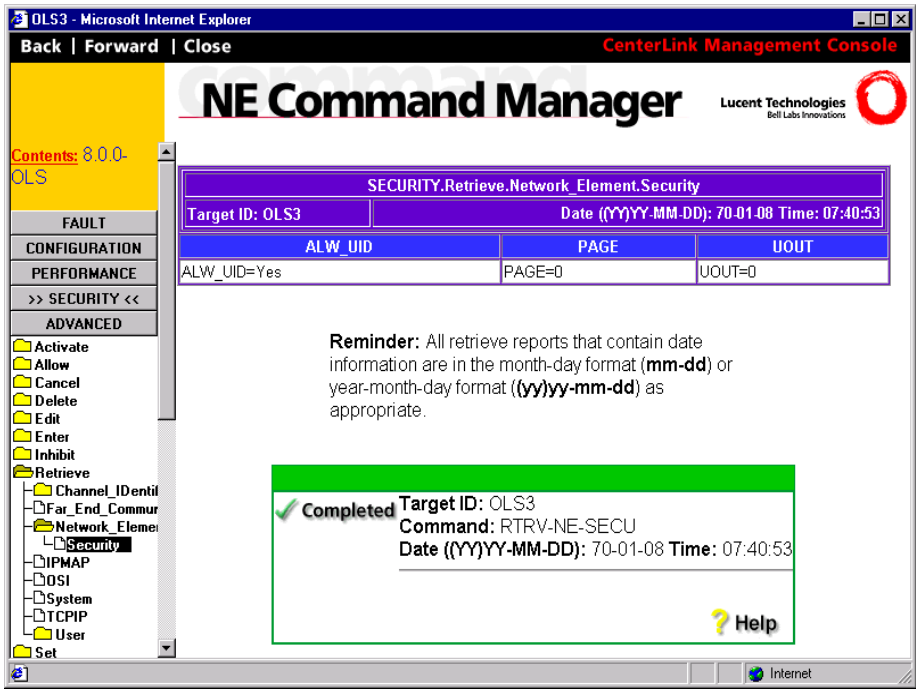
NE security

The following example illustrates the report for the command, **SECURITY.Retrieve.Network_Element.Security**.



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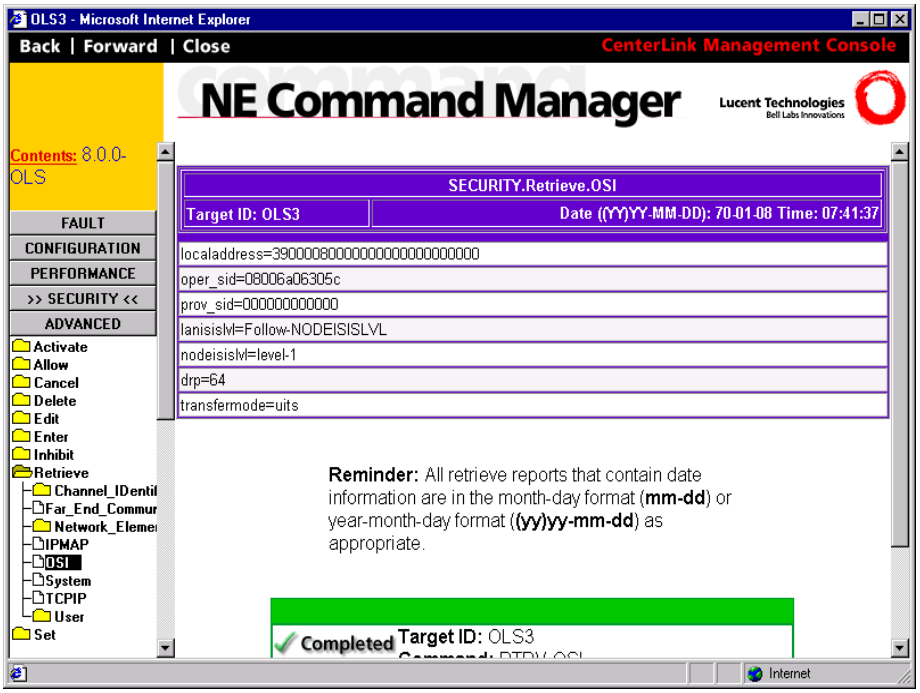
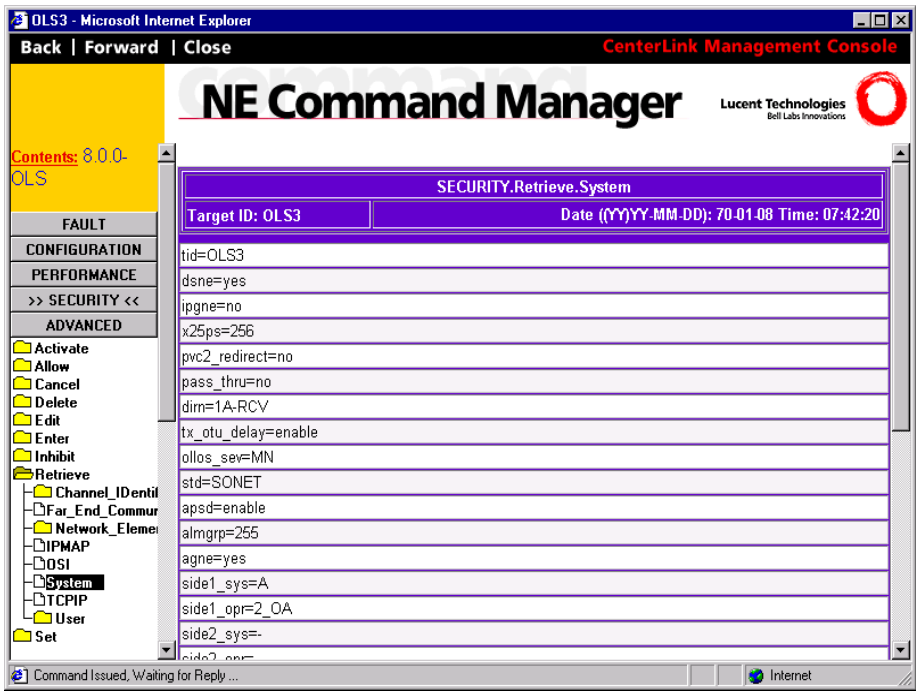
OSI The following example illustrates the report for the command, **SECURITY.Retrieve.OSI**.

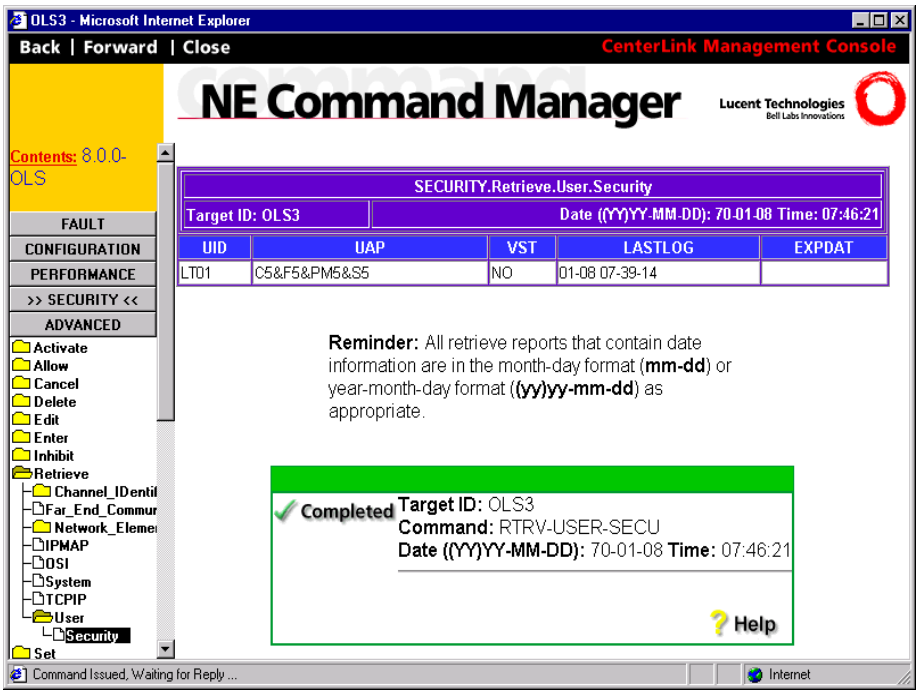


System The following example illustrates the report for the command, **SECURITY.Retrieve.System**.



User security

The following example illustrates the report for the command, **SECURITY.Retrieve.User.Security**.



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CIT Tutorial

Overview

Purpose

This tutorial illustrates, through a series of exercises, the features of the CenterLink software. ***It is strongly recommended that this tutorial only be used with a network element that is out of service.***

Contents

This section contains the following information.

Using CenterLink Software	10 - 34

Using CenterLink Software

Overview

Follow the steps in this section to get an overview of using the CenterLink Software.

Starting assumptions

It is assumed that the craft interface terminal (CIT) is conditioned and connected to the Metropolis® EON network element. If it is not, refer to "DLP-501: Connect and Condition Craft Interface Terminal (CIT)" (9-11).

- All software (CD-ROM, disks, or tape) is installed and running, such as CenterLink, Windows, browser, Acrobat Reader.
- PC is connected to DCE port of Metropolis® EON, or equivalent.
- PC is NOT communicating with a network element.
- Power to PC is turned on.

1 Obtain from the administrator the following information.

- Target ID
- UID (User Identifier) – the default with new software is `LT01`
- PID (Private ID) – the default with new software is `FT-2000`

2 Double click the **CenterLink** icon.

Result: Centerlink starts up and displays the Launch Console screen, similar to the following figure.

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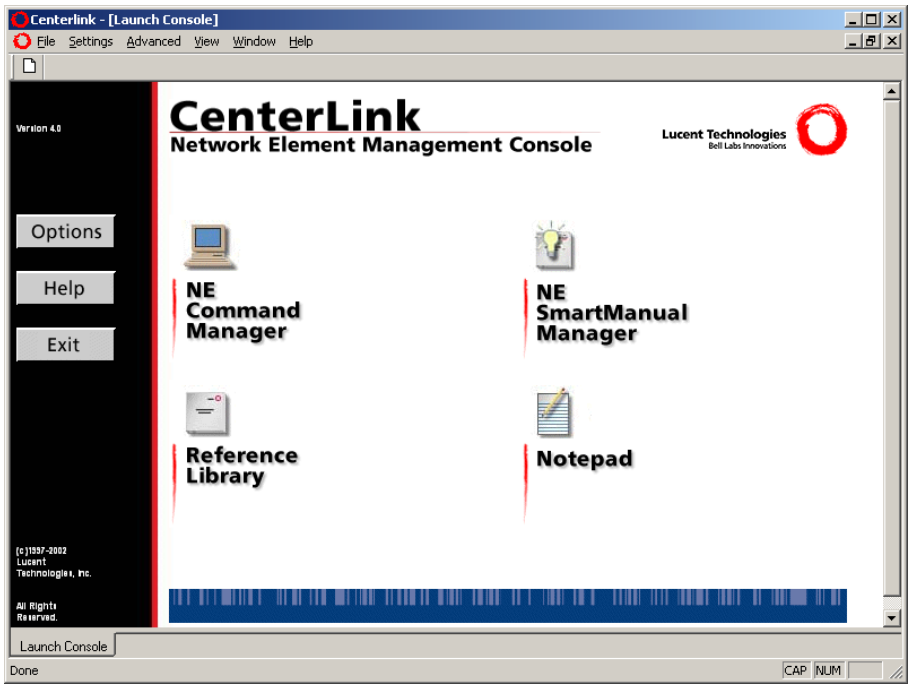
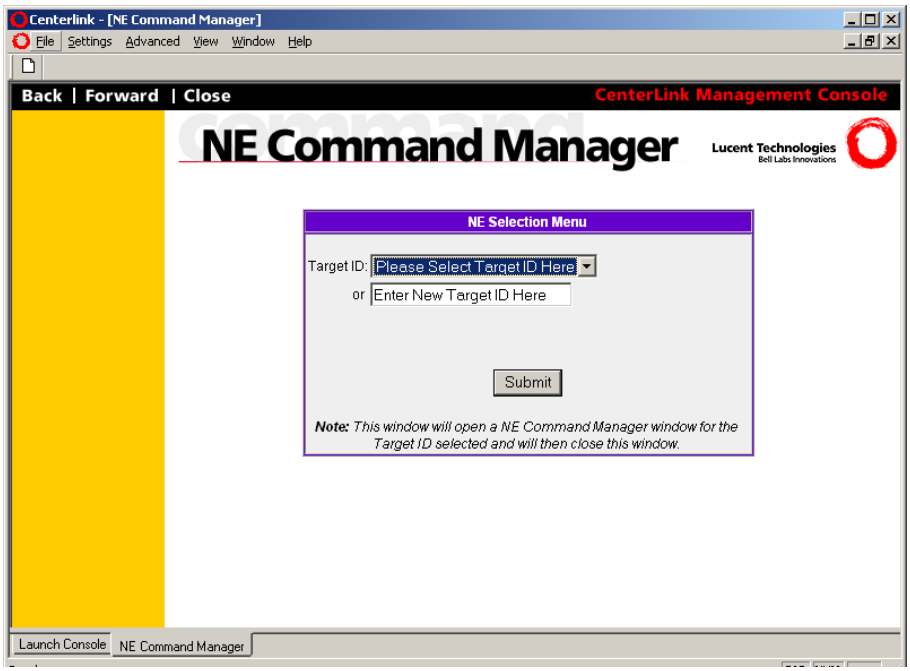
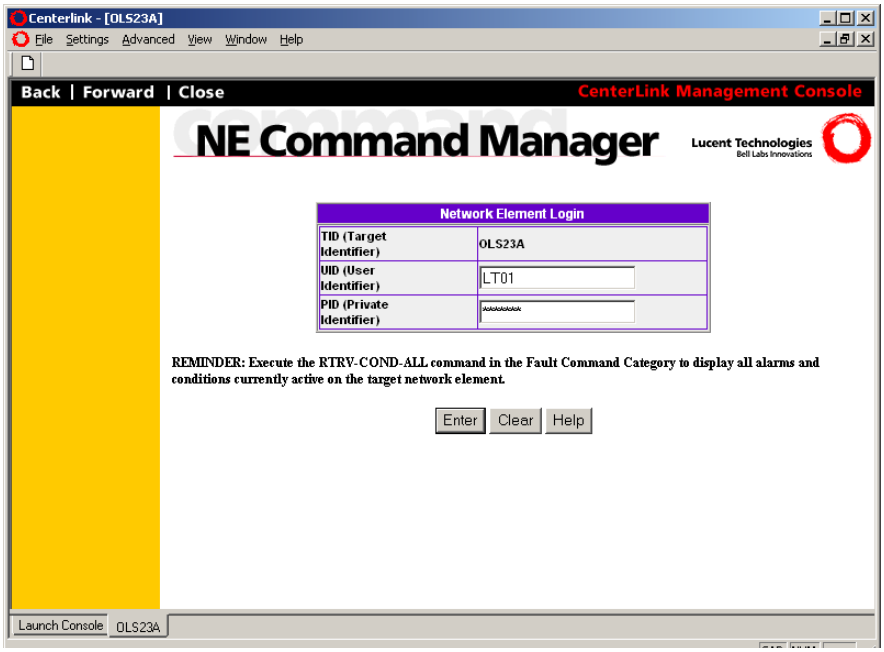


3 Select **NE Command Manager** to advance to the next screen, similar to the following figure.



4 Select the TID to be logged into from drop down menu or type in the NE TID and then click on the **Submit** button.

Result: An NE Command Manager screen for the selected TID appears, similar to the following figure.



5 Type your assigned UID in the **UID (User Identifier)** field and press the **Tab** key to advance to the next field.

6 Type your assigned Private Identifier in the **PID (Private ID)** field. Notice that an asterisk appears in place of a character which secures your Private Identifier.

7 Select **Enter** below the **Network Element Login** box.

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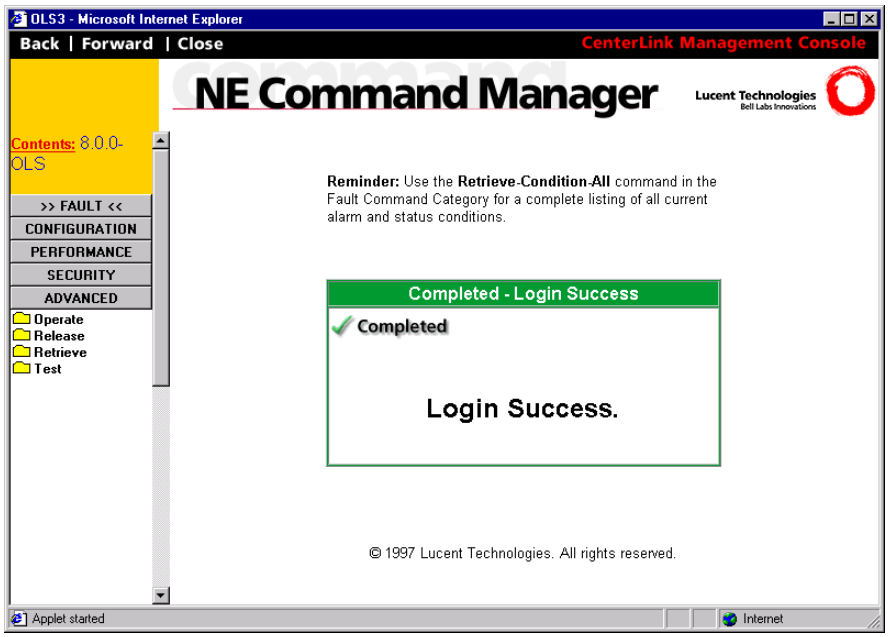
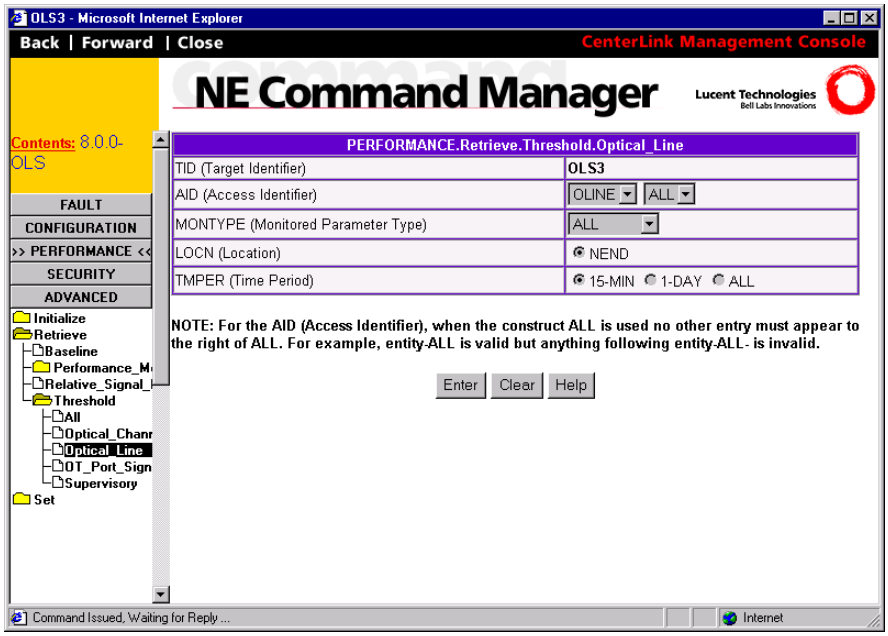


8 Select the command **PERFORMANCE.Retrieve.Threshold.Optical_Line**.

Result: The screen for this command appears, similar to the following figure.



Important! The TID selected is from a previous command and appears in the TID field. CenterLink remembers the TID of the last command entered.

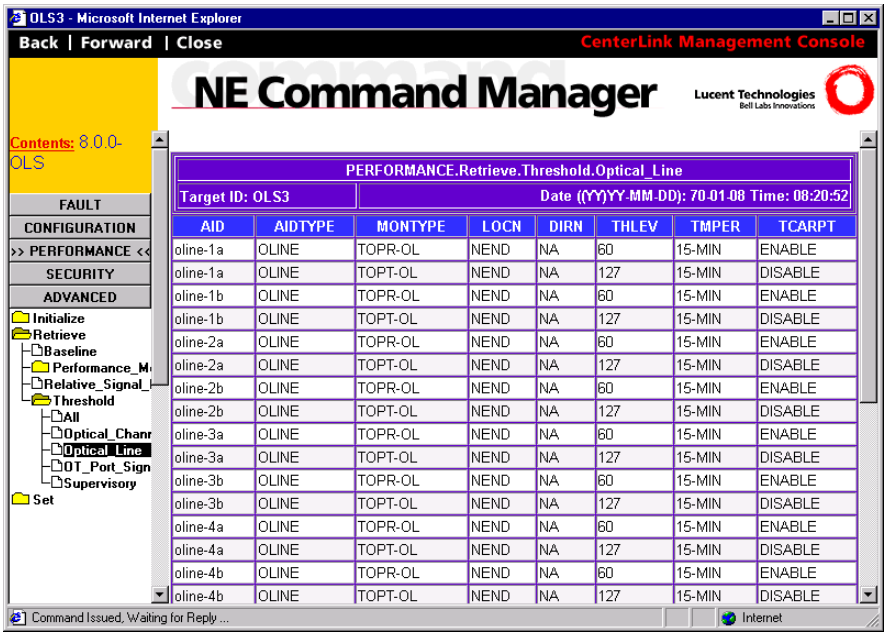
9 For the AID, select **OLINE** in the first field and **1A** in the second field.

10 For **MONTYPE**, select **ALL**.

11 For **TMPER**, select **1-DAY**.

12 Select **Enter**.

Result: A report screen appears, similar to the following figure.



13 Select **Close** near the top left corner of the screen.

Result: A prompt to log out appears.

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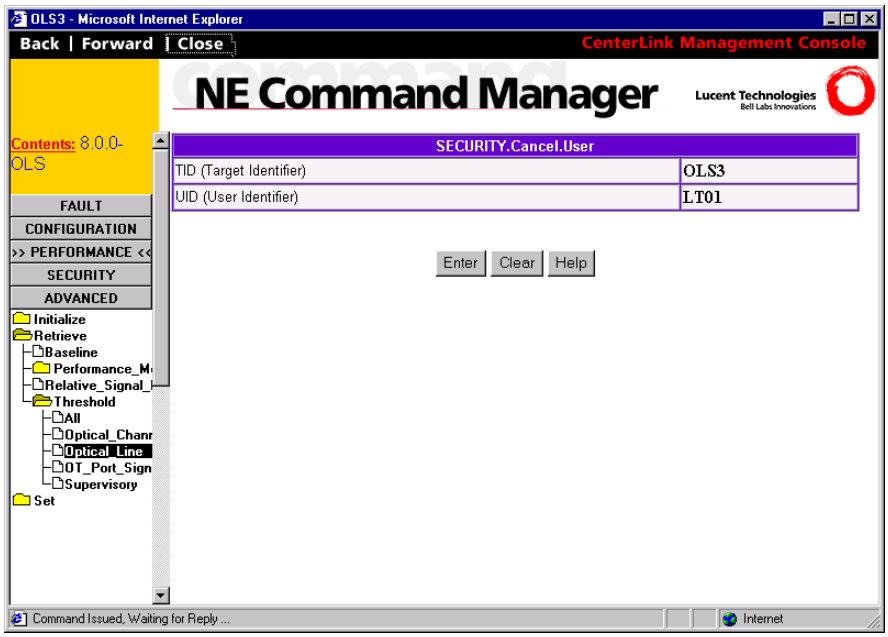
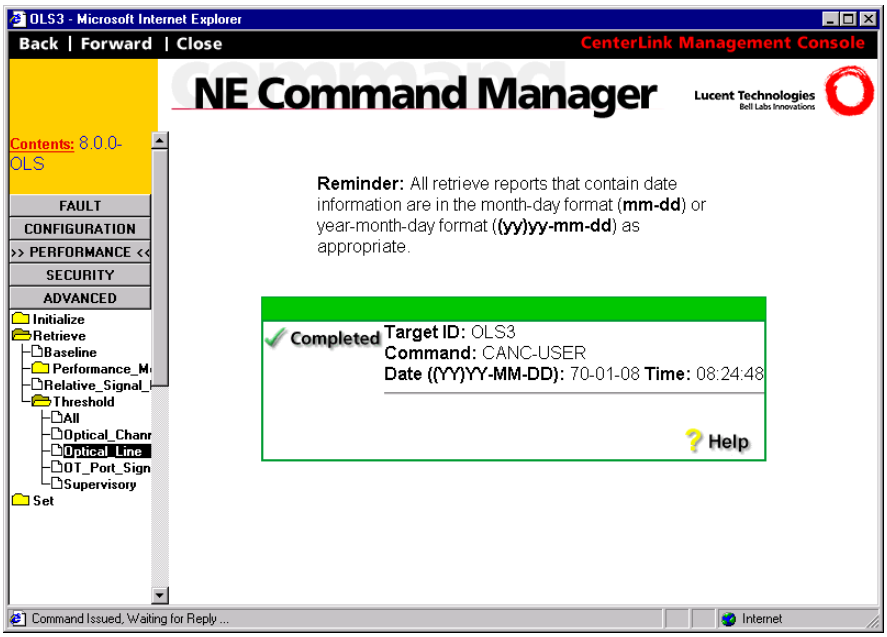
14 Select **OK**.

Result: The logout screen appears, similar to the following figure.



15 Select **Enter**.

Result: A confirmation that you have logged out appears, similar to the following figure.



16 If you want to log back into the same network element, select **SECURITY.Activate.User** and enter your UID and PID.

END OF STEPS

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11 Administration and Provisioning Concepts

Overview

Purpose This chapter contains conceptual information about administration and provisioning.

Contents This chapter is divided into the following sections.

Administration	11 - 2
Provisioning	11 - 19

Administration

Overview

Purpose

This section explains concepts related to keeping the system running and providing access to it.

Contents

Memory Administration	11 - 3
Version Recognition	11 - 6
Security	11 - 7
Software Upgrades	11 - 11
Correlating Alarms	11 - 12
Access Identifiers	11 - 14

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Memory Administration

Description

The Metropolis® EON memory consists of the following:

- Executable code: This is the collection of programs that controls the operation of the system.
- Data: This is a collection of system parameters and their associated values. A parameter is a characteristic of the system that affects its operation. A value is a number, text string, or other menu selection associated with a parameter.

There are two complete copies of executable code in the system under normal conditions. One complete copy of executable code is located in the nonvolatile memory of the System Memory (SYSMEM) circuit pack. The other copy is distributed in the volatile memory of the System Controller (SYSCTL) circuit pack and the individual board controllers on the Overhead Controller - Tributary (TOHCTL), Telemetry Controller (TLM), and Optical Amplifier (OA) circuit packs. [The Optical Multiplexing Units (OMUs), Optical Demultiplexing Units (ODUs), and Optical Translator Port Modules (OTPMs) do not have board controllers.

The other copy of executable code is distributed in the volatile memory of the Optical Translator Controller (OTCTL), Optical Translator Unit (OTU), and Quad Optical Translator Unit (QUAD OTU) circuit packs. The system executes the copy in the board controllers and the SYSCTL circuit packs.

There are three sets of data in the system under normal conditions:

- Two sets of data are located in the nonvolatile memory of the SYSMEM circuit pack.
  - One set contains the system parameters and their original values (value assigned to a parameter at the factory).
  - The second set contains the system parameters and their current values (values currently being used by the system).
- The third set of data is located in the volatile memory of the SYSCTL circuit pack, plus the board controller of the other circuit packs. This set contains the system parameters and their current values.

If the system loses power and then regains power, the executable code and the data (with current values) are copied from the nonvolatile

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memory in the SYSMEM circuit pack to the volatile memory in the SYSCTL circuit pack. The system then starts running the executable code.

If the SYSCTL circuit pack is replaced, the executable code and data (with current values) are copied from the nonvolatile memory in the SYSMEM circuit pack to the volatile memory in the SYSCTL circuit pack. The system then starts running the executable code.

If the SYSMEM circuit pack is replaced and the executable code in the new SYSMEM circuit pack is different from what is running in the SYSCTL circuit pack, one of the following functions can be performed:

- Restart the system with the version of executable code in the new SYSMEM circuit pack.
- Load another copy of the currently running version of the executable code from the craft interface terminal (CIT) to the SYSMEM circuit pack.
- Copy the currently running version of the executable code from the SYSMEM at another network element to the SYSMEM circuit pack via the supervisory signal data communications channel (DCC).

The Metropolis® EON supports the following CIT memory administration functions:

- Install-Software: This copies the executable code and original values from the CD-ROM in the CIT to the SYSMEM circuit pack.
- Initialize-System: The **CONFIGURATION.Initialize.System (ph=9)** command replaces most current values in the SYSMEM circuit pack with the original values in the SYSMEM circuit pack and initiates the reset function (see Reset). Automatically provisioned parameters are unaffected by this command. The current values that are not replaced with their original values are those set with the following inputs:
  - **CONFIGURATION.Edit.Date**
  - **SECURITY.Edit.Private_Identifier**
  - **SECURITY.Edit.User.Security**
  - **SECURITY.Enter.User.Security**
  - **SECURITY.Enter.Far_End_Communications**

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  - **SECURITY.Enter.Network_Element.Security**. [The current values of the Target Identifier (TID) and Directory Service Network Element (DSNE) parameters are not replaced with their original values; but, the current values of the other parameters provisioned with this command are replaced with their original values.]

- Reset: The **CONFIGURATION.Initialize.System (ph=3)** command copies the current values from the SYSCTL circuit pack to the SYSMEM circuit pack and the executable code from the SYSMEM circuit pack to the SYSCTL circuit pack. The executable code in the SYSCTL circuit pack is then restarted and the current values in the SYSMEM circuit pack are reformatted to work with the new executable code.
- Update: The **CONFIGURATION.Update.System** command updates the state of all the automatically provisioned parameters based on what circuit packs are present and the condition of the incoming signals. Refer to “Provisionable Parameters and Original Values” in this chapter for more information about automatically provisioned parameters.
- Copy-Program: The **CONFIGURATION.Copy.Program** command copies the executable code and original values from the SYSMEM circuit pack of the network element (where the input is invoked) to the SYSMEM circuit pack of any other network element.

For more information about the memory administration commands, refer to the on-line help available with the Centerlink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

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Version Recognition

Description

The Metropolis® EON provides automatic version recognition of all the hardware and software installed. The Metropolis® EON is able to report the type and version of the circuit pack that is installed in each slot. The *Common Language*™*CLEI*™ code and serial number of each circuit pack are stored on the circuit pack and are accessible by the System Controller circuit pack. The equipment catalog item (ECI) version identification and apparatus code for each circuit pack are also provided. For detailed information, refer to the on-line help available with the CenterLink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

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Security

General

The Metropolis® EON provides a security function to protect against unauthorized access to the CIT functions (for example, provisioning). The security function limits access to the Metropolis® EON to legitimate users only. Security is provided using a four-tier approach that provides maximum flexibility and control. The four tiers are as follows:

- Port security
- User login security
- Network element login security
- Password aging.

Port Security

Port security provides the capability to control user access to the Metropolis® EON on a per port basis. Port security includes the following:

- ***Provisionable port status***: Dial-up access using the CIT (DTE) port may be enabled to allow users to log in to that port or disabled to deny any attempt to log in to that port. Local access to the CIT (DCE) port may never be disabled. However, legitimate logins to the CIT (DCE) port are required.
- ***Inactivity timers***: A provisionable inactivity timer (0-999 minutes) is provided for the local CIT (DCE) and CIT (DTE) ports. Inactivity timers do not apply to logins using the X.25 interface. If the user does not interact with the Metropolis® EON within the provisioned time, the user will automatically be disconnected. The inactivity timer is reset by any data received at the port from a user, regardless of whether the data is addressed to a local or remote login session. The inactivity timer is also reset by any output addressed to the local port, regardless of origin (local or remote login session).

In Releases 2.1 and later releases, the **SECURITY.Enter.Channel Identifier.Security** command is used to enable/disable port security. The **SECURITY.Retrieve.Channel_Identifier.Security** command is used to report port status. For more information, refer to the on-line help available with the Centerlink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

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Enhanced User Login Security

Enhanced user login security provides the capability to control access to the Metropolis® EON on an individual user basis. Enhanced user login security includes the following:

- ***Login ID and password***: All users must properly identify themselves by providing a valid login ID and password before gaining access to the Metropolis® EON.
- ***User authorization levels***: Each user login ID may be assigned a different authorization level for each function category of commands (that is, fault, configuration, performance, and security). The authorization level for each login ID is not required to be the same for all function categories. The following authorization levels are available (in descending order):
  - Expert: level 5 (original value, non-provisionable)
  - Privileged: level 4
  - General: level 3
  - Basic: level 2 (Reserved for use in a future release.)
  - Reports: level 1.

  Each user is allowed to execute any commands in the function category with the same or lower authorization level. Refer to Chapter 10 for more information about commands and their associated authorization levels.
- ***Expert users***: There are only two expert users. An expert user has the expert: level 5 authorization level assigned in all command function categories (non-provisionable). An expert user is allowed to perform all network element functions including those affecting security, access to the network element, system initialization, and software installation. An expert user is also allowed to perform high speed tests and specify that certain commands affect all low speed ports (for example, commands that have the potential for massive service interruption). An expert user login ID and password may only be changed by the other expert user. A new expert user may not be created, or an existing expert user may not be deleted.
- ***User created login IDs***: Up to 98 login IDs may be provisioned in the Metropolis® EON. The authorization level of each command function category is provisionable for each user created login ID. The authorization level for each command function category is not required to have the same value. Users must provision the

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authorization level of each command function category associated with a user created login ID. There is no original value associated with the authorization level parameter.

- ***Visitor Logins***: Visitor logins may be provisioned with expiration dates. Visitor logins are automatically deleted on the provisioned expiration date regardless of their use. Visitor logins are reports, basic, general, or privileged logins.

Login IDs and passwords are administered with the **SECURITY.Enter.User.Security**, **SECURITY.Edit.User.Security**, and **SECURITY.Retrieve.User.Security** commands. For more information about provisioning user login security, refer to the on-line help available with the Centerlink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

Network Element Login Security

Network element login security provides the capability to control access to the Metropolis® EON on a network element basis. Network element login security is provided by controlling whether or not nonexpert users are allowed to access the network element. When logins are allowed, nonexpert users may log in and access the network element. When logins are not allowed, login attempts are denied. Expert users are not affected by this security measure and are always allowed to log in.

Network element security is intended to disable nonexpert logins quickly on a temporary basis. This capability might be used during routine maintenance or upgrade activities. Permanent security should be provided using port security or user login security.

Login aging prevents inactive, nonexpert users from accessing the Metropolis® EON. If the difference between the last login date and the current date of a nonexpert login exceeds the provisioned login lifetime parameter, the login is automatically deleted. An audit runs each day at 11:59 p.m. to check for and delete expired logins. The same audit automatically deletes visitor logins at 11:59 p.m. on the provisioned expiration date. Login aging applies only to nonexpert logins. An expert login is never deleted.

The **SECURITY.Enter.Network_Element.Security** command is used to enable/disable nonexpert user logins. The **SECURITY.Retrieve.Network_Element.Security** command is used to report whether logins are allowed or not. For more information about provisioning network element security, refer to the on-line help

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available with the Centerlink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

Password Aging

Password aging provides the capability to force users to periodically change their password. If the users do not change their password within the provisioned period of time, their password will expire. The next time the users attempt to log in, they will not be allowed to execute any commands until they change their password.

To enable password aging, the password aging interval must be provisioned in the range of 7 to 999 days. To disable password aging, the password aging interval must be provisioned to 0 days.

If password aging is enabled, a user may not change a password unless at least 7 days have passed since the last password change for that login. Any attempt to change a password when less than 7 days have passed is denied.

The **SECURITY.Enter.Network_Element.Securit**y command is used to enable/disable password aging and provision the password aging interval. The **SECURITY.Retrieve.Network_Element.Security command** is used to report the password aging interval in days. For more information about provisioning password aging, refer to the on-line help available with the Centerlink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

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Software Upgrades

Description

The Metropolis® EON provides an in-service software upgrade capability using a CIT locally or remotely (with a modem or digital data network). The CIT (PC running CenterLink Management Console software) must be used locally to install the initial software into a system. Remote software upgrades over the supervisory signal DCC are possible.

The Metropolis® EON is ***fully*** operational during the software upgrade. For example, the Metropolis® EON maintains all transmission, performance monitoring, and system reporting functions. For detailed information about installing a particular software release, refer to Release 8.0.0 Metropolis® EON Software Release Description (SRD), comcode 109148387.

Correlating Alarms

An optical signal takes one of the following paths through the Metropolis® EON and Optical Translator:

- ***Through***: The through path is from an Optical Line System End Terminal through an OTU circuit pack or OTPM to another Optical Line System End Terminal.
- ***Add***: The add path is from a SONET/SDH lightwave terminal through an OTU circuit pack or OTPM to an Optical Line System End Terminal.
- ***Drop***: The drop path is from an Optical Line System End Terminal through an OTU circuit pack or OTPM to a SONET/SDH lightwave terminal.

Users can provision the association of an Optical Translator port to an optical channel. This association is used for correlating alarms rather than relying on the operations system. The **CONFIGURATION.Enter.Association.OT_Port_Signal** command is used to provision an association from an Optical Translator port to one or two “upstream” or “downstream” optical channels. Each Optical Translator port can be associated with:

- one upstream and one downstream optical channel (through path)
- one downstream optical channel (add path)
- one upstream optical channel (drop path).

The provisioning state of the Optical Translator port and the associated optical channel(s) must be the same. If the states are different, multiple trouble conditions may be reported for a single optical channel loss of signal condition. For more information about Optical Translator port and optical channel provisioning states, refer to “” in this section.

If associations are lost, system recovery will be automatic and associations will be recovered within 30 minutes. Infrequent loss of associations and automatic recovery can be expected. Improvement in congestion handling via the Navis™ Optical EMS reduces the number of lost associations significantly.

If a trouble condition (for example, equipment failure or incoming signal failure) is reported for a particular optical translator port, the port’s output will be turned off. Normally, this causes an additional loss of signal (LOS) condition to be reported at the downstream optical

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channel, but if the user has provisioned an associated downstream optical channel, reporting of the LOS condition is suppressed on the downstream optical channel.

The Optical Line System End Terminal transmits an alarm indication message to downstream repeaters and end terminals to suppress any alarms generated because of the LOS condition at the optical translator port.

If an alarm indication message or LOS condition is detected on an upstream optical channel, the Metropolis® EON would normally either do nothing (alarm indication message) or report the LOS condition. An Optical Translator port connected to this optical channel also reports a trouble condition. However, if the Optical Translator port has an associated upstream optical channel with an active alarm indication message or LOS condition, the port will suppress the condition being reported. The optical translator port's output will also be turned off and any associated downstream optical channel will suppress reporting the condition.

The **CONFIGURATION.Delete.Association.OT_Port_Signal** command is used to delete an association between an Optical Translator and optical channels. For more information about provisioning alarm correlations, refer to the on-line help available with the Centerlink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

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Access Identifiers

Description

The access identifiers (AIDs) are used to access the functionality of the Metropolis® EON. The Metropolis® EON also uses AIDs to identify, address, and report on entities within the system. Entities are circuit pack slots, ports, signals, transmission lines, operations interfaces, data communications channels (DCC), and alarm interfaces.

Table 11-1 Metropolis® EON Access Identifier Values

Entity Name	General Notes	Starting Release	Ending Release (if appl)	Values
ALL		1.0		{ALL}
Port (COM)		1.0	1.0	{ALL, DCE, DTE, DCC, X25}
Port (COM)		2.0	3.3	{ALL, DCE,DTE,DCC,X25,SER_TLM1}
Port (COM)		4.0		{ALL,DEC,DTE,DCC,X25,SER_TLM1,LAN}
Operations Interface (CIT)		1.0		{CIT,TL1}-{DCE,DTE,DCC,X25}
Operations Interface (User Panel)		1.0		{USER}-{PANEL}
Operations Interface (OFFICE ALARMS)		1.0		{OFFICE ALMS}
Operations Interface (PAR TLM)		1.0		{PAR TLM}
Point (Control)		1.0	1.0	{CONT}-{ALL,1-4}
Point (Control)		2.0		{CONT}-{ALL, 1-35}
Point (Environmental)		1.0	1.0	{ENV}-{ALL,1-16}
Point (Environmental)		2.0		{ENV}-{ALL,1-144}
PM Register		1.0	1.0	{REG)-{ALL, DAY,QH}
Slot (TOHCTL)		1.0		{TOHCTL}

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Entity Name	General Notes	Starting Release	Ending Release (if appl)	Values
Slot (SYSCTL)		1.0		{SYSCTL}
Slot (SYSMEM)		1.0		{SYSMEM}
Optical Line		1.0		{OLINE}-{ALL, 1A,1B,2A,2B,3A,3B,4A,4B}
Optical Channel		1.0	2.0	{OCHAN}-{ALL, 1A,1B,2A,2B,3A,3B,4A,4B}-{1-8}
Optical Channel		2.1	8.1	{OCHAN}-{ALL, 1A,1B,2A,2B,3A,3B,4A,4B}-{1-16}
Optical Channel		8.2		{OCHAN}-{ALL, 1A,2B,2A,2B}-{1-32}
Supervisory Channel		1.0	2.0	{SUPR}-{ALL, 1A,1B,2A,2B,3A,3B,4A,4B}
Supervisory Channel		2.1	2.1	{SUPR}-{TLM}-{ALL, 1A,1B,2A,2B,3A,3B,4A,4B}
Supervisory Channel		3.0		{SUPR}-{ALL, 1A,1B,2A,2B,3A,3B,4A,4B}
CMS Port		1.0		{CMS}-{ALL, 1A,1B,2A,2B,3A,3B,4A,4B}
Slot (OA)		1.0		{OA}-{ALL,1A,1B,2A,2B,3A,3B,4A,4B}
Slot (OU)		2.0		{OU} -{ALL,1A,1B,2A,2B,3A,3B,4A,4B}
Slot (TLM)		1.0		{TLM}-{ALL, 1A,1B,2A,2B,3A,3B,4A,4B}

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Entity Name	General Notes	Starting Release	Ending Release (if appl)	Values
Signal (SUPR, CMS)		1.0		{SUPR,CMS}-{ALL,1,2,3,4}
Operations Interface (DCC-SUPR)		1.0		{DCCSUPR}-{ALL, 1A,2B,2A,2B,3A,3B,4A,4B}
Shelf (OLS)		1.0		{SHLF}-{ALL,1-2}
System		2.0		{SYSTEM}
Slot (OTU)		3.0		{OTU}-{ALL,1,2}-{ALL,1-32}
Slot (OTPM)		3.0		{OTPM}-{ALL,1,2}-{ALL,1,3,5…31}-{ALL,1-4}
Port (OTU)		3.0		{OTU}-{ALL,1,2}-{ALL,1-32}-1
Port (OTPM,OTPM25)		3.0		{OTPM}-{ALL,1,2}-{ALL,1,3,5…31}-{ALL,1-4}-1
Slot (OTCTL)		3.0		{OTCTL}-{ALL,1,2}
Shelf (OT)		3.0	8.1	{SHLF}-{OT}-{ALL,1,2}-{ALL,LO,MID,UP}
Shelf (OT)		8.1		{SHLF}-{OT}-{ALL,1,2}-{ALL,1_8,9_20,21_32}
Port (TCP Port)		4.0		{Port}-{ALL,1,2,3,4,5,6,7,8}
Slot (OPS)		3.1		{OTU}-{ALL,1,2}-{ALL,1,3,5…31}
Slot (SPODU or SPOMU)		3.1		{OTU}-{ALL,1,2}-{ALL,1,3,5…31}
Slot (OUPSR)	1	8.0	R8.1	{OUPSR}-{ALL,1,2}-{ALL,1-32}

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Entity Name	General Notes	Starting Release	Ending Release (if appl)	Values
Slot (OUPSR)	1	8.2		{OTU}-{ALL,1,2}-{ALL,1-32}
Port (OUPSR)	2	8.2		{OUPSR}-{ALL,1,2}-{ALL,1-32}-{ALL,AIN,BIN,CIN,AOUT,BOUT,COUT}
Slot (2DM25)	3	8.2		{OTU}-{ALL,1,2}-{ALL,1-32}
Port (2DM25)	3	8.2		{2DM25}-{ALL,1,2}-{ALL,1-32}-{ALL, HS, P1, P2}
Port (MUXOTU)	4	8.2		{MUXOTU}-{ALL,1,2}-{ALL,1-32}-{ALL, HS, P1, P2, P3, P4, P5, P6, P7, P8}
Slot (OMON)		8.0		{OA}-{ALL,2A}
Port (OMON)		8.2		{OMON}-{ALL, 2A}-{ALL, IN1, IN2}
Slot (LIRCV,LITX,LIHTR)		8.0		{OA}-{ALL,1A,1B,2B,2A,2B,3A,3B,4A,4B}
Slot (IOALRP)		4.0		{IAOLRP}

Notes:

1. In R8.0 and R8.1 the OUPSR transmission alarms are generated against the slot AID OUPSR-(1,2)-(1,32), and the OUPSR equipment alarms are generated against the slot AID OTU-(1,2)-(1-32).
2. In R8.2 and later the OUPSR transmission related alarms are generated against the port AID OUPSR-(1,2)-(1,32)-(AIN, BIN, CIN, AOUT, BOUT, COUT), and OUPSR equipment alarms are still generated against the slot AID OTU-(1,2)-(1-32).
3. All EON MUX OTUs following this naming convention:
   – 1st character equals the number of inputs
   – 2nd character is ***D*** for data or ***S*** for SONET/SDH
   – 3rd character is ***M*** for multiplexer
   – 4th and 5th characters equal the output rate, such as ***25*** for

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2.5 Gb/s and 10 for ***10*** Gb/s

4. The port AID MUXOTU will be used to report alarms related to all Muxing OTUs.

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Provisioning

Overview

Purpose

This section explains concepts related to setting options for particular pieces of equipment, signals, or for the entire system.

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Provisioning Circuit Pack Slots

Description

To simplify circuit pack installation, circuit pack slot parameters can be provisioned before installing the corresponding circuit pack. All system parameters and values (current and original) are preserved by the Metropolis® EON in the nonvolatile memory of SYSMEM circuit pack. The parameters and values are protected by the nonvolatile memory if a power failure occurs and are retrievable on demand regardless of the means used for provisioning. The parameters are automatically downloaded when the affected circuit pack is installed in the slot.

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Provisioning on Circuit Pack Replacement

Description

Replacement of a failed circuit pack is simplified by the Metropolis® EON's automatic provisioning of the current circuit pack values. The SYSCTL and SYSMEM circuit packs maintain a provisioning map of the entire system, so when a transmission circuit pack is replaced, the SYSCTL and SYSMEM circuit packs automatically download provisioning parameters and current values to the new circuit pack.

□

Auto Provisioning Date/Time

Description

When the SYSCTL circuit pack is reseated/replaced or a node power failure/recovery occurs, the Metropolis® EON uses the original date/time values (70-01-01, 00:00:00) in all reports. During ring startup the node obtains the correct date and time from the node provisioned as directory services network element (DS-NE). If the SYSCTL circuit pack is reseated/replaced or a node power failure/recovery occurs at the DS-NE, the DS-NE obtains the correct date and time from an adjacent node during ring startup.

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Circuit Pack Slot, Port, and Optical Channel Provisioning States

Description

The OA, TLM, and OTU circuit pack slots may be in one of the following states:

- ***AUTO (Auto)***: AUTO (OOS-MA-AS) is the original value of the circuit pack slot state parameter. AUTO refers to a circuit pack slot that is available for automatic provisioning. A circuit pack slot makes a transition from the AUTO state to the EQ state when the presence of a circuit pack is detected.
- ***EQ (Equipped***): EQ refers to a circuit pack slot that is fully monitored and alarmed. A circuit pack slot makes a transition from the EQ state to the AUTO state when the **CONFIGURATION.Update.System** command is executed while the absence of a circuit pack is detected.

The IS-3/STM-1 customer maintenance signal (CMS – not supported by LDA4 TLM) and Optical Translator signal ports may be in one of the following states:

- ***AUTO (Auto)***: AUTO (OOS-MA-AS) is the original value of the port state parameter. AUTO refers to a port that is available for automatic provisioning. A port makes a transition from the AUTO state to the IS state after a good signal is detected. A port in the AUTO state can also be provisioned to the NMON state, using the **CONFIGURATION.Enter.CMS** and **CONFIGURATION.Enter.OT_Port_Signal** commands.
- ***IS (In Service)***: IS refers to a port that is fully monitored and alarmed. A port makes a transition from the IS state to the AUTO state when the **CONFIGURATION.Update.System** command is executed while the absence of a good signal is detected. A port also makes a transition from the IS state to the AUTO state when the associated circuit pack slot makes an EQ-to-AUTO circuit pack slot state transition. A port in the IS state can also be provisioned to the AUTO or NMON state, using the **CONFIGURATION.Enter.CMS** and **CONFIGURATION.Enter.OT_Port_Signal** commands.
- ***NMON (Not Monitored)***: NMON (OOS) refers to a port that is not monitored and will not make a transition to the IS state when a good signal is detected. A port in the NMON state can be

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provisioned to the AUTO state, using the **CONFIGURATION.Enter.CMS** and **CONFIGURATION.Enter.OT_Port_Signal** commands.

The optical channels may be in one of the following states:

- ***AUTO (Auto)***: AUTO (OOS-MA-AS) is the original value of the optical channel state parameter. AUTO refers to an optical channel that is available for automatic provisioning. An optical channel makes a transition from the AUTO state to the IS state after the presence of an optical channel is detected. An optical channel in the AUTO state can also be provisioned to the NMON state, using the **CONFIGURATION.Enter.Optical_Channel** command.
- ***IS (In Service)***: IS refers to an optical channel that is fully monitored and alarmed. An optical channel makes a transition from the IS state to the AUTO state when the **CONFIGURATION.Update.System** command is executed while a loss of signal is detected. An optical channel in the IS state can also be provisioned to the AUTO or NMON state, using the **CONFIGURATION.Enter.Optical_Channel** command.
- ***NMON (Not Monitored)***: NMON (OOS) refers to an optical channel that is not monitored and will not make a transition to the IS state when the presence of an optical channel is detected. An optical channel in the NMON state can be provisioned to the AUTO state, using the **CONFIGURATION.Enter.Optical_Channel** command.

The Metropolis® EON monitors, reports, and alarms trouble conditions associated with optical channels, supervisory channels, (CMS) ports, and Optical Translator ports according to the optical channel state, port state, and the circuit pack slot state. The circuit pack slot state must be in the EQ state.

Provisionable Parameters and Original Values

Important! The Metropolis® EON has no switch-setable parameters.

If unsupported characters are entered into the TID, for example, the user may need to reset and reprovision the system.

Installation provisioning is minimized with provisionable parameters and original values. Each provisionable parameter is assigned an original value. The provisionable parameters and original values are copied from the CD-ROM in the CIT to the SYSMEM circuit pack.

The SYSMEM circuit pack contains one copy of the provisionable parameters with their original values and another copy of the provisionable parameters with their current values. The SYSCTL circuit pack, plus the board controllers on the other circuit packs, contain one copy of the provisionable parameters with their current values.

The original values cannot be changed. The current values can be changed through local provisioning.

A provisioning rule is that a repeater be selected when designating a DSNE. This will improve the DCN performance.

The Provisionable Parameters Job Aid is inserted into this chapter for your convenience. It shows the provisionable parameters of the Metropolis® EON. This includes the parameters that can be provisioned using the CIT, plus the parameters that are automatically provisioned or have fixed values (cannot be changed). The original value for each provisionable parameter appears in brackets [ ]. The applicable CenterLink Management Console commands also appear, with the corresponding TL1 command in brackets [ ].

Because there are so many parameters specific to threshold crossing alerts (TCAs), they appear separately in the Provisionable Threshold

Crossing Alert Parameters Job Aid. It uses a format similar to the Provisionable Parameters Job Aid.

CAUTION

Changes to the System Identifier (SID) could result in serious network problems, if not exercised with extremely careful planning. Customers are required to assume full responsibility for proper network operation when making any such changes. OLS R6.0 and later allows for the provisioning of the NSAP System ID. The original value is a unique number that is assigned at the factory by Lucent Technologies.

Metropolis® EON R8.2 Provisionable Parameters

Parameter	Options [Original Value]	Method	CenterLink Management Console Command [TL1 Command]	CenterLink Management Console Report [TL1 Report]
System Identification CAUTION: If using an element management system, delete node associations before changing the TID.		CIT	SECURITY-Enter-System [ENT-SYS]	SECURITY-Retrieve-System [RTRV-SYS]
– New Target Identifier (NEW_TID)	[LT-FT-2000] *1 to 20 characters*			
– Standard	[SONET], SDH			
– Automatic Power Shut Down (APSD)	[ENABLE], DISABLE			
– Transmit OTU	ENABLE, DISABLE			
– Optical Line Loss Severity (OLLOS_SEV)	[CR], MJ, MN, CR_Prompt, MN_Prompt, MN_Deferred			
– Directory Service Network Element (DSNE)	Yes, [No]			
– TCP/IP-OSI TL1 Gateway Network Element (IPGNE)	Yes, [No]			
– Alarm Gateway Network Element (AGNE)	Yes, [No]			
– Alarm Group (ALMGRP)	0–[255]			
– X.25 Packer Size (X25PS)	128, [256]			
– Pass-through ring mode feature (PASS-THRU)	YES, [NO]			
– Direction (DIRN)	[1A-TX], 1a-RCV, 1A-TX-THRU, 1A-RCV-THRU, DUAL			
– Side 1 System Type (SIDE1_SYS)	[A], B, C, 1_0A, 0_OA			
– Side 2 System Type (SIDE2_SYS)	[A], B, C, 1_0A, 0_OA			

Metropolis® EON R8.2 Provisionable Parameters

Parameter	Options [Original Value]	Method	CenterLink Management Console Command [TL1 Command]	CenterLink Management Console Report [TL1 Report]
– LAN Companion for Ring Discovery (COMPANION_TID)	A valid TID *1 to 20 characters*			
– Local Area Address (LOCALADDRESS)	A variable length address field between 1 and 13 bytes in range 00-FF [3900008000000-0000000000000]	CIT	SECURITY-Enter-OSI [ENT-OSI]	SECURITY-Retrieve-OSI [RTRV-OSI]
– Provisioned System Identifier (PROV_SID)	See Caution at top of page.			
– LAN ISIS Level (LANISISLVL)	[Level-1], Level-2, Follow-NODEISISLVL			
– Node ISIS LVL (NODEISISLVL)	[Level-1], Level-2			
– Designated Router Priority (DRP)	1–28 [64]			
– Transfer Mode (TRANSFERMODE)	[UITS]			
– IP Address (IP_AD)	A valid IP address (4 fields separated by periods, each field 0-255), example: 135.13.38.55	CIT	SECURITY-Enter-TCP [ENT-TCP]	SECURITY-Retrieve-TCP [RTRV-TCP]
– IP Subnet Mask (IP_SNM)	A valid subnet mask (same format as IP address)			
– Default Router Address (IP_DRAD)	A valid IP address			
– IP Map				
IP Address (IP_AD)	A valid IP address	CIT	SECURITY-Enter-IPMap [ENT-IP-MAP]	SECURITY-Retrieve-IPMap [RTRV-IP-MAP]
Host Name (HOST)	Host name of the OS (not including domain name). 1 to 15 alphanumerics			
Application Context Identifier (ACID)	OS application context identifier. MT=maintenance MA=memory admin CMDR=command-response only OTHR=other RST=restoration			

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Metropolis® EON R8.2 Provisionable Parameters

Parameter	Options [Original Value]	Method	CenterLink Management Console Command [TL1 Command]	CenterLink Management Console Report [TL1 Report]
Performance Monitoring – Start Time	[00]-23	CIT	PERFORMANCE-Set-Performance_Monitoring-Start_Time [SET-PM-STIME]	PERFORMANCE-Retrieve-Performance_Monitoring-Start_Time [RTRV-PM-STIME]
Operations – Operation Port Baud Rates			None	None
CIT (DCE)	9600			
CIT (DTE)	9600			
X.25	1200, 2400, 4800, 9600, 19200, 56000 [No Original Value]	Auto		
LAN	10BaseT LAN	Cable		
– Remote Access		CIT	SECURITY-Enter-Far_End_Communications [ENT-FECOM]	SECURITY-Retrieve-Far_End_Communications [RTRV-FECOM]
Remote Activity Reporting (RAR)	ENABLE, [DISABLE]			
Remote Office Alarms (ROA)	ENABLE, [DISABLE]			
– Network Element Security			SECURITY-Enter-Network_Element - Security [ENT-NE-SECU]	SECURITY-Retrieve-Network_Element-Security [RTRV-NE-SECU]
Logins Allowed (ALW_UID)	[Yes], No			
Password Aging Interval (PAGE)	[0], 7–999 Days			
Login Aging (UOUT)	[0], 7–999 Days			
– Port Security			SECURITY-Enter-Channel_Identifier-Security [ENT-CID-SECU]	SECURITY-Retrieve Channel_Identifier-Security [RTRV-CID-SECU]
Access Identifier (AID)	DCDCE, DTE, DCC, X.25, SER_TLM, LAN [no original value]			
Timeout (TMOUT)	0-999 Minutes [15]			
Port Access (PORTACC)	[Enable], Disable			
Baud Rate (BAUDRATE)	9600			
X.25 Channel Type (CHAN)	PVC{1-2}, TBL{1-16}			
X.25 OS Type	MT, MA, CMDR, OTHR, RST, NONE			
SVC Calling Address (CALLADDR)	1 to 15 digits			
Year Format (YEARFMT)	2-DIGIT, 4-DIGIT			

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Metropolis® EON R8.2 Provisionable Parameters

Parameter	Options [Original Value]	Method	CenterLink Management Console Command [TL1 Command]	CenterLink Management Console Report [TL1 Report]
– Login Security				
Private Identifier (PID)	[FT-2000] *6 to 10 characters with at least 1 digit and exactly one symbol*	CIT	Enter new login with: SECURITY-Enter-User-Security [ENT-USER-SECU]	None
User Identifier (UID)	[LT01 and LT02] *1 to 10 alphanumeric characters*		Change login with: SECURITY-Edit-User-Security [ED-USER-SECU]	SECURITY-Retrieve-User-Security [RTRV-USER-SECU]
User Access Privilege (UAP)	C{1-4}&F{1-4}& PM{1-4}&S{1-4}		Change password only with: SECURITY-Enter-Private_ Identifier [ED-PID]	
Type of Temporary Login (TYPE)	Visitor			
Expiration Date (EXPDAT)	(YY)YY-MM-DD			
Slot State Provisioning – All Slots	EQ, [AUTO]	Auto	None	FAULT-Retrieve-State [RTRV-STATE]
OC-48 Termination – LBO (Optical)	0, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 16, 18, 20 dB	Lightguide jumper	None (manually installed)	None (dB stamped on LBO)
IS-3 Termination – LBO (Optical)	0, 5, 7, 10, 12, 15, 17, 17.5, 20 dB	Lightguide jumper	None (manually installed)	None (dB stamped on LBO)
Loopback Testing – 2:1 MUX OTU (2DM25)	LS_SIDE,HS_SIDE, [NORMAL]	CIT	FAULT-Test-Loopback [TEST-LOOPBACK]	None
Incoming Signal		CIT	CONFIGURATION-Set-Attribute-Alarm [SET-ATTR-ALM]	CONFIGURATION-Retrieve-Attribute-Alarm [RTRV-ATTR-ALM]
– Alarm Delay (ALMDEL)	0-120 seconds [2]			
– Alarm Clear Delay (CLRDEL)	0-120 seconds [10]			

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Metropolis® EON R8.2 Provisionable Parameters

Parameter	Options [Original Value]	Method	CenterLink Management Console	
			Command [TL1 Command]	Report [TL1 Report]
User-Settable Miscellaneous Discretes				
– Description of Control Outputs 1-36 (CONTTYPE)	*1 to 26 characters*	CIT	CONFIGURATION-Set-Attribute-Control [SET-ATTR-CONT]	CONFIGURATION-Retrieve-Attribute-Control [RTRV-ATTR-CONT]
– Notification Code (NTFCNCDE)	CR, MF, [MN], NA, NR, NO, CR_Prompt, MJ_Prompt, MN_Deferred, NA_No_Alarm, NR_Report, NO_Not_Indicated	CIT	CONFIGURATION-Set-Attribute-Environment [SET-ATTR-ENV]	CONFIGURATION-Retrieve-Attribute-Environment [RTRV-ATTR-ENV]
– Environmental Input Alarm Message (ALMMSG)	1 to 26 characters enclosed by delimiters. Example: \"Alarm Message\"			
Date and Time				
– Date	SONET – (YY)YY-MM-DD [70-01-01] SDH – DD-MM-(YY)YY [01-01-70]	CIT	CONFIGURATION-Edit-Date_and_Time [ED-DAT]	CONFIGURATION-Retrieve-Date_and_Time [RTRV-DAT]
– Time	HH-MM-SS			
– Time Zone (TZ)	*[blank] 1-3 letters*			
– Start Daylight Savings Date (STRTDST)	SONET – MM-DD [01-01] SDH – DD-MM [01-01]			
–				
– Stop Daylight Savings Date (STOPDST)	SONET – MM-DD [01-01] SDH – DD-MM [01-01]			
– Daylight Savings Time Zone (DSTZ)	*[blank] 1-3 letters*			

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Metropolis® EON R8.2 Provisionable Parameters

Parameter	Options [Original Value]	Method	CenterLink Management Console	
			Command [TL1 Command]	Report [TL1 Report]
OC-48 Section				
– Expected Incoming Path Trace Message (EXPTRC)	[no original value] 1 to 15 characters	CIT	CONFIGURATION-Enter-Section-Trace	CONFIGURATION-Retrieve-Section-Trace
– Notification Code (NTFCNCDE)	CR, MF, [MN], NA, NR, NO, CR_Prompt, MJ_Prompt, MN_Deferred, NA_No_Alarm, NR_Report, NO_Not_Indicated		[ENT-SECTRC]	[ENT-SECTRC]
Supervisory Signal				
– Notification Code (NTFCNCDE)	CR, MF, [MN], NA, NR, NO, CR_Prompt, MJ_Prompt, MN_Deferred, NA_No_Alarm, NR_Report, NO_Not_Indicated	CIT	CONFIGURATION-Enter-Supervisory [ENT-SUPR]	CONFIGURATION-Retrieve-Supervisory [RTRV-SUPR]
– Signal Degrade Threshold (SDTHR)	10^{-5}, [10^{-6}], 10^{-7}, 10^{-8}, 10^{-9}			
Optical Channel State				
– Primary State (PST)	[OOS-MA-AS(AUTO)/IS], OOS(NMON)	CIT	CONFIGURATION-Enter-Optical_Channel [ENT-OCHAN]	CONFIGURATION-Retrieve-Optical_Channel [RTRV-OCHAN]
– Port	[AUTO], IS	CIT, Auto	To set unused slots back to AUTO after dropping channel(s): CONFIGURATION-Update-System [UPD-SYS]	CONFIGURATION-Retrieve-Optical_Channel [RTRV-OCHAN]
CMS Provisioning				
– Access Identifier (AID)	CMS-{ALL, 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B}	CIT	CONFIGURATION-Enter-Customer_Maintenance_Signal [ENT-CMS]	CONFIGURATION-Retrieve-Customer_Maintenance_Signal [RTRV-CMS]
– Secondary State (SST)	OOS-MA-AS or OOS			
– Optical Line LOS Severity	SONET – [MINOR], MAJOR, CRITICAL SDH – [MINOR], PROMPT, DEFERRED	CIT	CONFIGURATION-Enter-System [ENT-SYS]	CONFIGURATION-Retrieve-Customer_Maintenance_Signal [RTRV-CMS]
OT Port Signal Provisioning				
– 10G OTU Expected Input Rate (OC192IN)	OC192, OCH, [DEFAULT]		CONFIGURATION-Enter-	CONFIGURATION-Retrieve-

Metropolis® EON R8.2 Provisionable Parameters

Parameter	Options [Original Value]	Method	CenterLink Management Console Command [TL1 Command]	CenterLink Management Console Report [TL1 Report]
– 10G OTU Expected Output Rate (OC192OUT)	[OC192], OCH		OT_Port_Signal [ENT-OTPS]	OT_Port_Signal [RTRV-OTPS]
– 2:1 MUX OTU Client Expected Input Rate (CEXP2DM25)	ESCON,ISC_CF, FICON,GbE-1, FC-100,[UNEQPT]			
– 2:1 MUX OTU Client Expected Mode and Wavelength (CW2DM25)	[MM850nm], MM1310nm,SM1310nm			
– Low Speed Broadband Bit Rate (LSBBRATE)	ETR_CLO,ISC, [High_Band], Low_Band			
– Universal Broadband Bit Rate (UBBRATE)	ETR,CLO,ESCON, ISC-3, FICON, FX,GbE-1,FDDI, FC-12,FC-25,FC-50, FC-100,D1-V, DV6000,OC3,OC12, OC48,STM1,STM4, STM16,[UNKNOWN]			
– UBB Data Rate Mismatch Notification Code (UBBDRMNC)	*Same as for NTFCNCDE, below*			
– Notification Code (NTFCNCDE)	CR, MF, [MN], NA, NR, NO, CR_Prompt, MJ_Prompt, MN_Deferred, NA_No_Alarm, NR_Report, NO_Not_Indicated			
– Primary State (PST)	[OOS-MA-AS(AUTO)/IS], OOS(NMON)			
– OTPS Associations				
TID	*TID that you are logged into*	CIT	CONFIGURATION-Enter-	CONFIGURATION-Retrieve-
Association Type	ADD, DROP, XADD, XDROP		Association-OT_Port_Signal	Association-OT_Port_Signal
Source TID	*A valid TID*			
Source AID	OUPSR-{1, 2}-{1-32}-{AOUT, BOUT}, OTU-{1, 2}-{1-32}-1 OTPM-{1, 2}-{1, 3, 5, 7, 9, 11, 13, 15, 17, 19,			

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Metropolis® EON R8.2 Provisionable Parameters

Parameter	Options [Original Value]	Method	CenterLink Management Console Command [TL1 Command]	CenterLink Management Console Report [TL1 Report]
Destination AID	OUPSR-{1, 2}-{1-32}-{AOUT, BOUT}, OTU-{1, 2}-{1-32}-1 OTPM-{1, 2}-{1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31}-{1-4}-1 OCHAN-{1A, 1B, 2A, 2B}-{1-16}			

END OF JOB AID

Metropolis® EON R8.2 Provisionable Threshold Crossing Alert (TCA) Parameters

	Threshold Range [Original Value]		CenterLink Management Console	
Parameter	Current 15 Minute	Current 1 Day	Command [TL1 Command]	Report [TL1 Report]
Optical Line				
– TCA Autonomous Report – Total Power Received (TOPR-OL)	[Enable], Disable	[Enable], Disable	PERFORMANCE-Set-Threshold-	PERFORMANCE-Retrieve-
– Threshold Level – Total Power Received (TOPR)	10, 20, 30, 40, 50, [60], 70, 80, 90, 100	10, 20, 30, 40, 50, [60], 70, 80, 90, 100	Optical_Line [SET-TH-OLINE]	Threshold-Optical_Line* [RTRV-TH-OLINE]
– TCA Autonomous Report – Total Power Transmitted (TOPT-OL)	[Enable], Disable	[Enable], Disable		
– Threshold Level – Total Power Transmitted (TOPT)	10, 20, 30, 40, 50, [60], 70, 80, 90, 100	10, 20, 30, 40, 50, [60], 70, 80, 90, 100		
Optical Channel				
– TCA Autonomous Report – Total Power Received(TOPR-OL)	[Enable], Disable	[Enable], Disable	PERFORMANCE-Set-Threshold-	PERFORMANCE-Retrieve-
– Threshold Level – Total Power Received (TOPR)	10, 20, 30, 40, 50, [60], 70, 80, 90, 100	10, 20, 30, 40, 50, [60], 70, 80, 90, 100	Optical_Channel [SET-TH-OCHAN]	Threshold-Optical_Channel* [RTRV-TH-OCHAN]
– TCA Autonomous Report – Total Power Transmitted (TOPT-OL)	[Enable], Disable	[Enable], Disable		
– Threshold Level – Total Power Transmitted (TOPT)	10, 20, 30, 40, 50, [60], 70, 80, 90, 100	10, 20, 30, 40, 50, [60], 70, 80, 90, 100		
Supervisory Channel				
– Line Coding Violations (CVL)†	-7, -8, [-9], -10	-7, -8, -9, [-10], -11, 12	PERFORMANCE-Set-Threshold-	PERFORMANCE-Retrieve-
– TCA Autonomous Report (CVL) †	[Enable], Disable	[Enable], Disable	Supervisory	Threshold-
– Line Errored Seconds (ESL)	1-900 [25]	1-65535 [250]	[SET-TH-SUPR]	Supervisory
– TCA Autonomous Report (ESL)	[Enable], Disable	[Enable], Disable		[RTRV-TH-SUPR]*
– Line Severely Errored Seconds (SESL)	1–63 [10]	1–4095 [40]		
– TCA Autonomous Report (SESL)	[Enable], Disable	[Enable], Disable		
– Line Unavailable Seconds (UASL)	1–63 [10]	1–4095 [10]		
– TCA Autonomous Report (UASL)	[Enable], Disable	[Enable], Disable		

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Metropolis® EON R8.2 Provisionable Threshold Crossing Alert (TCA) Parameters

	Threshold Range [Original Value]		CenterLink Management Console	
Parameter	Current 15 Minute	Current 1 Day	Command [TL1 Command]	Report [TL1 Report]
– TCA Autonomous Report – OC-3 Laser Bias Current (LBC-SU)†	[Enable], Disable	[Enable], Disable		
– TCA Autonomous Report – OC-3 Signal Power (SPR-SU)†	[Enable], Disable	[Enable], Disable		
OT Port Signal				
– Coding Violations – Section Near End (CVS) †	-7, -8, [-9], -10	-7, -8, -9, [-10], -11, 12	PERFORMANCE-Set-Threshold-	PERFORMANCE-Retrieve-
– TCA Autonomous Report (CVS) †	[Enable], Disable	[Enable], Disable	OT_Port_Signal	Threshold-
– Errored Seconds – Section Near End (ESS)	1–900 [25]	1-65535 [250]	[SET-TH-OTPS}	OT_Port_Signal [RTRV-TH-OTPS]*
– TCA Autonomous Report (ESS)	[Enable], Disable	[Enable], Disable		
– Severely Errored Seconds – Section Near End (SESS)	1–63 [10]	1–4095 [40]		
– TCA Autonomous Report (SESS)	[Enable], Disable	[Enable], Disable		
– Severely Errored Framing Seconds – Section Near End (SEFS)	1–63 [10]	1–4095 [40]		
– TCA Autonomous Report (SEFS)	[Enable], Disable	[Enable], Disable		

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12 Performance Monitoring Concepts

Overview

Purpose

This chapter contains conceptual information about performance monitoring. For specific procedures, see Chapter 9.

Contents

This chapter is divided into the following sections.

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Performance Parameters

Proactive maintenance

Proactive maintenance consists of monitoring performance parameters associated with the optical lines, optical channels, supervisory channels, and customer maintenance signals.

Thresholds

Performance parameter thresholds are set to show degraded performance. When a performance monitoring threshold is crossed, it is reported to the operations system where all threshold crossings associated with a particular path can be correlated, and the likely source of the degradation can be identified.

Degrading conditions

The Metropolis® EON provides performance monitoring to support proactive maintenance of a network. Proactive maintenance refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending hard or soft failure.

For more information about provisioning thresholds and enabling/ disabling the reporting of threshold crossing alerts (TCAs) to an operations system, refer to Chapter 9.

Parameters

Facility	***Measured Parameter***	***Maximum Counts***	
		Current 15 Minute	***Current 1 Day***
Optical Line	Total Optical Power Received (TOPR-OL)	—	—
	Laser Bias Current for Pump 1 (LBC-P1)	—	—
	Laser Bias Current for Pump 2 (LBC-P2)	—	—
	Laser Backface Current for Pump 1 (LBFC-P1)	—	—
	Laser Backface Current for Pump 2 (LBFC-P2)	—	—
Optical Channel	Signal Power Received (SPR-C)	—	—

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Facility	***Measured Parameter***	***Maximum Counts***	
		Current 15 Minute	***Current 1 Day***
Supervisory Channel	Signal Power Received (SPR-SU)	—	—
	Laser Bias Current (LBC-SU)	—	—
	Line (B2) Coding Violations (CV-L)	16383	1048575
	Line (B2) Errored Seconds (ES-L)	900	65535
	Line (B2) Severely Errored Seconds (SES-L)	900	65535
	Line (B2) Unavailable Seconds (UAS-L)	900	65535
Optical Translator Port Signals[1]	OC-3/STM-1Section (B1) Coding Violations (CV-S)	16383	1048575
	OC-12/STM-4Section (B1) Coding Violations (CV-S)	16383	1048575
	OC-48/STM-16 Section (B1) Coding Violations (CV-S)	16383	1048575
	8 bit/10 bit Coding Violations (CV-S)	16383	1048575
	Section (B1) Errored Seconds (ES-S)	900	65535
	Section (B1) Severely Errored Seconds (SES-S)	900	65535
	Section (B1) Severely Errored Frame Seconds (SEFS-S)	900	65535
	8 bit/10 bit Errored Seconds (ES-S)	900	65535
	8 bit/10 bit Severely Errored Seconds (SES-S)	900	65535
	8 bit/10 bit Severely Errored Frame Seconds (SEFS-S)	900	65535

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Optical Line Parameters

The following optical line parameters are monitored continuously to detect degraded performance of the laser:

- ***Total Optical Power Received (TOPR-OL)***: This parameter is the total power for all the optical channels. It is a function of the total number of optical channels in service at any time and is reported using a scale from 0 to 100. The reported value of the total optical power received parameter is compared to the baseline value. The baseline value is provided as a basis from which to measure deviations and set thresholds for detecting degraded performance.

  The baseline value of the total optical power received parameter is automatically provisioned when an optical channel is added. When an Optical Amplifier circuit pack is replaced, the outside plant loss changes, or an optical channel is deleted, the baseline value should be initialized using the **PERFORMANCE.Initialize.Register.Optical_Line** command.
- ***Laser Bias Current for Pump 1 (LBC-P1)***: This parameter indicates whether the system optics are working within normal margins (in range or out of range).
- ***Laser Bias Current for Pump 2 (LBC-P2)***: This parameter indicates whether the system optics are working within normal margins (in range or out of range).
- ***Laser Backface Current for Pump 1 (LBFC-P1)***: This parameter indicates whether the laser for pump 1 is working within normal margins (in range or out of range).
- ***Laser Backface Current for Pump 2 (LBFC-P2)***: This parameter indicates whether the laser for pump 2 is working within normal margins (in range or out of range).

Threshold crossing alerts (TCAs) are generated if the TOPR-OL parameter exceeds the set threshold. (Threshold crossing alerts are not supported for the LBC-P1, LBC-P2, LBFC-P1, and LBFC-P2 parameters.) The threshold is set and the TCA is enabled or disabled using the **PERFORMANCE.Set.Threshold.Optical_Line** command. TCAs can be enabled or disabled for a single parameter.

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Optical Channel Parameters

The following optical channel parameters are monitored continuously to detect degraded performance of the laser:

- ***Signal Power Received (SPR-C)***: This parameter is the measurement of the signal power per channel. The signal power is determined by monitoring the power of the tone on the supervisory signal. It is a function of the total number of optical channels in service at any time and is reported using a scale from 0 to 100. The reported value of the signal power per channel parameter is compared to the baseline value. The baseline value is provided as a basis from which to measure deviations and set thresholds for detecting degraded performance.

  The baseline value of the signal power per channel parameter is automatically provisioned when an optical channel is added. When an Optical Amplifier circuit pack is replaced, the outside plant loss changes, or an optical channel is deleted, the baseline value should be initialized using the **PERFORMANCE.Initialize.Register.Optical_Line** command.

Threshold crossing alerts (TCAs) are generated if the SPR-C parameter exceeds the set threshold. The threshold is set and the TCA is enabled or disabled using the **PERFORMANCE.Set.Threshold.Optical_Channel** command. TCAs can be enabled or disabled for a single parameter.

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Supervisory Channel Parameters

The following supervisory channel parameters are monitored continuously to detect degraded performance of the laser:

- ***Signal Power Received (SPR-SU)***: This parameter is the measurement of the supervisory channel signal power. The signal power is determined by monitoring the power of the tone on the supervisory signal. The signal power received is reported using a scale from 0 to 100. The signal power received parameter can be used with other proactive performance monitoring parameters to isolate the source of an impending supervisory channel failure.
- ***Laser Bias Current (LBC-SU)***: This parameter indicates whether the system optics are working within normal margins (in range or out of range). The upper limit is 1.5 times the initial factory (nominal) value. There is no lower limit.
- ***Line (B2) Coding Violations (CV-L)***: To monitor the performance of the supervisory channel, the line B2 parity is calculated, written, and checked for errors. The line B2 parity violation counter is incremented for each line bit interleaved parity (BIP) error detected. Each line BIP-8 can detect up to eight errors per STS-1 frame.
- ***Line (B2) Errored Seconds (ES-L)***: An errored second (ES) is a second in which there are one or more B2 parity violations or a supervisory channel defect detected.
- ***Line (B2) Severely Errored Seconds (SES-L)***: A severely errored second (SES) is a second in which there are 9 or more B2 parity violations or a supervisory channel AIS defect detected.
- ***Line (B2) Unavailable Seconds (UAS-L)***: An unavailable second (UAS) is a second during which the supervisory channel is “unavailable”. Unavailable seconds are counted after 10 consecutive line (B2) severely errored seconds (SES). These 10 severely errored seconds are counted, and each subsequent second is counted until there are 10 consecutive seconds without a severely errored second. The 10 consecutive seconds without a severely errored second are not counted as unavailable seconds.

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Optical Translator Port Signal Parameters

Definitions

The following parameters are monitored:

- ***Section (B1) Coding Violations (CV-S)***: The number of B1 coding, or parity violations.
- ***Section (B1) Errored Seconds (ES-S)***: The number of seconds in which there are one or more B1 parity violations detected, one or more LOS defects, or one or more LOF defects.
- ***Section (B1) Severely Errored Seconds (SES-S)***: The number of seconds in which there are 16 or more B1 parity violations detected on an OC-3/STM-1 section, 63 or more B1 parity violations detected on an OC-12/STM-4 section, 249 or more B1 parity violations detected on an OC-48/STM-16 section, one or more LOS defects, or one or more LOF defects.
- ***Section (B1) Severely Errored Frame Seconds (SEFS-S)***: The number of seconds during which an out-of-frame event occurred.
- ***8 bit/10 bit Coding Violations (CV-S)***: The number of 8 bit/10 bit coding, or parity violations.
- ***8 bit/10 bit Errored Seconds (ES-S)***: The number of seconds with one or more 8 bit/10 bit parity violations.
- ***8 bit/10 bit Severely Errored Seconds (SES-S)***: The number of second with ***n*** or more 8 bit/10 bit parity violations. See the table below for the value of ***n***.
- ***8 bit/10 bit Severely Errored Frame Second (SEFS-S)***: The number of seconds during which a Loss of Sync (Codeword or Bit Sync), or LOS occurred.

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SES-S The following table defines the number, ***n***, of coding violations (CV-S) required to constitute a severely errored second (SES-S) for 8 bit/10 bit.

Parameter	Signal Bit Rate	SESS CVS/s Threshold (*n*)
ESCON	200 Mb/s	200
FICON	1.062 Gb/s	1062
1000BaseLX (GbE-1)	1.25 Gb/s	1250
FC-12	133 Mb/s	133
FC-25	266 Mb/s	266
FC-50	531 Mb/s	531
FC-100	1.062 Gb/s	1062

TCAs A threshold crossing alert (TCA) is generated if a section parameter exceeds the provisionable threshold. The thresholds are set and the TCAs are enabled or disabled using the **PERFORMANCE.Set.Threshold.OT_Port_Signal** command.

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Performance Monitoring Data Storage and Reports

The Metropolis® EON provides current 15-minute and current 1-day registers for all accumulated performance parameters. There is also 5 previous 1-day registers and 31 previous 15-minute registers (8 hours).

> **Important!** The 15-minute and 1-day intervals are accurate to within ±10 seconds. For example, a 15-minute interval (900 seconds) varies from 890 to 910 seconds.

The Metropolis® EON can initialize the current 15-minute and/or current 1-day registers through the CIT at any time, as well as retrieve and report the contents of any parameter storage register at any time. When performance monitoring data is retrieved, any previous 1-day or 15-minute register with all zero data is not reported. The current 1-day and 15-minute registers are always reported, even when they contain all zero data.

For examples of the **PERFROMANCE.Initialize.Register.All**, **PERFORMANCE.Retrieve.Performance_Monitoring.All**, **PERFORMANCE.Retrieve.Performance_Monitoring.Optical_Channel**, **PERFORMANCE.Retrieve.Performance Monitoring.Optical_Line**, **PERFORMANCE.Retrieve.Performance_Monitoring.Supervisory**, and **PERFORMANCE.Retrieve.Performance_Monitoring.OT_Port_Signal** reports, refer to Chapter 16, “Using the Craft Interface Terminal” For detailed information, refer to the on-line help available with the CenterLink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

The Metropolis® EON can also initialize (baseline) certain optical parameters of an optical line through the CIT at any time. The initialized (baseline) value of the affected optical parameters is measured and used as the normal operating reference. The affected optical parameters include the total optical power received for an optical line (TOPR-OL) and the optical channel signal power (SPR-C) of the addressed optical line. The optical parameters should be initialized when an Optical Amplifier circuit pack is replaced, the outside plant loss changes, or an optical channel is deleted. (When an optical channel is added, the Optical Amplifier circuit pack automatically baselines the TOPR-OL and SPR-C parameters.) When

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these optical parameters are initialized, the current 1-day and/or current 15-minute registers for the TOPR-OL and SPR-C parameters will be corrupted.

For detailed information about the **PERFORMANCE.Initialize.Register.Optical_Line** command, refer to the on-line help available with the CenterLink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

A single start time can be provisioned for measuring all the current 1-day performance monitoring parameters. The start time can be provisioned to start at any hour. The performance monitoring parameters will reset and begin daily at the provisioned start time.

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Performance Monitoring During Failed Conditions

Overview

When a trouble condition is detected, the Metropolis® EON stops accumulating affected performance parameters per Bellcore requirements. All unaffected performance parameters continue to be accumulated during the trouble condition. The coding violations (CV) and errored seconds (ES) counts are accumulated until a severely errored second (SES) is counted. When a severely errored second (SES) is counted, the coding violations (CV) count is inhibited. The errored seconds (ES) and severely errored seconds (SES) counts continue to be accumulated until an unavailable second (UAS) is counted. When an unavailable second (UAS) is counted, the coding violations (CV), errored seconds (ES), and severely errored seconds (SES) counts are inhibited.

TCAs

A threshold crossing alert (TCA) is generated if a CV-L, ES-L, SES-L, or UAS-L parameter exceeds the provisionable threshold. The thresholds are set and the TCAs are enabled or disabled using the **PERFORMANCE.Set.Threshold.Supervisory** command. TCAs can be enabled or disabled for a single parameter. The unavailable seconds (UAS) parameter counts are not inhibited.

Failed conditions

The following table shows the parameters that are monitored during failed conditions and the parameters that are inhibited. Y shows the parameters that are monitored during the failed condition. N shows the parameter that are inhibited during the failed condition.

	Failed Conditions									
	Optical Line		**Optical Channel**		**Supervisory Channel**				**OT Port Signal**	
Parameters	**LOS**	**AIM**	**LOS**	**AIM**	**LOS**	**LOF**	**SF**	**SD**	**LOS**	**LOF**
Optical Channel Optics										
Laser Bias Current (LBC-P)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Laser Backface Current (LBFC-P)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Total Optical Power Received (TOPR-OL)	Y[1]	Y[1]	Y	Y	Y	Y	Y	Y	Y	Y
OC-48/STM-16 Line										

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	Failed Conditions									
	Optical Line		**Optical Channel**		**Supervisory Channel**				**OT Port Signal**	
Parameters	**LOS**	**AIM**	**LOS**	**AIM**	**LOS**	**LOF**	**SF**	**SD**	**LOS**	**LOF**
Laser Bias Current (LBC)	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Optical Power Transmit (OPT)	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Optical Power Received (OPR)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Optical Channel Optics Signal Power Received (SPR-C)	Y[1]	Y[1]	Y[1]	Y[1]	Y	Y	Y	Y	—	—
Supervisory Channel Optics Laser Bias Current (LBC-SU)	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Signal Power Received (SPR-SU)	Y[1]	Y	Y	Y	Y[1]	Y[1]	Y[1]	Y[1]	Y	Y
Supervisory Channel Line Coding Violations (CV-L)	N	Y	Y	Y	N	N	N	N	Y	Y
Errored Seconds (ES-L)	N[1]	Y	Y	Y	N[2]	N[2]	N[2]	N[2]	Y	Y
Severely Errored Seconds (SES-L)	N[2]	Y	Y	Y	N[2]	N[2]	N[2]	N[2]	Y	Y
Unavailable Seconds (UAS-L)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
OT Port Signal Coding Violations (CV-S)	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Errored Seconds (ES-S)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Severely Errored Seconds (SES-S)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Severely Errored Frame Seconds (SEFS-S)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Notes:

1. Autonomous TCA reporting for this parameter is inhibited during

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failed conditions.

2. This parameter is inhibited during periods of unavailability only.

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Performance Monitoring Parameter Thresholds

Overview

The current 15-minute and current 1-day thresholds for each performance monitoring parameter are provisionable using the CIT. Whenever the current 15-minute or the current 1-day threshold for a given performance monitoring parameter is reached or exceeded, the Metropolis® EON generates a threshold crossing alert (TCA). The TCA is then entered into the appropriate performance monitoring report.

Setting

For information about provisioning thresholds using the **PERFORMANCE.Set.Threshold.All**, **PERFORMANCE.Set.Threshold.Optical_Channel**, **PERFORMANCE.Set.Threshold.Optical_Line**, **PERFORMANCE.Set.Threshold.Supervisory** and **PERFORMANCE.Set.Threshold.OT_Port_Signal** commands, refer to the on-line help available with the CenterLink Management Console or *Operations Systems Engineering Guide, 365-575-395*.

Retrieving

Also refer to examples of the **PERFORMANCE.Retrieve.Threshold.Optical_Line**, **PERFORMANCE.Retrieve.Threshold.Optical_Channel**, **PERFORMANCE.Retrieve.Threshold.Supervisory** and **PERFORMANCE.Retrieve.Threshold.OT_Port_Signal** reports in Chapter 16, “Using the Craft Interface Terminal”. For detailed information, refer to the on-line help available with the CenterLink Management Console or *Operations Systems Engineering Guide*, *365-575-395*.

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Threshold Crossing Alert Transmission to an Operations System

Overview

To trigger proactive maintenance activity within an operations system, the Metropolis® EON supports autonomous messages reporting threshold cross alerts. These autonomous messages show the crossing of a performance monitoring threshold for the current 15-minute and 1-day registers.

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13 Circuit Pack Descriptions

Overview

Purpose

This chapter provides a detailed functional description of the Metropolis® EON circuit packs, units, and modules.

Contents

The chapter is divided into the following parts:

Circuit Pack/Software Compatibility	13 - 2
Control Circuit Packs	13 - 5
Transmission Circuit Packs	13 - 25

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Circuit Pack/Software Compatibility

Overview

Purpose This part of the chapter provides a list of which circuit packs are supported by which software releases.

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Circuit Pack/Unit/Modules and Software Compatibility

Refer to the following table for information about circuit packs/units/ modules and compatible software.

Table 13-1 Circuit Packs/Units/Modules and Compatible Software

Circuit Pack/Unit/Module		***Compatible* Metropolis® EON *Software***											
Code	***Name***	***R3.0***	***R3.1***	**R3.3**	**R3.4**	**R4.0.x**	**R5.0.x**	**R6.0.x**	**R7.0.x**	**R7.5**	**R8.0**	**R8.2**	**R8.2.1**
LDA1	TLM	X	X	X	X	X	X	X	X	X	X	X	X
LDA4	TLM					X	X	X		X	X	X	X
LDA3	IAOLRP					X	X	X		X	X	X	X
LEA1	SYSCTL	X	X	X	X	X	X	X	X	X	X	X	X
LEA2	SYSMEM	X	X	X	X	X	X	X	X	X	X	X	X
LEA5	TOHCTL	X	X	X	X				X				
LEA102	TOHCTL					X	X	X		X	X	X	X
LEA7	OA	X	X	X	X	X	X	X	X	X	X	X	X
LEA7B	OA			X	X	X	X	X	X	X	X	X	X
LEA104	OA	X	X	X	X	X	X	X	X	X	X	X	X
LEA105	OA	X	X	X	X	X	X	X	X	X	X	X	X
LEA107B	OA							X	X	X	X	X	X
LEA207	OA2										X	X	X
LEA307	OA3											X	X
LEA209	LIRCV										X	X	X
LEA210	LIHTR											X	X
LEA211	LITX										X	X	X
LEP1	OPS		X			X	X	X		X			
LEP2	OUPSR										X	X	X
LEP3	OUPSR											X	X
LUD1	OTCTL	X	X	X	X	X	X	X	X	X	X	X	X
506A	OMU	X	X	X	X	X	X	X	X	X	X	X	X
506B	OMU								X	X	X	X	X
507A	OMU16										X	X	X
507B	OMU16										X	X	X
508A	OMU32											X	X
508B	OMU32											X	X
606A	ODU	X	X	X	X	X	X	X	X	X	X	X	X
606B	ODU	X	X	X	X	X	X	X	X	X	X	X	X

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Circuit Pack/Unit/Module		***Compatible* Metropolis® EON *Software***											
Code	***Name***	***R3.0***	***R3.1***	**R3.3**	**R3.4**	**R4.0.x**	**R5.0.x**	**R6.0.x**	**R7.0.x**	**R7.5**	**R8.0**	**R8.2**	**R8.2.1**
606C	ODU								X	X	X	X	X
606D	ODU								X	X	X	X	X
607A	ODU16										X	X	X
607B	ODU16										X	X	X
608A	ODU32											X	X
608B	ODU32											X	X
BSY1	SPODU		X			X	X	X		X			
BSY2	SPOMU		X			X	X	X		X			
41A1C - 41A16C	OTU 1.5	X	X	X	X	X	X	X	X	X	X	X	X
41BB	OTU 1.3	X	X	X	X	X	X	X	X	X	X	X	X
41C1C - 41C16C	OTU 1.5 DISP	X	X	X	X	X	X	X	X	X	X	X	X
41F1 - 41F16	OTU GbE-1 1.5			X	X	X		X	X	X	X	X	X
41G	OTU GbE-1 1.3			X	X	X		X	X	X	X	X	X
41H1A - 41H32A	10G OTU 1.5											X	X
41HB	10G OTU 1.3											X	X
41H1C - 41H32C	10G OTU 1.5											X	X
41S	QUAD OTU	X		X	X	X	X	X	X	X	X	X	X
41T	QUAD OTU25										X	X	X
41U	QOTUUB											X	X
42A1B - 42A16B	OTPM 1.5	X		X	X	X	X	X	X	X	X	X	X
42B	OTPM 1.3	X		X	X	X	X	X	X	X	X	X	X
43A1B - 43A16B	OTPM 1.5	X		X	X	X	X	X	X	X	X	X	X
43B	OTPM 1.3	X		X	X	X	X	X	X	X	X	X	X
44A1B - 44A16B	LSBB OTPM 1.5	X		X	X	X	X	X	X	X	X	X	X
44B	LSBB OTPM 1.3	X		X	X	X	X	X	X	X	X	X	X
44C1 - 44C16	ELSBB OTPM 1.5											X	X
44BC	ELSBB OTPM 1.3											X	X
46A1 - 46A32	OTPM25 1.5										X	X	X
46B	OTPM25 1.3										X	X	X
47A1 - 47A32	OTPM UBB 1.5											X	X
47B	OTPM DUBB 1.3											X	X
41M1-32	2DM25 Muxing OTU												X

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Control Circuit Packs

Overview

Purpose

Control circuit packs are the “brains” of the network element. They are involved in the operation, control, and monitoring of the network element. Control circuit packs are common between the 16- and 32-channel systems.

Contents

Control circuit packs used in Metropolis® EON include the following.

System Controller (SYSCTL)	13 - 6
System Memory (SYSMEM)	13 - 10
Tributary Overhead Controller (TOHCTL)	13 - 14
OT Controller (OTCTL)	13 - 18
Telemetry (TLM) Circuit Pack	13 - 20
Intra-Office LAN Relay Pack (IAOLRP)	13 - 24

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System Controller (SYSCTL)

Overview

The SYSCTL circuit pack, together with the SYSMEM, provides the highest level of system control for Metropolis® EON. The SYSCTL circuit pack provides system-level user and operations systems interfaces, performs system-wide maintenance computations and performance monitoring, and supports serial telemetry and X.25, TCP/IP, and OSI/LAN interfaces.

Scope of control

The SYSCTL circuit pack can support two fully-integrated OT System Controller Shelves and up to four Complementary Shelves.

Block diagram

The following figure provides an overall block diagram of the SYSCTL circuit pack. The SYSCTL circuit pack is the highest level microprocessor in the 2-level control hierarchy of the Metropolis® EON.

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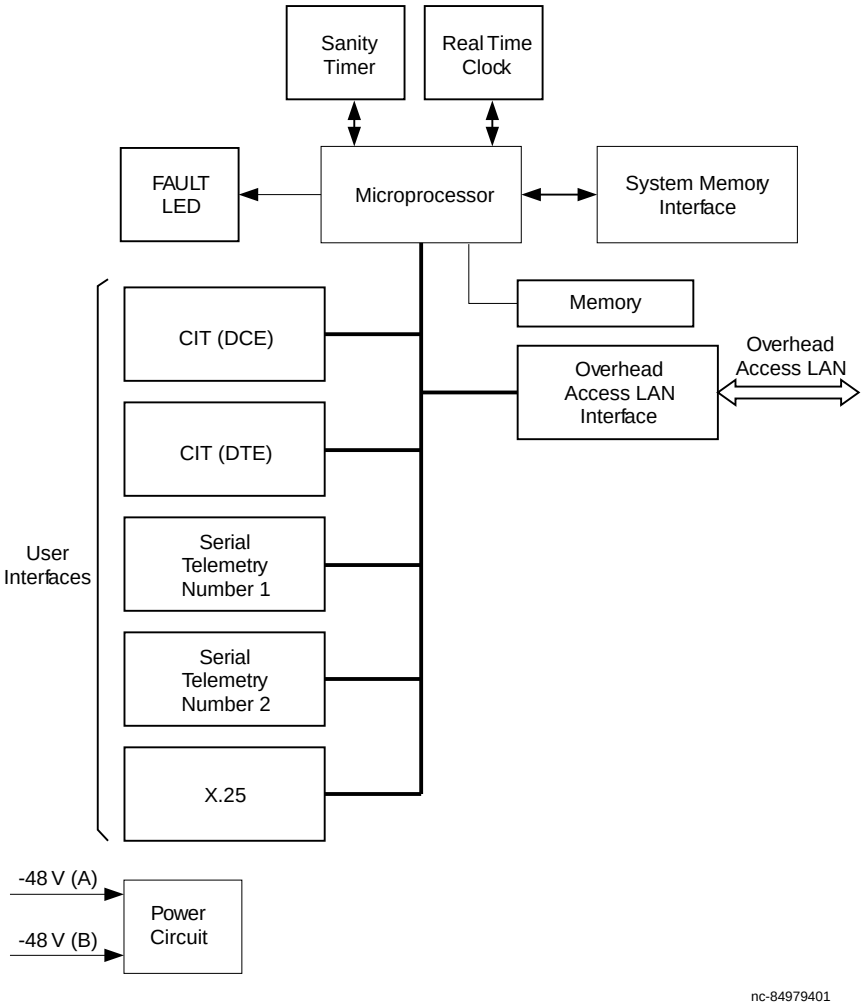
Figure 13-1 SYSCTL Circuit Pack Block Diagram



Start-up memory

The start-up memory consists of 64 kilobytes of read-only memory. The start-up memory contains the program that allows the microprocessor to copy the executable code and data for the system from the nonvolatile memory of the SYSMEM circuit pack into the operating memory of the SYSCTL circuit pack. This allows the microprocessor to start up operation during a power-up or a reset condition or when initializing new software. The SYSCTL circuit pack also has a unique network services access point (NSAP) code in the read-only memory.

Main operating memory

The main operating memory consists of 8 megabytes of dynamic random access memory (DRAM). Direct memory access (DMA) allows the SYSCTL circuit pack to copy the executable code and data for the system from the nonvolatile memory of the SYSMEM circuit

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pack into the operating memory during a power-up or reset condition, or when initializing new software.

Nonvolatile memory

The nonvolatile memory consists of 128 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the history of the SYSCTL circuit pack, such as the ***Common Language CLEI*** code and type/ version information.

Overhead access interface

The overhead access interface allows the SYSCTL circuit pack to communicate with the Overhead Controller - Tributary (TOHCTL) and Optical Translator Controller (OTCTL) circuit packs.

Serial user interfaces

The SYSCTL circuit pack provides the following serial user interfaces:

- ***CIT (DCE) interface***: The CIT (DCE) interface is configured as data circuit equipment (DCE) for direct craft interface terminal (CIT) access. The CIT (DCE) interface allows direct access to a PC running CenterLink Management Console software. The CIT (DCE) interface may also be provisioned to allow direct access to an ASCII-based terminal. The CIT (DCE) interface supports data rates up to 9600 baud.
- ***CIT (DTE) interface***: The CIT (DTE) interface is configured as data terminating equipment (DTE) to allow a permanent connection to a modem. The CIT (DTE) interface allows dial-up access to a PC running CenterLink Management Console software. The CIT (DTE) interface may also be provisioned to allow access to an ASCII-based terminal. The CIT (DTE) interface supports data rates up to 9600 baud.
- ***Serial telemetry interface***: The serial telemetry interface is used to transfer alarm, status, and control information to and from an external miscellaneous discrete unit via a 2400-baud EIA-422 port. The external miscellaneous discrete unit provides an additional 128 miscellaneous discrete environmental inputs and 32 control outputs.

  TCP/IP: The TCP/IP interface supports the Ethernet protocol and the Transaction Language 1 (TL1) message language. This interface is used to report performance monitoring data to the Lucent element management system, Navis™ Optical EMS.

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OSI/LAN: The OSI/LAN interface supports the Open Systems Interconnection (OSI) protocol and the TL1 message language. This interface is used to report performance monitoring data to Navis™ Optical EMS.

- ***X.25 interface***: The X.25 interface supports X.25 protocol and the TL1 message language. This interface is used to report alarm and status conditions and performance monitoring data to the Bellcore Network Monitoring and Analysis (NMA) system, the Bellcore Operations System/Intelligent Network Elements (OS/INE), and the Lucent element management system, Navis™ Optical EMS using an EIA-232-D port operating at 1200 to 56,000 baud.

Electrical power source

The SYSCTL circuit pack receives two sources of -48 volts that are diode OR'd, fused, and filtered. A modular DC-to-DC power converter produces +5 volts and -5 volts used on the circuit pack. The power converter also provides a +5 volt source for the FAULT LED indicator on any circuit pack that has a power failure.

Power failure

The SYSCTL circuit pack monitors the two -48 volt sources to the circuit pack. If the SYSCTL circuit pack detects a failure of the onboard fuse or power converter, the red FAULT LED indicator will light. If the fuse or power converter fails, the SYSMEM circuit pack provides +5 volts to light the FAULT LED indicator on the SYSCTL circuit pack.

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System Memory (SYSMEM)

Overview

The SYSMEM circuit pack provides memory support for the system controller (SYSCTL) circuit pack. The SYSMEM circuit pack contains erasable/programmable read-only memory (EPROM) for nonvolatile storage of the system state and user-provisioned data. It also contains a flash EPROM for nonvolatile storage of the software for the entire system. The SYSMEM circuit pack also supports the user panel, parallel telemetry, miscellaneous discretes, and office alarms.

Block diagram

The following figure shows a functional block diagram of the SYSMEM circuit pack. The nonvolatile program (executable code) storage is provided by 8 megabytes of flash erasable programmable read-only memory (flash-EPROM). This contains the main system software for all the controllers in the system (for example, System Controller, and board controllers). Flash-EPROM combines the nonvolatility of EPROM with the in-circuit reprogramming ability of electrically erasable programmable read-only memory (EEPROM). Flash-EPROM allows in-service software upgrades to be performed locally or remotely (via modem connections).

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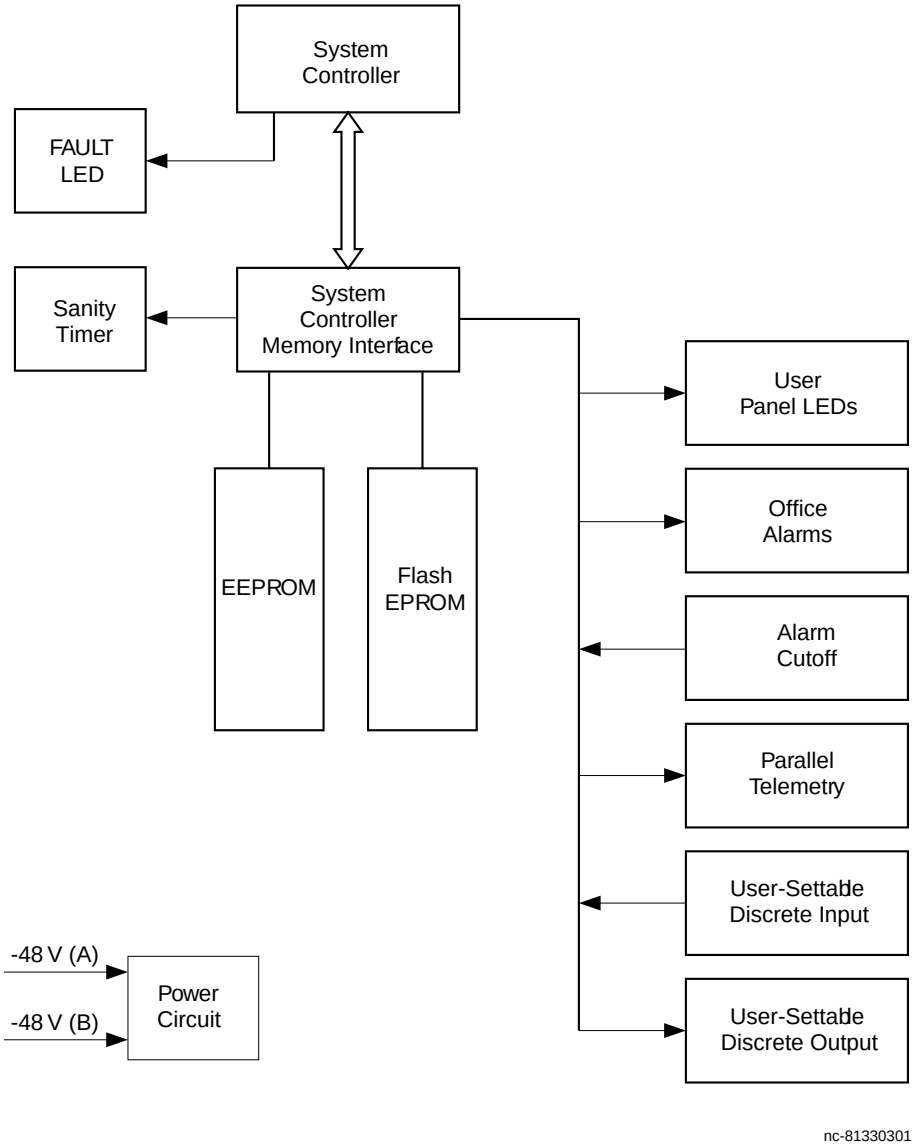
Figure 13-2 SYSMEM Circuit Pack Block Diagram



Nonvolatile memory

The nonvolatile configuration (data) storage is provided by 128 kilobytes of EEPROM. This contains all system state and user-provisioned data. This includes all system parameters with their original and current values. EEPROM is byte erasable and writable. This allows configuration information to be easily changed during system operation.

The nonvolatile memory consists of 128 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the history of the SYSMEM circuit pack such as the ***CLEI*** code and type/version information.

Alarm relays

The SYSMEM circuit pack provides relays for the Metropolis® EON to interface with a central office alarm grid. The relays are controlled by the microprocessor on the SYSCTL circuit pack. Relays are provided for audible and visible alarms for the following.

- For SONET:
  - Critical
  - Major
  - Minor
- For SDH:
  - Critical
  - Prompt
  - Deferred

Alarm LEDs

The normally closed contacts for the critical and major relays provide the alarm closure if power fails.

The SYSMEM circuit pack provides the outputs to light the following LED indicators on the user panel of End Terminal and Repeater Shelves.

- For SONET:
  - Critical (CR) alarm
  - Major (MJ) alarm
  - Minor (MN) alarm
  - Abnormal (ABN) status
  - Near-end activity (NE ACTY)
  - Far-end activity (FE ACTY)
- For SDH:
  - Critical (CR)
  - Prompt
  - Deferred
  - Abnormal
  - Info-N
  - Info-F

The SYSMEM circuit pack also accepts the alarm cutoff (ACO) input from the user panel of End Terminal and Repeater Shelves.

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OS alarms

The SYSMEM circuit pack supplies the following alarms from the Metropolis® EON as remote information accessible to an operations system:

- For SONET:
  - Local CR, MJ, and MN alarms
  - Remote CR, MJ, and MN alarms.
- For SDH:
  - Local Critical, Prompt, and Deferred alarms
  - Remote Critical, Prompt, and Deferred alarms.

The SYSMEM circuit pack accepts 16 user-settable environmental inputs and provides 4 user-settable control outputs at a Metropolis® EON network element.

Electrical power source

The SYSMEM circuit pack receives two sources of -48 volts that are diode OR'd, fused, and filtered. Two modular DC-to-DC power converters produce +5 volts and +12 volts used on the circuit pack. The +5 volt power converter provides a +5 volt source for the FAULT LED indicator on the System Controller (SYSCTL) circuit pack if a power failure occurs on the SYSCTL circuit pack. The +12 volt power converter is used to program the flash memory.

Power failure

The SYSMEM circuit pack monitors the two -48 volt sources to the circuit pack. If the SYSMEM circuit pack detects a failure of the onboard fuse or power converter, the red FAULT LED indicator will light. If the fuse or +5 volt power converter fails, the SYSCTL circuit pack provides +5 volts to light the FAULT LED indicator on the SYSMEM circuit pack.

□

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Tributary Overhead Controller (TOHCTL)

Overview

The TOHCTL circuit pack processes the overhead (D1 - D3) of the supervisory channel. The TOHCTL interfaces with the transmission overhead on the TLM circuit pack in order to deliver and receive DCC data. The TOHCTL interfaces with the system controller complex by means of the OALAN. Based on the configuration in which it is installed (Repeater or End Terminal), the TOHCTL (LEA102) circuit pack automatically determines whether to process the signals from slot TLM-1B or slot IAOLRP as SONET DCC or as IAOLAN-specific.

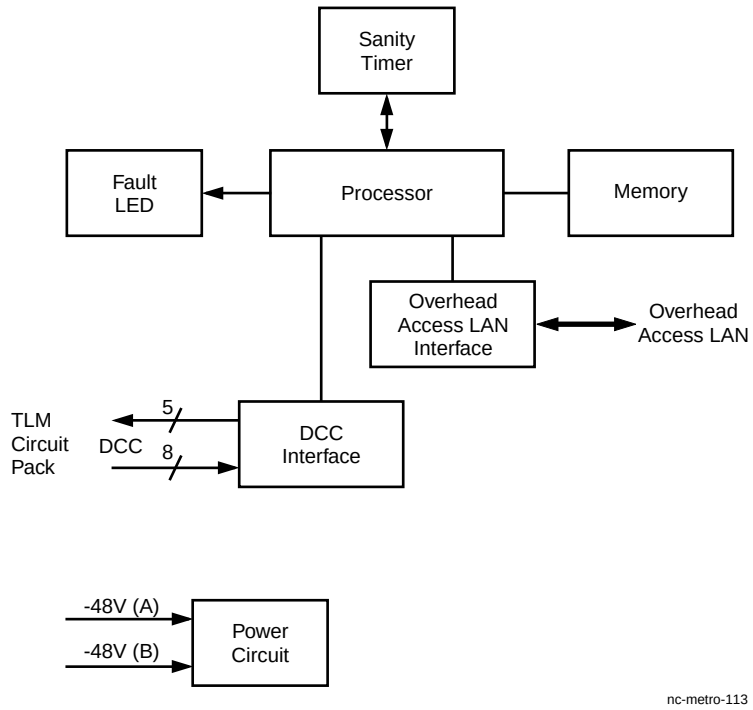
Compatibility

In R8.0 and later releases only the LEA102 TOHCTL may be used.

Block diagram

The following figure provides an overall block diagram of the TOHCTL circuit pack.

Figure 13-3 TOHCTL Circuit Pack Block Diagram



Processor

The processor shown in the TOHCTL circuit pack block diagram performs protocol processing of the OSI 7-layer stack for the SONET section DCC and the IAOLAN interface. The processor also manages the overhead access local area network (OALAN) communications with the SYSCTL circuit pack.

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Start-up memory

The start-up memory consists of 512 kilobytes of read-only memory. The start-up memory contains the program that allows the processor to load the executable code and data from the SYSCTL circuit pack into the operating memory. This allows the processor to start up operation during a power-up, or a reset condition, or when initializing new software.

Main operating memory

The main operating memory consists of 32 megabytes of DRAM. Direct memory access (DMA) allows the processor to load the executable code and data received from the SYSCTL circuit pack (via the overhead access local area network) into the operating memory during a power-up, or reset condition, or when initializing new software.

Nonvolatile memory

The nonvolatile memory consists of 256 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the history of the TOHCTL circuit pack such as the ***CLEI*** code and type/version information.

TLM interface

The DCC interface interacts with the Telemetry Controller (TLM) circuit packs. The DCC interface performs protocol processing for layer 1 (physical) of the OSI 7-layer stack for the section DCC of the supervisory signal.

Receive direction

In the receive direction, the TLM circuit pack transmits the DCC overhead bytes via the overhead channel to the DCC interface. The DCC interface transmits the information to the processor for OSI protocol processing.

Transmit direction

In the transmit direction, the DCC interface accepts the DCC bytes from the processor and transmits the information via the overhead channel to the TLM circuit pack. This information provides end-to-end communications and maintenance.

DCC protection switching

The DCC interface also supports bidirectional 1x1 protection switching for the supervisory signal DCC of optical lines 1 and 2 only.

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DCC bytes

The following table shows the section DCC bytes that are provided by the TOHCTL circuit pack.

Table 13-2 Overhead Bytes

Name	Overhead Byte	Data Rate	Access
DCC	D1-D3	192 kb/s	System Controller

IAOLAN interface

The TOHCTL circuit pack supports an IAOLAN interface to an element management system (for example, the Lucent element management system, Navis™ Optical EMS. The IAOLAN interface uses the OSI or TCP/IP protocol and the TL1 message language.

10BaseT

The IAOLAN interface interacts with a 10BaseT LAN signal (10 Mb/s Ethernet LAN) through a balanced driver/receiver. The IAOLAN interface performs protocol processing for layer 1 (physical) of the OSI 7-layer stack for the IAOLAN data.

Receive direction

In the receive direction, the IAOLAN interface accepts IAOLAN data from the INTRAOFFICE LAN connector. The IAOLAN data is routed from the INTRAOFFICE LAN connector, through the IAOLRP circuit pack in the TLM 1B slot, to the IAOLAN Interface. The IAOLAN interface transmits the information to the processor for OSI protocol processing.

Transmit direction

In the transmit direction, the IAOLAN interface accepts the IAOLAN data from the processor and transmits the information to the INTRAOFFICE LAN connector. The IAOLAN data is routed from the IAOLAN interface, through the IAOLRP circuit pack in the TLM 1B slot, to the INTRAOFFICE LAN connector.

OALAN interface

The overhead access local area network (OALAN) interface allows the TOHCTL circuit pack to communicate with the SYSCTL circuit pack. The SYSCTL circuit pack allows users to access the section DCC using the CIT and message-based operations systems (IAOLAN/TL1) interfaces for single-ended operations.

Electrical power source

The TOHCTL circuit pack receives two sources of -48 volts that are diode OR'd, fused, and filtered. A modular DC-to-DC power converter produces +5 and +3.3 volts used on the circuit pack.

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Power failure

The TOHCTL circuit pack monitors the two -48 volt sources to the circuit pack. If the TOHCTL circuit pack detects a failure of the onboard fuse or power converter, the red FAULT LED indicator will light. If the fuse or power converter fails, the SYSCTL circuit pack provides +5 volts to light the FAULT LED indicator on the TOHCTL circuit pack.

□

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OT Controller (OTCTL)

Overview

To facilitate integration of the OT with Metropolis® EON the OTCTL is used to integrate the OTUs into the Metropolis® EON control structure. It occupies three slots in the OT System Controller Shelf.

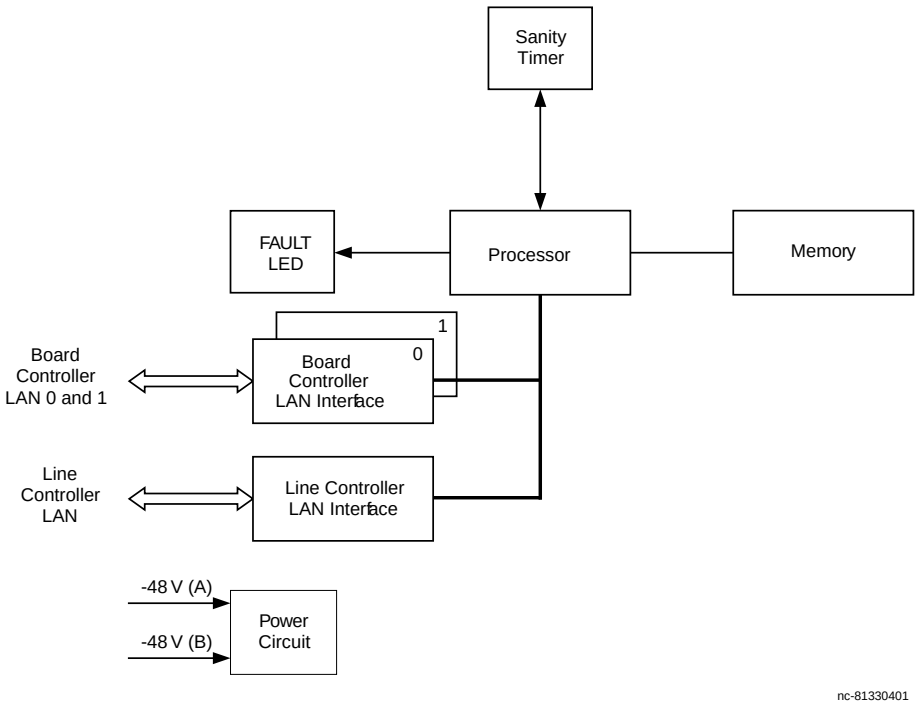
Integration

Operationally, the integration of these circuit packs makes the combination of Metropolis® EON and OT appear as a single network element. The OTCTL controls all of the OTUs in up to three OT shelves via the BCLAN connections provided in the backplane and inter-shelf OT cabling.

Block diagram

The following figure provides an overall block diagram of the OTCTL circuit pack.

Figure 13-4 OTCTL Circuit Pack Block Diagram



Start-up memory

The start-up memory of the OTCTL consists of 64 kilobytes of read-only memory. The start-up memory contains the program that allows the processor to load the executable code and data from the SYSCTL circuit pack into the operating memory. This allows the processor to start up operation during a power-up or a reset condition, or when initializing new software.

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Main operating memory

The main operating memory of the OTCTL circuit pack consists of 8 megabytes of DRAM. Direct memory access (DMA) allows the board controller to load the executable code and data received from the SYSCTL circuit pack (via the overhead access local area network) into the operating memory during a power-up or reset condition, or when initializing new software.

Nonvolatile memory

The nonvolatile memory consists of 128 bytes of electrically-erasable programmable read-only memory (EEPROM). The nonvolatile memory is used to store information about the history of the OTCTL circuit pack such as the ***CLEI*** code and type/version information.

LCLAN

The overhead access local area network (LCLAN) interface allows the OTCTL circuit pack to communicate with the SYSCTL circuit pack.

BCLAN

Two board controller local area network (BCLAN) interfaces (BCLAN 0 and BCLAN 1) allow the OTCTL circuit pack to communicate with the board controllers on the OTU and QUAD OTU circuit packs.

Electrical power source

The OTCTL circuit pack receives two sources of -48 volts that are diode OR'd, fused, and filtered. A modular DC-to-DC power converter produces +5 volts used on the circuit pack. The power converter also provides two +5 volt sources for the FAULT LED indicators on the OTU and QUAD OTU circuit packs if a power failure occurs.

Power failure

The OTCTL circuit pack monitors the two -48 volt sources to the circuit pack. If the OTCTL circuit pack detects a failure of the onboard fuse or power converter, the red FAULT LED indicator will light. If the fuse or power converter fails, the SYSCTL circuit pack provides +5 volts to light the FAULT LED indicator on the OTCTL circuit pack.

□

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Telemetry (TLM) Circuit Pack

Overview

The TLM circuit pack provides a supervisory channel on the optical line. This channel is used for fault location and maintenance functions. In addition, three orderwire channels, E1, E2, and F are available with the LDA4.

Compatibility

The LEA207 and LEA307 can only be used with LDA4. The LEA7 and LEA104 can only be used with LDA1. The LEA7B and LEA107B can be used with both LDA1 and LDA4.

The following table shows the compatibility of OA and TLM Circuit Packs.

Table 13-3 OA and TLM Circuit Pack Compatibility

	LDA1	LDA4
LEA207		X
LEA307		X
LEA7B	X	X
LEA107B	X	X
LEA7	X	
LEA104	X	

Usage

A fully-equipped End Terminal Shelf requires one TLM circuit pack per line, while a fully-equipped Repeater Shelf requires two TLM circuit packs per line. When the end terminal uses the telemetry-through feature, two TLM circuit packs per line are used.

> **Important!** In 32-channel systems, only the LDA4 TLM may be used for the optical supervisory channel (OSC). The LDA1 may be used for TLM feed-through only.

LDA4 versus LDA1

The main differences between the LDA4 TLM circuit pack and the LDA1 are:

- The 155 Mb/s SONET/SDH OC3/STM1-like supervisory channel in the LDA1 is replaced with a Manchester-encoded E1 Signal operating at 2.048 Mb/s. The wavelengths of the LDA4 and LDA1 supervisory signals are 1510 nm and 1532 nm, respectively.

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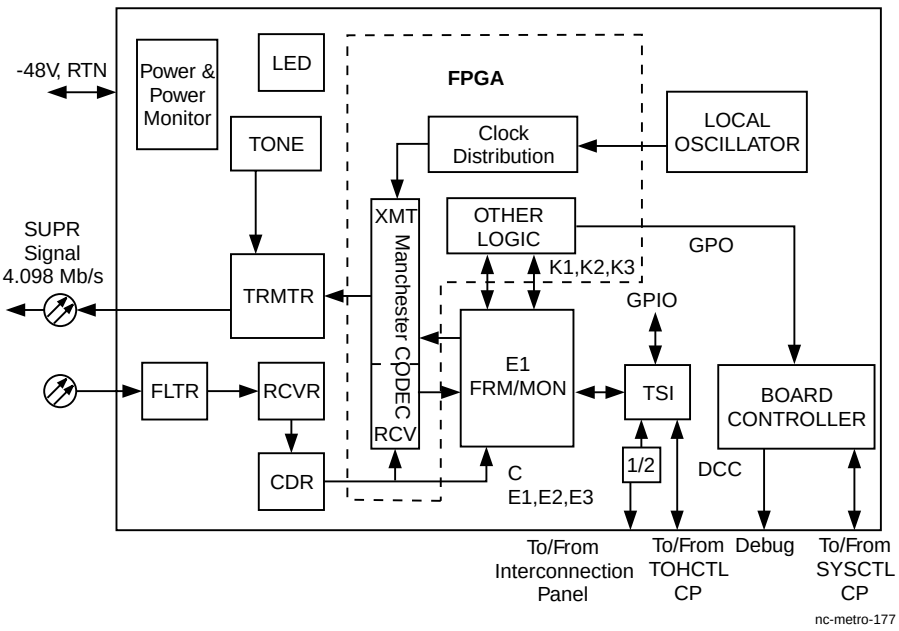
- The LDA4 TLM circuit pack does not have a Customer Maintenance Signal Channel (CMS); whereas the LDA1 does support the CMS.
- The transmitted Supervisory Signal Channel is derived from a local clock. Unlike the LDA1, the LDA4 does not support a through-timed mode (derived from an incoming signal such as the CMS channel).

Block diagram

Refer to the following figure for a block diagram of the LDA4 TLM circuit pack. A Manchester CODEC interfaces with the transmitter and receiver to convert from the 4.096 baud rate to/from 2.048 Mb/s E1 signal in NRZ format. The data passes through a clock and data recovery (CDR) circuit, which generates a re-timed 2.048 Mb/s signal and a 2.048-MHz clock. The clock provides timing for the receive direction. The transmit direction is clocked by a local oscillator.

Figure 13-5 LDA4 TLM Circuit Pack Block Diagram



E1 signal

The E1 signal is passed to an E1 framer module and Time Slot Interchanger (TSI). The TSI breaks down the signal into the subchannels shown in the following table. The E1 signal is the European equivalent to the T1, except asynchronously carrying 30 channels (bytes) of user data, and two channels for overhead. An FPGA allows for the extraction/monitoring, manipulation, and extraction of bits/bytes within E1 channel/timeslots. The control interface between VLSI chips and the CPU is via GPIO. The transmit supervisory signal

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is combined as before with the other optical channels in the out-going Optical line signal to the next NE.

E1 byte allocation

The following table identifies the byte allocation for the E1 Signal in the Supervisory Channel.

Table 13-4 E1 Signal Supervisory Channel Byte Allocation

Time Slot	Use	Time Slot	Use	Time Slot	Use	Time Slot	Use
0	FRM/CRC	8	X	16	Signal Channel	24	X
1	OW1 (E1)	9	X	17	K1	25	X
2	DL-1 (D1)	10	X	18	X	26	X
3	DL-2 (D2)	11	OW3 (F1)	19	X	27	K3 (c1)[1]
4	DL-3 (D3)	12	X	20	X	28	X
5	X	13	X	21	X	29	X
6	OW2 (E2)	14	X	22	K2	30	X
7	X	15	X	23	X	31	X

Notes:

1. K3 in E1 replaces C1 in SONET for Optical Line ID

Simulating SONET overhead

The hardware architecture allows monitoring, manipulation, and inserting data in the unused E1 voice/data channel bytes to simulate the functionality of the required SONET overhead bytes. This is accomplished primarily through the time slot interchanger (TSI) and the FPGA design. The appropriate overhead channels are marked with their equivalent SONET functionality in the previous table to provide:

- DCC (D1-D3)
- Orderwire (E1, E2, F1),
- Protection switching (K1, K2),
- Optical Line ID mismatch/Installation Self-Test (K3 in E1 signal replaces C1 in SONET).

Other performance monitoring

All other digital defect and performance monitoring data for the supervisory signal is derived in software from the E1 Frame/CRC overhead byte. These include:

- Coding Violations (CV-L)

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- Errored Seconds (ES-L)
- Severely Errored Seconds (SES-L)
- Unavailable Seconds in Signal Degrade (SD)
- Signal Fail (SF)

□

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Intra-Office LAN Relay Pack (IAOLRP)

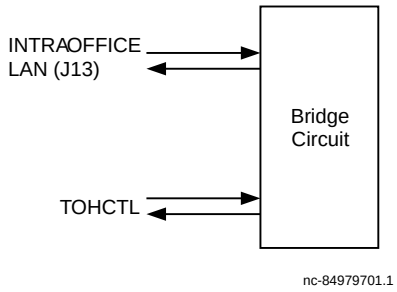
Overview

The IAOLRP (LAN) circuit pack provides a connection to the IAOLAN interface and supports DCC connectivity between the two bays/shelves in a ring terminal. This circuit pack is required in Metropolis® EON End Terminal locations where the IAOLAN feature is deployed. It resides in the TLM-1B slot of the Metropolis® EON shelf. The IAOLRP circuit pack contains no active circuitry.

Block diagram

The following figure provides an overall block diagram of the IAOLRP circuit pack.

Figure 13-6 LDA3 IAOLRP Circuit Pack Block Diagram



Receive direction

In the receive direction, the IAOLRP circuit pack bridges IAOLAN data from the INTRAOFFICE LAN connector (on the interconnection panel) to an overhead channel port on the TOHCTL circuit pack. The TOHCTL circuit pack performs Open System Interconnection (OSI) protocol processing for the IAOLAN interface.

Transmit direction

In the transmit direction, the IAOLRP circuit pack bridges IAOLAN data from the overhead channel on the TOHCTL circuit pack to the INTRAOFFICE LAN connector.

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Transmission Circuit Packs

Overview

Purpose

This part of the chapter describes transmission circuit packs, units, and modules. These are the circuit packs, units, and modules that are directly involved in carrying customer traffic. All circuit pack, unit, and port module assemblies connect to the backplane. All optical connections in and out of the circuit packs run through faceplate-mounted optical connectors.

Contents

Control circuit packs used in Metropolis® EON include the following.

OA3 (LEA307)	13 - 27
Optical Amplifier (OA2)	13 - 31
Optical Amplifier (OA)	13 - 34
Line Interface Receive (LIRCV) Unit	13 - 35
Line Interface Transmit (LITX) Unit	13 - 37
Optical Multiplexer Unit 32 (OMU32)	13 - 39
Optical Multiplexer Unit 16 (OMU16)	13 - 41
Optical Multiplexer Unit (OMU)	13 - 43
Optical Demultiplexer Unit (ODU32)	13 - 44
Optical Demultiplexer Unit (ODU16)	13 - 46
Optical Demultiplexer Unit (ODU)	13 - 48
Line Interface Heater (LIHTR) Unit	13 - 49
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OA3 (LEA307)

Overview

The Release 8.2 OA3 circuit pack incorporates a higher power Variable Gain Optical Amplifier Module (VGOAM) with internal power monitoring and gain adjustment. The new R8.2 OA3 circuit pack has the following features:

- 32-channel support which will allow upgrade of existing 16-channel LEA7B routes to 32 channels.
- Mid-stage connections to DCMs which allow greater route distances for 10 Gb/s signals.
- An output connector located under a safety cover to allow connector removal only after the circuit pack has been disengaged from the backplane.
- Automatic Power Shutdown (APSD)
- Support of the 1510 nm optical supervisory channel (OSC)
- Software-controlled, per channel output power (automatic gain control).
- Software-controlled Variable Optical Attenuator (VOA) to maintain gain flatness.
- Hardware- and software-controlled power transient suppression.

Compatibility

The OA3 will only support the supervisory channel at 1510 nm using the LDA4 TLM circuit pack

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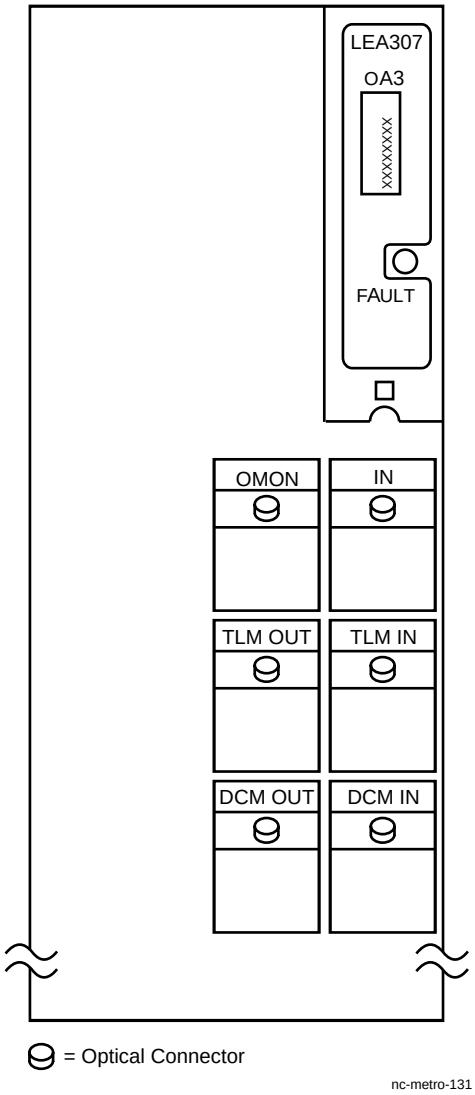
Faceplate The following figure shows the OA3 faceplate.

Figure 13-7 OA3 (LEA307) Circuit Pack



Components

Important! The 32-wavelength 10G OA will not support the original 1532 nm OSC because the filter for the 1532 nm signal overlaps the spectrum needed for channels 17-32.

The OA3 operates in the 1.5 mm wavelength band. The main components of the OA3 are as follows:

- Pump laser – Two high powered optical pump lasers provide power which is combined with the 1.5 mm signal. These pumps are not redundant.

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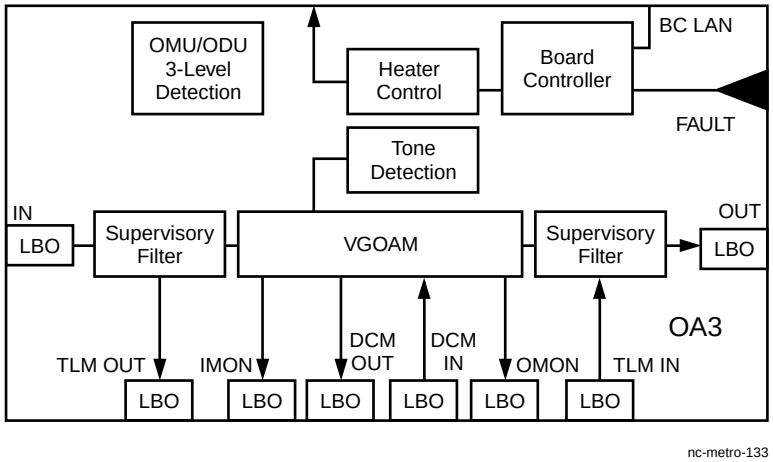
- Filter– At the OA3 input, a filter separates the light at 1510 nm from the rest of the 1.5 mm band. This filtering separates the supervisory channel from the optical (signal) wavelengths and reduces noise
- Optical splitter– An optical splitter at the OA3 output splits off a small amount of light for monitoring purposes.
- Optical isolators– Optical isolators prevent optical reflections from degrading system performance.
- VGOAM (Variable Gain Optical Amplifier Module)– performs automatic gain control under software control
- DCM in and out ports

Block diagram

The following figure shows an overall block diagram of an OA3 circuit pack.

Figure 13-8 OA3 Block Diagram



Metropolis® EON demultiplexes the signals at the other end of the optical line and passes them on to compatible optical receivers.

Function

The OA3 circuit pack does the following:

- Amplifies the optical line signal
- Provides power monitors on the optical monitor point provided by the amplifier module
- Controls the pump lasers which, in turn, automatically control OA output power
- Provides add/drop ports for the supervisory signal

- Provides temperature control for the ODU16
- Receives data from the OMU16s and ODU16s for version and type information.

□

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Optical Amplifier (OA2)

Overview

The Release 8.0 OA2 circuit pack has the following features:

- Support of 100 GHz-spaced optical channels from 192.10 THz to 195.90 THz.
- Support the 1510 nm optical supervisory channel (OSC)
- Software-controlled output power based on the number of channels equipped (automatic gain control).
- Software-controlled Variable Optical Amplifier (VOA) to maintain gain flatness.
- Hardware- and software-controlled power transient suppression.

Compatibility

The OA2 will only support the supervisory channel at 1510 nm using the LDA4 TLM circuit pack.

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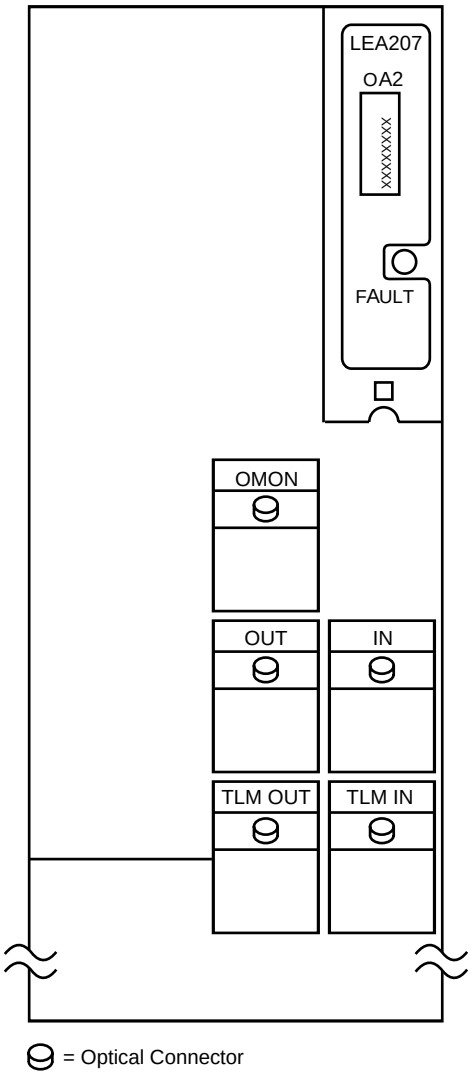
Faceplate The following figure shows the faceplate of the OA2.

Figure 13-9 OA2 (LEA207) Circuit Pack



Components The OA2 operates in the 1.5 mm wavelength band. The main components of the OA2 are as follows:

- Pump laser – Two high powered optical pump lasers provide power which is combined with the 1.5 mm signal. These pumps are not redundant.
- Filter– At the OA2 input, a filter separates the light at 1510 nm from the rest of the 1.5 mm band. This filtering separates the supervisory channel from the optical (signal) wavelengths and reduces noise

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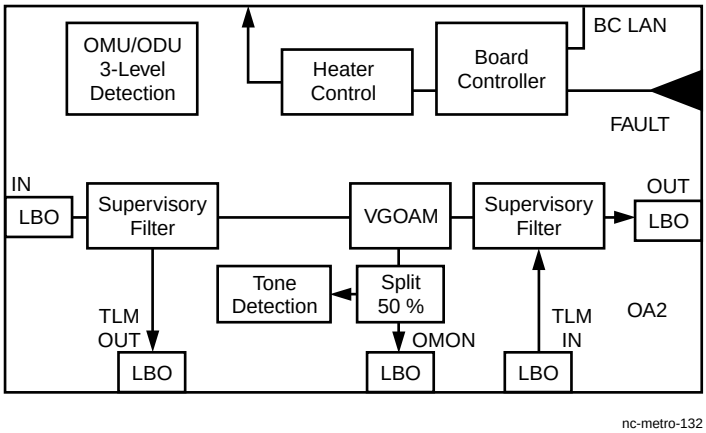
- Optical splitter– An optical splitter at the OA2 output splits off a small amount of light for monitoring purposes.
- Optical isolators– Optical isolators prevent optical reflections from degrading system performance.
- VGOAM (Variable Gain Optical Amplifier Module)– performs automatic gain control under software control

Block diagram

The following figure shows an overall block diagram of an OA2 circuit pack.

Figure 13-10 OA2 Block Diagram



Metropolis® EON demultiplexes the signals at the other end of the optical line and passes them on to compatible optical receivers.

Function

The OA2 circuit pack does the following:

- Amplifies the optical line signal
- Provides power monitors on the optical monitor point provided by the amplifier module
- Controls the pump lasers which, in turn, automatically control OA output power
- Provides add/drop ports for the supervisory signal
- Provides temperature control for the ODU16
- Receives data from the OMU16s and ODU16s for version and type information.

□

Optical Amplifier (OA)

Overview

The 16-channel OAs operate in the 1.5 mm wavelength band. The main components of the OAs are as follows:

- Pump lasers– Two high powered optical pump lasers, operating at a wavelength of 980 nm, provide power which is combined with the 1.5 mm signal
- Filter– In the middle of the OA, a filter separates the light at 1532 or 1510 nm from the rest of the 1.5 mm band. This filtering separates the supervisory channel from the optical (signal) wavelengths and reduces noise
- Optical splitter– An optical splitter in the OA splits off a small amount of light for monitoring purposes
- Optical isolators– Optical isolators prevent optical reflections from degrading system performance.

Metropolis® EON demultiplexes the signals at the other end of the optical line and passes them on to compatible optical receivers.

Function

The OA circuit pack does the following:

- Amplifies the optical line signal
- Provides power monitors on the optical monitor point provided by the amplifier module
- Controls the pump lasers which, in turn, automatically control OA output power
- Provides add/drop ports for the supervisory signal
- Provides temperature control for the ODU
- Receives data from the OMUs and ODUs for version and type information.

Important! Metropolis® EON uses the LEA107B OA for Long Span, 16-wavelength systems. Long Reach systems use the LEA7B OA. The LEA7B is required for single-OA operation.

□

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Line Interface Receive (LIRCV) Unit

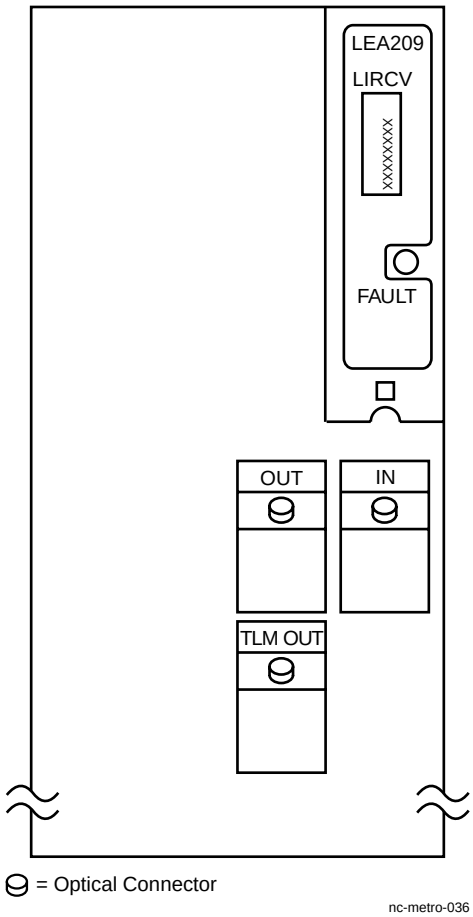
Overview

The Release 8.0 Line Interface Receive (LIRCV) circuit pack (see the following figure) supplies the supervisory channel (1510 nm) drop filter for single-OA applications. This circuit pack also controls the heater for any associated ODU16 when a receive amplifier is not equipped.

Faceplate

The following figure shows the faceplate of the LIRCV.

Figure 13-11 LIRCV (LEA209) Circuit Pack



Function

Important! The LIRCV may be used with 16-channel optical amplifiers as long as an OMU16/ODU16 is also used.

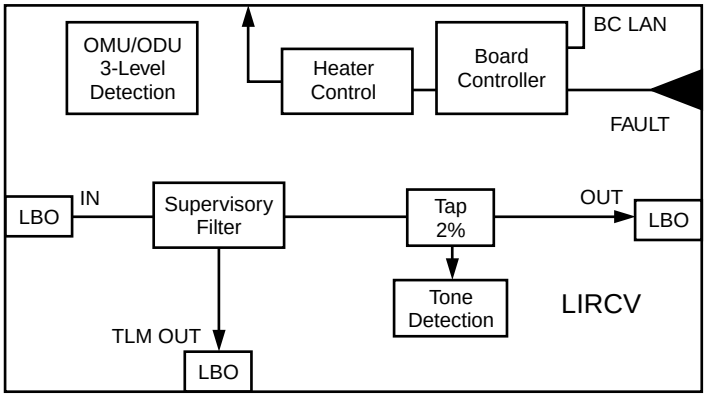
When amplification is not needed at the receive end, the Line Interface Receive (LIRCV) circuit pack allows a shelf to receive a signal without having a receive OA by providing the following:

- ODU16 detection and heater control for any associated single-OA applications when an amplifier is not equipped
- tone based channel detection for automatic power shutdown APSD control and performance monitoring (PM)

Block diagram

The following figure shows an overall block diagram of an LIRCV circuit pack.

Figure 13-12 LIRCV (LEA209) Circuit Pack Block Diagram



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Line Interface Transmit (LITX) Unit

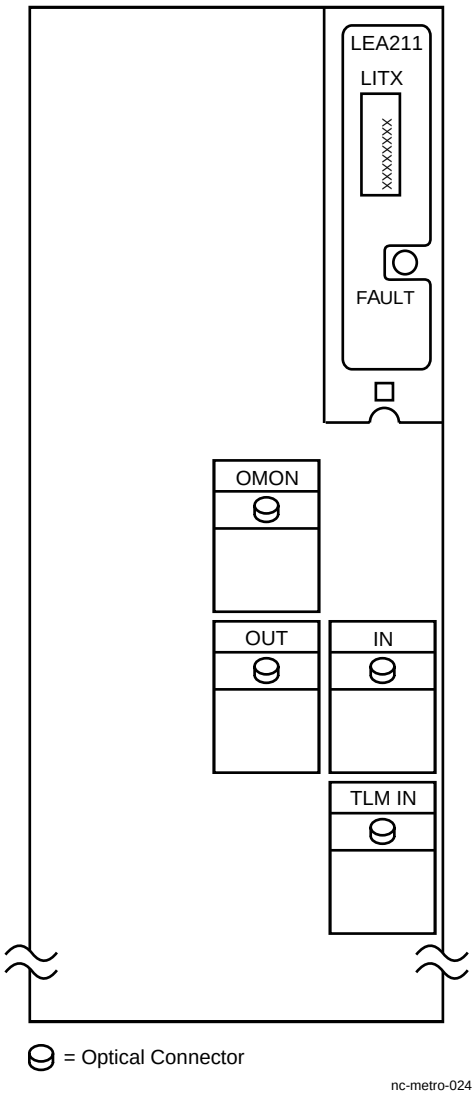
Overview

The Release 8.0 Line Interface Transmit (LITX) circuit pack supplies the supervisory add filter for zero-OA applications. This circuit pack also controls the heater for any associated OMU16 when a transmit amplifier is not equipped.

Faceplate

The following figure shows the faceplate of an LITX.

Figure 13-13 LITX (LEA211) Circuit Pack



Function

Important! The LITX may be used with 16-channel optical amplifiers as long as an R8.0 OMU16/ODU16 is also used.

When amplification is not needed at the transmit end, the Line Interface Transmit (LITX) circuit pack allows a shelf to transmit a signal without having a transmit OA by providing the following:

- OMU16 detection and heater control for zero-OA applications
- optical monitor connector for test access to balance OMU inputs

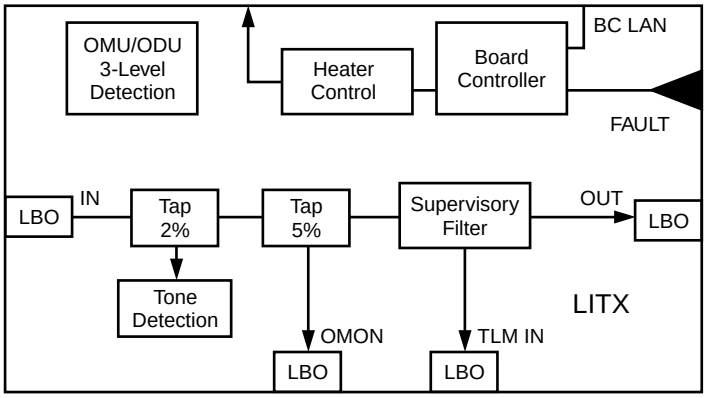
  tone based channel detection for automatic power shutdown

  APSD control and performance monitoring (PM)

Block diagram

The following figure shows an overall block diagram of an LITX circuit pack.

Figure 13-14 LITX (LEA211) Circuit Pack Block Diagram



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Optical Multiplexer Unit 32 (OMU32)

Overview

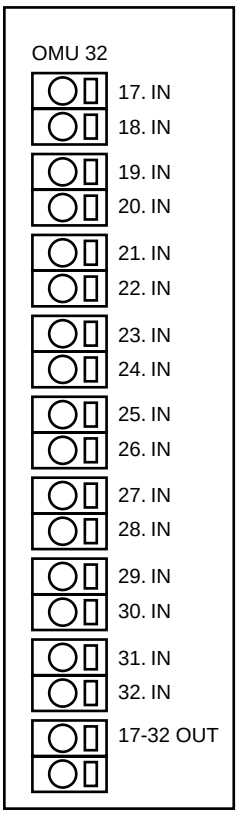
The Release 8.2 OMU32 508A/B multiplexes channels 17-32 into a single signal. The 508A/B has 17-32 OUT connector so that it can transmit the multiplexed 17-32 signal to an OMU16 which combines it with the 1-16 signal and transmits the combined signal onto the optical line. The 508A has a through loss of 8.0 dB and the 508B has a through loss of 5.5 dB.

A filter device is used with the 508A and 508B OMU instead of a coupler device to achieve less insertion loss.

Faceplate

The following figure shows the faceplate of the OMU32 without combiner.

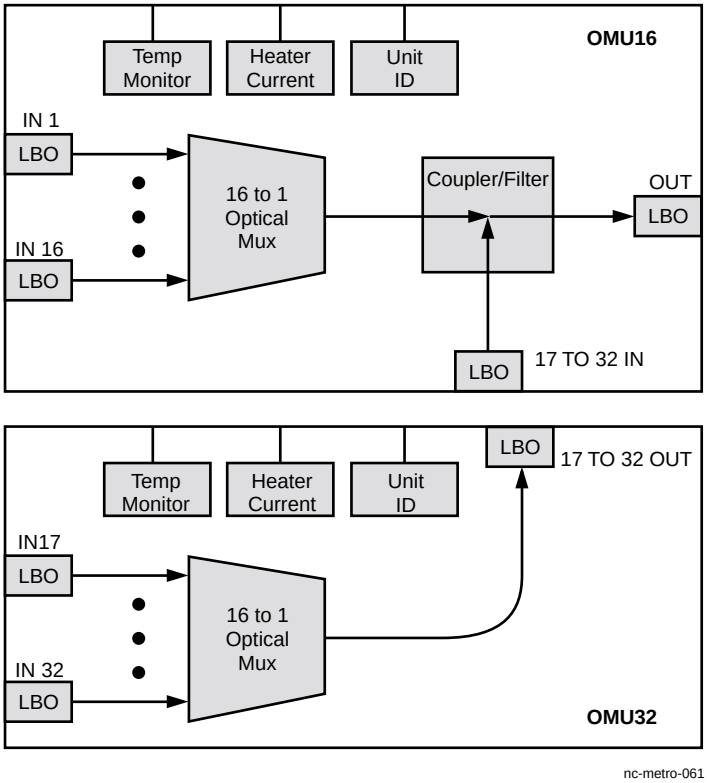
Figure 13-15 508A and 508B OMU32 (without Combiner) Faceplates



Block diagram

The following figure depicts the OMU32 and shows how it interworks with the OMU16 (described next in this chapter). The upgrade to 32 channels is a non-service affecting procedure.

Figure 13-16 OMU16/32 Circuit Pack Block Diagram



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Optical Multiplexer Unit 16 (OMU16)

Overview

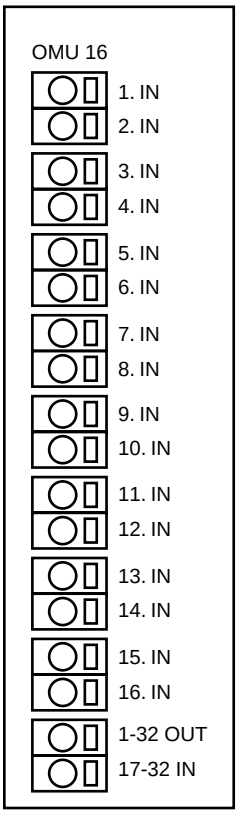
The 32-wavelength ready OMU16 has a combiner and input connector for channels 17-32 providing the support for future in-service growth of channels 17-32. The 507A has insertion loss of 8 dB. The 507B has insertion loss of 5.5 dB.

A filter device is used with the 507A and 507B OMU instead of a coupler device to achieve less insertion loss.

Faceplate

The following figure shows the faceplate of the OMU16.

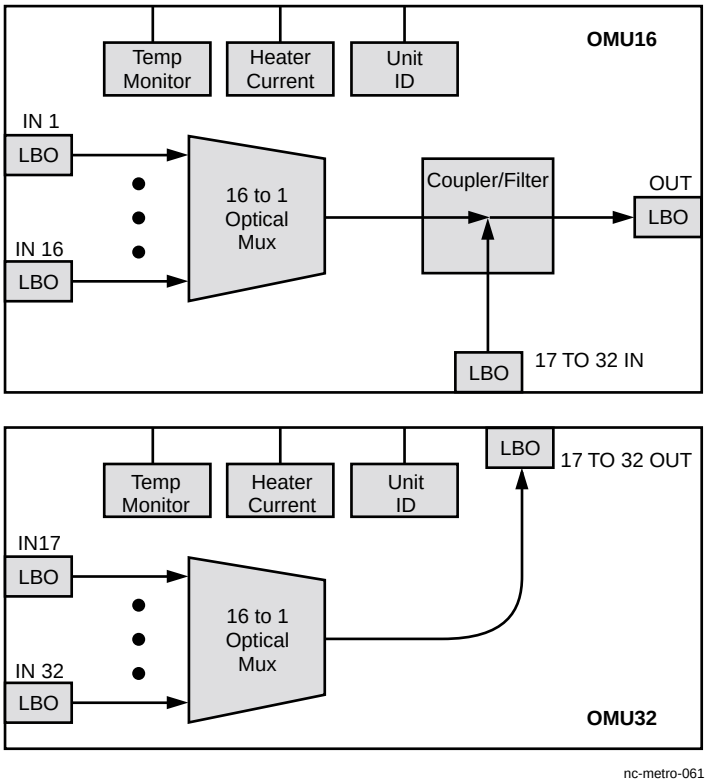
Figure 13-17 507A and 507B OMU16 Faceplates



Important! The OMU16 circuit packs can be used with 16- or 32-channel systems.

The following figure depicts the OMU16 and shows how it interworks with the OMU32 (described previously in this chapter). The upgrade to 32 channels is a non-service affecting procedure.

Figure 13-18 OMU16/32 Circuit Pack Block Diagram



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Optical Multiplexer Unit (OMU)

Used at the end terminal site, the OMU combines up to sixteen optical wavelengths into one signal called the optical line signal. The 506A OMU which is used with Metropolis® EON combines up to 16 optical wavelengths into one signal. This signal, known as the optical line signal, has a through loss of £ 14 dB.

□

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Optical Demultiplexer Unit (ODU32)

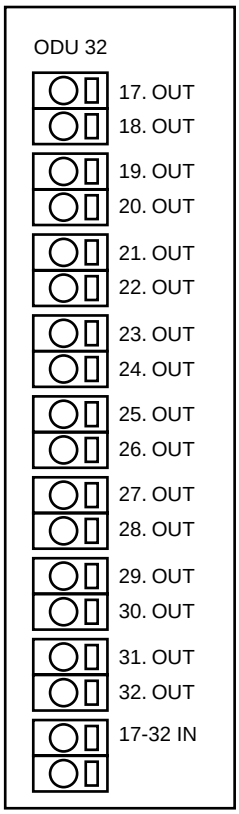
Overview

The Release 8.2 ODU32 608A/B receives a multiplexed 17-32 signal and demultiplexes it into channels 17-32. The 608A has a through loss of 8.0 dB and the 608B has a through loss of 5.5 dB.

Faceplate

The following figure shows the faceplate of the ODU32 without splitter.

Figure 13-19 608A and 608B ODU32 (without Splitter) Faceplates



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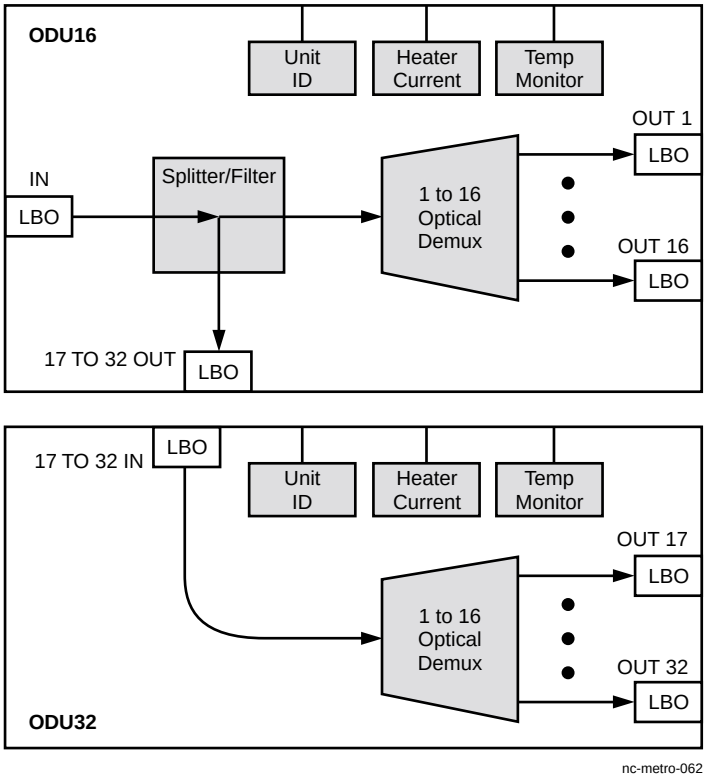
Block diagram

The following figure depicts the ODU32 and shows how it interworks with the ODU16 (described next in this chapter). The upgrade to 32 channels is a non-service affecting procedure.

Figure 13-20 ODU16/32 Circuit Pack Block Diagram



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Optical Demultiplexer Unit (ODU16)

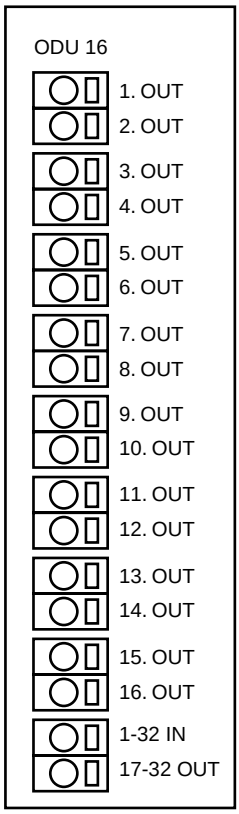
Overview

The Release 8.0 ODU16 has a splitter and output connector for channels 17-32 providing support for future in-service growth of channels 17-32. The 607A has insertion loss of 8 dB; the 608A has ODU16 has insertion loss of 5.5 dB.

Faceplate

The following figure shows the ODU16 faceplate.

Figure 13-21 607A and 607B ODU16 Faceplates



Block diagram

Important! The ODU16 circuit packs can be used with 16- or 32-channel systems.

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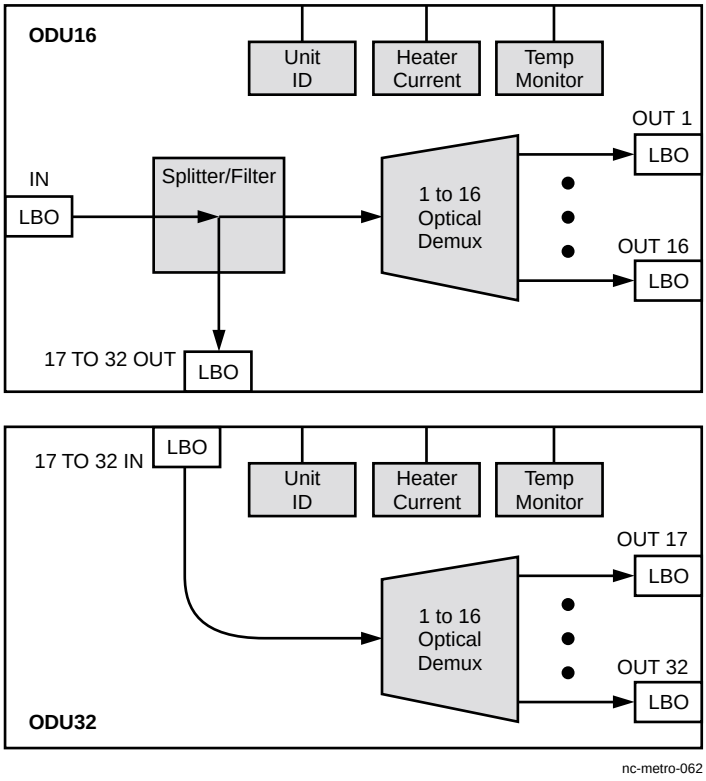
The following figure depicts the ODU16 and shows how it interworks with the ODU32. The upgrade to 32 channels is a non-service affecting procedure.

Figure 13-22 ODU16/32 Circuit Pack Block Diagram



Optical Demultiplexer Unit (ODU)

The ODU demultiplexes the input optical signal into a maximum of sixteen wavelengths. The types of ODUs used with Metropolis® EON are:

- 606A (sixteen wavelength; without 1510 nm Supervisory Channel Output, and a through loss of £ 14 dB)
- 606B (sixteen wavelength; with 1510 nm Supervisory Channel Output, and a through loss of £ 14 dB)

Important! The 606B ODU is used for single-OA operation. Alternatively, the 32-channel ready 607A or 607B ODU may be used with the LIRCV circuit pack for single-OA operation in 16-channel systems.

□

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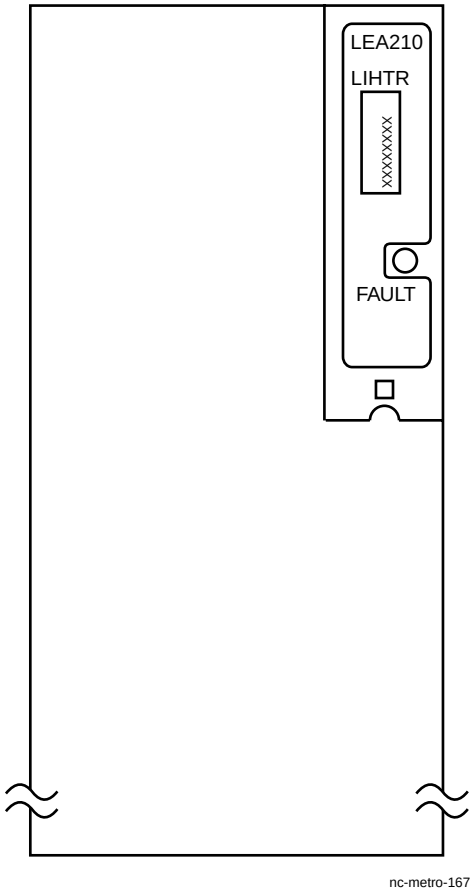
Line Interface Heater (LIHTR) Unit

Overview The Release 8.2 Line Interface Heater (LIHTR) circuit pack (see the following figure) provides OMU32 and ODU32 detection and heater control for 32-channel applications.

Faceplate The following figure shows the faceplate of the LIHTR.

Figure 13-23 LIHTR (LEA210) Circuit Pack



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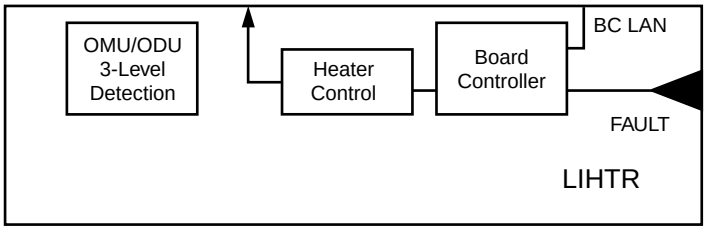
Block diagram The following figure shows an overall block diagram of an LIHTR circuit pack.

Figure 13-24 LIHTR (LEA210) Circuit Pack Block Diagram



Important! The LIHTR may only be used with 32-channel optical amplifiers as long as an OMU32/ODU32 is also used.

□

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UBB Optical Translator Port Module Unit (OTPM)

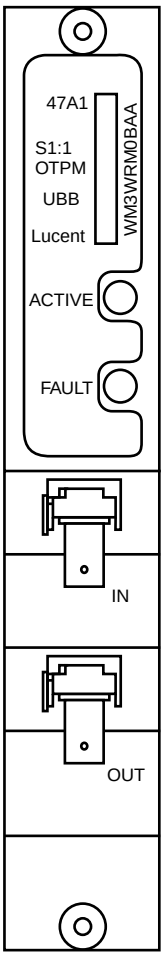
Overview

The Release 8.2 Universal Broadband OTPM (OTPM UBB) circuit pack is a half-size module. There are thirty-two add OTPMs (47A1-32) for multi-mode input to support the full 32-channel capacity of the system and an OTPM 47B for the drop function.

Faceplate

The following figure shows the faceplate of a UBB circuit pack.

Figure 13-25 UBB Circuit Pack Faceplate



Function

The OTPM UBB control structure provides the following functionality:

- Software download from the SYSCTL/SYSMEM to the OTCTL and through the OTCTL to the QOTUUB 41U
- Equipment failure indications for OTPMs

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- Incoming signal failure indications (LOS, LOF, and AIS) for OTPM ports
- 8-bit/10-bit performance monitoring for each OTPM UBB port
- Optical parameter performance monitoring (LBFC/OPT, RCV PWR/OPR, LBC) for the OTPMs
- Autonomous TL1 alarm reporting for all OTPM equipment
- Autonomous TL1 alarm reporting for OTPM incoming signal conditions, including the T-x condition types for TCAs
- Incoming signal port state provisioning for all OTPM ports
- In-service indications (green LED) for OTPM ports.
- Alarm notification on add OTPM UBBs (47A1-32) when the received data rate does not match the provisioned data rate

This information is reported through the Metropolis® EON user interface.

3R The OTPM UBB circuit pack module reshapes, retimes, and regenerates (3R) the signal. This circuit pack regenerates an incoming optical signal in the 16 Mb/s to 2.5 Gb/s range by:

- Converting the signal from optical to electrical format
- Converting the signal back into an optical signal that is compatible with Metropolis® EON or a receiver of the optical channel source
- Monitoring the signal for degradation.

Signal range The UBB circuit pack can transport any data protocol in the optical signal range between 16 Mb/s and 2.5Gb/s. The OTPM UBB dispersion is at 6200 ps/nm. Total distance supported is 360 km over SSMF. The OTPM UBB will support 1310 nm interfaces only.

> **Important!** If the bit-rate is not provisioned, the UBB feature will transport the bit-rate it receives, between 50 Mb/s and 2.5 Gb/s. For bit rates between 16 Mb/s and 50 Mb/s, the UBB will transport the signal but only if it is provisioned.

Signal types and PM

The following table shows the range of signals transported by the UBB and indicates whether or not the performance monitoring (PM) type is 8B/10B.

Table 13-5 UBB Signals and Signal Degrade (SD) Detection

Category	Signal	Signal Data Rate	PM Type
IBM Mainframe	ETR (External Timing Request)	16 Mb/s	None
	CLO (Control Link Oscillator)	16 Mb/s	None
	ESCONTM (Enterprise System Connection)	200 Mb/s	None
	ISC-3 (Inter-system Channel) peer mode	2.13 Gb/s	None
	FICONTM (Fiber Connection)	1.062 Gb/s	8B/10B
Gigabit Ethernet (GbE)	100BaseFx	1.25 Mb/s	None
	1000BaseLx	1.25 Gb/s	8B/10B
FDDI	FDDI (Fiber Distributed Data Interface)	125 Mb/s	None
Fiber Channel (FC)	FC-12	133 Mb/s	8B/10B
	FC-25	266 Mb/s	8B/10B
	FC-50	531 Mb/s	8B/10B
	FC-100	1.062 Gb/s	8B/10B
Video	D1 Video	270 Mb/s	None
	DV6000 Video	2.38 Gb/s	None
Concatenated SONET/SDH	OC-3/STM-1C	155.52 Mb/s	None
	OC-12/STM-4C	622.08 Mb/s	None
	OC-48C/STM-16C	2.5 Gb/s	None
Unknown	(The default is “Hunt and Lock”.)	50 Mb/s - 2.5 Gb/s	None

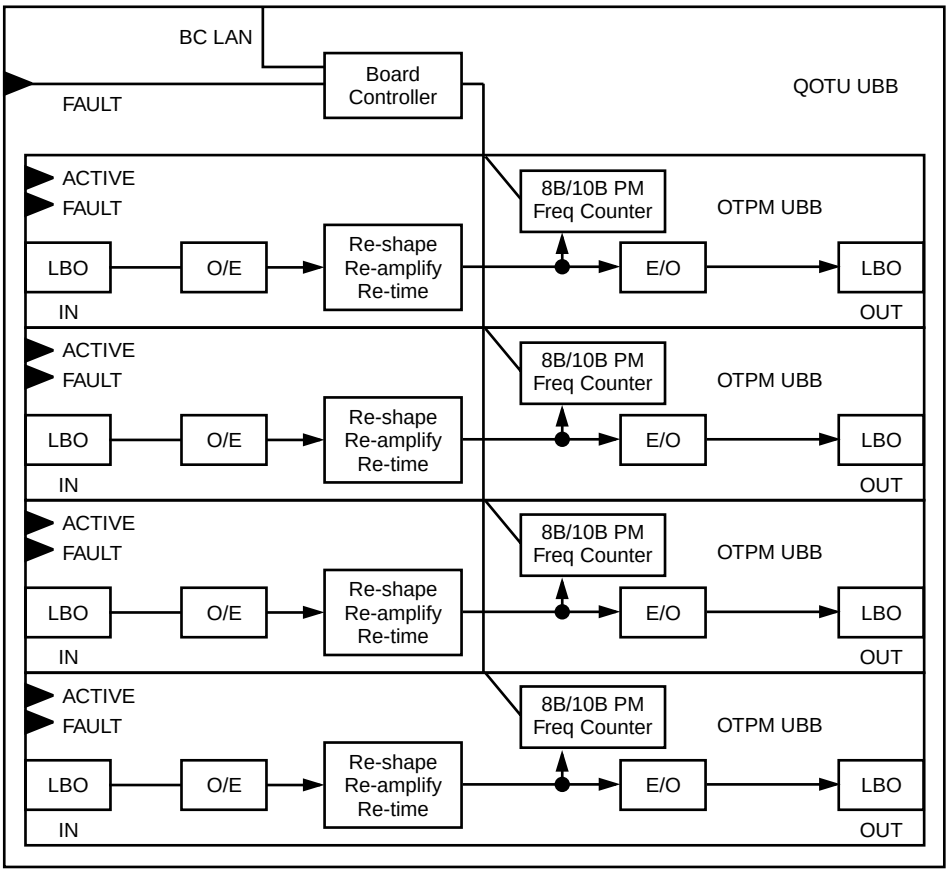
Signals with 8B/10B encoding will switch on SD when configured with OUPSR. Signals without 8B/10B encoding will switch on LOS only. If the specific bit-rate is provisioned, a discrepancy between the provisioned rate and the incoming rate is identified in an alarm with user-provisionable severity. If the bit-rate is not provisioned, the UBB feature will transport the bit-rate it receives, between

50 Mb/s and 2.5 Gb/s. For bit rates between 16 Mb/s and 50 Mb/s, the UBB will transport the signal but only if it is provisioned.

Block diagram

The following figure shows an overall block diagram of a UBB circuit pack.

Figure 13-26 UBB Circuit Pack Block Diagram



O = Optical
E = Electrical
PM = Performance Monitoring

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2:1 Data Multiplexer OTU (2DM25)

Overview

The Release 8.2 2:1 data multiplexer OTU (2DM25, code: 41M(1-32)) multiplexes two signals of any of the following types into a single OC-48 signal:

- Gigabit Ethernet
- ESCON
- Fiber Channel
- FICON
- Inter-System Channel (ISC-2)

The 2DM25 also demultiplexes the OC-48/STM-16 signal back into the two signal types. In other words the circuit pack is bidirectional. The services are transported in native mode. If regeneration is required, the OTPM25 may be used.

The 2DM25 Mux OTU performs performance monitoring checks using 8B/10B encoding for all four bit rates. In addition, the created OC-48/ STM-16 signal is monitored by reading and reporting J0 and B1 bytes.

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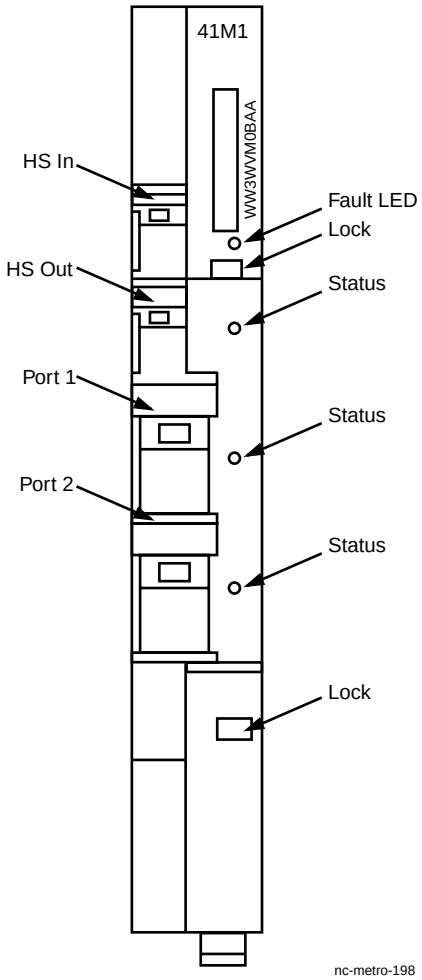
Faceplate The following figure shows the faceplate of a full-size 2DM25 circuit pack.

Figure 13-27 2DM25 Circuit Pack Faceplate



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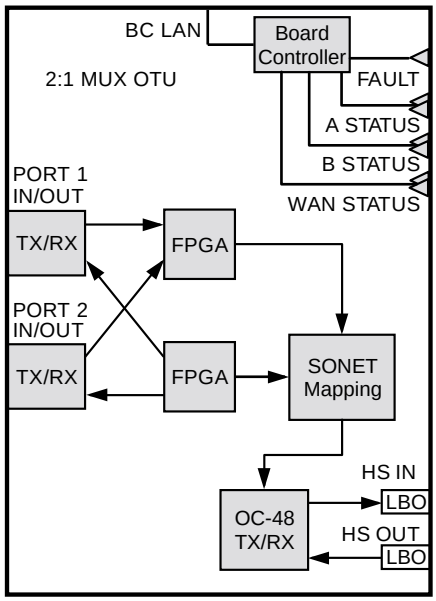
Block diagram

The following figure shows an overall block diagram of a 2DM25 circuit pack.

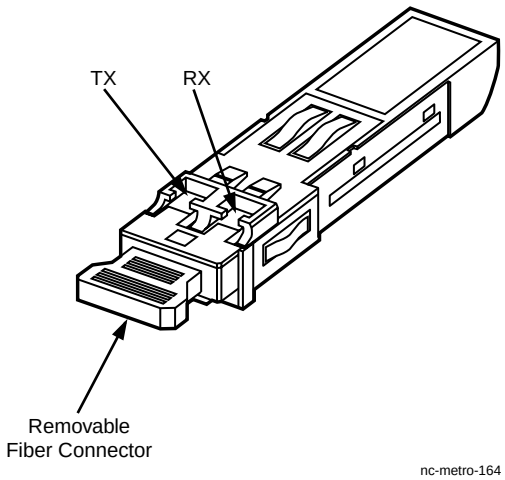
Figure 13-28 2DM25 Circuit Pack Block Diagram



SFP module

The Mux OTU requires a small form factor plug-in (SFP) module (see the following figure) which is to be plugged in to receive the client input signal. SFPs are new in Release 8.2. See Chapter 7 for SFP module ordering information.

Figure 13-29 Small Form Factor Plug-in (SFP) Module



Enhanced LSBB Circuit Pack

Overview

Release 8.2 introduces the Enhanced Low Speed Broadband (ELSBB) circuit pack. The Enhanced LSBB is a Metropolis EON Optical Translator Port Module (OTPM, 44C1-16, and 44BC). Like other EON Optical Translator Unit (OTU), it performs signal optical/electrical conversion. Performance monitoring is limited to optical parameters, including LOS; however, it does not retime the signal (2R). The ELSBB supports equipment version information, software download through the system control architecture, equipment failure indications, incoming signal failure indications, autonomous TL1 alarm reporting, port provisioning and in-service indications.

The ELSBB supports 16 channels and can transport signals with data rates from 16 Mb/s to 1.062 Gb/s. It also supports the 1.062 Gb/s ISC2 (Inter-System Coupling) with Open Fiber Control (OFC), an IBM proprietary feature which is a safety interlock to ensure the transmitting laser is turned on only when the optical link is not open.The ELSBB may be provisioned for 4 rates: ETR/CLO, HI (high band), LO (low band), and ISC. The ELSBB is a half-sized OTPM and is mounted in the pre-release 8.0 QOTU (41S).

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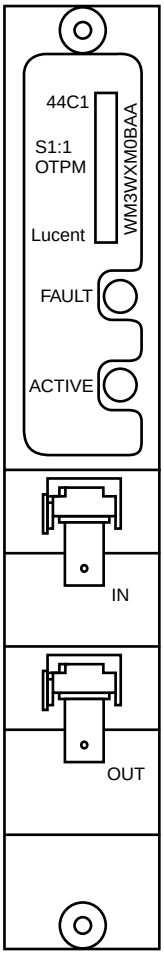
Faceplate The following figure shows the faceplate of an ELSBB circuit pack.

Figure 13-30 ELSBB Circuit Pack Faceplate



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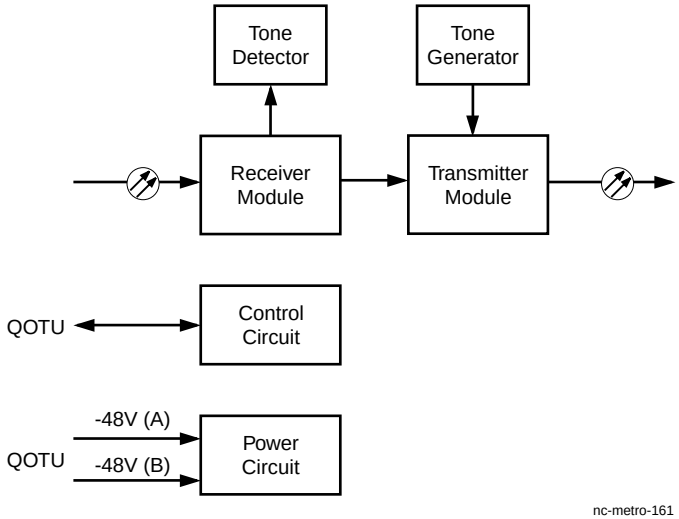
Block diagram

The following figure shows a functional block diagram of the ELSBB circuit pack.

Figure 13-31 ELSBB BLock Diagram



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10Gb/s Optical Translator Unit (10G OTU)

Overview

Release 8.2 introduces 10 Gb/s transmission through the new 10G OTU circuit pack. The transmitter signal is provisionable as an OC-192/STM-64 signal with forward error correction (FEC) or an OCh10G signal with strong FEC.

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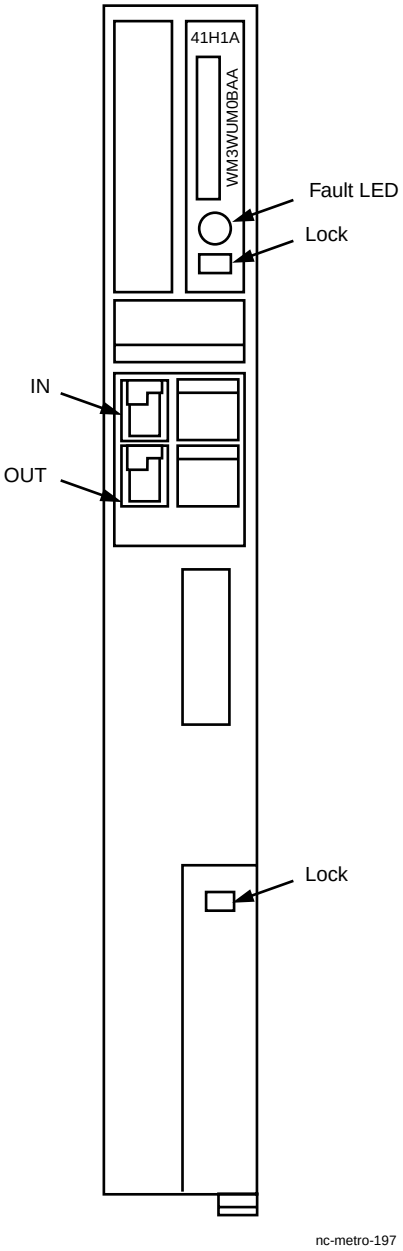
Faceplate The following figure shows the faceplate of a 10G OTU circuit pack.

Figure 13-32 10 Gb/s OTU Circuit Pack Faceplate



Strong FEC Strong FEC is accomplished by adding digital overhead that contains the FEC check bytes and the optical channel overhead (OCh-OH), and transporting the resulting signal at a rate 15/14 times the OC-192 rate (approximately 10.6 Gb/s). The combination of the FEC and OCh-OH is known as the WaveWrapper^{TM} or “digital wrapper”. This OCh-OH enables new maintenance functions that do not rely on SONET/SDH processing such as signaling channels and maintenance signals for OCh

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shared protections rings and optical channel trace. Strong FEC enables high-speed transmission more reliably and over longer distances.

Function

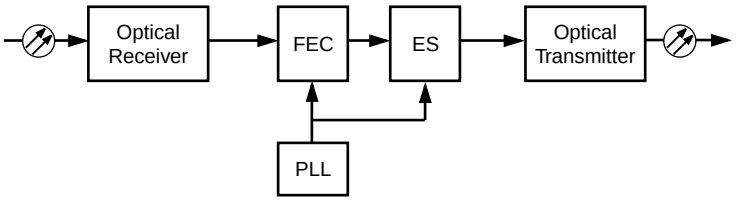
The 10G OTU includes the following characteristics:

- Receives a standard OC-192/STM-64 or OCh 10G optical signal
- Monitors the SONET section B1 overhead bytes
- Reads the SONET section trace bytes (J0)
- Uses a byte processor FEC 10G for health and performance monitoring and forward error correction (FEC) processing
- The FEC10G has four modes of operation: OC-192 in and out, OC-192 in and OCh10G out, OCh10G in and OC-192 out, and OCh10G in and out
- Combines a wavelength specific tone signal with the STS-192 signal
- Modulates a laser transmitter to produce an OC-192/STM-64 or OCh10G optical signal at a specific frequency
- Provides performance monitoring data to the software
- Reports to the Optical Translator Controller (OTCTL) circuit pack using the board controller local area network (BCLAN)

Block diagram

The following figure shows an overall block diagram of a 10G OTU circuit pack.

Figure 13-33 10G OTU Block Diagram



FEC = Forward Error Correction

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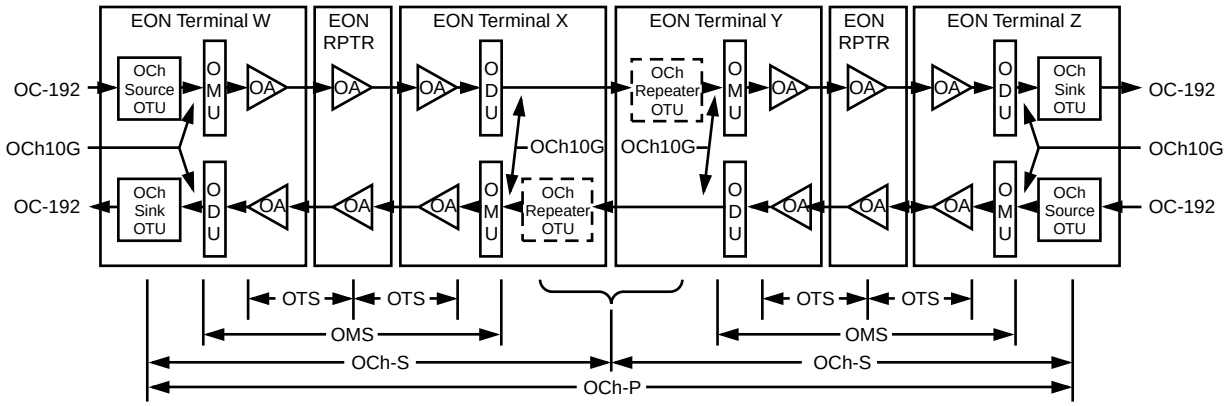
Transmission The following figure shows the transmission of 10G signals.

Figure 13-34 Transmission of 10G Signals



OCh = Overhead Channel
OCh-P = OCh Section
OCh-P = OCh Path
OMS = Optical Multiplex
OTS = Optical Transmission Section
EON = Metropolis® Enhanced Optical Networking (EON)

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Optical Translator Port Module Unit 25 (OTPM25)

Overview

The OTPM25 circuit pack is a half-size module that allows twice the add/drop capacity in the same space as the original 41x OTUs. As of Release 8.2 there are thirty-two OTPM25s 46A1-32x to support the full 32-channel capacity of the system and an OTPM25 46B for the drop function. The OTPM dispersion is at 6200 ps/nm. Total distance supported is 360 km.

The OTPM 25 circuit pack module regenerates an OC-48/STM-16 optical signal by:

- Converting the signal from optical to electrical format
- Converting the signal back into an optical signal that is compatible with Metropolis® EON or a receiver of the optical channel source
- Monitoring the signal for degradation.

Function

The OTPM 25 control structure provides the following functionality:

- Equipment version information per OTPM 25
- Software download from the SYSCTL/SYSMEM to the OTCTL and through the OTCTL to the QOTU 41T
- Equipment failure indications for OTPMs
- Incoming signal failure indications (LOS, LOF, and AIS) for OTPM ports
- B1/J0 performance monitoring in 15 minute/daily bins and TCAs for each OTPM port
- Optical parameter performance monitoring (LBFC/OPT, RCV PWR/OPR, LBC) for the OTPMs
- Autonomous TL1 alarm reporting for all OTPM equipment
- Autonomous TL1 alarm reporting for OTPM incoming signal conditions, including the T-x condition types for TCAs
- Incoming signal port state provisioning for all OTPM ports
- In-service indications (green LED) for OTPM ports.

This information is reported through the Metropolis® EON user interface.

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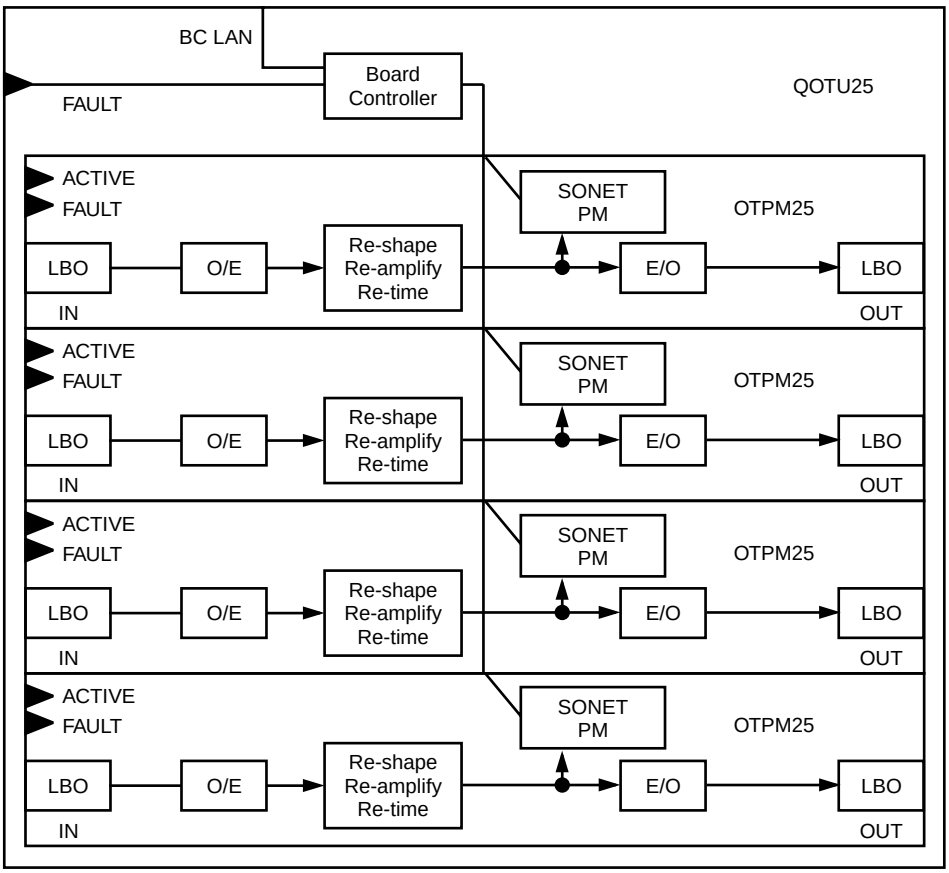
Block diagram The following figure shows an overall block diagram of a OTPM 25 circuit pack.

Figure 13-35 OTPM 25 Circuit Pack Block Diagram



O = Optical
E = Electrical
PM = Performance Monitoring

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Important! These OTPM 25s may be used with a 16-channel optical amplifier; however, R8.0 software and OT shelves are required.

□

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Optical Unidirectional Path-switched Ring (OUPSR)

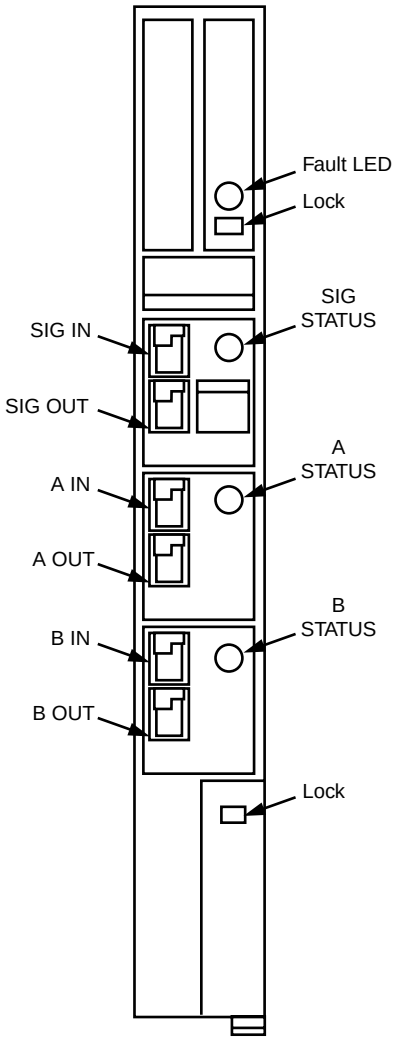
Overview

The R8.0 and R8.2 OUPSR circuit packs (LEP2 and LEP3, respectively) each consist of a head-end splitter and tail-end selector to perform a per wavelength switch function. The LEP2 accepts single-mode inputs from the client; the LEP3 accepts multi-mode inputs.

Faceplate

The following figure shows the faceplate of the OUPSR.

Figure 13-36 OUPSR (LEP2 and LEP3)



Transmit side

On the transmitting side, the OUPSR takes an unprotected client service, splits it into two signals and transmits the individual signals through the east side and west side of a Metropolis® EON ring system.

Receive side

On the receiving side, the OUPSR circuit pack receives two separate signals from two different OTU packs and determines which signal to choose depending on the quality of the signals. The OUPSR would be placed in a Metropolis® EON ring at those locations where the customer wishes to add or drop traffic.

Tail-end selection

The selection of the signal that is chosen on the receiving side may also be based on external commands entered manually via the Craft Interface Terminal (CIT). The forced or manual switch to protection via the CIT causes traffic to be switched to the designated side regardless of which side is currently active. The automatic switch causes traffic to be switched to the other side unless the other side has a higher priority switch request that is active. The total time to complete the protection switch once the decision to switch has been made is no more than 50 ms, and the detection time for signal failure or interruption is less than 10 ms.

Client, working, protection

Important! The physical client ports are labeled ***SIG IN*** and ***SIG OUT*** on the circuit pack, but the AIDs for these ports are ***CIN*** and ***COUT***.

SIG IN and ***SIG OUT*** carry the client signal. At the transmit end, the add OUPSR pack splits the ***SIG IN*** signal into ***A OUT*** and ***B OUT*** signals. By default, ***A OUT*** is considered the working signal and ***B OUT*** is considered the protection signal. The working signal is added through an add OTU to travel in one direction around the ring and the protection signal is added through an add OTU to travel in the other direction around the ring. At the receive end, the working and protection signals are dropped through drop OTUs to the drop OUPSR pack. The OUPSR selects the working signal if it is good, otherwise it selects the protection signal.

Switch on SD

In Release 8.2 the OUPSR switching is based on signal degrade (SD), when used with two drop OTUs that detect SD (see the following table). The OUPSR switches on LOS, not SD, if equipped with either: two OTUs that do not detect SD or with only one drop OTU. Note that the ETR/CLO signal may not be optically protected. Also, OUPSR

does not support LSBB (44AxB) and ELSBB (44Cx) in 16-channel systems.

Table 13-6 Drop OTUs that Detect Signal Degrade (SD)

OTU	Bit Rate
41BB	OC-48/STM-16
47B	See Table 4-5.
46B	OC-48/STM-16
41M	FICON, Fiber Channel, ESCON, GbE, and OC-48/STM-16

OTU options

OTUs can be used with OUPSRs in the following ways:

- ***with protected OTUs (four OTUs per office)***

  This option supports switching on signal degrade (SD), alarm indication signal (AIS), and loss of frame (LOF). It also protects against a single OTU failure for both the add and drop signals.

- ***with protected drop (unprotected add) OTUs (three OTUs per office)***

  This option supports switching on signal degrade (SD), alarm indication signal (AIS), and loss of frame (LOF). It also protects against a single OTU failure for the drop signal but not for the add signal.

- ***two OTUs per office***

  This option supports switching on LOS only. This option does not support switching on signal degrade (SD). It also does not protect against an OTU failure. The LEP3 will not be used in this configuration.

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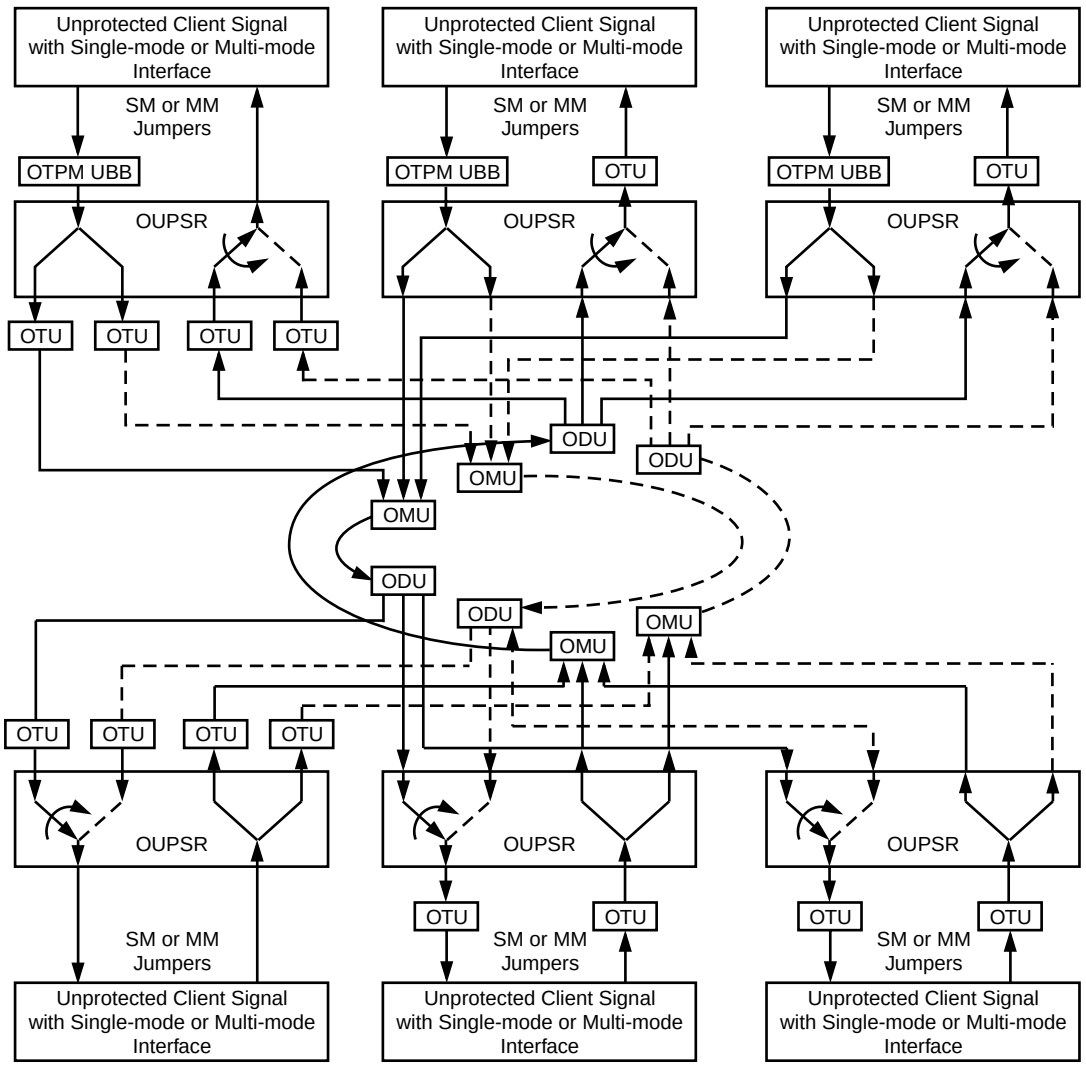
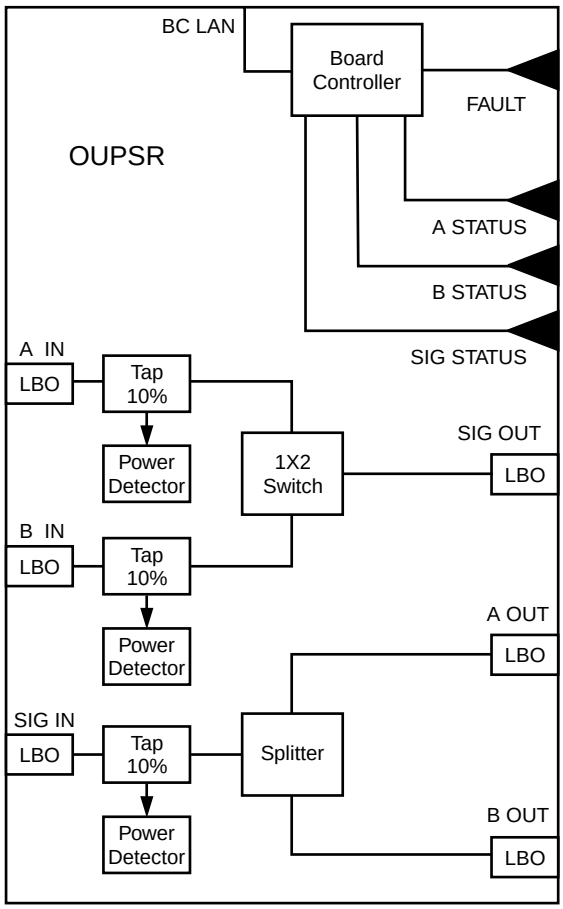
OTU options illustrated The following figure illustrates the three OTU options.

Figure 13-37 Four, Three, or Two OTUs per Office



Block diagram The following figure shows an overall block diagram of an OUPSR circuit pack.

Figure 13-38 OUPSR (LEP2 and LEP3) Circuit Pack Block Diagram



QOTUUB Carrier

Overview

Release 8.2 introduces the Quad Optical Translator Unit (QOTU) (41T) Universal Broadband (UBB) also known as the QOTUUB carrier. Each QUOTUBB (Universal Broadband) circuit pack occupies two OTU slots in an OT shelf and can contain a maximum of four OTPM UBBs in any combination with the capability of transmitting from 16 Mb/s to 2.5 Gb/s. The 47Ax series of OTPM UBB circuit packs are used.

OTPM UBB and DUBBs (add and drop Universal Broadband) are housed individually in the QOTUUB ports 1, 2, 3, and 4. The following figure illustrates the port locations on the QOTUUB.

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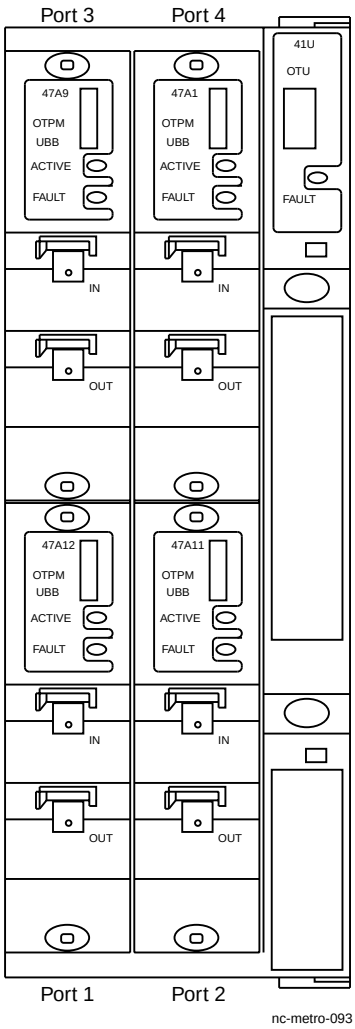
Faceplate The following figure shows the faceplate of the QOTUUB.

Figure 13-39 QOTUUB Design



Quad Optical Translator Unit (QOTU25) Carrier for 2.5G Signals

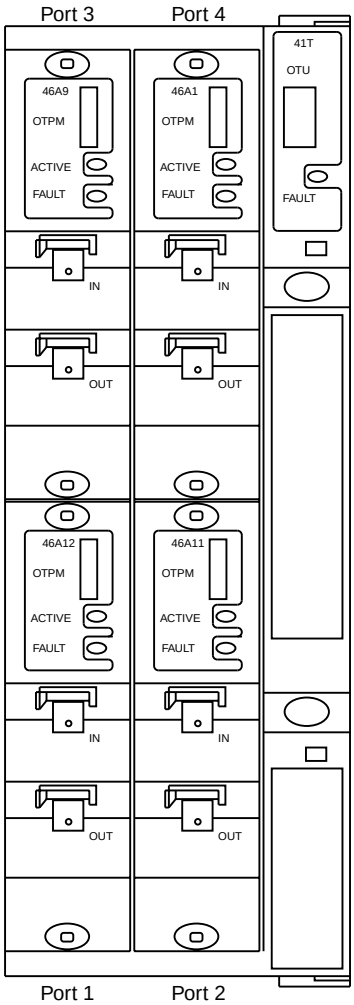
Overview

The Release 8.0 QOTU25 carrier circuit pack (41U) occupies two OTU slots in an OT shelf and can contain a maximum of four OC-48/STM-16 OTPM25s in any combination. The 46Ax series of QOTU25 circuit packs are used. OTPM25s are housed individually in QOTU25 ports 1, 2, 3, and 4. The following figure illustrates the port locations on the QOTU25.

Faceplate

The following figure shows the faceplate of the QOTU25.

Figure 13-40 QOTU25 Design



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Pre-release 8.0 OTUs

Overview

The following lists the pre-release 8 Optical Translator Unit (OTU) transmission circuit packs used in the Metropolis® EON:

- 41F1 through 41F16 1.25 Gigabit Ethernet Optical Translator Unit (Add) - 1.5mm
- 41G 1.25 Gigabit Ethernet Optical Translator Unit (Drop) - 1.3mm
- 41A1C through 41A16C OC-48/STM-16 Optical Translator Unit - 1.5mm
- 41BB OC-48 STM16 Optical Translator Unit - 1.3mm
- 41C1C through 41C16C OC-48/STM-16 Optical Translator Unit - 1.5mm
- 42A1B through 42A16B OC-12/STM-4 Optical Translator Port Module - 1.5mm
- 42B, OC-12/STM-4 Optical Translator Port Module - 1.3mm
- 43A1B through 43A16B OC-3/STM-1 Optical Translator Port Module - 1.5mm
- 43B, OC-3/STM-1 Optical Translator Port Module - 1.3mm.
- Quad Optical Translator Unit (QOTU)

All circuit pack, unit, and port module assemblies connect to the backplane. All optical connections in and out of the circuit packs run through faceplate-mounted optical connectors.

Function

The OTU/OTPM circuit pack regenerates an OC-3/STM-1, OC-12/STM-4 or OC-48/STM-16 optical signal by:

- Converting the signal from optical to electrical format
- Converting the signal back into an optical signal that is compatible with Metropolis® EON or a receiver of the optical channel source
- Monitoring the signal for degradation.

The OTU/OTPM control structure provides the following functionality:

- Equipment version information per QOTU and OTPM (OC-3/STM-1, OC-12/STM-4, OC-48/STM-16.
- Software download from the SYSCTL/SYSMEM to the OTCTL and through the OTCTL to the OTUs and QOTUs

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- Equipment failure indications for OTUs, QOTUs, and OTPMs
- Incoming signal failure indications (LOS, LOF, and AIS) for OTU and OTPM ports
- B1 and J0 performance monitoring in 15 minute/daily bins and TCAs for each OTU and OTPM port (this is not provided for the LSBB OTPM)
- Optical parameter performance monitoring (LBFC/OPT, RCV PWR/OPR, LBC) for the OC-48/STM-16 OTUs. For OC-3/STM-1 and OC-12/STM-4 OTPMs, analog performance parameters are not provided (available for factory testing and calibration) and all out-of-range indications are treated as OTPM failures.
- Autonomous TL1 alarm reporting for all OTU, QOTU, and OTPM equipment
- Autonomous TL1 alarm reporting for QOTU and OTPM incoming signal conditions, including the T-x condition types for TCAs
- Incoming signal port state provisioning for all OTU and OTPM ports
- In-service indications (green LED) for OTPM ports.

This information is reported through the Metropolis® EON user interface. For more detailed information regarding OC-3/STM-1, previous OC-48/STM-16 and OC-12/STM-4 refer to pre-R8.0 APOGs.

Important! Pre-release 8 OTUs can all be used in a 32-channel system.

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Appendix A: Power Down/Power Up an Optical Network Element (NE)

Overview

Purpose

This procedure is designed to help a metropolitan service provider prepare for a planned loss of power to all or part of a central office. The loss of power to any NE will cause a loss of traffic on that NE, so traffic must be rerouted around the NE. Because there are so many variations from product to product, this procedure is written at a high level. See the specific product documentation if you need more details for any step.

The front of any shelf that receives electrical power has either two (A and B) circuit breakers or two (A and B) fuses. Most NE shelves do receive electrical power.

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Power Down an Optical Network Element (NE)

CAUTION

Electrostatic Discharge

Use a static ground wrist strap whenever handling circuit packs or working on a network element to prevent electrostatic discharge (ESD) damage to sensitive components.

1 Reroute traffic around the NE.

2 Power down each shelf in one of the following ways:

- Shut off both A and B circuit breakers by inserting an object such as a thin flathead screwdriver into the slot on the “off” side of each circuit breaker.
- Remove both A and B fuses by lifting the cover, then pressing in and down, then releasing to allow the fuse to spring outward.

3 Shut off power at the Battery Distribution Feeder Bay (BDFB)

END OF STEPS

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Power Up an Optical Network Element (NE)

CAUTION

Electrostatic Discharge

Use a static ground wrist strap whenever handling circuit packs or working on a network element to prevent electrostatic discharge (ESD) damage to sensitive components.

1 Verify that power is on at the Battery Distribution Feeder Bay (BDFB).

2 Continue with the next step for the shelf containing the system controller circuit pack.

3 Power up the shelf and verify that both A and B power supplies are good as follows:

1. Turn on circuit breaker A or insert fuse A and press inward and upward.

   If the green power on LED is not lit, check for a reversal on the power feeder and verify there is voltage at the connector.
2. Turn off circuit breaker A or remove fuse A.
3. Turn on circuit breaker B or insert fuse B and press inward and upward.

   If the green power on LED is not lit, check for a reversal on the power feeder and verify there is voltage at the connector.
4. Turn on circuit breaker A or insert fuse A and press inward and upward.

Result: You have verified that both A and B power supplies are good and are now turned on.

4 Wait for all of the circuit packs on this shelf to finish booting, indicated by the following:

- all red LEDs are off
- for packs with green LEDs, they are on steadily.

5 Repeat steps 3 and 4 for all other shelves that contain controller circuit packs.

6 Repeat step 3 for all shelves that do not contain any controller circuit packs.

7 Log into the network element with a craft interface terminal and check alarms.

8 If any alarms appear, use the product documentation to clear them. For most products, the appropriate document will be an *Alarm Message and Trouble Clearing Guide* or a *User/Service Manual*.

9 If this NE allows cross-connection, verify that the cross-connections are correct. Refer to the appropriate product documentation, usually a *User Operations Guide* or a *User/Service Manual*.

10 Reroute traffic back onto this NE.

END OF STEPS

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Appendix B: Support for Signal Types

Overview

Purpose This appendix serves as a reference for the support of various signal types by Metropolis® Enhanced Optical Networking (EON).

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Support for Signal Types

Name	Supporting OTUs/ OTPMs	Data Rate	PM Type Supported
IBM® Mainframe Protocols			
ETR (External Timing Request)	ELSBB, UBB	16 Mb/s	none
CLO (Control Link Oscillator)	ELSBB, UBB	16 Mb/s	none
ESCON® (Enterprise System Connection)	2DM25, LSBB, ELSBB, UBB	200 Mb/s	8B/10B[3]
ISC (Inter-System Channel)	2DM25, ELSBB	1.062 Gb/s	none
ISC-2	2DM25, ELSBB	1.062 Gb/s	none
ISC-3 at Peer Mode	UBB	2.13 Gb/s	none
FICON™ (Fiber Connection)	2DM25, ELSBB, UBB	1.062 Gb/s	8B/10B[1]
Ethernet			
100Base-FX (also called FX, Fast Ethernet)	LSBB, ELSBB, UBB	125 Mb/s	none
1000Base-LX (also called GbE-1, Gigabit Ethernet)	2DM25, GbE, UBB	1.25 Gb/s	8B/10B[1]
Fiber Distributed Data Interface			
FDDI	LSBB, ELSBB, UBB	125 Mb/s	none
Fibre Channel			
FC-12	LSBB, ELSBB, UBB	133 Mb/s	8B/10B[1]
FC-25	LSBB, ELSBB, UBB	266 Mb/s	8B/10B[1]
FC-50	LSBB, ELSBB, UBB	531 Mb/s	8B/10B[1]
FC-100	2DM25, ELSBB, UBB	1.062 Gb/s	8B/10B[1]
Video			
D1 Video	LSBB, ELSBB, UBB	270 Mb/s	none
DV6000	UBB	2.38 Gb/s	none

continued next page...

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Name	Supporting OTUs/ OTPMs	Data Rate	PM Type Supported
SONET/SDH, DWDM			
OC-3/STM-1	OC-3/STM-1, LSBB, ELSBB, UBB	155.52 Mb/s	SONET/SDH[2]
OC-12/STM-4	OC-12/STM-4, LSBB, ELSBB, UBB	622.08 Mb/s	SONET/SDH[2]
OC-48/STM-16	2.5G (OTPM25), UBB	2.488 Gb/s	SONET/SDH[2]
OC-192/STM-64	10G	9.953 Gb/s	SONET/SDH[2]
OCh10G	10G	10.664 Gb/s	OCh

Notes:

1. 8B/10B performance monitoring supported only by UBB and 2DM25.
2. SONET/SDH performance monitoring supported only by OC-3/STM-1, OC-12/STM-4, OC-48/STM-16, 10G, and 2DM25 packs.
3. 8B/10B performance monitoring supported only by 2DM25.

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Glossary

100Base-FX (also called FX, Fast Ethernet)

An Ethernet protocol with a signal rate of 125 Mb/s.

1000Base-LX (also called GbE-1, Gigabit Ethernet)

An Ethernet protocol with a signal rate of 1.25 Gb/s.

0x1 Line Operation
An unprotected operation. The connection between network elements has one bidirectional line (no protection line).

1+1 Line Protection
A protection architecture in which the transmitting equipment transmits a valid signal on both the working and protection lines. The receiving equipment monitors both lines. Based on performance criteria and OS control, the receiving equipment chooses one line as the active line and designates the other as the standby line.

1xN Equipment Protection
1xN protection pertains to N number of circuit pack/port units protected by one circuit pack or port unit. When a protection switch occurs, the working signals are routed from the failed pack to the protection pack. When the fault clears, the signals revert to the working port unit.

12NC (12-digit Numerical Code)
Used to uniquely identify an item or product. The first ten digits uniquely identify an item. The eleventh digit is used to specify the particular variant of an item. The twelfth digit is used for the revision issue. Items with the first eleven digits the same, are functionally equal and may be exchanged.

A

ABN
Abnormal alarm status

ABS (Absent)
Used to indicate that a given circuit pack is not installed.

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AC
Alternating Current

ACO (Alarm Cut-Off)
A button on the user panel used to silence audible alarms.

ACT (Active)
Used to indicate that a circuit pack or module is in-service and currently providing service functions.

ADM (Add/Drop Multiplexer)
The term for a synchronous network element capable of combining signals of different rates and having those signals added to or dropped from the stream.

AEL
Accessible Emission Limits

Agent
Performs operations on managed objects and issues events on behalf of these managed objects. All SDH managed objects will support at least an agent. Control of distant agents is possible via local “Managers”.

AGNE
Alarm Gateway Network Element

AID (Access Identifier)
A technical specification for explicitly naming entities (both physical and logical) of an NE using a grammar comprised of ASCII text, keywords, and grammar rules.

AIS (Alarm Indication Signal)
A code transmitted downstream in a digital network that indicates that an upstream failure has been detected and alarmed if the upstream alarm has not been suppressed.

AITS
Acknowledged Information Transfer Service: Confirmed mode of operation of the LAPD protocol.

Alarm
Visible or audible signal indicating that an equipment failure or significant event/ condition has occurred.

Alarm Correlation
The search for a directly-reported alarm that can account for a given symptomatic

condition.

Alarm Severity
An attribute defining 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 network management layer OSs.

Alarm Throttling
A feature that automatically or manually suppresses autonomous messages that are not priority alarms.

Aligning
Indicating the head of a virtual container by means of a pointer, for example, creating an Administrative Unit (AU) or a Tributary Unit (TU).

AMI (Alternate Mark Inversion)
A line code that employs a ternary signal to convert binary digits, in which successive binary ones are represented by signal elements that are normally of alternative positive and negative polarity but equal in amplitude and in which binary zeros are represented by signal elements that have zero amplitude.

Anomaly
A difference between the actual and desired operation of a function.

ANSI
American National Standards Institute

APD
Avalanche Photo Diode

APS (Automatic Protection Switch)
A protection switch that occurs automatically in response to an automatically detected fault condition.

ASCII (American Standard Code for Information Interchange)
A standard 7-bit code that represents letters, numbers, punctuation marks, and special characters in the interchange of data among computing and communications equipment.

ASN.1
Abstract Syntax Notation 1

Assembly
Gathering together of payload data with overhead and pointer information (an indication of the direction of the signal).

Association
A logical connection between manager and agent through which management information can be exchanged.

Asynchronous
The essential characteristic of time-scales or signals such that their corresponding significant instants do not necessarily occur at the same average rate.

ATM (Asynchronous Transfer Mode)
A high-speed transmission technology characterized by high bandwidth and low delay. It utilizes a packet switching and multiplexing technique which allocates bandwidth on demand.

Attribute
Alarm indication level: critical, major, minor, or no alarm.

AU (Administrative Unit)
Carrier for TUs.

AUG
Administrative Unit Group

AU PTR (Administrative Unit Pointer)
Indicates the phase alignment of the VC-N with respect to the STM-N frame. The pointer position is fixed with respect to the STM-N frame.

AUTO (Automatic)
One possible state of a port or slot. When a port is in the AUTO state and a good signal is detected, the port automatically enters the IS (in-service) state. When a slot is in the AUTO state and a circuit pack is detected, the slot automatically enters the EQ (equipped) state.

Autolock
Action taken by the system in the event of circuit pack failure/trouble. System switches to protection and prevents a return to the working circuit pack even if the trouble clears. Multiple protection switches on a circuit pack during a short period of time cause the system to autolock the pack.

Autonomous Message
A message transmitted from the controlled network element to the Navis™ Optical

EMS which was not a response to a Navis™ Optical EMS originated command.

AVAIL
Available

B

Bandwidth
The difference in Hz between the highest and lowest frequencies in a transmission channel. The data rate that can be carried by a given communications circuit.

Baud Rate
Transmission rate of data (bits per second) on a network link.

BCLAN (Board Controller Local Area Network)
The internal local area network that provides communications between the line controller circuit pack and board controllers on the circuit packs associated with a high-speed line.

BER (Bit Error Rate)
The ratio of error bits received to the total number of bits transmitted.

Bidirectional Line
A transmission path consisting of two fibers that handle traffic in both the transmit and receive directions.

Bidirectional Ring
A ring in which both directions of traffic between any two nodes travel through the same network elements (although in opposite directions).

Bidirectional Switch
Protection switching performed in both the transmit and receive directions.

BIP-N (Bit Interleaved Parity-N)
A method of error monitoring over a specified number of bits (BIP-3 or BIP-8).

Bit
The smallest unit of information in a computer, with a value of either 0 or 1.

Bit Error Rate Threshold
The point at which an alarm is issued for bit errors.

BLD OUT LG
Build-Out Lightguide

BLSR (Bidirectional Line Switched Ring)
A method of SONET transport in which half of the working network is sent counter-clockwise over one fiber and the other half is sent clockwise over another fiber. BLSR offers bandwidth use advantages for distributed traffic in single-ring architectures.

Bridge Cross-Connection
The setting up of a cross-connection leg with the same input tributary as that of an existing cross-connection leg. Thus, forming a 1:2 bridge from an input tributary to two output tributaries.

Broadband Communications
Voice, data, and/or video communications at greater than 2 Mb/s rates.

Broadband Service Transport
STM-1 concatenation transport over the for ATM applications.

Byte
Refers to a group of eight consecutive binary digits.

C C

Container

CC (Clear Channel)
A digital circuit where no framing or control bits are required, thus making the full bandwidth available for communications.

CC (Cross-Connection)
Path-level connections between input and output tributaries or specific ports within a single NE. Cross-connections are made in a consistent way even though there are various types of ports and various types of port protection. Cross-Connections are reconfigurable interconnections between tributaries of transmission interfaces.

Cell Relay
Fixed length cells. For example, ATM with 53 octets.

CenterLink
A user-friendly, menu-driven web-based browser interface that can be used with the Metropolis™ EON. CenterLink software runs on a Microsoft ***Windows95***™, ***Windows98***™, ***Windows2000***™, ***Windows2000***™, ***WindowsNT***™ compatible personal computer (PC).

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CEPT
Conférence Européenne des Administrations des Postes et des Télécommunications

Channel
A sub-unit of transmission capacity within a defined higher level of transmission capacity.

Circuit
A set of transmission channels through one or more network elements that provides transmission of signals between two points, to support a single communications path.

CIT or CenterLink (Customer Interface Terminal)
The user interface terminal used by craft personnel to communicate with a network element.

CL
Clear

CLEC (Competitive - or Certified - Local Exchange Carrier)

A term coined for the deregulated, competitive telecommunications environment envisioned by the Telecommunications Act of 1996 (see ELEC).

CLEI
Common Language Equipment Identifier

CLF
Channel Loading Factor

Client
Computer in a computer network that generally offers a user interface to a server.

CLLI
Common Language Location Identifier

CLO (Control Link Oscillator)

An IBM® mainframe protocol with a signal rate of 16 Mb/s.

Closed Ring Network
A network formed of a ring-shaped configuration of network elements. Each network element connects to two others, one on each side.

CM (Configuration Management)
A subsystem that configures the network and processes messages from the network.

CM (Customer Maintenance)
An optical signal

CMI
Coded Mark Inversion

CMIP
Common Management Information Protocol. OSI standard protocol for OAM&P information exchange.

CMISE
Common Management Information Service Element

CO (Central Office)
A building where common carriers terminate customer circuits.

Collocated
System elements that are located in the same location.

Command Group
An administrator-defined group that defines commands to which a user has access.

Concatenation
A procedure whereby multiple virtual containers are associated one with each other resulting in a combined capacity that can be used as a single container across which bit sequence integrity is maintained.

Co-Resident
A hardware configuration where two applications can be active at the same time independently on the same hardware and software platform without interfering with each others functioning.

Correlation
A process where related hard failure alarms are identified.

CP
Circuit Pack

CPE
Customer Premises Equipment

CR (Critical)
An alarm that indicates a severe, service-affecting condition.

CRC
Cyclical Redundancy Check

Cross-Connect Map
Connection map for an SDH Network Element; contains information about how signals are connected between high speed time slots and low speed tributaries.

Crosstalk
An unwanted signal introduced into one transmission line from another.

CSMA/CD
Carrier Sense Multiple Access with Collision Detection

CTS
Customer Technical Support within Lucent Technologies

Current Value
The value currently assigned to a provisionable parameter.

Customer Maintenance Signal
A 155-Mb/s optical signal originating from customer supplied equipment and used for customer maintenance activities. It is carried as part of the supervisory signal.

D D1 Video

A video protocol with a signal rate of 270 Mb/s.

DACS/DCS
Digital Access Cross-Connect System

Data
A collection of system parameters and their associated values.

Database Administrator
A user who administers the database of the application.

dB
Decibels

DC
Direct Current

DCC (Data Communications Channel)
The embedded overhead communications channel in the synchronous line, used for end-to-end communications and maintenance. The DCC carries alarm, control, and status information between network elements in a synchronous network.

DCE (Data Communications Equipment)
The equipment that provides signal conversion and coding between the data terminating equipment (DTE) and the line. The DCE may be separate equipment or an integral part of the DTE or of intermediate equipment. A DCE may perform other functions usually performed at the network end of the line.

DCF
Data Communications Function

DCM (Dispersion Compensation Module)
A module that is fibered to an OA to compensate for dispersion of 10G signals over long distances.

DCN
Data Communications Network

Default
An operation or value that the system or application assumes, unless a user makes an explicit choice.

Default Provisioning
The parameter values that are preprogrammed as shipped from the factory.

Defect
A limited interruption of the ability of an item to perform a required function. It may or may not lead to maintenance action depending on the results of additional analysis.

DEMUX (Demultiplexer)
A device that splits a combined signal into individual signals at the receiver end of transmission.

Demultiplexing
A process applied to a multiplexed signal for recovering signals combined within it and for restoring the distinct individual channels of these signals.

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Deprovisioning
The inverse order of provisioning. To manually remove/delete a parameter that has (or parameters that have) previously been provisioned.

Digital Link
A transmission span such as a point-to-point 2 Mb/s, 34 Mb/s, 140 Mb/s, VC12, VC3 or VC4 link between controlled network elements. The channels within a digital link are insignificant.

Digital Multiplexer
Equipment that combines by time-division multiplexing several digital signals into a single composite digital signal.

Digital Section
A transmission span such as an STM-N signal. A digital section may contain multiple digital channels.

Disassembly
Splitting up a signal into its constituents as payload data and overhead (an indication of the direction of a signal).

Dispersion
Time-broadening of a transmitted light pulse.

Dispersion Shifted Optical Fiber
1330/1550 nm minimum dispersion wavelength.

Divergence
When there is unequal amplification of incoming wavelengths, the result is a power divergence between wavelengths.

DMA
Direct Memory Access

DNI (Dual Node Ring Interworking)
A topology in which two rings are interconnected at two nodes on each ring and operate so that inter-ring traffic is not lost in the event of a node or link failure at an interconnecting point.

Doping
The addition of impurities to a substance in order to attain desired properties.

Downstream
At or towards the destination of the considered transmission stream, for example,

looking in the same direction of transmission.

DPLL
Digital Phase Locked Loop

DRAM
Dynamic Random Access Memory

Drop and Continue
A circuit configuration that provides redundant signal appearances at the outputs of two network elements in a ring. Can be used for Dual Node Ring Interworking (DNI) and for video distribution applications.

Drop-Down Menu
A menu that is displayed from a menu bar.

Drop Side Signal
An optical signal suitable for transmission over Metropolis™ EON.

DS3
Digital Signal Level 3 (44.736 Mb/s)

DSNE (Directory Service Network Element)
A designated network element that is responsible for administering a database that maps network element names (TIDs) to NSAP addresses. There must be one and only one DSNE per subnetwork.

DTE (Data Terminating Equipment)
The equipment that originates data for transmission and accepts transmitted data.

DTMF
Dual Tone Multifrequency

Dual
An end terminal configuration that supports east-west transmission.

DUS
Do not Use for Synchronization

DV6000

A video protocol with a signal rate of 2.38 Gb/s.

DWDM (Dense Wavelength Division Multiplexing)
Transmitting two or more signals of different wavelengths simultaneously over a

single fiber.

E

EBER (Excessive Bit Error Rate)
The calculated average bit error rate over a data stream.

EC-1 (Electrical Carrier level-1 signal)
An STS-1 signal that has been shaped and encoded for transmission over electrical media.

ECC
Embedded Control Channel

EEPROM
Electrically Erasable Programmable Read-Only Memory

EIA (Electronic Industries Association)
A trade association of the electronic industry that establishes electrical and functional standards.

ELSBB (Enhanced Low-Speed Broadband)
This usually refers to the ELSBB circuit pack, which can transmit and receive signals with various protocols and with speeds between 16 Mb/s and 1.06 Gb/s.

EMC (Electromagnetic Compatibility)
A measure of equipment tolerance to external electromagnetic fields.

EMDU (External Miscellaneous Discrete Unit)
Connected to the serial telemetry interface of Metropolis® EON to provide an additional set of miscellaneous discrete input and output points.

EMI (Electromagnetic Interference)
High-energy, electrically induced magnetic fields that cause data corruption in cables passing through the fields.

EMS
Element Management System

EMS
Element Management System

End Terminal
Metropolis™ EON equipment that terminates optical line signals. It consists of a collocated optical multiplexer unit (OMU) and optical demultiplexer unit (ODU)

for bidirectional transmission, optical amplifiers (OA), and telemetry packs.

Entity Identifier
The name used by the system to refer to a circuit pack, memory device, or communications link.

EPROM
Erasable Programmable Read-Only Memory

EQ (Equipped)
Status of a circuit pack or interface module that is in the system database and physically in the frame, but not yet provisioned.

ES (Errored Seconds)
A performance monitoring parameter. ES “type A” is a second with exactly one error; ES “type B” is a second with more than one and less than the number of errors in a severely errored second for the given signal. ES by itself means the sum of the type A and type B ESs.

ESCON® (Enterprise System Connection)

An IBM® mainframe protocol with a signal rate of 200 Mb/s.

ESD
Electrostatic Discharge

ESP
Electrostatic Protection

ETR (External Timing Request)

An IBM® mainframe protocol with a signal rate of 16 Mb/s.

ETSI
European Telecommunications Standards Institute

Event
A significant change. Events in controlled Network Elements include signal failures, equipment failures, signals exceeding thresholds, and protection switch activity. When an event occurs in a controlled Network Element, the controlled Network Element will generate an alarm or status message and send it to the management system.

Event Driven
A required characteristic of network element software system: NEs are reactive systems, primarily viewed as systems that wait for and then handle events. Events

are provided by the external interface packages, the hardware resource packages, and also by the software itself.

Externally Timed
An operating condition of a clock in which it is locked to an external reference and is using time constants that are altered to quickly bring the local oscillator's frequency into approximate agreement with the synchronization reference frequency.

Extra traffic
Unprotected traffic that is carried over protection channels when their capacity is not used for the protection of working traffic.

F

Fault
Term used when a circuit pack has a hard (not temporary) fault and cannot perform its normal function.

Fault Management
Collecting, processing, and forwarding of autonomous messages from network elements.

FC-12

A fibre channel with a signal rate of 133 Mb/s.

FC-25

A fibre channel with a signal rate of 266 Mb/s.

FC-50

A fibre channel with a signal rate of 531 Mb/s.

FC-100

A fibre channel with a signal rate of 1.062 Gb/s.

FCC
Federal Communications Commission

FDA/CDRH
The Food and Drug Administration`s Center for Devices and Radiological Health.

FDDI (Fiber Distributed Data Interface)

A fiber interface (having a signal rate of 125 Mb/s) that connects computers and distributes data among them.

FE (Far End)
Any other network element in a maintenance subnetwork other than the one the user is at or working on. Also called remote.

FE ACTY
Far-End Activity.

FEBE (Far-End Block Error)
An indication returned to the transmitting node that an errored block has been detected at the receiving node. A block is a specified grouping of bits.

FEPROM (Flash EPROM)
A technology that combines the nonvolatility of EPROM with the in-circuit reprogrammability of EEPROM (electrically-erasable PROM).

FERF (Far-End Receive Failure)
An indication returned to a transmitting Network Element that the receiving Network Element has detected an incoming section failure. Also known as RDI.

FICONTM (Fiber Connection)

An IBM® mainframe protocol with a signal rate of 1.062 Gb/s.

FIT (Failures in Time)
Circuit pack failure rates per 10^9 hours as calculated using the method described in Reliability Prediction Procedure for Electronic Equipment, BellCore Method I, Issue 5, September 1995.

Folded Rings
Folded (collapsed) rings are rings without fiber diversity. The terminology derives from the image of folding a ring into a linear segment.

Forced
Term used when a circuit pack (either working or protection) has been locked into a service-providing state by user command.

FR (Frame Relay)
A form of packet switching that relies on high-quality phone lines to minimize errors. It is very good at handling high-speed, bursty data over wide area networks. The frames are variable lengths and error checking is done at the end points.

Frame
The smallest block of digital data being transmitted.

Framework
An assembly of equipment units capable of housing shelves, such as a bay framework.

Free Running
An operating condition of a clock in which its local oscillator is not locked to an internal synchronization reference and is using no storage techniques to sustain its accuracy.

G

GB
Gigabytes

Gbit/s
Gigabits per second

GHz
Gigahertz

Global Wait to Restore Time
Corresponds to the time to wait before switching back to the timing reference. It occurs after a timing link failure has cleared. This time applies for all timing sources in a system hence the name global. This can be between 0 and 60 minutes, in increments of one minute.

GNE (Gateway Network Element)
A network element that passes information between other network elements and management systems through a data communication network.

H

Hard Failure
An unrecoverable nonsymptomatic (primary) failure that causes signal impairment or interferes with critical network functions, such as DCC operation.

Hazard Level
Output power level of a Metropolis™ EON system or device that poses safety risks to personnel. For 1550-nm wavelengths, hazard levels are defined as follows: Level 1 £ 10 dBm.

HDB3 (High Density Bipolar 3 Code)
Line code for 2 Mb/s transmission systems.

HDLC (High Level Data Link Control)
OSI reference model datalink layer protocol.

HMI
Human Machine Interface

HML (Human Machine Language)
A standard language developed by the ITU for describing the interaction between humans and dumb terminals.

HO
High Order

Holdover
An operating condition of a clock in which its local oscillator is not locked to an external reference but is using storage techniques to maintain its accuracy with respect to the last known frequency comparison with a synchronization reference.

Hot Standby
A circuit pack ready for fast, automatic placement into operation to replace an active circuit pack. It has the same signal as the service going through it, so that choice is all that is required.

HPA (Higher Order Path Adaptation)
Function that adapts a lower order Virtual Container to a higher order Virtual Container by processing the Tributary Unit pointer which indicates the phase of the lower order Virtual Container Path Overhead relative to the higher order Virtual Container Path Overhead and assembling/disassembling the complete higher order Virtual Container.

HPC (Higher Order Path Connection)
Function that provides for flexible assignment of higher order Virtual Containers within an STM-N signal.

HPT (Higher Order Path Termination)
Function that terminates a higher order path by generating and adding the appropriate Virtual Container Path Overhead to the relevant container at the path source and removing the Virtual Container Path Overhead and reading it at the path sink.

HS
High Speed

HW
Hardware

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Hz (Hertz)
A unit of frequency equal to one cycle per second.

I

IAO LAN
Intraoffice Local Area Network

IAOLRP
Intraoffice Line Relay Pack

ID
Identifier

IEC
International Electro-Technical Commission

IEEE
Institute of Electrical and Electronics Engineers

ILEC (Incumbent Local Exchange Carrier)

The dominant phone carrier within a geographic area as determined by the FCC (see CLEC).

I/O
Input/Output

IMF
Infant Mortality Factor

Insert
To physically insert a circuit pack into a slot, thus causing a system initiated restoral of an entity into service and/or creation of an entity and associated attributes.

Interface Capacity
The total number of STM-1 equivalents (bidirectional) tributaries in all transmission interfaces with which a given transmission interface shelf can be equipped at one time. The interface capacity varies with equipage.

Intermediate System (IS)
A system which routes/relays management information. An SDH Network Element may be a combined intermediate and end system.

IPC
Inter Processor Communications

IR
Intermediate Reach

IS (In-Service)
A memory administrative state for ports. IS refers to a port that is fully monitored and alarmed.

ISC (Inter-System Channel)

An IBM® mainframe protocol with a signal rate of 1.062 Gb/s.

ISC-2

An IBM® mainframe protocol (a newer version of ISC) with a signal rate of 1.062 Gb/s.

ISC-3 at Peer Mode

An IBM® mainframe protocol with a signal rate of 2.13 Gb/s.

ISDN
Integrated Services Digital Network

IS-IS Routing
The Network Elements in a management network, route packets (data) between each other using an IS-IS level protocol. The size of a network running IS-IS Level 1 is limited, and therefore certain mechanisms are employed to facilitate the management of larger networks.

For STATIC ROUTING, the capability exists for disabling the protocol over the LAN connections, effectively causing the management network to be partitioned into separate IS-IS Level 1 areas. In order for the network management system to communicate with a specific Network Element in one of these areas, the network management system must identify through which so-called Gateway Network Element this specific Network Element is connected to the LAN. All packets to this specific Network Element are routed directly to the Gateway Network Element by the network management system, before being re-routed (if necessary) within the Level 1 area.

For DYNAMIC ROUTING an IS-IS Level 2 routing protocol is used allowing a number of Level 1 areas to interwork. The Network Elements which connect an IS-IS area to another area are set to run the IS-IS Level 2 protocol within the Network Element and on the connection between other Network Elements. Packets can now be routed between IS-IS areas and the network management system does not have to identify the Gateway Network Elements.

ITM
Integrated Transport Management

ITM-NM
Integrated Transport Management Network Module

ITU
International Telecommunications Union

ITU-T
International Telecommunications Union — Telecommunication standardization sector. Formerly known as CCITT: Comité Consultatif International Télégrafique & Téléphonique; International Telegraph and Telephone Consultative Committee.

J

Jitter
Short term variations of amplitude and frequency components of a digital signal from their ideal position in time.

K

Kbit/s
Kilobits per second

L

LAN (Local Area Network)
A communications network that covers a limited geographic area, is privately owned and user administered, is mostly used for internal transfer of information within a business, is normally contained within a single building or adjacent group of buildings, and transmits data at a very rapid speed.

LBC
Laser Bias Current

LBFC
Laser Backface Currents

LBO (Lightguide Build-Out)
An attenuating (signal-reducing) element used to keep an optical output signal strength within desired limits.

LCN
Local Communications Network

LED
Light-Emitting Diode

LGX
Lightguide cross-connect panel

LH
Long Haul

Line
A transmission medium, together with the associated equipment, required to provide the means of transporting information between two consecutive network elements. One network element originates the line signal; the other terminates it.

Line Protection
The optical interfaces can be protected by line protection. Line protection switching protects against failures of line facilities, including the interfaces at both ends of a line, the optical fibers, and any equipment between the two ends. Line protection includes protection of equipment failures.

Line Timing
Refers to a network element that derives its timing from an incoming STM-N signal.

Link
The mapping between in-ports and out-ports. It specifies how components are connected to one another.

LO
Low Order

Location
An identifier for a specific circuit pack, interface module, interface port, or communications link.

Lockout State
The Lockout State shall be defined for each working or protection circuit pack. The two permitted states are: None – meaning no lockout is set for the circuit pack, set meaning the circuit pack has been locked out. The values (None & Set) shall be taken independently for each working or protection circuit pack.

LOF (Loss of Frame)
A failure to synchronize to an incoming signal.

LOM
Loss Of Multiframe

Loopback
Type of diagnostic test used to compare an original transmitted signal with the resulting received signal. A loopback is established when the received optical or electrical external transmission signal is sent from a port or tributary input directly back toward the output.

Loop Timing
A special case of line timing. It applies to network elements that have only one OC-N/STM-N interface. For example, terminating nodes in a linear network are loop timed.

LOP (Loss of Pointer)
A failure to extract good data from a signal payload.

LOS (Loss of Signal)
The complete absence of an incoming signal.

Loss Budget
Loss (in dB) of optical power due to the span transmission medium (includes fiber loss and splice losses).

LIRCV
Line Interface Receive circuit pack

LPA (Lower order Path Adaptation)
Function that adapts a PDH signal to a synchronous network by mapping the signal into or de-mapping the signal out of a synchronous container.

LPC (Lower Order Path Connection)
Function that provides for flexible assignment of lower order VCs in a higher order VC.

LPT (Lower Order Path Termination)
Function that terminates a lower order path by generating and adding the appropriate VC POH to the relevant container at the path source and removing the VC POH and reading it at the path sink.

LS
Low Speed

LSBB

Low-speed broadband. This usually refers to the LSBB circuit pack, which can transmit and receive signals with various protocols and with speeds between 16 and 750 Mb/s.

LTE
Line Terminating Equipment

LWS
Lucent Worldwide Services

M

µ
Microns

µm
Micrometer

MAF
Management Application Function

Maintenance Condition
An equipment state in which some normal service functions are suspended, either because of a problem or to perform special functions (copy memory) that can not be performed while normal service is being provided.

Management Connection
Identifies the type of routing used (STATIC or DYNAMIC); selecting STATIC allows the gateway network element to be identified.

Manager
Capable of issuing network management operations and receiving events. The manager communicates with the agent in the controlled network element.

Manual Switch State
A protection group shall enter the Manual Switch State upon the initiation and successful completion of the Manual Switch command. The protection group leaves the Manual Switch state by means of the Clear or Forced Switch commands. While in the Manual Switch state the system may switch the active unit automatically if required for protection switching.

Mapping
The logical association of one set of values, such as addresses on one network, with quantities or values of another set, such as devices or addresses on another network.

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MB
Megabytes

Mbit/s
Megabits per second

MCF (Message Communications Function)
Function that provides facilities for the transport and routing of Telecommunications Management Network messages to and from the Network Manager.

MD (Mediation Device)
Allows for exchange of management information between Operations System and Network Elements.

MDI
Miscellaneous Discrete Input

MDO
Miscellaneous Discrete Output

MEC (Manufacturer Executable Code)
Network Element system software in binary format that after being downloaded to one of the stores can be executed by the system controller of the network element.

MEM
Memory

Mid-Span Meet
The capability to interface between two lightwave network elements of different vendors. This applies to high-speed optical interfaces.

MIPS
Millions of Instructions Per Second

Miscellaneous Discrete Interface
Allows an operations system to control and monitor equipment collocated within a set of input and output contact closures.

MJ (Major (alarm)
Indicates a service-affecting failure, main or unit controller failure, or power supply failure.

MMI
Man-Machine Interface

MML
Human-Machine Language

MN (Minor alarm)
Indicates a non-service-affecting failure of equipment or facility.

MO
Managed Object

MS
Multiplexer Section

ms
Millisecond

MSOH (Multiplexer Section OverHead)
Part of the Section Overhead. Is accessible only at line terminals and multiplexers.

MSP (Multiplexer Section Protection)
Provides capability for switching a signal from a working to a protection section.

MS-SPRING (Multiplexer Section Shared Protection Ring)
A protection method used in Add-Drop Multiplexer Network Elements.

MST (Multiplexer Section Termination)
Function that generates the Multiplexer Section OverHead in the transmit direction and terminates the part of the Multiplexer Section overhead that is acceptable in the receive direction.

MTBF
Mean Time Between Failures

MTBMA
Mean Time Between Maintenance Activities

MTIE
Maximum Time Interval Error

MTPI
Multiplexer Timing Physical Interface

MTS (Multiplexer Timing Source)
Function that provides timing reference to the relevant component parts of the multiplex equipment and represents the SDH Network Element clock.

MTTR
Mean Time To Repair

Multiplexer
A device (circuit pack) that combines two or more transmission signals into a combined signal on a shared medium.

Multiplexing
A procedure by which multiple lower order path layer signals are adapted into a higher order path, or the multiple higher order path layer signals are adapted into a multiplex section.

N

NA
Not Applicable

NE (Network Element)
A node in a telecommunication network that supports network transport services and is directly manageable by a management system.

NE ACTY
Near-End Activity

NMA
Network Monitoring and Analysis System

NEBS
Network Equipment-Building System

nm
Nanometer (10^{-9} meters)

NMON (Not Monitored)
A provisioning state for equipment that is not monitored or alarmed.

NMS
Network Management System

Node
A network element in a ring or, more generally, in any type of network. In a

network element supporting interfaces to more than one ring, node refers to an interface that is in a particular ring. Node is also defined as all equipment that is controlled by one system controller. A node is not always directly manageable by a management system.

Non-Revertive Switching
In non-revertive switching, an active and stand-by line exist on the network. When a protection switch occurs, the standby line is selected to support traffic, thereby becoming the active line. The original active line then becomes the stand-by line. This status remains in effect even when the fault clears. That is, there is no automatic switch back to the original status.

Non-Synchronous
The essential characteristic of time-scales or signals such that their corresponding significant instants do not necessarily occur at the same average rate.

No Request State
This is the routine-operation quiet state in which no external command activities are occurring.

NORM
Normal

NPI
Null Pointer Indication

NPPA (Non-Preemptible Protection Access)
Non-preemptible protection access increases the available span capacity for traffic which does not require protection by a ring, but which cannot be preempted.

NRZ
Nonreturn to Zero

NSA
Non-Service Affecting

NSAP Address (Network Service Access Point Address)
Used in the OSI network layer 3). An automatically assigned number that uniquely identifies a Network Element for the purposes of routing DCC messages.

NVM (Non-Volatile Memory)
Memory that retains its stored data after power has been removed. An example of NVM would be a hard disk.

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O

O&M
Operation and Maintenance

OA (Optical Amplifier)
A device that amplifies an optical signal without converting the signal from optical to electrical, then back again to optical energy.

OADM Office (Optical Add/Drop Multiplex Office)
A Metropolis® EON dual terminal shelf or two colocated end terminal shelves with pass-through wavelengths.

OALAN (Overhead Access Local Area Network)
The internal local area network that provides communications between the system controller circuit pack and the overhead controller circuit pack.

OAM&P
Operations, Administration, Maintenance, and Provisioning

OC, OC-n
Optical Carrier

OC-3
Optical Carrier, Level 3 Signal (155 Mbit/s)

OC-12
Optical Carrier, Level 12 Signal (622.08 Mbit/s)

OC-48
Optical Carrier, Level 48 (2488.32 Mb/s) (2.5 Gbit/s)

OC-192
Optical Carrier, Level 192 (9953.28 Mb/s) (10 Gbit/s)

OCh10G

An optical channel for overhead in a DWDM system - signal rate is 10.664 Gb/s.

OCHAN
Optical Channel

ODU (Optical Demultiplexer Unit)
A type of circuit pack that demultiplexes the input optical signal into a maximum of 16 wavelengths.

OI (Operations Interworking)
The capability to access, operate, provision, and administer remote systems through craft interface access from any site in a SDH network or from a centralized operations system.

OLINE
Optical Line

OMU (Optical Multiplexer Unit)
A type of circuit pack that combines up to 16 optical wavelengths into one signal called the optical line signal.

OOF
Out-of-Frame

OOS (Out-of-Service)
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.

Open Ring Network
A network formed of a linear chain-shaped configuration of network elements. Each network element connects to two others, one on each side, except for two network elements at the ends which are connected on only one side. A closed ring can be formed by adding a connection between the two end nodes.

Operations Interface
Any interface providing you with information on the system behavior or control. These include the equipment LEDs, user panel, CenterLink CIT, office alarms, and all telemetry interfaces.

Operator
A user of the system with operator-level user privileges.

Optical Line Signal
A multiplexed optical signal containing multiple wavelengths or channels.

Optical Section
See "Span."

Orderwire
A section of the supervisory signal that is used for communication between sites.

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Original Value Provisioning
Preprogramming of a system's original values at the factory. These values can be overridden using local or remote provisioning.

OS (Operations System)
A central computer-based system used to provide operations, administration, and maintenance functions.

OSF
Open Software Foundation Operations System Function

OSI (Open Systems Interconnection)
Referring to the OSI reference model, a logical structure for network operations standardized by the International Standards Organization (ISO).

OTU (Optical Translator Unit)
A circuit pack that regenerates an OC-48/STM-16 optical signal by converting the signal from an optical to an electrical format then converting the signal back into an optical signal that is compatible with Metropolis™ EON.

OTPM (Optical Translator Port Module)
Similar to the OTU (see "OTU"), except it is half the size.

OTPS
Optical Translator Port Signal

OUPSR (Optical Unidirectional Path Switched Ring)
A protection scheme where an OUPSR circuit pack (at the entrance of the DWDM ring) splits a single wavelength into two equal signals, sends one in each direction around the DWDM ring, then (at the exit of the DWDM) selects an acceptable signal from the two available.

Outage
A disruption of service that lasts for more than 1 second.

OW (Orderwire)
A dedicated voice-grade line for communications between maintenance and repair personnel.

P

Parallel Telemetry
A set of alarms and status information reported to an operations center.

Parameter
A variable that is given a value for a specified application. A constant, variable, or expression that is used to pass values between components.

Parity Check
Tests whether the number of ones (or zeros) in an array of binary bits is odd or even; used to determine that the received signal is the same as the transmitted signal.

Pass-Through
Paths that are cross-connected directly across an intermediate node in a network.

Path
A logical connection between the point at which a standard frame format for the signal at the given rate is assembled, and the point at which the standard frame format for the signal is disassembled.

Path Terminating Equipment
Network elements in which the path overhead is terminated.

PCB
Printed Circuit Board

PCM
Pulse Code Modulation

PDH
Plesiochronous Digital Hierarchy

PI
Physical Interface

Platform
A family of equipment and software configurations designed to support a particular application.

Plesiochronous Network
A network that contains multiple subnetworks, each internally synchronous and all operating at the same nominal frequency, but whose timing may be slightly different at any particular instant.

PM (Performance Monitoring)
Measures the quality of service and identifies degrading or marginally operating systems (before an alarm would be generated).

PMD (Polarization Mode Dispersion)
Output pulse broadening due to random coupling of the two polarization modes in an optical fiber.

POH (Path Overhead)
Informational bytes assigned to, and transported with the payload until the payload is demultiplexed. It provides for integrity of communication between the point of assembly of a virtual container and its point of disassembly.

Pointer
An indicator whose value defines the frame offset of a virtual container with respect to the frame reference of the transport entity on which it is supported.

POP
Point of Presence

Port (also called Line)
The physical interface, consisting of both an input and output, where an electrical or optical transmission interface is connected to the system and may be used to carry traffic between network elements. The words “port” and “line” may often be used synonymously. “Port” emphasizes the physical interface, and “line” emphasizes the interconnection. Either may be used to identify the signal being carried.

Port State Provisioning
A feature that allows a user to suppress alarm reporting and performance monitoring during provisioning by supporting multiple states (automatic, in-service, and not monitored) for low-speed ports.

POTS
Plain Old Telephone Service

PP
Pointer Processing

PRC (Primary Reference Clock)
The main timing clock reference in SDH equipment.

Preprovisioning
The process by which the user specifies parameter values for an entity in advance of some of the equipment being present. These parameters are maintained only in NVM. These modifications are initiated locally or remotely by either a CIT or an OS. Preprovisioning provides for the decoupling of manual intervention tasks (for example, install circuit packs) from those tasks associated with configuring the

node to provide services (for example, specifying the entities to be cross-connected).

PRI
Primary

Proactive Maintenance
Refers to the process of detecting degrading conditions not severe enough to initiate protection switching or alarming, but indicative of an impending signal fail or signal degrade defect.

Protection Access
To provision traffic to be carried by protection tributaries when the port tributaries are not being used to carry the protected working traffic.

Protection Group Configuration
The members of a group and their roles, for example, working protection, line number, etc.

Protection Path
One of two signals entering a path selector used for path protection switching or dual ring interworking. The other is the working path. The designations working and protection are provisioned by the user, whereas the terms active path and standby path indicate the current protection state.

Protection State
When the working unit is currently considered active by the system and that it is carrying traffic. The “active unit state” specifically refers to the receive direction of operation — since protection switching is unidirectional.

Protection Switching
The switching of traffic from a malfunctioning line/channel to one that is working.

PROTN (Protection)
Extra capacity (channels, circuit packs) in transmission equipment that is not intended to be used for service, but rather to serve as backup against equipment failures.

PROV (Provisioned)
Indicating that a circuit pack is ready to perform its intended function. A provisioned circuit pack can be active (ACT), in-service (IS), standby (STBY), provisioned out-of-service (POS), or out-of-service (OOS).

Provisioning
Assigning a value to a system parameter.

PSDN
Public Switched Data Network

PSTN
Public Switched Telephone Network

PTE
Path Terminating Equipment

PVC
Permanent Virtual Circuit

PWR
Power

PWR ON
Power On

Q

Q-LAN
Thin Ethernet LAN which connects the manager to Gateway Network Elements so that management information between Network Elements and management systems can be exchanged.

QL (Quality Level)
The quality of the timing signal(s) provided to clock a Network Element. The level is provided by the Synchronization Status Marker which can accompany the timing signal. If the System and Output Timing Quality Level mode is “Enabled”, and if the signal selected for the Station Clock Output has a quality level below the Acceptance Quality Level, the Network Element “squelches” the Station Clock Output Signal, which means that no signal is forwarded at all.

Possible levels are:

- PRC (Primary Reference Clock)
- SSU_T (Synchronization Supply Unit - Transit)
- SSU_L (Synchronization Supply Unit - Local)
- SEC (SDH Equipment Clock)
- DUS (Do not Use for Synchronization)

QOS
Quality of Service

QOTU
Quad Optical Translator Unit

R **RAC**
Rack connection panel

RAM
Random Access Memory

RCV
Receive

RDI (Remote Defect Indication)
An indication returned to a transmitting terminal that the receiving terminal has detected an incoming section failure. [Previously called far-end-receive failure (FERF).]

Reactive Maintenance
Refers to detecting defects/failures and clearing them.

Receive-Direction
The direction towards the Network Element.

Regeneration
The process of reconstructing a digital signal to eliminate the effects of noise and distortion.

Regenerator Loop
Loop in a Network Element between the Station Clock Output(s) and one or both Station Clock Inputs, which can be used to dejitterize the selected timing reference in network applications.

Regenerator Section Termination (RST)
Function that generates the Regenerator Section Overhead (RSOH) in the transmit direction and terminates the RSOH in the receive direction.

Reliability
The ability of a software system performing its required functions under stated conditions for a stated period of time. The probability for an equipment to fulfill its function. Some of the ways in which reliability is measured are: MTBF (Mean

Time Between Failures) expressed in hours; Availability = (MTBF)/(MTBF+MTTR)(%) [where MTTR = mean time to restore]; outage in minutes per year; failures per hour; percentage of failures per 1,000 hours.

Remote Network Element

Any Network Element that is connected to the referenced Network Element through either an electrical or optical link. It may be the adjacent node on a ring, or N nodes away from the reference. It also may be at the same physical location but is usually at another (remote) site.

Repeater Terminal

In Metropolis™ EON, a bidirectional terminal consisting of a pair of optical amplifiers and the corresponding telemetry packs.

Restore Timer

Counts down the time (in minutes) during which the switch waits to let the worker line recover before switching back to it. This option can be set to prevent the protection switch continually switching if a line has a continual transient fault. This field is grayed out if the mode is non-revertive.

Revertive

A protection switching mode in which, after a protection switch occurs, the equipment returns to the nominal configuration (that is, the working equipment is active, and the protection equipment is standby) after any failure conditions that caused a protection switch to occur, clear, or after any external switch commands are reset. (See “Non-Revertive”.)

Revertive Switching

In revertive switching, there is a working and protection high-speed line, circuit pack, etc. When a protection switch occurs, the protection line, circuit pack, etc. is selected. When the fault clears, service “reverts” to the working line.

Ring

A configuration of nodes comprised of network elements connected in a circular fashion. Under normal conditions, each node is interconnected with its neighbor and includes capacity for transmission in either direction between adjacent nodes. Path switched rings use a head-end bridge and tail-end switch. Line switched rings actively reroute traffic over the protection capacity.

Route

A series of contiguous digital sections.

Router
An interface between two networks. While routers are like bridges, they work differently. Routers provide more functionality than bridges. For example, they can find the best route between any two networks, even if there are several different networks in between. Routers also provide network management capabilities such as load balancing, partitioning of the network, and trouble-shooting.

RPP
Reliability Prediction Procedure

RSOH
Regenerator Section OverHead; part of SOH

RST
Regenerator Section Termination

RT
Remote Terminal

RTRV
Retrieve

RZ (Return to Zero)
A code form having two information states (termed zero and one) and having a third state or an at-rest condition to which the signal returns during each period.

S

SA
Service Affecting

SA
Section Adaptation

SD
Signal Degrade

SDH (Synchronous Digital Hierarchy)
A hierarchical set of digital transport structures, standardized for the transport of suitable adapted payloads over transmission networks.

SDS
Standard Directory Service based on ANSI recommendation T1.245

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SEC
Secondary

SEC
SDH Equipment Clock

Section
The portion of a transmission facility, including terminating points, between a terminal network element and a line-terminating network element, or two line-terminating network elements.

Section Adaptation
Function that processes the AU-pointer to indicate the phase of the VC-3/4 POH relative to the STM-N SOH and assembles/disassembles the complete STM-N frame.

Self-Healing
A network's ability to automatically recover from the failure of one or more of its components.

SEMF (Synchronous Equipment Management Function)
Function that converts performance data and implementation specific hardware alarms into object-oriented messages for transmission over the DCC and/or Q-interface. It also converts object-oriented messages related to other management functions for passing across the S reference points.

Server
Computer in a computer network that performs dedicated main tasks which generally require sufficient performance.

Service
The operational mode of a physical entity that indicates that the entity is providing service. This designation will change with each switch action.

SES (Severely Errored Seconds)
This performance monitoring parameter is a second in which a signal failure occurs, or more than a preset amount of coding violations (dependent on the type of signal) occurs.

SH
Short Haul

Short Reach
The capability to concatenate up to three spans between end terminals before

regeneration is required.

Single-Ended Operations
Provides operations support from a single location to remote Network Elements in the same SDH subnetwork. With this capability you can perform operations, administration, maintenance, and provisioning on a centralized basis. The remote Network Elements can be those that are specified for the current release.

Site Address
The unique address for a Network Element.

Slot
A physical position in a shelf designed for holding a circuit pack and connecting it to the backplane. This term is also used loosely to refer to the collection of ports or tributaries connected to a physical circuit pack placed in a slot.

SM (Single-Mode Fiber)
An 8-m diameter low-loss, long-span optical fiber typically operating at either 1310 nm, 1550 nm, or both.

SmartManual
Available from the CenterLink launch console screen, the SmartManual provides assistance in determining LBO values.

SMN
SDH Management Network

SNC/I
SubNetwork Connection (protection) / Inherent monitoring

SNC/N
SubNetwork Connection (protection) / Non-Intrusive Monitoring

SNR (Signal-to-Noise Ratio)
The relative strength of signal compared to noise.

Software Backup
The process of saving an image of the current network element's databases, which are contained in its NVM, to a remote location. The remote location could be the CenterLink CIT or an OS.

Software Download
The process of transferring a generic (full or partial) or provisioned database from a remote entity to the target network element's memory. The remote entity may be

the CenterLink CIT or an OS. The download procedure uses bulk transfer to move an uninterpreted binary file into the network element.

Software ID
Number that provides the software version information for the system.

SOH (Section Overhead)
Capacity added to either an AU-4 or assembly of AU-3s to create an STM-1. Contains always STM-1 framing and optionally maintenance and operational functions. SOH can be subdivided in MSOH (multiplex section overhead) and RSOH (regenerator section overhead).

SONET (Synchronous Optical NETwork)
The North American standard for the rates and formats that defines optical signals and their constituents.

Span
An uninterrupted bidirectional fiber section between two network elements.

Span Growth
A type of growth in which one wavelength is added to all lines before the next wavelength is added.

Span Loss
Loss (in dB) of optical power due to the span transmission medium (includes fiber loss and splice losses).

SPE
Synchronous Payload Envelope

SPI
SDH Physical Interface

Squelch Map
This map contains information for each cross-connection in a ring and indicates the source and destination nodes for the low-speed circuit that is part of the cross-connection. This information is used to prevent traffic misconnection in rings with isolated nodes or segments.

SSM
Synchronization Status Marker

SSMF
Standard Single-Mode Fiber

SSU_L
Synchronization Supply Unit — Local

SSU_T
Synchronization Supply Unit — Transit

Standby Path
One of two signals entering a constituent path selector, the standby path is the path not currently being selected.

State
The state of a circuit pack indicates whether it is defective or normal (ready for normal use).

Station Clock Input
An external clock may be connected to a Station Clock Input.

Status
The indication of a short-term change in the system.

STBY (Standby)
The circuit pack is in service but is not providing service functions. It is ready to be used to replace a similar circuit pack either by protection or by duplex switching.

STM
Synchronous Transport Module (SDH)

STM-N (Synchronous Transport Module, Level N)
A building block information structure that supports SDH section layer connections, where N represents a multiple of 155.52 Mb/s. Normally N=1, 4, 16, or 64.

STS
Synchronous Transport Signal (SONET)

Subnetwork
A group of interconnected/interrelated Network Elements. The most common connotation is a synchronous network in which the Network Elements have data communications channel (DCC) connectivity.

Supervisor
A user of the application with supervisor user privileges.

Suppression
A process where service-affecting alarms that have been identified as an “effect” are not displayed to a user.

SYNC
Synchronizer

Synchronization Messaging
Synchronization messaging is used to communicate the quality of network timing, internal timing status, and timing states throughout a subnetwork.

Synchronous
The essential characteristic of time scales or signals such that their corresponding significant instances occur at precisely the same average rate, generally traceable to a single Stratum-1 source.

Synchronous Network
The synchronization of transmission systems with synchronous payloads to a master (network) clock that can be traced to a reference clock.

Synchronous Payload
Payloads that can be derived from a network transmission signal by removing integral numbers of bits from every frame. Therefore, no variable bit-stuffing rate adjustments are required to fit the payload in the transmission signal.

SYSCTL
The system controller circuit pack that provides overall administrative control of the terminal.

SYSMEM
The system memory circuit pack that, in conjunction with the SYSCTL circuit pack, maintains a provisioning map of the entire system.

System Administrator
A user of the computer system on which the system’s OS software application can be installed.

T

TARP
Target Identifiers Address Resolution Protocol

TBD
To Be Determined

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.

TDM (Time Division Multiplexing)
A technique for transmitting a number of separate data, voice, and/or video signals simultaneously over one communications medium by interleaving a portion of each signal one after another.

Telemetry Feedthrough
Operations capability for 4-fiber applications which allows the DCC to go from one end terminal (one subnetwork) through to the other collocated end terminal (separate subnetwork), thereby extending Metropolis™ EON operations domain.

Through (or Continue) Cross-Connection
A cross-connection within a ring, where the input and output tributaries have the same tributary number but are in lines opposite each other.

Through Timing
Refers to a network element that derives its transmit timing in the east direction from a received line signal in the east direction and its transmit timing in the west direction from a received line signal in the west direction.

THz
Terrahertz (10^{12} Hz)

TID (Target Identifier)
A provisionable parameter that is used to identify a particular Network Element within a network. It is a character string of up to 20 characters where the characters are letters, digits, or hyphens (-).

TL1 (Transaction Language 1)
A machine-to-machine communications language that is a subset of ITU's human-machine language.

TLM (Telemetry) Circuit Pack
The circuit pack that carries the Supervisory signal.

TMN
Telecommunications Management Network

TOPR
Total Optical Power Received

TR
Technical Requirement

Transmit-Direction
The direction outwards from the Network Element.

Tributary
A signal of a specific rate (2 Mb/s, 34 Mb/s, 140 Mb/s, VC12, VC3, VC4, STM-1 or STM-4) that may be added to or dropped from a line signal.

Tributary
A path-level unit of bandwidth within a port, or the constituent signal(s) being carried in this unit of bandwidth, for example, an STM-1 tributary within an STM-N port.

Tributary Unit Pointer
Indicates the phase alignment of the VC with respect to the TU in which it resides. The pointer position is fixed with respect to the TU frame.

True Wave™ Optical Fiber
Lucent Technologies' fiber generally called non-zero dispersion-shift fiber, with a controlled amount of chromatic dispersion designed for amplified systems in the 1550/1310 nm range.

TSA (Time Slot Assignment)
A capability that allows any tributary in a ring to be cross-connected to any tributary in any lower-rate, non-ring interface or to the same-numbered tributary in the opposite side of the ring.

TSI (Time Slot Interchange)
The ability of the user to assign cross-connections between any tributaries of any lines within a Network Element. Three types of TSI can be defined: Hairpin TSI, Inter-ring TSI (between rings), and Intra-ring TSI (within rings).

TSO
Technical Support Organization

T-TD (TL1 Translation Device)
Technical Support Organization

TTP
Trail Termination Point

TU (Tributary Unit)
An information structure which provides adaptation between the lower order path layer and the higher path layer. Consists of a VC-n plus a tributary unit pointer TU PTR.

TUG
Tributary Unit Group

Two-Way Point-to-Point Cross-Connection
A two-legged interconnection, that supports two-way transmission, between two and only two tributaries.

Two-Way Roll
The operation which moves a two-way cross-connection between tributary i and tributary j to a two-way cross-connection between the same tributary i and a new tributary k with a single user command.

U

UAS (Unavailable Seconds)
In performance monitoring, the count of seconds in which a signal is declared failed or in which 10 consecutively severely errored seconds (SES) occurred, until the time when 10 consecutive non-SES occur.

UBB (Universal Broadband)
This usually refers to the UBB circuit pack, which can transmit and receive signals with various protocols and with speeds between 16 Mb/s and 2.5 Gb/s.

UITS
Unacknowledged Information Transfer Service. Unconfirmed mode of LAPD operation.

UNEQ
Path Unequipped

UPSR (Unidirectional Path Switched Ring)
A SONET protection scheme where the original signal is split into two equal signals, one is sent in each direction around the SONET ring, then (at the exit of the ring) an acceptable signal is selected from the two available.

Upstream
At or towards the source of the considered transmission stream, for example, looking in the opposite direction of transmission.

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User Privilege
Permissions a user must perform on the computer system on which the system software runs.

UTC (Universal Coordinated Time)
A time-zone independent indication of an event. The local time can be calculated from the Universal Coordinated Time.

V

V
Volts

VAC
Volts Alternating Current

Value
A number, text string, or other menu selection associated with a parameter.

Variable
An item of data named by an identifier. Each variable has a type, such as int or Object, and a scope.

VC (Virtual Container)
Container with path overhead.

VDC
Volts Direct Current

VF
Voice frequency

Virtual
Refers to artificial objects created by a computer to help the system control shared resources.

Virtual Circuit
A logical connection through a data communication (for example, X.25) network.

Voice Frequency (VF) Circuit
A 64 kilobit per second digitized signal.

Volatile Memory
Type of memory that is lost if electrical power is interrupted.

WAD
Wavelength Add/Drop

WAN (Wide Area Network)
A communication network that uses common-carrier provided lines and covers an extended geographical area.

Wander
Long term variations of amplitude frequency components (below 10 Hz) of a digital signal from their ideal position in time possibly resulting in buffer problems at a receiver.

Wavelength Blocking
At a WAD site with branching, if a wavelength goes express between two co-located end terminals, that wavelength can only be added or dropped at the third co-located end terminal. Wavelength interchange permits the wavelength on the their end terminal to be converted into an available wavelength at the other two end terminals.

Wavelength Interchange
The ability to change the wavelength associated with an STM-N signal into another wavelength.

WDCS
Wideband Digital Cross-Connect System

WDM (Wavelength Division Multiplexing)
A means of increasing the information-carrying capacity of an optical fiber by simultaneously transmitting signals at different wavelengths.

Wideband Communications
Voice, data, and/or video communication at digital rates from 64 kb/s to 2 Mb/s.

Working
Label attached to a physical entity. In case of revertive switching the working line or unit is the entity that is carrying service under normal operation. In case of nonrevertive switching the label has no particular meaning.

Working State
The working unit is currently considered active by the system and that it is carrying traffic.

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WRT (Wait to Restore Time)
Corresponds to the time to wait before switching back after a failure has cleared, in a revertive protection scheme. This can be between 0 and 15 minutes, in increments of one minute.

WS
Work Station

WTR (Wait to Restore)
Applies to revertive switching operation. The protection group enters the WTR state when all Equipment Fail (EF) conditions are cleared, but the system has not yet reverted back to its working line. The protection group remains in the WTR state until the Wait-to-Restore timer completes the WTR time interval.

X

X.25
An ITU standard defining the connection between a terminal and a public packet-switched network

X.25 Interface/Protocol
The ITU packet-switched interface standard for terminal access that specifies three protocol layers: physical, link, and packet for connection to a packet-switched data network.

Z

Zero Code Suppression
A technique used to reduce the number of consecutive zeros in a line-coded signal (B3ZS, B8ZS).

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