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Nortel

Optical Metro 5100/5200

Software and User Interface

Standard   Release 8.0   Issue 1   April 2005

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About this document

This document describes the software and user interface that is used to commission and manage the Nortel Optical Metro 5100/5200 (identified prior to Release 7 as Nortel Networks OPTera Metro 5000-series Multiservice Platform).

This document contains the following information:

- overview of the Optical Metro 5100/5200 System Manager
- description of fault sectionalization
- description of performance monitoring
- description of optical path protection switching
- description of SNMP surveillance MIB
- description of software features
- System Manager windows and fields

Audience for this document

This document is intended for the following audience:

- strategic and current planners
- provisioners

Optical Metro 5100/5200 library

The Optical Metro 5100/5200 library consists of the *Nortel Optical Metro 5100/5200 Technical Publications*, NT0H65AM.

Technical Publications

The Optical Metro 5100/5200 Nortel Technical Publications (NTP) consist of descriptive information and procedures.

Descriptive information
These NTPs provide detailed descriptive information about the Optical Metro 5100/5200 , including system software and hardware descriptions, technical specifications, ordering information, and TL1 user information.

Procedures
These NTPs contain all procedures required to install, provision, and maintain the Optical Metro 5100/5200.

The following roadmap lists the documents in the Optical Metro 5100/5200 library.

OM2805p

Planning a Network	Installing, Commissioning and Testing a Network	Managing, Provisioning and Testing a Network	Maintaining and Troubleshooting a Network
About the NTP Library (323-1701-090)	Installing Optical Metro 5200 Shelves and Components, Part 1 (323-1701-201)	Provisioning and Operating Procedures Part 1 (323-1701-310)	Trouble Clearing and Alarm Reference Guide, Part 1 (323-1701-542)
Network Planning and Link Engineering Part 1 (323-1701-110)	Installing Optical Metro 5200 Shelves and Components, Part 2 (323-1701-201)	Provisioning and Operating Procedures Part 2 (323-1701-310)	Trouble Clearing and Alarm Reference Guide, Part 2 (323-1701-542)
Network Planning and Link Engineering Part 2 (323-1701-110)	Installing Optical Metro 5100 Shelves and Components, Part 1 (323-1701-210)	Customer Acceptance Testing Procedures (323-1701-330)	Trouble Clearing and Alarm Reference Guide, Part 3 (323-1701-542)
Network Planning and Link Engineering Part 3 (323-1701-110)	Installing Optical Metro 5100 Shelves and Components, Part 2 (323-1701-210)	TL1 Interface, Part 1 (323-1701-190)	Trouble Clearing and Alarm Reference Guide, Part 4 (323-1701-542)
Software and User Interface (323-1701-101)	Commissioning Procedures (323-1701-220)	TL1 Interface, Part 2 (323-1701-190)	Maintenance and Replacement Procedures (323-1701-546)
Hardware Description Part 1 (323-1701-102)	Connection Procedures Part 1 (323-1701-221)	TL1 Interface, Part 3 (323-1701-190)	
Hardware Description Part 2 (323-1701-102)	Connection Procedures Part 2 (323-1701-221)	TL1 Interface, Part 4 (323-1701-190)	
Technical Specifications (323-1701-180)	Testing and Equalization Procedures (323-1701-222)		

Technical assistance service telephone numbers

For technical support and information from Nortel Networks, refer to the following table.

Technical Assistance Service	
For service-affecting problems: For 24-hour emergency recovery or software upgrade support, that is, for: • restoration of service for equipment that has been carrying traffic and is out of service • issues that prevent traffic protection switching • issues that prevent completion of software upgrades	**North America:** 1-800-4NORTEL (1-800-466-7835) **International:** 001-919-992-8300
For non-service-affecting problems: For 24-hour support on issues requiring immediate support or for 14-hour support (8 a.m. to 10 p.m. EST) on upgrade notification and non-urgent issues.	**North America:** 1-800-4NORTEL (1-800-466-7835) *Note:* You require an express routing code (ERC). To determine the ERC, see our corporate Web site at www.nortel.com. Click on the Express Routing Codes link. **International:** Varies according to country. For a list of telephone numbers, see our corporate Web site at www.nortel.com. Click on the Contact Us link.
Global software upgrade support:	**North America:** 1-800-4NORTEL (1-800-466-7835) **International:** Varies according to country. For a list of telephone numbers, see our corporate Web site at www.nortel.com. Click on the Contact Us link.

System Manager

In this chapter

Commissioning Wizard overview

The Commissioning Wizard is the Optical Metro 5100/5200 software tool for commissioning shelves and configuring the System Manager for your network.

The Commissioning Wizard starts up automatically the first time that you log into a network after installing the Optical Metro 5100/5200 software on the System Manager computer. Each window prompts you for all required management information.

All data that you first enter in the Commissioning Wizard can be modified later in the Optical Metro 5100/5200 System Manager.

You must be an Admin level user to use the Commissioning Wizard.

You can perform the following functions through the Commissioning Wizard:

- network, site, and shelf naming
- shelf addressing
- shelf surveillance
- date and time configuration

Network, site, and shelf names

The System Manager uses the name information that you enter in the Commissioning Wizard to identify shelf information that appears on System Manager screens.

Note: If you are using Optical Network Manager OMEA to manage Optical Metro 5100/5200 network elements, you must keep the NE name to a maximum of 20 characters.

Shelf addressing

The System Manager uses Internet Protocol (IP) addressing for network monitoring and maintenance connections. Use the commissioning wizard to initially configure the IP addressing and network surveillance information for each shelf in the network.

You must develop a detailed IP addressing plan before you begin commissioning the network.

Shelf surveillance

You can use the Commissioning Wizard to enable or disable audible alarms and to configure external trap managers.

Note: Alarm and event monitoring is performed through the System Manager after the shelf has been commissioned.

Date and time configuration

Each Optical Metro 5100/5200 shelf has a Time of Day (TOD) clock that, by default, uses Greenwich Mean Time (GMT). For every network configuration, one shelf is designated as the primary shelf. The other shelves in the ring periodically synchronize their TOD clocks with the primary shelf using the Simple Network Time Protocol (SNTP).

When an event occurs on a shelf the event is time stamped using the TOD clock of the shelf. Events can include alarm raise or clear, protection switching, and user login or logout. The shelf uses the time stamp internally and for communications with the System Manager. When the System Manager displays events to the user, the time stamp is converted to local time. The local time is adjusted for daylight saving time (DST) and the time zone, using the local time of the computer that is running the System Manager.

For more information, refer to "Appendix—System Manager windows and fields", Time stamp rules, in this book.

System Manager overview

The Optical Metro 5100/5200 System Manager is a Web-based graphical user interface (GUI) that allows you to access one or more shelves in an Optical Metro 5100/5200 network. Use the System Manager to provision, monitor, and maintain the network.

You can perform the following functions through the System Manager:

- equipment and facility configuration
- alarm management
- connections management
- protection management
- software download and upgrade
- performance monitoring
- login, security, and user administration
- troubleshooting
- shelf level graphics

Equipment and facility configuration

The System Manager lets you configure inventory and facility information. Information that you can configure includes the circuit pack type, administrative state, facility name, and loopback. You can view manufacturing information about the circuit pack but you cannot change it.

Apart from circuit packs, which are equipped in the Optical Metro 5100/5200 shelves, the following optical components can also be inventoried by the System Manager:

- all OMX types
- all ECT types, PBE types, and C&L splitter/coupler
- OSC splitter/coupler
- 1310 splitter/coupler
- transponder protection tray
- discrete VOA
- equipment inventory unit (EIU)

These optical components can be inventoried provided they are directly connected to the shelf's OMX Interface cards located in the shelf's maintenance panel using data communication cables or are connected to the EIU which is connected to the maintenance panel.

Alarm management

Use the System Manager to view active alarms and acknowledge new alarms. The System Manager lets you save and print the alarms list, and get details about current alarms. System Manager counts and displays the number of active alarms on the shelf.

System Manager relies on network element site and shelf correlation software to isolate faults and identify the probable location of fiber breaks.

Only users logged into System Manager as an Admin-level user see security alarms. Operator, Observer, Customer1 and Customer2-level users cannot see security alarms.

Channel Assignment management

The Channel Assignment window lets you view, create, and modify channel names, descriptions, protection modes, and bit rates, performance monitoring modes. You can also select the protocol that is sent over each channel and define protection parameters.

Protection management

Protection management in an Optical Metro 5100/5200 network includes

- automatic path switching if equipment or a facility fails
- per channel facility protection
- Optical Channel Manager (OCM) equipment protection
- path protection

For more information about protection schemes, refer to the "Protection switching" chapter in this book.

Software download and upgrade

The System Manager lets you download the software to the shelf processor and begin circuit pack upgrades. You have the option of downloading software to a shelf without committing the software load.

For more information about downloading software, refer to the "Installing the System Manager" chapter in *Commissioning Procedures,* 323-1701-220.

Performance monitoring

The System Manager has alarms, event, and alert logs to notify you of the performance of the Optical Metro 5100/5200 shelf.

For more information about performance monitoring, refer to the "Performance monitoring description" chapter in this book.

Troubleshooting

The System Manager provides an Optical Metro 5100/5200 IP routing table and interface statistic information to enable better troubleshooting of Optical Metro 5100/5200 network problems.

Event history review

You can view a list of the events that occur on the shelves through the event log of the System Manager. Events include login attempts, changes in the states of alarms and alerts, and user provisioning requests.

You must be logged into System Manager as an Admin-level user to retrieve security-related alarms, events, and user requests.

Event buffers

The Optical Metro 5100/5200 System Manager has two event buffers:

- shelf level—accessed through the Event History window
- System Manager level—accessed through the Event Console window

Note: The System Manager level event buffer may differ from the shelf level event buffer. If, for example, the System Manager is out of contact with a shelf when events occur, the System Manager level event buffer will be updated, but the shelf level event buffer will not contain the event.

The shelf level event buffer contains the last 400 events that have occurred on each shelf. When the shelf event buffer has over 400 events for a specific shelf, the shelf software overwrites the oldest events with the newer events. If there is a power failure to the shelf, the events in the shelf event buffer are lost. You can save the contents of the event buffer to a file to keep for your records.

The System Manager level event buffer records events that the current System Manager session receives from network elements. The buffer also records conditions under which the System Manager session loses or regains contact with the network elements. Shelf events are sent through UDP packets. The System Manager may not receive some of the shelf events. To view events that are stored on the shelf, use the Event History window.

Login, security, and user administration

A userID and password are required to login to System Manager. Once successfully logged in, you can access all the shelves in the system managed by the same primary NE. A login request is rejected if you use an incorrect user name or password. Failed login attempts are recorded in the event log of the shelf and include the date, time, and IP address of the computer from which the login attempt was made. An "Intrusion attempt" security alarm is raised if the number of consecutive failed login attempts exceeds the maximum login attempt threshold.

After a successful login has occurred, System Manager displays an advisory warning regarding unauthorized entry and use and the possible consequences.

The user levels include: Customer 1, Customer 2, Admin, Operator, and Observer.

Admin-level users can provision seven ring-wide user accounts in addition to the three default user accounts. Admin-level users can also change the privilege level, enable and disable, or delete individual user accounts.

The Login User List panel is under the Security tab and is only accessible to Admin-level users.

Shelf level graphics

The shelf level graphic window displays provisioning information, physical circuit pack information, shelf details, and alarm information on a per slot basis.

System Manager to network connection

The System Manager is accessible from any shelf in the network through the 10Base-T 1X port on the maintenance panel. Use the System Manager to access shelves

- locally through the 10Base-T 1X Ethernet port on the Optical Metro 5100/5200 shelf
- remotely through a TCP/IP network, using

  — a 10Base-T Ethernet interface, through the DCN, or

  — a modem dial-up connection, using a RS232/V24 1 (DTE) interface to the Optical Metro 5100/5200 shelf

A System Manager applet is stored on the shelf processor (SP) circuit pack of each shelf. Logging in to the shelf enables the System Manager.

Recommended number of System Manager sessions

The Optical Metro 5100/5200 supports multiple System Manager sessions on a single computer. The computer and network must comply with the minimum platform requirements outlined in Table 4-1 of *Technical Specifications, 323-1701-180.*

Nortel Networks recommends that you limit the number of System Manager sessions to eight per system (all the Network Elements managed by the same Shelf List) at any given time.

A network element can host up to eight simultaneous System Manager sessions. If you are using System Manager to monitor your network, Nortel Networks recommends that the System Manager sessions be opened from or hosted by one or more Gateway Network Elements (GNEs).

System requirements

For the minimum platform requirements for the Optical Metro 5100/5200 System Manager, refer to Table 4-1 in *Technical Specifications,* 323-1701-180.

System Manager main window

Figure 1-1 shows the System Manager main window.

Figure 1-1
System Manager main window

OM2316t
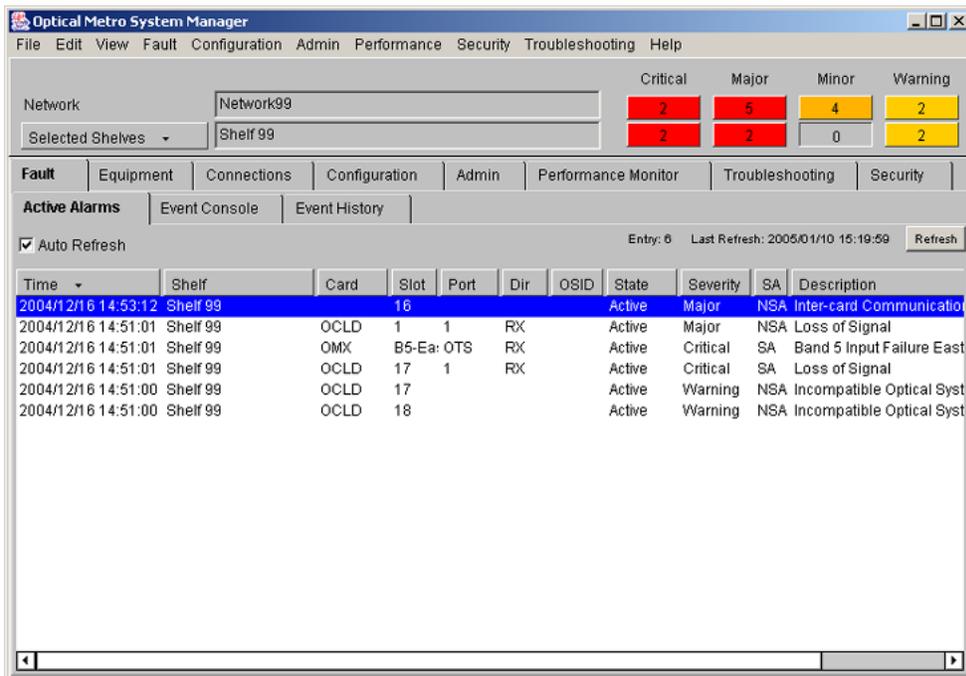
The main window of the System Manager has the following sections:

- network shelf selector
- menu bar
- alarm banner
- information windows

Network shelf selector

Use the network shelf selector to select single or multiple shelves in the network. The network shelf selector filters the information that it displays according to the shelves you select.

The **Selected Shelves** button toggles the drop-down list of selected shelves on and off. When you display the list, you can change the shelf selection.

Shelf icons

Icons of different colors report the status of the shelves displayed in the network tree. Table 1-1 lists icon colors and the shelf status that each represents. When multiple alarms occur on a shelf, the icon displays the color of the alarm with the highest severity.

Table 1-1
Shelf icons

Icon color	Status
Green	There are no alarms on the shelf.
Red	There are critical alarms on the shelf.
Red	There are major alarms on the shelf.
Orange	There are minor alarms on the shelf.
Yellow	There are warnings on the shelf.
Blue	The System Manager is out of contact with the shelf. The shelf icon will turn blue if the System Manager is out of contact with the shelf for more than approximately two minutes.
Blue outline	System Manager is updating the shelf data. This icon displays upon login, and changes to one of the above icons once shelf data is retrieved.

Menu bar

The menu bar lists the menu options in the System Manager across the top of the window.

Alarm banner

Optical Metro 5100/5200 alarms are visually reported on the indicator lamps of the shelf maintenance panel, and on the System Manager alarm banner.

The alarm banner has a top and a bottom row. The top row shows the alarm count for the whole network. The bottom row shows the alarm count for the selected shelf. For information on the color codes used in the alarm banner, refer to Table 7-5 on page 7-13 in "Appendix—System Manager windows and fields" of this book.

If an alarm or warning is unacknowledged and clears automatically, the alarm banner color remains highlighted until you acknowledge the alarm or warning. This convention makes sure that you are aware of all alarm activity reported by the System Manager.

The alarm banner is blue when the System Manager cannot poll a shelf for alarm status.

Accessing information windows

Use the information windows to view and manage information about the network. Access the different information windows by clicking on the labelled tabs.

The Information windows of the System Manager are:

- Fault
- Equipment
- Connections
- Configuration
- Admin
- Performance Monitor
- Troubleshooting
- Security

Information windows display information for the shelves that you select. You can sort and display data in all the information windows except the Event Console window.

Figure 1-2 shows the window hierarchy in the System Manager.

Figure 1-2
Hierarchy of windows in the System Manager

OM2315t
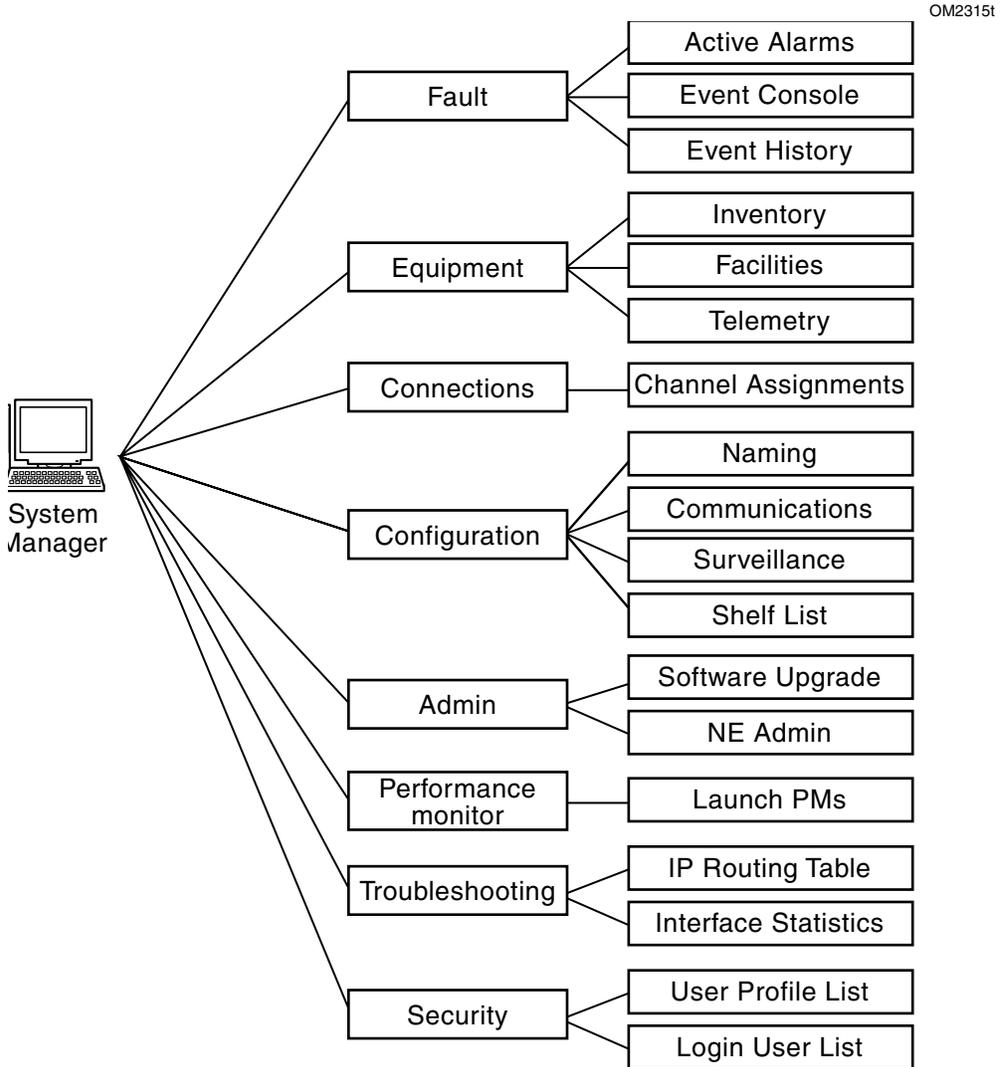
Related topics

- Procedures in *Provisioning and Operating Procedures,* 323-1701-310
- "Installing the System Manager" chapter in *Commissioning Procedures,* 323-1701-220

Fault sectionalization

In this chapter

Overview

This chapter describes the fault sectionalization features provided by the Optical Metro 5100/5200 platform. Fault sectionalization detects defects that may affect the performance of the WDM ring and reports them as alarms to the management system. The fault sectionalization features correlate multiple defects into one reported root-cause fault where possible. Two distinct features accomplish fault sectionalization: intersite fault sectionalization and intrasite fault sectionalization. Both of the fault sectionalization features require the use of the Optical Supervisory Channel (OSC) circuit pack and tray.

The intersite fault sectionalization feature identifies WDM fiber failures between the OSC tray at one site and the OSC tray at an adjacent site. The Shelf Input Failure alarm is used to indicate a broken intersite WDM fiber. Intersite fault sectionalization supports Optical Metro 5100/5200 networks. This feature is always enabled when OSC circuit packs are present in the network.

The Intrasite fault sectionalization (IFS) feature identifies WDM fiber failures within sites. The IFS feature uses ring and site topology knowledge and information about signal failure defects to identify broken fibers within sites. IFS supports Optical Metro 5100/5200 networks. This feature is optionally enabled on OSC circuit packs.

Intersite fault sectionalization

The intersite fault sectionalization feature uses the OSC circuit pack to provide a point-to-point signal between sites on the WDM ring. When the OSC optical signal is included in the WDM fiber between sites, faults that affect the fiber between sites, such as a fiber break, result in a loss of signal at the receiving end of the fiber. Consequently, a Loss of Signal (LOS) alarm raised at an OSC indicates that there may be a problem with the WDM fiber between this site and the far end where the OSC signal is transmitted. For more information, see the "Supported configurations" chapter in *Network Planning and Link Engineering*, 323-1701-110.

However, other faults, such as OSC circuit pack to OSC tray communication failures, can also cause an OSC LOS alarm. To more accurately indicate an intersite fiber break, the Shelf Input Failure (SIF) alarm is raised. When a Band Input Failure (BIF) alarm and an OSC LOS alarm occur on the same OADM shelf in the same direction, the SIF alarm is raised. On an OFA shelf with an OSC, the SIF alarm is raised when the OSC, all Optical Fiber Amplifier (OFA) circuit packs, and active per band equalizer (APBE) circuit packs in the shelf, in the same plane (east or west), report LOS. The SIF alarm masks the BIF alarm and the OSC LOS alarm.

On a Mixed Shelf with an OSC, the SIF alarm is raised when the OSC, all Optical Fiber Amplifier (OFA) circuit packs, all active per band equalizer (APBE), and all OADM cards in the shelf, in the same direction have LOS conditions.

When an intersite fiber is broken, the SIF alarm is used to determine which span is failed. For example, in Figure 2-1 on page 2-3, if both the eastbound and westbound fibers between Site 2 and Site 3 are broken, the following BIF alarms are raised:

- Site 1 Band 1 East and Band 2 West
- Site 2 Band 2 East
- Site 3 Band 3 West
- Site 4 Band 1 West
- Site 6 Band 3 East

Figure 2-1
Fault sectionalization on intersite fiber cuts

OM0887t
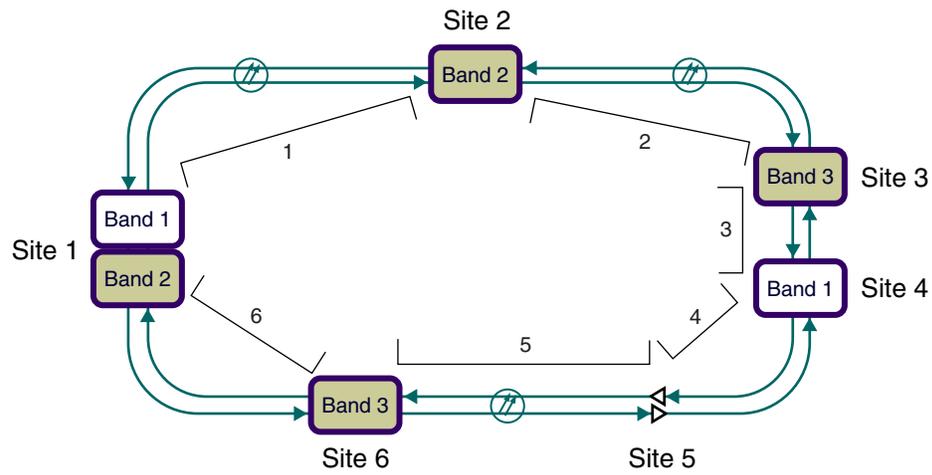
Legend

└──────┘ = OSC link

From this pattern of BIF alarms, it is difficult to determine the location of the fiber break. With the use of the OSCs, SIF alarms are raised at Site 2 East and Site 3 West to indicate exactly which intersite span has failed. For this example, spans are broken in each direction.

If only one of the WDM fibers is broken, the OSC raising the LOS alarm sends a Remote Fault Indication alarm to the transmitting end. In the above example, if only the eastbound fiber breaks, the Site 3 west OSC port in the Band 3 shelf raises the SIF alarm and the Site 2 east OSC port raises a Remote LOS alarm. Except for the site with the SIF alarm, all downstream BIF alarms continue to be raised.

In all cases, if the WDM span is broken, and there are OCLDs, OTRs, or Muxponders in the OSC shelf, the SIF alarm is raised.

> *Note:* If the intrasite fault sectionalization feature is enabled, then the BIF alarms downstream from the intersite fiber break are replaced with warning, non-service affecting, Band Alarm Indication Signal alarms.

OFA shelf fault reporting

When the OSC circuit pack is installed on an OFA shelf, an LOS fault raised by the OFA and APBE circuit packs in conjunction with an LOS fault raised by the OSC causes an SIF alarm. The SIF alarm masks the OSC LOS, the OFA LOS, and APBE LOS alarms.

Note: If the intrasite fault sectionalization feature is enabled, then all BIF, OFA LOS, and APBE LOS alarms downstream from the intersite fiber break are replaced with warning, non-service affecting, Band Alarm Indication Signal alarms.

OSC fiber break detection

The OSC provides a mechanism for reporting OSC fiber faults when only one of the two fibers connecting two sites has sufficiently degraded or failed causing a LOS alarm, an Invalid Signal alarm, or a Loss of Frame alarm. When the OSC Rx port detects one of these conditions, a signal is returned in the Tx direction to report the fault. If the Tx fiber is functioning, the remote OSC raises either a Remote LOS alarm, a Remote Invalid Signal alarm, or a Remote Loss of Frame alarm.

If an OSC raises one of these alarms, the fiber connected to the Tx port interconnecting the two OSC circuit packs may be defective or incorrectly connected.

Incorrect fault reporting

In the absence of multiple broken fibers, intersite fault sectionalization only reports SIF alarms when there is an intersite fiber failure. The one exception occurs when the shelf containing the OSC circuit pack loses power. If the downstream site contains the same band in the shelf with the OSC, then an SIF alarm is incorrectly reported. This can be avoided if the OSC is not placed in a shelf containing the same band on adjacent sites.

Refer to the example shown in Figure 2-1 on page 2-3. The OSC at Site 1 should be located in the Band 1 shelf to avoid SIF confusion if the Band 2 shelf in Site 2 loses power.

Intersite fault sectionalization feature considerations

Shelf input failure reporting and optical system identifiers
For a SIF alarm to be identified, a shelf must have an active OSC LOS and all line equipment (OCLD, OTR, Muxponder, OFA and APBE) in the shelf for the same optical system identifier as the OSC must also have LOS in the same direction as the OSC. This condition alone identifies the intersite fiber as the cause of the failure. When interconnected rings are present in the network, extreme caution should be used in provisioning equipment ring numbers to ensure correct operation of the intersite fault sectionalization feature. For rules for provisioning equipment ring numbers, refer to Procedure 3-36 "Provisioning the optical system identifier (OSID)" in *Provisioning and Operating Procedures*, 323-1701-310.

Requirements for OSC circuit pack placement at a site
To ensure the correct operation of the intersite fault sectionalization feature, and reporting of SIF alarms to identify failed WDM fiber spans, the following special consideration must be given to the placement of the OSC circuit pack at every site.

- If the shelf containing the OSC circuit pack does not contain line equipment in both directions, then when an OSC LOS occurs there will be insufficient data to determine if the cause is the intersite fiber or the OSC tray to OSC circuit pack fiber. As a result, only the OSC LOS alarm will be raised at this site.

- At an OADM/Terminal site, with or without amplification
  — the OSC circuit pack must be located in an OADM shelf
  — the OSC circuit pack must not be located in a shelf with no line equipment in one or both directions

- At an OFA site
  — the OSC circuit pack must be located in an OFA shelf
  — the shelf should have OFAs and/or APBEs that transmit in both the east and west directions. Special consideration should be taken when determining the location of all circuit packs in the OFA shelves at an OFA site

If the OSC is located in a shelf that violates the above considerations, intersite fiber detection will not be identified with a SIF alarm. Only an OSC LOS alarm will be raised when the intersite fiber is broken. In this case, the first step in troubleshooting the problem should be to inspect the OSC tray to OSC circuit pack fiber. If the problem is not resolved, work backwards by next investigating the intersite fiber, followed by the transmit OSC circuit pack to OSC tray fiber at the remote site reporting the Remote LOS alarm.

Connecting OSC ports
The East port on an OSC must be connected to the West port on the OSC at the site immediately to the East. Similarly, the West port must be connected to the East port of the OSC immediately to the West. If these fibers are incorrectly connected such that the East OSC port is connected to another East OSC port, an East Fiber Mismatch alarm is raised. The shelf that has the two ports reversed raises both an East Fiber Mismatch and a West Fiber Mismatch alarm.

Fiber failure examples
When the shelf containing the OSC circuit pack detects both a BIF and an OSC LOS for the same direction (east or west), then the SIF alarm is raised instead of the BIF alarm and the LOS alarm.

Figure 2-2 on page 2-7 shows three failure scenarios: a WDM fiber break, a C-Band fiber break, and an OSC Rx fiber break.

A fiber break at X1 with the external WDM fiber plant will cause band failures for all shelves. Since the OSC-W Rx port will also detect a loss of signal, the Band 2 shelf will raise an SIF alarm. The other shelves will raise the BIF alarms.

A fiber break at X2 between the C&L Splitter and the OADM shelf will cause band failures but no OSC failures. In this case, the SIF alarm will not be raised.

A fiber break at X3 between the OSC splitter and the OSC circuit pack will result in an OSC-W LOS alarm. No BIF or SIF alarms will be raised.

In the above failure examples 1 and 3, if only the Rx fiber is broken, the alarms in this shelf will be the same but the shelf containing the OSC circuit pack at the site to the west will raise the Remote LOS alarm against the east OSC port. Because only a single OSC circuit pack exists at each site, the OSC does not provide any fault isolation between the shelves at an Optical Metro 5100/5200 site. Fault isolation between shelves is provided by the IFS feature, if it is enabled.

Figure 2-2
Three failure scenarios for fault sectionalization

OM0888p
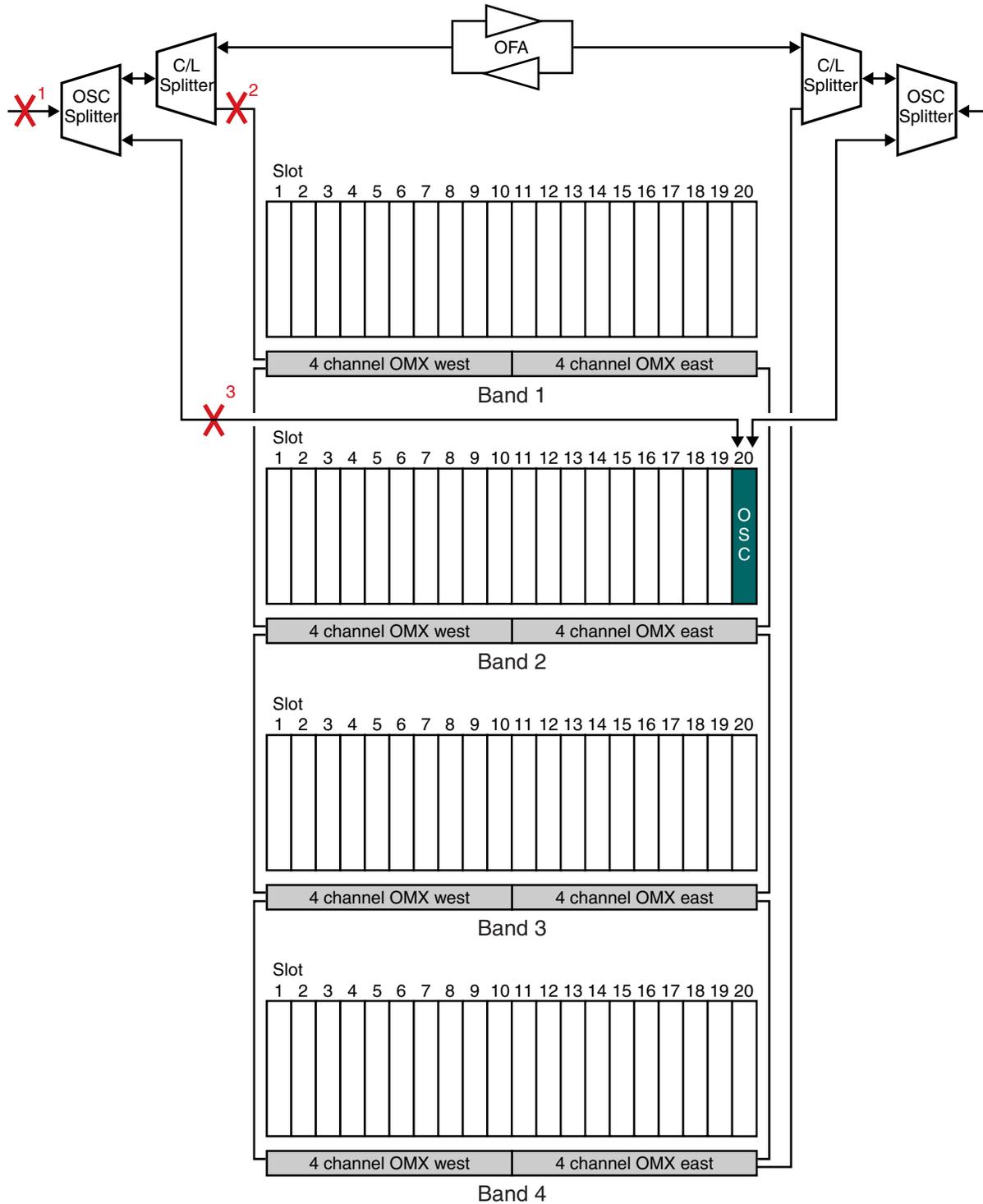
Intrasite fault sectionalization

Fundamental to the design of a WDM optical ring is the transparent passing of optical signals between sites without optical to electrical to optical (OEO) conversion for every wavelength. These undetected wavelengths passing through a site can be adversely effected by fiber faults within a site. Faults resulting from impairment of these wavelength are reported downstream at the first site performing OEO conversion of the wavelength.

Optical signal failures, such as fiber breaks, cause numerous BIF alarms to occur at optical to electrical sites downstream from the origin. The location of the fault can be difficult to identify since the fault may be detected several sites away from the point where the actual problem occurred.

IFS enhances the isolation of faults to specific spans within a site, and provides the ability to identify a span between OMXs that is causing an optical signal failure at sites downstream. With IFS enabled, downstream BIF alarms caused by failed spans are suppressed, and Optical Signal Failure (OSF) alarms are raised against the OMX, C&L splitter/coupler, OFA circuit pack, APBE circuit pack, or the OSC tray, to accurately identify the location of the fault.

How intrasite fault sectionalization works

The IFS feature collects OFA, APBE, OTR, OCLD, Muxponder and OSC LOS faults from all shelves in the ring and correlates these faults with the band occupancy of the intrasite WDM fibers. When a WDM fiber is broken, the OFA/APBE LOS, and the BIF alarm pattern is compared with the expected alarms for each WDM fiber, if the fiber were broken. When a match is found, the OSF Tx/Rx alarms are raised, identifying both ends of the potentially failed fiber span. Often more than one match is found. All matches result in a pair of OSF Tx/Rx alarms. Multiple OSF alarms are reported when a WDM fiber fails because this is a property of the WDM optical signal. IFS correctly identifies all potential fault locations that can cause the optical signal failure. In all cases, only one failed fiber span is identified within each site. In some cases, the OSF Tx and Rx endpoints will correspond to endpoints of more than one physical fiber, but the fibers are adjacent to each other. This occurs when each fiber between the Tx and Rx endpoints have identical band occupancies and are therefore all equally likely candidates to be the fiber break.

Whenever a pattern of BIF conditions does not match any WDM fiber failure patterns, the BIF alarms (or the LOS alarm in the case of a single channel band) are raised. This only occurs when there are multiple broken fibers or a site has not been fibered correctly. If, for example, the C&L splitter/coupler is not installed at one site, but the site has been provisioned to be parallel (meaning the C&L splitter/coupler is required when C-Bands and L-Bands are deployed), and a fiber between two OMXs is broken at that site, then an incorrect fiber span identification might result.

Correct operation of the IFS feature requires that all sites conform to the supported site topologies, and that the site equipping rules be followed. Furthermore, the feature relies on correct provisioning of feature-related data, such as optical system identifier (OSID), OFA and APBE location and direction, site fibering topology, and site fibering configuration.

Failure to connect all shelves in a site to the Ethernet hub results in unsuppressed BIF alarms. The Intrasite Communication Failure (ICF) alarm is raised whenever the IFS feature loses contact with a shelf at a site. The shelf must be reconnected before correct fault sectionalization can occur.

The OSC Remote Fault Sectionalization Not Responding alarm is raised when the OSC circuit pack is not receiving fault sectionalization information from an OSC at an adjacent site. Either the IFS feature is disabled at the remote site, or there is a loss of connectivity between this OSC and the adjacent OSC.

Site topologies for intrasite fault sectionalization

The IFS feature requires that each Optical Metro 5100/5200 site where the feature is enabled conform to one of the site fibering topologies described below.

Supported site topologies, or OMX fibering methods, for this feature include:

- standard—for multi-shelf OADM sites, terminal sites, and OFA sites
- stacked—for terminal sites
- single-shelf—for single-shelf or multi-shelf OADM sites

For the advantages and disadvantages of each topology, refer to the "Supported configurations" chapter in *Network Planning and Link Engineering*, 323-1701-110.

The IFS feature supports each of these site fibering topologies in parallel or serial configurations. The parallel configuration is used when the site has C&L splitter/couplers deployed. When there is no C&L splitter/coupler deployed, the site is said to be configured serially. For sites with amplification, if the ring contains both C-band and L-band channels, then the only supported configuration at this site is parallel. Serial amplification is only supported by the intrasite fault sectionalization if the ring contains either C-band or L-band channels, but not both. The site fibering topology and configuration values are provisionable on the OSC equipment and must be selected prior to enabling IFS. Follow Procedure 3-37 "Provisioning the fibering topology and fibering configuration" in *Provisioning and Operating Procedures*, 323-1701-310.

In all cases, the general location for equipment at a site is as follows, starting at the outermost equipment at the site and moving inward.

- The OSC trays are the outer-most equipment on the West and East sides of a site.

- The next piece of equipment on the inside of the site is the C&L splitter/couplers (or ECTs at an OFA site), if present.

- APBE and OFA circuit packs are fibered next (in pre and pre2-amp configuration).

- All OMXs are located in the center of the site.

- APBE and OFA circuit packs are fibered next (in post-amp configuration).

Within each of the supported topologies and configurations for the IFS feature, the fiber plan requires that OMXs be fibered in a specific order in each direction. The following describes the OMX ordering for each topology.

Standard fibering rule
Standard OMX fibering can be deployed at a terminal site, a multi-shelf OADM site, or an OFA site. For the IFS feature, all OFA sites should be provisioned as standard. In addition, standard OMX fibering can be deployed at a single-shelf OADM site. This method is also referred to as single-shelf fibering. If the site has a parallel fibering configuration, fiber the OMXs for C-band and L-band separately.

- From West to East: all OMXs must be fibered to first drop all the bands in ascending order (1, 2, 3) and then add all bands in ascending order (1, 2, 3)

- From East to West: all OMXs must be fibered to first drop all bands in descending order (3, 2, 1) and then add all bands in descending order (3, 2, 1)

Stacked fibering rule
Stacked OMX fibering is generally only deployed at terminal sites. It makes no sense to call an OFA site fibering stacked. If the site is a parallel fibering configuration, fiber the OMXs for C-band and L-band separately.

- From West to East: all OMXs must be fibered to first drop all the bands in ascending order (1, 2, 3) and then add all bands in descending order (3, 2, 1)

- From East to West: all OMXs must be fibered to first drop all bands in ascending order (1, 2, 3) and then add all bands in descending order (3, 2, 1)

Single-shelf fibering rule
Single-shelf fibering can be deployed at an OADM site with one shelf (also called standard fibering) or multiple shelves. If the site has a parallel fibering configuration, fiber the OMXs for C-band and L-band separately.

- From West to East: all OMXs must be fibered to first drop each band and then add each band in ascending order (drop 1, add 1, drop 2, add 2, drop 3 add 3).

- From East to West: all OMXs must be fibered to first drop each band and then add each band in descending order (drop 3, add 3, drop 2, add 2, drop 1, add 1).

From a link engineering perspective, the single-shelf fibering topology has the worst fiber-loss characteristics for multi-shelf sites. For the IFS feature, the recommended OMX fibering interconnection is stacked fibering for terminal sites, standard fibering for multi-shelf OADM and OFA sites, and single-shelf fibering for sites with a single shelf (also called standard fibering).

Figure 2-3, 2-4, and 2-5 illustrate each of the site fibering topologies for parallel configurations with typical locations for OFAs and APBE circuit packs. The OFA and APBE circuit packs are optional. Note that for serial configurations, the C&L splitter couplers are not present and OFA and APBE circuit packs can only be present if the ring only contains C-band or L-band channels, for the intrasite fault sectionalization feature.

Figure 2-3
Standard parallel site with OFAs and APBEs

OM1520p
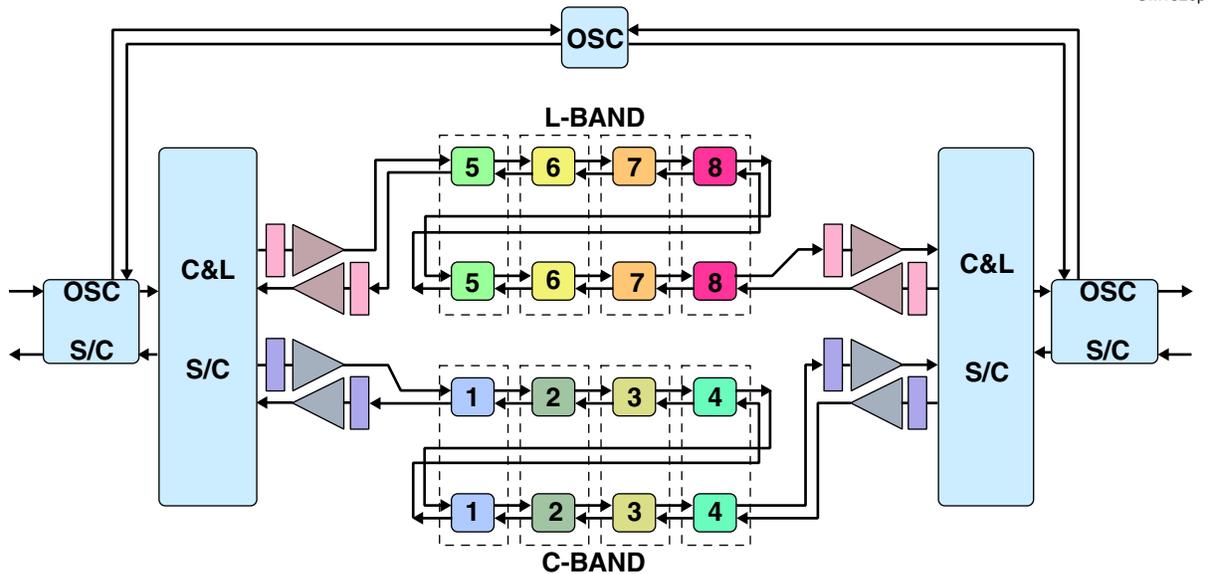
Figure 2-4
Stacked parallel site with OFAs and APBEs
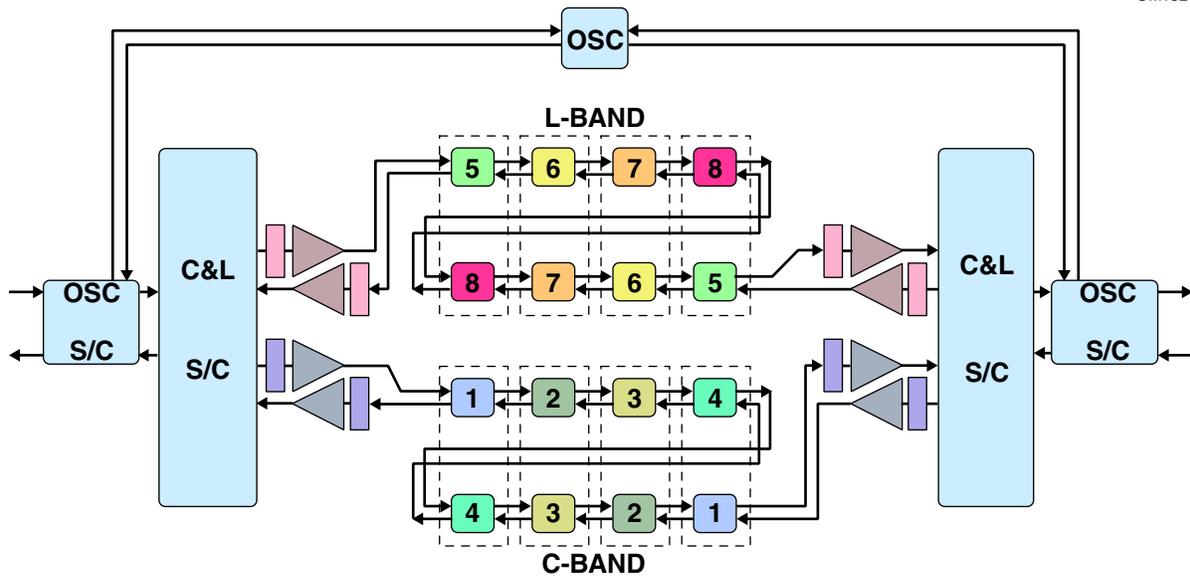
Figure 2-5
Single-shelf fibering at a multi-shelf OADM site
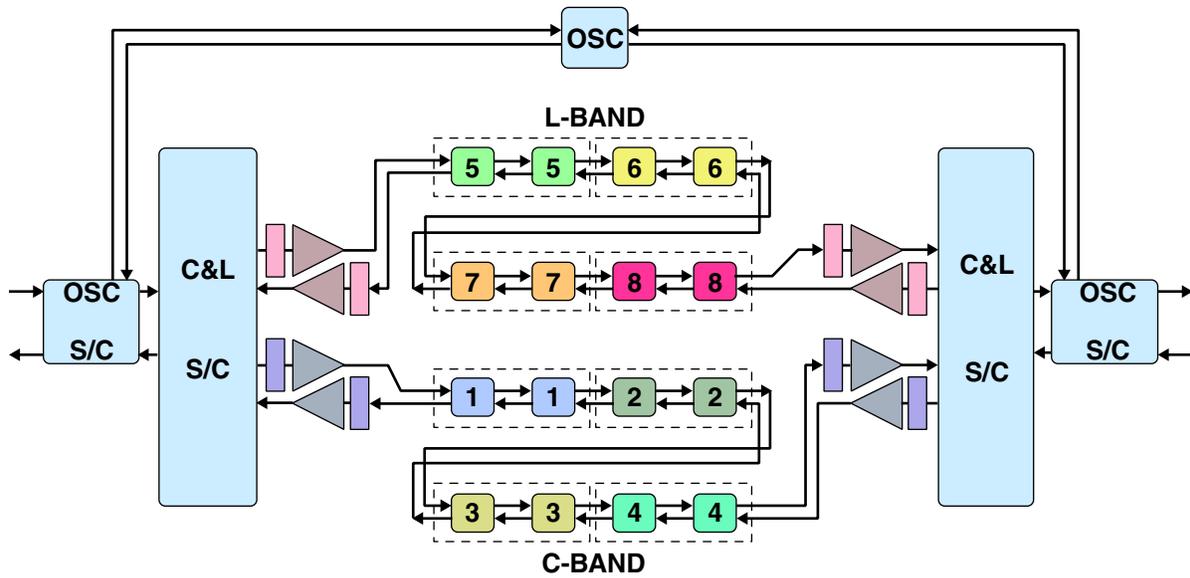
Site configuration rules

If the IFS feature is to be used for identifying failed fiber spans within a site, the following site configuration rules must be followed.

- One OSC circuit pack and OSC tray is required at each site. For sites where interconnected rings meet, one OSC circuit pack and OSC tray is required for each ring passing through the site.

- Each site in the Optical Metro 5100/5200 ring must comply with one of the supported site fibering topologies and configurations for the feature. The feature allows different sites to be configured differently but a single method should be employed within a site. At a bridge site, equipment for each ring can employ a different topology and configuration as long as all equipment for a single ring use the same topology and configuration.

  Note: IFS is not feasible on point-to-point configurations, including hub-and-spoke, due to the number of OSC circuit packs and trays required (one per ring). Also, the feature is not useful in OMX-less configurations.

- Within each of the C and L bands, the OMXs must be ordered in each direction according to the fibering rule for each site fibering topology.

- All line-facing equipment (OTR, OCLD, Muxponder, APBE, OFA, and OSC) must be provisioned with the correct non-zero optical system identifier.

- All OSC circuit packs must be provisioned with the correct site fibering topology and configuration.

  — All OFA sites should be provisioned to be Standard fibering topology.

  — All sites with OFA and/or APBE circuit packs in rings with C-bands and L-bands must be provisioned to be Parallel fibering configuration.

- All OFA and APBE circuit packs must be provisioned with correct location and direction data. The location must be Pre, Pre2, Post, Thru or Thru2, and the direction must be westbound or eastbound.

- An Ethernet hub must be installed at all sites having more than two shelves. When a site has only two shelves, an RJ-45 cross-over cable can be used to connect the two shelves. On sites with two or more shelves, the Enet-2 port must be enabled.

- All shelves at the same site, including bridge sites, must have the same hubbing group provisioned and it must be unique per site in the network.

- You cannot change the default values for the Enet Port 2 IP address and Enet Port 2 mask. See Procedure 1-30 "Assigning IP addresses for Ethernet port 2 and Serial port 1" in *Provisioning and Operating Procedures*, 323-1701-310, for the default values.

Provisioning OFA sites

OFA and APBE circuit packs must be provisioned with the correct location, direction, and optical system identifier. The location must be Pre, Pre2, Post, Thru or Thru2. The direction must be westbound or eastbound depending on physical location at the site.

The meaning of the direction parameter selections is as follows:

- Eastbound indicates that the APBE or OFA receives the signal from the west, and transmits it to the east.
- Westbound indicates that the APBE or OFA receives the signal from the east, and transmits it to the west.

The meaning of the location parameter is as follows:

- Pre indicates that the OFA or APBE is receiving a signal from an adjacent site prior to presentation to a local OMX.
- Pre2 indicates that the APBE is between two OFAs prior to presentation to a local OMX. In this case, the APBE and the second OFA both have the location value of pre2.
- Post indicates that the OFA or APBE is receiving a signal from a local OMX prior to sending the signal to an adjacent site.
- Thru indicates that the OFA or APBE is receiving a signal from an adjacent site and sending the signal directly to another site. No local OMXs are associated with a thru-amp.
- Thru2 indicates that the APBE is between two OFAs and the first OFA is receiving a signal from an adjacent site and sending the signal directly to another site. No local OMXs are associated with a thru2-amp. In this case, the APBE and the second OFA both have the location value of Thru2.

See Figure 2-6 for an example of Pre and Post locations. See Figure 2-7 on page 2-16 for an example of Thru locations. See Figure 2-8 for an example of Pre, Pre2 and Post locations. See Figure 2-9 on page 2-18 for an example of Thru and Thru2 locations.

Figure 2-6
Site topology and OFA shelf provisioning

OM1519t

West   East

Legend

▷ = OFA

▯ = APBE
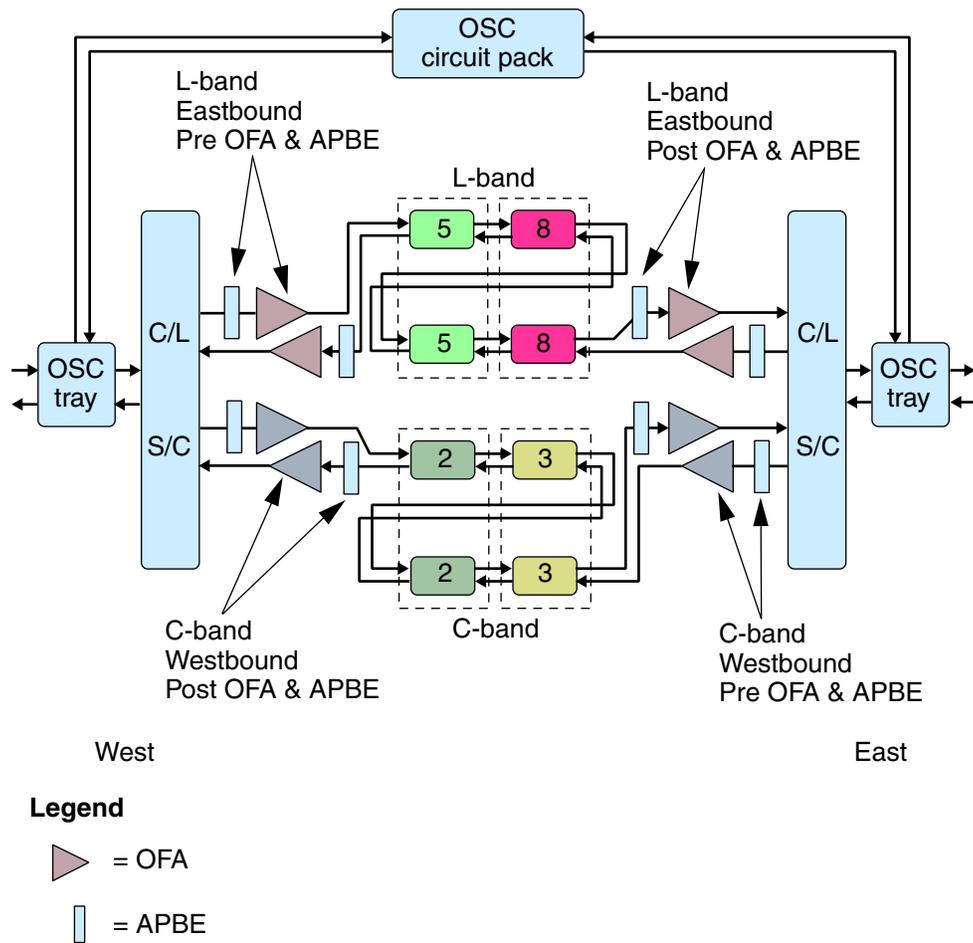
Figure 2-7
Site topology for an OFA site

OM1518t

West

East

Legend

▷ = OFA
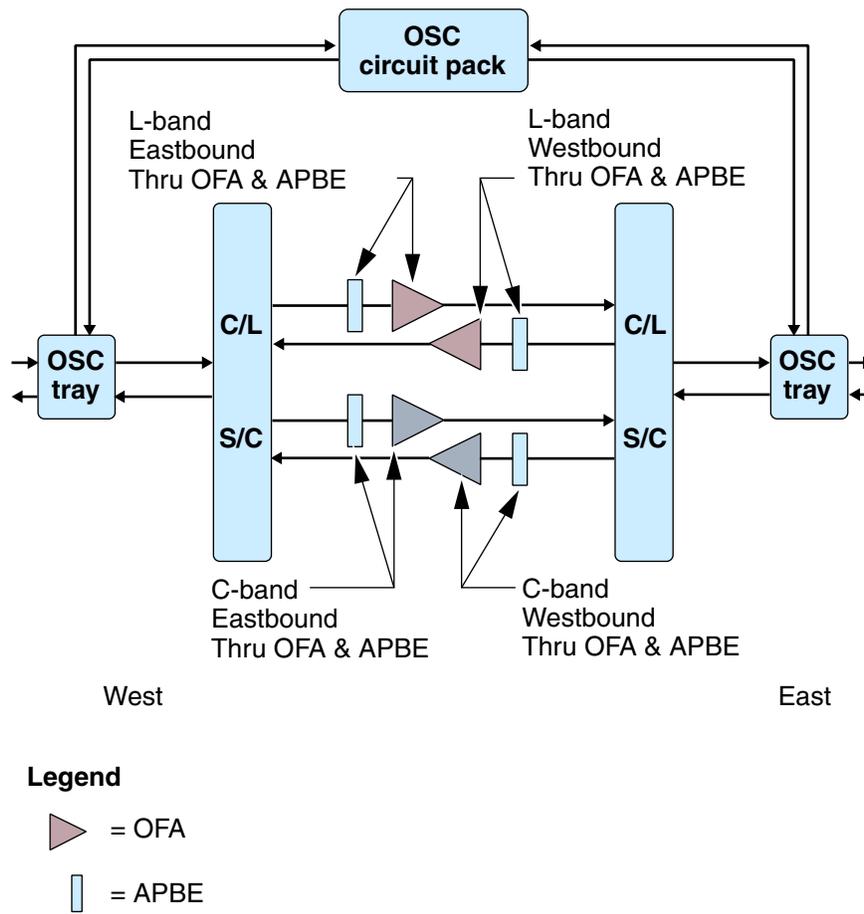
▯ = APBE

Figure 2-8
Site topology and OFA shelf provisioning for extended reach metro system with DSCM

OM2816t

Legend

▷ = OFA
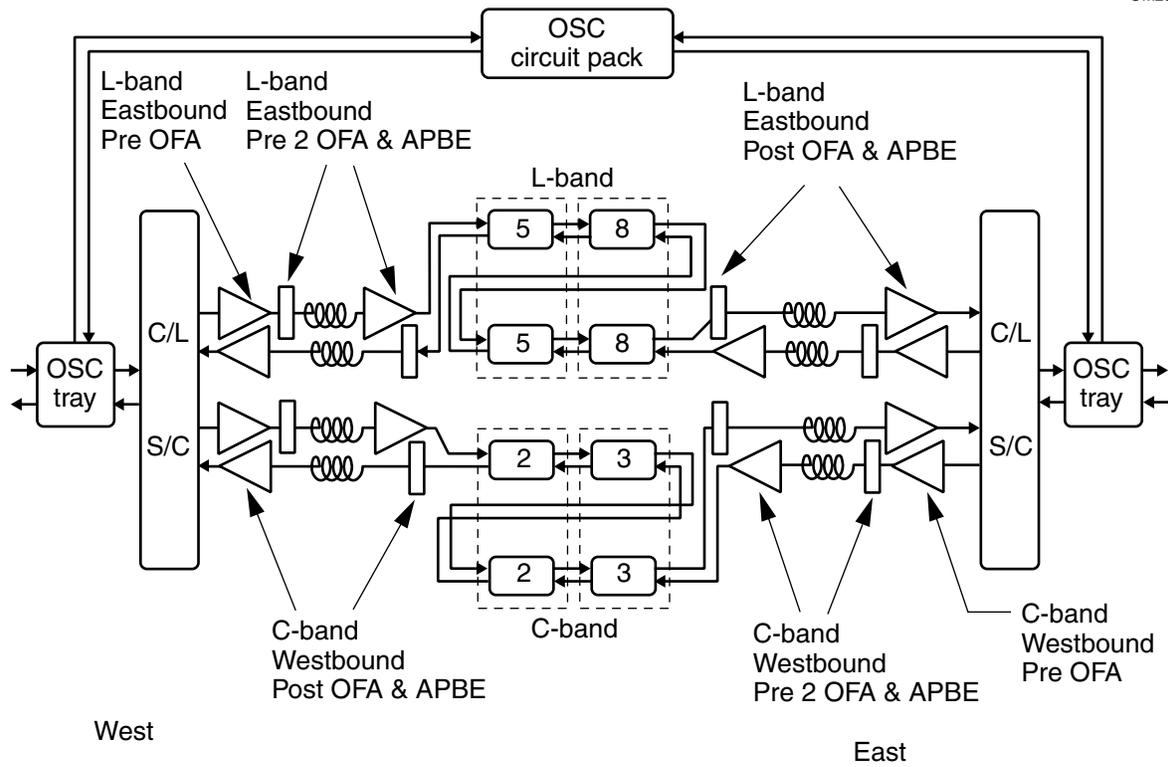
▯ = APBE

⏚ = DSCM

Figure 2-9
Site topology for an OFA site for extended reach metro system with DSCM

OM2817t

West   East
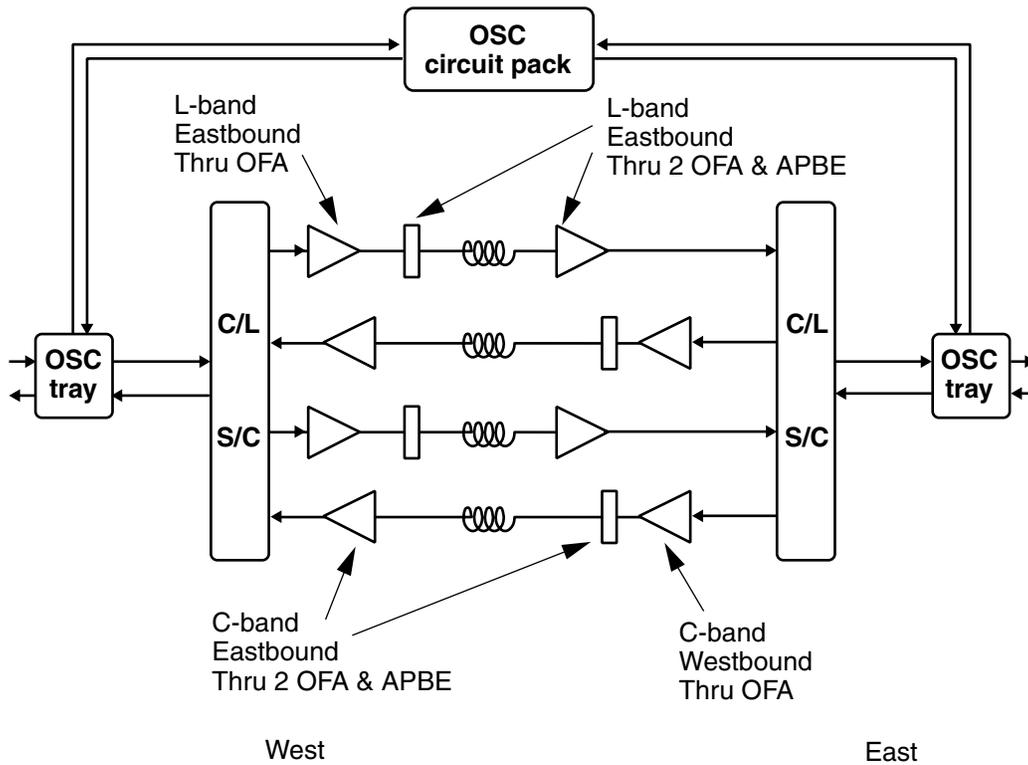
Legend

▷ = OFA

▯ = APBE

〰 = DSCM

Enhanced intersite fault sectionalization

When an intersite fiber is broken and the IFS feature is disabled, the SIF alarm is used to determine which span is failed. The intersite fault sectionalization feature uses the SIF alarm to indicate that either the intersite fiber is broken or there are multiple broken fibers (typically the OSC tray to OSC circuit pack fiber and one or more OMX or intrasite fibers). Besides, if a site has an OSC but no equipment in one or both directions, then intersite fault sectionalization is unable to isolate the fault to the intersite fiber and so an OSC LOS is the only alarm that becomes active. Furthermore, even if a SIF alarm is raised, critical BIF alarms remain active at all shelves other than the shelf reporting the SIF alarm.

When the IFS feature is enabled, an enhanced level of intersite fault sectionalization is possible. This is possible because IFS has detailed knowledge of ring and site topology.

First, if the IFS feature is enabled, the critical BIF, OFA/APBE LOS alarms that occur downstream from the SIF alarm are masked with the non-service-affecting Band Alarm Indication Signal warnings. The same masking of critical alarms will occur when the SIF alarm is raised at an OFA shelf at an OFA site.

Second, the IFS feature is able to exploit ring and site topology information to better isolate the intersite fiber as the cause of the BIF (or OCLD/OTR/Muxponder LOS in the case of a single channel band), OFA/APBE LOS alarms in the ring. When the intrasite fault sectionalization feature detects that an OSC has LOS and every band coming into this site from the immediate site upstream is experiencing an input failure (at this site or sites downstream), a SIF alarm will be raised. The Site Input Failure alarm replaces the Shelf Input Failure alarm (if it is raised), and is an excellent indicator that the intersite fiber is broken. Essentially, the IFS feature is performing the same analysis that would be done manually to isolate the intersite fiber as the cause of the faults.

If the IFS feature is enabled and a Shelf Input Failure alarm is active then it is likely that there is a multiple fiber break, or the sites are fibered or provisioned incorrectly. Note that the IFS feature can now isolate the intersite fiber as the cause of the faults even when there is no line equipment in one or both directions of the shelf where the OSC is located.

OFA and APBE facility service states

When the facility of an OFA or APBE circuit pack is taken from in-service (IS) to out-of-service (OOS), the output or Tx of that facility is attenuated to nil. If the facility that is OOS is unused, meaning that there are no OCLDs, OTRs, or Muxponders upstream transmitting an optical signal through that facility, or there are no OCLDs, OTRs, or Muxponders downstream expecting to receive an optical signal from that facility, then there is no affect to it being placed OOS. If this is not the case, then the action of placing the OFA or APBE facility OOS impacts the optical signal between transmitting and receiving pairs of OCLD, OTR, or Muxponder line circuit packs. Even when the OCLD, OTR, or Muxponder circuit packs are not carrying traffic (and are OOS), placing an intermediate line facility such as an OFA or APBE OOS will break the optical signal between the pair of circuit packs.

If IFS is enabled and an in-service OFA or APBE facility is placed OOS, the feature will attempt to correlate the resulting downstream input failures (BIF, OCLD/OTR/Muxponder LOS, OFA/APBE LOS) into a failed fiber span. While technically correct, a failed fiber span identification by Optical Signal Failure Tx/Rx alarms will not help the user to repair the problem. As a result,

when the IFS feature is enabled, it is possible to exploit ring and site topology information to isolate the resulting input failures to the OOS OFA or APBE facility.

When IFS detects that an OOS OFA or APBE facility is in use and the OOS state is causing an interruption in the optical signal between all channels upstream and downstream that are dependent on the specific OFA or APBE facility, the "Facility Out-of-Service—Optical Signal Failure" alarm will be raised against the Tx port of the offending facility. All downstream input failures resulting from this fault will be masked by non-service-affecting Band Alarm Indication Signal warnings.

To clear the "Facility Out-of-Service–Optical Signal Failure" alarm, the indicated facility should be placed IS if it is actually in use. If all of the upstream or downstream line equipment is actually unused, and the OFA or APBE facility is to be OOS, then all line equipment transmitting or receiving through the OOS facility should be removed. This can be accomplished, at minimum, by deleting the facility of all upstream or downstream equipment, or simply deleting the circuit packs completely. It is not sufficient to place the downstream and upstream facilities OOS since the circuit packs continue to transmit overhead information between each other when in this state.

> *Note:* The "Facility Out-of-Service—Optical Signal Failure" alarm is always raised against an out-of-service OFA or APBE facility by IFS, when it is enabled. In general, facilities are placed out-of-service to suppress alarms because they are unused. However, in the case of OFA and APBEs, the facilities are required to be in-service for line signals to pass downstream. Placing an OFA or APBE facility out-of-service incorrectly can seriously impact the performance of the network and should only be done when the OFA or APBE is unused. Use extreme caution when doing so.

Feature considerations

Multiple fiber identifications
Multiple Optical Signal Failure alarms are reported when a WDM fiber fails. This behavior is not a limitation of IFS, but a property of the WDM optical signal. IFS correctly identifies all potential fault locations that can cause the optical signal failure. In all cases, the feature identifies only one fault location at each site.

When the intrasite fault sectionalization feature should be disabled
To ensure the correct operation of IFS, disable the feature at the site before you make any major changes to the site configuration. Re-enable the feature after the changes are made, and you have verified the fibering of the site according to Procedure 1-8 "Testing site fibering for intrasite fault sectionalization" in *Testing and Equalization Procedures*, 323-1701-222.

Disable IFS at the site before you:

- begin an upgrade of any shelf in the network. Only re-enable the IFS feature after all shelves are using the same software version.

- add or remove a shelf

- decommission a shelf

- change the optical system identifier

- remove the last OCLD, OTR, or Muxponder of a band in the east or west plane, or delete the facility of the last OCLD, OTR, or Muxponder of a band in the east or west plane

- make any fibering changes between the OSC trays, C&L splitter/couplers, OMXs, APBEs, or OFAs

- unseat an OFA or APBE circuit pack or delete an OFA or APBE facility

Intrasite Fault Sectionalization and Extended Metro Configurations
The IFS software can be used in Extendend Metro configurations but it will not correlate to fibers that begin or end on DSCM equipment or OFA and APBE equipment provisioned to be in the Pre2 or Thru2 locations. This equipment is not monitored by IFS and faults in these areas will be identified at the recognizable equipment before and after the unrecognizable equipment. This limitation should be considered when troubleshooting IFS alarms in Extended Metro systems.

Intrasite fault sectionalization behavior at an OADM or terminal site with no line equipment deployed in one or both directions

Nortel Networks recommends that an OMX is fibered into a site, and IFS is to be enabled, then connect at least one OCLD, OTR, or Muxponder to the OMX in each direction. This eliminates the possibility that IFS will be unable to identify all potential fibers for a given set of faults, and will better direct a technician to the exact cause.

At an OADM or terminal site:

- if an OMX is fibered, and no shelf at the site has line equipment fibered to the OMX, IFS is unaware of the presence of the OMX. Without line equipment, it is impossible for IFS to detect the OMX at the site, even if it is provisioned.

  If, at the same site, there are other OMXs that are fibered to line equipment, IFS may identify two fiber endpoints that do not correspond to a single physical fiber. The intention of the Optical Signal Failure alarms is to indicate the range of consecutive fibers that should be examined.

  For example, a site has Band 1, 2 and 3 OMXs in the east and west direction and B1C1 and B3C1 OCLDs in the east and west direction. With the restriction of standard fibering at the site, IFS interprets the OMX fibering as B1-W, B3-W, B1-E, B3-E from west to east and B3-E, B1-E,

B3-W, B1-W from east to west. Under this assumption, IFS may identify a suspect fiber span as <Optical Signal Failure Tx, B1-W, Thru, Tx> and <Optical Signal Failure Rx, B3-W, OTS, Rx>. Physically, this identification represents two fibers <B1-W, Thru, Tx> to <B2-W, OTS, Rx> and <B2-W, Thru, Tx> to <B3-W, OTS, Rx>. Either of these two fibers could be the cause of the problem and both should be investigated as the potential fiber failure causing a set of observed failures.

- If there are several OMXs at the site without line equipment fibered to them, IFS may identify two fiber endpoints that physically correspond to two or more consecutive fibers.

- If there are OMXs at the site for east and west, and line equipment fibered in one direction (either east or west), IFS may identify two fiber endpoints that physically correspond to two or more consecutive fibers. For example, in an asymmetric ring deployment, where the site only has line equipment connected to east OMXs, IFS might identify a fiber from a C&L S/C west to the first OMX in the east (ignoring all west OMXs) for a given pattern of alarms in the system.

- If there is no line equipment at the site for a direction, regardless of whether there are OMXs fibered at the site, IFS makes an assumption regarding the site topology. For example, in a parallel fibering configuration, the equipment is assumed to be fibered in the following order:
    — <OSC S/C, Thru, Tx> to <C&L S/C, OTS, Rx>
    — <C&L S/C, C-Band, Tx> to <C&L S/C, C-Band, Rx>
    — <C&L S/C, L-Band, Tx> to <C&L S/C, L-Band, Rx>
    — <C&L S/C, OTS, Tx> to <OSC S/C, Thru, Rx>

In the above configuration, if there are OMXs fibered at the site, and a fiber at one of these OMXs is broken, IFS may not identify a fiber at this site. Depending on the pattern of faults generated from the broken fiber, there may be other potential broken fibers identified at other sites in the ring.

If a fiber is broken at another site, and the pattern of alarms in the ring matches the inbound (OSC S/C to C&L S/C) or outbound (C&L S/C to OSC S/C) fiber at the site with the above configuration, IFS will only identify the outbound fiber at this site as suspect. Technically, the inbound or outbound fiber of this site are equally likely to be the potential cause since every band passes through this site and the two fibers are identical.

IFS is limited to identifying a single fiber at any site as a candidate. The intent is to point the technician to the best area for investigation. If the identified outbound fiber is repaired and the problem does not clear, the technician should trace backwards at this "glass-through" site until all dark fibers are examined. Note that for this scenario, there will always be at least one other fiber identified at another site in the ring.

Intrasite fault sectionalization behavior at an OFA site with no line equipment deployed in one or both directions

Deployment of a ring configuration where an OFA site has line equipment (OFA or APBE circuit packs) in one direction, but not the other, is highly unlikely. In general, when amplification is required in one direction, it is also required in the other direction. If such a site exists, there is likely post-amplification at a site upstream in the direction without OFAs. Nortel Networks recommends that you reconsider the placement of OFAs so that the OFA site is eliminated, or post-OFAs and APBEs are relocated to the OFA site to ensure the maximum utility of the IFS feature.

At an OFA site, if there are no circuit packs (OFAs or APBEs) at the site in one direction, IFS assumes the site topology for that direction is (assuming a parallel fibering configuration):

- <OSC S/C, Thru, Tx> to <C&L S/C, OTS, Rx>
- <C&L S/C, C-Band, Tx> to <C&L S/C, C-Band, Rx>
- <C&L S/C, L-Band, Tx> to <C&L S/C, L-Band, Rx>
- <C&L S/C, OTS, Tx> to <OSC S/C, Thru, Rx>

If the site is fibered as described above, and a fiber is broken at this site, then faults will occur downstream. IFS will be able to identify the broken fiber at the site but because there are no OFAs present, there may be an increased number of duplicate broken fibers identified around the ring. This would not occur if line equipment were present in this direction at this site.

If a fiber is broken at another site, and the pattern of alarms in the ring matches the inbound (OSC S/C to C&L S/C) or outbound (C&L S/C to OSC S/C) fiber at the site with the above configuration, IFS will only identify the outbound fiber at this site as suspect. Technically, the inbound or outbound fiber of this site are equally likely to be the potential cause since every band passes through this site and the two fibers are identical.

IFS is limited to identifying a single fiber at any site as a candidate. The intent is to point the technician to the best area for investigation. If the identified outbound fiber is repaired and the problem does not clear, the technician should trace backwards at this "glass-through" site until all dark fibers are examined. For this scenario, there will always be at least one other fiber identified at another site in the ring.

Performance monitoring description

In this chapter

General description

Performance monitoring (PM) allows you to detect degradation in the network on a timely basis. An aspect of surveillance, performance monitoring works with measurable performance parameters (PPs) that count or gauge the quality of payload signals and transmission equipment.

Optical Metro 5100/5200 provides four types of performance monitoring

- facility performance monitoring
- equipment performance monitoring
- generic operational measurements
- Ethernet operational measurements

Facility performance monitoring measures errors on the signal. Equipment performance monitoring measures the optical receive and transmit power levels. Operational measurements are counts that can be asynchronously retrieved and cleared.

Rules for provisioning PM modes and each type of the PPs are described in detail in the following sections.

Facility PP counts are binned into 15-minute, 1-day, and untimed bins. Equipment PPs are not binned. A Threshold Crossing Alert (TCA) is associated with the current bin of the facility PPs in general and the current reading of the equipment PPs.

Operational measurements (OMs) are supported for the OCI SRM GbE/FC, OTR 10 Gbit/s Enhanced and Muxponder 10 Gbit/s GbE/FC VCAT circuit packs only. OMs are binned into 15-minute, 1-day, and untimed bins. OMs do not have TCAs associated with them.

Note: The Muxponder circuit packs are also referred to as multiplexer optical transponder or MOTR.

PM modes, PPs, and provisioning rules

The following facility PM provisioning rules apply:

- PM mode must be specified at the connection level for each facility involved. Each facility has its own PM mode.

- PM mode must be specified as part of the channel assignment creation. The default PM mode depends on the configured protocol rate and the type of circuit pack. See Table 3-2 for more information.

  Note: The OFA circuit pack does not have channel assignments. The PM mode is always SFC.

- SONET and SDH PPs are supported on both SONET and SDH signals. 8B/10B PPs are supported on certain 8B/10B signals. 64B/68B PPs are supported on the OTR 10 Gbit/s Enhanced circuit pack in LanPhy mode.

- SFC PPs are supported on the Rx signal for the configured protocol rate on OCI, OCI SRM, OCLD, OTR, and OFA circuit packs that do not have another type of facility performance monitoring.

- PM mode can be changed while in-service, after a connection is provisioned by editing the channel assignment for the facility.

- When the PM mode or protocol rate is changed in the channel assignment, the PP counts are reset to 0 and the TCA threshold and reporting status is reset to the default.

PM modes

PM modes define what type of PPs to collect. The following PM modes are available:

- SONET

    Near-end

  — Section layer performance parameters are based on BIP-8 errors in B1 bytes of SONET section overhead and SDH regenerator section overhead and some section layer defects.

  — Line layer performance parameters are based on BIP-8 errors in B2 bytes of SONET line overhead or SDH multiplex section overhead and some section/line layer defects.

— Path layer performance parameters are based on BIP-8 errors in B3 bytes of SONET path overhead or SDH path (high order) and some section/line/path layer defects. They monitor the traffic performance of an individual path.

Far-end

— The far-end line layer parameters are derived based on error counts detected by the far-end equipment and reported back to the near-end equipment using the:

– REI-L (bits 5-8 of M0 byte for OC-1, M1 byte for OC-N [N >= 3]) indication in the Line overhead.

– RDI-L events

— The far-end path layer parameters are derived based on error counts detected by the far-end PTE and reported back to the near-end PTE using the:

– REI-P (bits 1-4 of G1 byte) indication in the Line overhead.

– RDI-P events

• SDH

Parameters in this mode are similar to those in SONET mode except it counts the block errors instead of BIP-8 errors.

• 8B/10B

8B/10B encoding is used for such protocols as Fibre Channel, Gigabit Ethernet, ESCON, FICON, FICON Express, and ISC-3.

This coding scheme converts 8 bits (8B) of data into 10 bit (10B) symbols. The extra 8B/10B encoding bits allow for performance monitoring within these data protocols similar to the SONET B1, B2, and B3 overhead bytes. Using these bytes, you can calculate the PM parameters such as CV, SES, SEFS, and UAS. Basically, 8B/10B encoding is analogous to SONET/FEC/B1/B2/B3 in that it allows for performance monitoring, error detection/correction, and improved link performance. The parameters in this mode are based on 8B10B code violation counts and loss of synchronization defect on the signal.

• 8B/10BWAN

This PM mode is only supported on the OCI SRM GbE/FC circuit packs and the Muxponder client facilities for FICON, FICON Express and Fibre Channel protocols. On the LAN (optical) port, the parameters are collected exactly the same as those in 8B10B mode. On the WAN port, the parameters are collected based on uncorrectable errored super block (GFP) and loss of frame delineation (LFD) defects.

• SFC

This PM mode is supported on any protocol that does not have other means of performance monitoring.

In this mode, all near-end traffic affecting failure events are counted and durations are recorded in 1-second periods. A failure event is counted when the failure starts. A failure event that begins in a one 1-second period and ends in another period is counted only in the period in which it begins.

- GigE

    This mode is supported on the OCI SRM GbE/FC and OCI SRM GbE circuit packs and on the client facilities of the Muxponder 10 Gbit/s GbE/FC VCAT circuit packs for Gigabit Ethernet protocol. The parameters are based on Frame Check Sequence error (InframeError OM counter) and loss of signal (LOS) and loss of synchronization (LOSYNC) defects.

    Note: The GigE mode is collected on the WAN port. It is only supported when the encapsulation mode is set to GFP-F on the Muxponder 10 Gbit/s GbE/FC VCAT circuit pack.

- GigEWAN

    This mode is only supported on the client facilities of the Muxponder circuit pack. The parameters are based on on uncorrectable errored super block (GFP) and loss of frame delineation (LFD) defects.

    Note: The GigEWAN mode is collected on the WAN port. It is only supported when the encapsulation mode is set to GFP-T on the Muxponder circuit pack.

- Agile

    This mode is only supported on the OCI SRM circuit pack for the aggregate signal. The parameters on the aggregate port are similar to the SONET section PPs and the parameters on the path ports are similar to the SONET path parameters except that they are based on proprietary transport overhead.

- Digital Wrapper

    This mode is only supported on the line side of the OTR 10 Gbit/s Enhanced circuit pack with the SONET, SDH, 10G Ethernet LAN and 10G Clear Channel protocols. The error counts are based on forward error correction (FEC) and BIP-8 functions provided in the digital wrapper overhead.

- LanPhy

    This mode is only supported on the client side of the OTR 10 Gbit/s Enhanced circuit pack. The error counts are based on 64B66B functions provided in the Ethernet signal.

- SONET/DigitalWrapper

    This mode is only supported on the line side of the Muxponder circuit pack. The error counts are based on SONET, forward error correction (FEC) and BIP-8 functions provided in the digital wrapper overhead.

- SDH/DigitalWrapper

    Parameters in this mode are similar to those in SONET mode except it counts the block errors instead of BIP-8 errors.

- None

    None is used to deprovision performance monitoring on the selected facility.

    Note: Equipment PPs are collected regardless of the specified PM mode.

Table 3-1 lists the terms used to describe PPs.

Table 3-1
PPs terms and definitions

Term	Description
LAN	The LAN ports connect to an Ethernet interface (client optics).
WAN	The WAN ports provide connectivity over the SONET/SDH ring (line optics).
Near-end	The near-end PMs give you the performance information of the local equipment.
Far-end	The far-end PMs give you the performance information of the remote equipment.
End PM Mode	Indicates the PM Mode of the end point or client-side, where End point indicates the originating circuit pack facility for the signal.
West PM Mode	Since a client signal can be transmitted either through the east path or the west path on the line side, West PM Mode indicates the PM Mode of the West (line-side) path.
East PM Mode	Since a client signal can be transmitted either through the east path or the west path on the line side, East PM Mode indicates the PM Mode of the East (line-side) path.
Agg. PM Mode	Relates to the aggregate PPs for all OCI SRM circuit packs.
Client signal PM	Relates to the PPs collected for the signal from/to the client equipment via the client side interface (OCI, for example).
Line signal PM	Relates to the PPs collected for the signal from/to Optical Metro 5100/5200 system equipment using the line side DWDM/CWDM equipment (OCLD, for example).

The following tables show which PM modes are available for a circuit pack according to the supported protocols.

- Table 3-2 for OCI circuit packs
- Table 3-3 for OCLD circuit packs (except OCLD 2.5 Gbit/s Flex circuit packs)
- Table 3-4 for OCLD 2.5 Gbit/s Flex and OCLD 2.5 Gbit/s Universal circuit packs
- Table 3-5 for OTR circuit packs
- Table 3-6 for Muxponder circuit packs

For more information about the protocols supported by a particular circuit pack, see "Circuit pack specifications" in *Technical Specifications*, 323-1701-180.

Table 3-2
PM modes for OCI circuit packs

Circuit pack	Protocol/Bit rate	End PM mode	Aggregate PM mode
All OCIs (except SONET/SDH and SRM-type OCIs)	All protocols	SFC (default) None	—
OCI SONET/SDH	SONET protocols	SONET (default) SDH None	—
	SDH protocols	SONET SDH (default) None	
OCI SRM	All protocols	SFC (default) None	Agile (default) None
OCI SRM SONET/SDH	OC-12	SONET (default) SDH None	—
	STM-4	SONET SDH (default) None	
OCI SRM SONET/SDH LTE	SONET protocols	SONET (default) SDH None	SONET (default) SDH None
	SDH protocols	SONET SDH (default) None	SONET SDH (default) None

Table 3-2 (continued)
PM modes for OCI circuit packs

Circuit pack	Protocol/Bit rate	End PM mode	Aggregate PM mode
OCI SRM ESCON	ESCON	8B/10B (default) None	SONET (default) SDH None
OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced	Gigabit Ethernet	GigE (default) None	SONET (default) SDH None
	FC100 FICON	8B/10BWAN (default) None	
OCI SRM GbE	Gigabit Ethernet	GigE (default) None	SONET (default) SDH None

Table 3-3
PM modes for OCLD circuit packs

Circuit pack	Protocol/Bit rate	West/East PM mode
All OCLDs (except OCLD 2.5 Gbit/s Flex and OCLD 2.5 Gbit/s Universal)	All protocols	SFC (default) None

Table 3-4
PM modes for OCLD 2.5 Gbit/s Flex and OCLD 2.5 Gbit/s Universal circuit packs

Circuit pack	Protocol/Bit rate	West/East PM mode
OCLD 2.5 Gbit/s Flex and OCLD 2.5 Gbit/s Universal	SONET protocols ESRM250	SONET (default) SDH None
	SDH protocols	SONET SDH (default) None
	ISC-3 Gigabit Ethernet FICON FC-100 (1063M) FC-200 FICON Express, ESCON	SONET SDH 8B/10B None
	All other protocols	SFC None

Table 3-5
PM modes for OTR circuit packs

Circuit pack	Protocol/Bit rate	End PM mode	West/East PM mode
OTR 2.5 Gbit/s Flex and OTR 2.5 Gbit/s Universal	SONET protocols	SONET (default) SDH None	None
	SDH protocols	SONET SDH (default) None	None
	ISC-3 Gigabit Ethernet FICON FC-100 (1063M) FC-200 FICON Express	8B/10B (default) None	None
	All other protocols	SFC (default) None	SFC (default) None
OTR 10 Gbit/s	OC-192 10G Ethernet Wan	SONET (default) SDH None	None
	STM-64	SONET SDH (default) None	None
	10G Clear Channel	SFC None	SFC None
OTR 10 Gbit/s Enhanced	OC-192 10G Ethernet Wan	SONET (default) SDH None	DigitalWrapper (default) None
	STM-64	SONET SDH (default) None	DigitalWrapper (default) None
	10G Ethernet Lan	LanPhy None	DigitalWrapper (default) None
	10G Clear Channel	SFC (default) None	DigitalWrapper (default) None

Table 3-6
PM modes for Muxponder circuit packs

Circuit pack	Protocol/Bit rate	End PM mode	West/East PM mode
Muxponder 10 Gbit/s GbE/FC	Gigabit Ethernet	GigEWAN (default when Encapsulation mode is GFP-T) GigEWAN (default when Encapsulation mode is GFP-F) None	SONET/DigitalWrapper SDH/DigitalWrapper None *Note:* If the aggregate traffic is SONET, then SONET is the default mode. If the aggregate traffic is SDH, then SDH is the default mode.
	FICON FC-100 (1063M) FC-200 FICON Express	8B/10BWAN (default) None	

Performance parameters (PPs)

The following tables show which facility and equipment PPs are supported on a circuit pack according to port type, port number, direction, and PM mode. See Figure 3-1 on page 3-11 for the port type definitions.

- Table 3-7 for the OCI SRM GbE/FC and OCI SRM GbE/FC Enhanced circuit packs
- Table 3-8 for the OCI SRM GbE circuit pack
- Table 3-9 for the OCI SRM ESCON circuit pack
- Table 3-10 for the OCI SRM circuit pack
- Table 3-11 for the OCI SRM SONET/SDH circuit pack
- Table 3-12 for the OCI SRM SONET/SDH LTE circuit pack
- Table 3-13 for the OCI SONET/SDH circuit pack
- Table 3-14 for the OCLD 2.5 Gbit/s Flex circuit pack
- Table 3-15 for the OCLD 2.5 Gbit/s Universal circuit pack
- Table 3-16 for the OTR 2.5 Gbit/s Flex circuit pack
- Table 3-17 for the OTR 10 Gbit/s circuit pack
- Table 3-18 for the OTR 10 Gbit/s Enhanced circuit pack
- Table 3-19 for the OTR 2.5 Gbit/s Universal circuit pack
- Table 3-20 for the Muxponder 10 Gbit/s GbE/FC circuit pack
- Table 3-21 for the Muxponder 10 Gbit/s GbE/FC VCAT circuit pack
- Table 3-22 for the OFA circuit pack
- Table 3-23 for the APBE circuit pack

Figure 3-1 shows a functional block diagram of an OCI SRM GbE/FC circuit pack. You can use this diagram as a generic example to understand the physical location where the performance parameters are collected for all circuit packs as listed in Tables 3-7 to 3-23.

Figure 3-1
OCI SRM GbE/FC circuit pack functional block diagram

OM1980
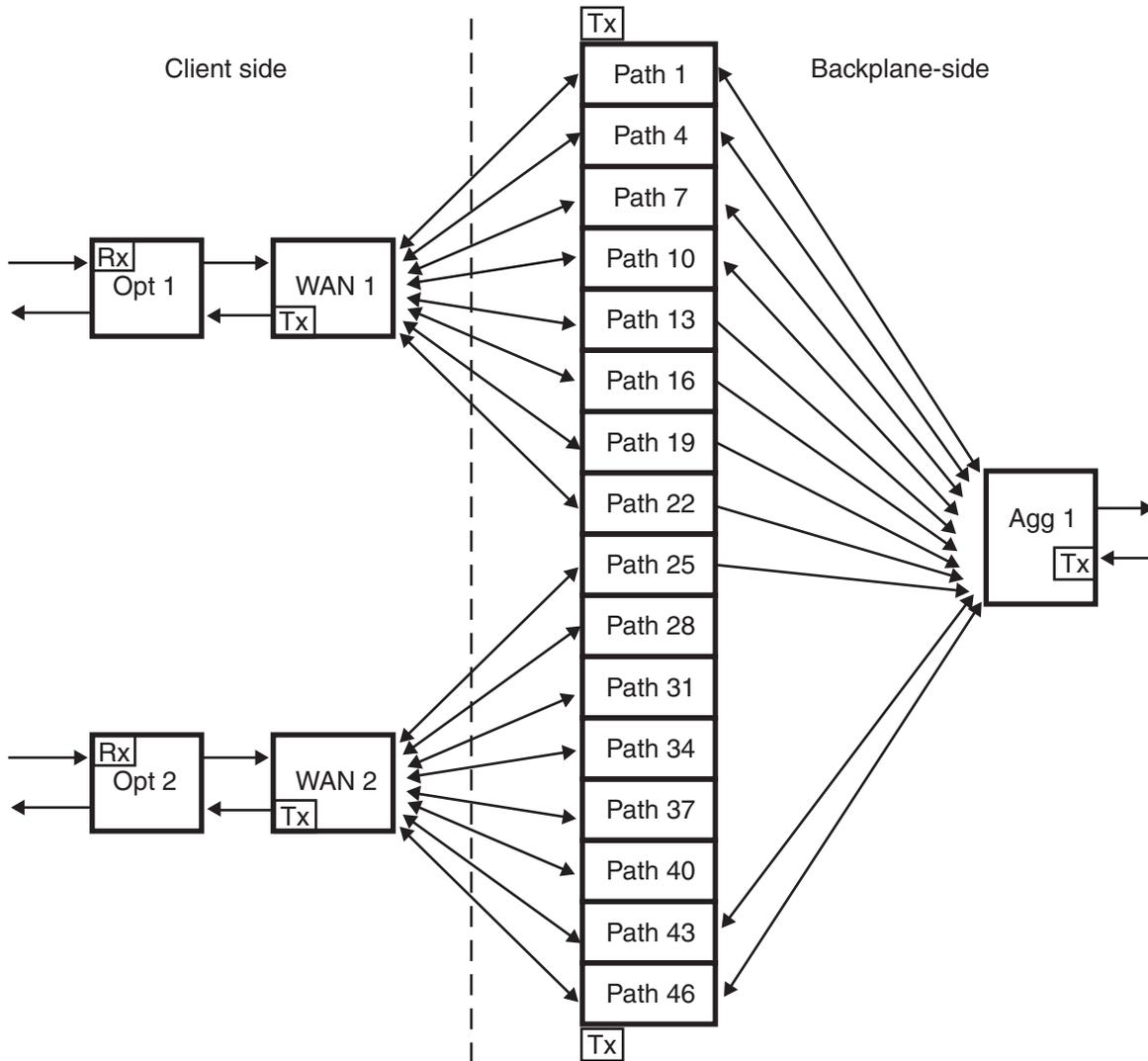
Table 3-7
PPs supported on the OCI SRM GbE/FC and OCI SRM GbE/FC Enhanced circuit packs

Port type	Port #	Direction	PM mode	PPs
Optical	1 and 2	Rx	GigE	ES, SES, UAS
			8B/10BWAN	CV, ES, SES, UAS
			None	No PPs available
Wan	1 and 2	Tx	GigE	ES, SES, UAS
			8B/10BWAN	ES, SES, UAS
			None	No PPs available
Path	SONET protocol: 1, 4, 7,10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43,46 SDH protocol: 1, 2, 3, ...,16	Tx	SONET	CVP, ESP, SESP, UASP CV-PFE, ES-PFE, SES-PFE, UAS-PFE
			SDH	EBP, ESP, SESP, UASP EB-PFE, ES-PFE, SES-PFE, UAS-PFE
			None	No PPs available
Aggregate	1	Tx	SONET	CVS, ESS, SESS, SEFSS CVL, ESL, SESL, UASL CV-LFE, ES-LFE, SES-LFE, UAS-LFE
			SDH	EBS, ESS, SESS, OFSS EBL, ESL, SESL, UASL EB-LFE, ES-LFE, SES-LFE, UAS-LFE
			None	No PPs available

Note: PPs on the OCI SRM GbE/FC and OCI SRM GbE/FC Enhanced circuit packs are monitored from INGRESS to EGRESS.

Table 3-8
PPs supported on the OCI SRM GbE circuit pack

Port type	Port #	Direction	PM mode	PPs
Optical	1 and 2	Rx	GigE	ES, SES, UAS
			None	No PPs available
Wan	1 and 2	Tx	GigE	ES, SES, UAS
			None	No PPs available
Path	SONET protocol: 1, 4, 7,10, 13, 16, 19, 22, 25, 28, 31, 34, 37, 40, 43,46 SDH protocol: 1, 2, 3, ...,16	Tx	SONET	CVP, ESP, SESP, UASP CV-PFE, ES-PFE, SES-PFE, UAS-PFE
			SDH	EBP, ESP, SESP, UASP EB-PFE, ES-PFE, SES-PFE, UAS-PFE
			None	No PPs available
Aggregate	1	Tx	SONET	CVS, ESS, SESS, SEFSS CVL, ESL, SESL, UASL CV-LFE, ES-LFE, SES-LFE, UAS-LFE
			SDH	EBS, ESS, SESS, OFSS EBL, ESL, SESL, UASL EB-LFE, ES-LFE, SES-LFE, UAS-LFE
			None	No PPs available
Note: PPs on the OCI SRM GbE circuit pack are monitored from INGRESS to EGRESS.				

Table 3-9
PPs supported on the OCI SRM ESCON circuit pack

Port type	Port #	Direction	PM mode	PPs
Optical	1 to 8	Rx	8B/10B	CV, ES, SES, UAS
			None	No PPs available
Path	1, 7, 13, 19, 25, 31, 37, 43	Tx	SONET	CVP, ESP, SESP, UASP
			SDH	EBP, ESP, SESP, UASP
			None	No PPs available

Table 3-9 (continued)
PPs supported on the OCI SRM ESCON circuit pack

Port type	Port #	Direction	PM mode	PPs
Aggregate	1	Tx	SONET	CVS, ESS, SESS, SEFSS, UASS
			SDH	EBS, ESS, SESS, OFSS, UASS
			None	No PPs available

Table 3-10
PPs supported on the OCI SRM circuit pack

Port type	Port #	Direction	PM mode	PPs
Optical	1 to 4	Tx	SFC	No PPs available
			None	No PPs available
		Rx	SFC	FC, ES
			None	No PPs available
Path	1 to 4	Tx	Agile	CV, ES, SES
			None	No PPs available
Aggregate	1	Tx	Agile	CV, ES, SES, SEFS, UAS
			None	No PPs available

Table 3-11
PPs supported on the OCI SRM SONET/SDH circuit pack

Port type	Port #	Direction	PM mode	PPs
Optical	1 to 4	Tx	SONET	CVS, ESS, SESS, SEFSS, UASS
			SDH	EBS, ESS, SESS, OFSS, UASS
			None	No PPs available
		Rx	SONET	CVS, ESS, SESS, SEFSS, UASS
			SDH	EBS, ESS, SESS, OFSS, UASS
			None	No PPs available

Note: When the Loss of Frame fault on an OCI SRM SONET/SDH circuit pack clears, the CV count on the Tx and Rx ports increases. The count increase is less than 20. As a result, you can see unexpected CV counts during the transition from a Loss of Frame to an In-frame condition. To compensate for this, Nortel Networks recommends that you reset the CV bin to zero after recovering from a Loss of Frame condition.

Table 3-12
PPs supported on the OCI SRM SONET/SDH LTE circuit pack

Port type	Port #	Direction	PM mode	PPs
Optical	1 to 4	Rx	SONET	CVS, ESS, SESS, SEFSS CVL, ESL, SESL, UASL CV-LFE, ES-LFE, SES-LFE, UAS-LFE
			SDH	EBS, ESS, SESS, OFSS EBL, ESL, SESL, UASL EB-LFE, ES-LFE, SES-LFE, UAS-LFE
			None	No PPs available
Aggregate	1	Tx	SONET	CVS, ESS, SESS, SEFSS CVL, ESL, SESL, UASL CV-LFE, ES-LFE, SES-LFE, UAS-LFE
			SDH	EBS, ESS, SESS, OFSS EBL, ESL, SESL, UASL EB-LFE, ES-LFE, SES-LFE, UAS-LFE
			None	No PPs available

Table 3-13
PPs supported on the OCI SONET/SDH circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1	Tx	SONET	CVS, ESS, SESS, SEFSS, UASS	TxPowerHigh, TxPowerLow
			SDH	EBS, ESS, SESS, OFSS, UASS	
			None	N/A	
		Rx	SONET	CVS, ESS, SESS, SEFSS, UASS	RxPowerHigh, RxPowerLow
			SDH	EBS, ESS, SESS, OFSS, UASS	
			None	N/A	

Table 3-14
PPs supported on the OCLD Flex circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
			8B/10B	CV, ES, SES	
			SONET	CVS, ESS, SESS, SEFS	
			SDH	EBS, ESS, SESS, OFSS	
			None	N/A	
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
			8B/10B	CV, ES, SES	
			SONET	CVS, ESS, SESS, SEFS	
			SDH	EBS, ESS, SESS, OFSS	
			None	N/A	

Table 3-15
PPs supported on the OCLD 2.5 Gbit/s Universal circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
			8B/10B	CV, ES, SES	
			SONET	CVS, ESS, SESS, SEFS	
			SDH	EBS, ESS, SESS, OFSS	
			None	N/A	
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
			8B/10B	CV, ES, SES	
			SONET	CVS, ESS, SESS, SEFS	
			SDH	EBS, ESS, SESS, OFSS	
			None	N/A	

Table 3-16
PPs supported on the OTR 2.5 Gbit/s Flex circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
			8B/10B	CV, ES, SES, UAS	
			SONET	CVS, ESS, SESS, SEFS, UASS	
			SDH	EBS, ESS, SESS, OFSS, UASS	
			None	N/A	
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
			8B/10B	CV, ES, SES, UAS	
			SONET	CVS, ESS, SESS, SEFS, UASS	
			SDH	EBS, ESS, SESS, OFSS, UASS	
			None	N/A	
	2	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
			None	N/A	
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
			None	N/A	
Note: On the OTR 2.5 Gbit/s Flex circuit pack, the Client Tx PPs are not valid when the facility is OOS and in a software loopback state.					

Table 3-17
PPs supported on the OTR 10 Gbit/s circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
			SONET	CVS, ESS, SESS, SEFS, UASS	
			SDH	EBS, ESS, SESS, OFSS, UASS	
			None	N/A	
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
			SONET	CVS, ESS, SESS, SEFS, UASS	
			SDH	EBS, ESS, SESS, OFSS, UASS	
			None	N/A	
	2	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
			None	N/A	
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
			None	N/A	

Note: On the OTR 10 Gbit/s circuit pack, the Client Tx PPs are not valid when the facility is OOS and in a software loopback state.

Table 3-18
PPs supported on the OTR 10 Gbit/s Enhanced circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
			SONET	CVS, ESS, SESS, SEFSS	
			SDH	EBS, ESS, SESS, OFSS	
			LanPhy	N/A	
			None	N/A	
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
			SONET	CVS, ESS, SESS, SEFSS, CVL, ESL, SESL, UASL	
			SDH	EBS, ESS, SESS, OFSS, EBL, ESL, SESL, UASL	
			LanPhy	CV, ES, SES, UAS	
			None	N/A	
	2	Tx	Digital Wrapper	N/A	TxPowerHigh, TxPowerLow
			None	N/A	
		Rx	Digital Wrapper	CV, ES, SES, FEC-CE, FEC-UF	RxPowerHigh, RxPowerLow
			None	N/A	
Note: On the OTR 10 Gbit/s Enhanced circuit pack, the Client Tx PPs are not valid when the facility is OOS and in a software loopback state.					

Table 3-19
PPs supported on the OTR 2.5 Gbit/s Universal circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
			8B/10B	CV, ES, SES	
			SONET	CVS, ESS, SESS, SEFS	
			SDH	EBS, ESS, SESS, OFSS	
			None	N/A	
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
			8B/10B	CV, ES, SES	
			SONET	CVS, ESS, SESS, SEFS	
			SDH	EBS, ESS, SESS, OFSS	
			None	N/A	

Table 3-20
PPs supported on the Muxponder 10 Gbit/s GbE/FC circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1, 2, 3, 4, 5, 6, 7, 8	Tx	GigEWAN	N/A	TxPowerHigh, TxPowerLow
			8B/10BWAN	N/A	
			None	N/A	
		Rx	GigEWAN	ES,SES,UAS	RxPowerHigh, RxPowerLow
			8B/10BWAN	CV, ES, SES, UAS	
			None	N/A	
	11	Tx	SONET/ DigitalWrapper	N/A	TxPowerHigh, TxPowerLow
			SDH/ DigitalWrapper	N/A	
			None	N/A	
		Rx	SONET/ DigitalWrapper	CV, ES, SES, FEC-CE, FEC-UF CVS, ESS, SESS, SEFSS CVL, ESL, SESL, UASL, CV-LFE, ES-LFE, SES-LFE, UAS-LFE,	RxPowerHigh, RxPowerLow
			SDH/ DigitalWrapper	CV, ES, SES, FEC-CE, FEC-UF EBS, ESS, SESS, OFSS EBL, ESL, SESL, UASL, EB-LFE, ES-LFE, SES-LFE, UAS-LFE	
			None	N/A	

Table 3-20 (continued)
PPs supported on the Muxponder 10 Gbit/s GbE/FC circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
WAN	1, 2, 3, 4, 5, 6, 7, 8, 9, 10 (See Note)	Tx	GigEWAN	ES, SES, UAS	N/A
			8B/10BWAN	ES, SES, UAS	
			None	N/A	
		Rx	GigEWAN	N/A	N/A
			8B/10BWAN	N/A	
			None	N/A	
Note: Ports 1 to 8 are supported on Muxponder 10 Gbit/s GbE/FC.					

Table 3-21
PPs supported on the Muxponder 10 Gbit/s GbE/FC VCAT circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Tx	GigE (using GFP-F)	N/A	TxPowerHigh, TxPowerLow
			GigEWAN (using GFP-T)	N/A	
			8B/10BWAN	N/A	
			None	N/A	
		Rx	GigE (using GFP-F)	ES, SES, UAS	RxPowerHigh, RxPowerLow
			GigEWAN (using GFP-T)	ES, SES, UAS	
			8B/10BWAN	CV, ES, SES, UAS	
			None	N/A	
	11	Tx	SONET/ DigitalWrapper	N/A	TxPowerHigh, TxPowerLow
			SDH/ DigitalWrapper	N/A	
			None	N/A	
		Rx	SONET/ DigitalWrapper	Digital Wrapper: CV, ES, SES, FEC-CE, FEC-UF SONET: CVS, ESS, SESS, SEFSS, CVL, ESL, SESL, UASL, CV-LFE, ES-LFE, SES-LFE, UAS-LFE,	RxPowerHigh, RxPowerLow
			SDH/ DigitalWrapper	Digital Wrapper: CV, ES, SES, FEC-CE, FEC-UF SDH: EBS, ESS, SESS, OFSS, EBL, ESL, SESL, UASL, EB-LFE, ES-LFE, SES-LFE, UAS-LFE	
			None	N/A	

Table 3-21
PPs supported on the Muxponder 10 Gbit/s GbE/FC VCAT circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
WAN	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Tx	GigE (using GFP-F)	ES, SES, UAS	N/A
			GigE WAN (using GFP-T)	ES, SES, UAS	
			8B/10BWAN	ES, SES, UAS	
			None	N/A	
		Rx	GigE (using GFP-F)	N/A	N/A
			GigE WAN (using GFP-T)	N/A	
			8B/10BWAN	N/A	
			None	N/A	
Optical Path	1, 2, 3, 4, 5, 6, 7, 8, 9, 10	Tx	Not applicable, (see Note 1)	SONET: CVP, ESP, SESP, UASP, CV-PFE, ES-PFE, SES-PFE, UAS-PFE SDH: EBP, ESP, SESP, UASP, EB-PFE, ES-PFE, SES-PFE, UAS-PFE (see Note 2 and Note 3)	NA

Note 1: PM Mode is not applicable to path PMs. Path PMs can be enabled/disabled using the Muxponder Channel Assignment Advance Detail screen. Path PMs are disabled by default.

Note 2: SONET Path PPs are collected if the port number 11 PM Mode parameter is set to SONET/Digital Wrapper. SDH Path PPs are collected if the port number 11 PM Mode parameter is set to SDH/Digital Wrapper. No Path PPs are collected if the port number 11 PM Mode parameter is set to None even if the Path PM parameter is set to Enable in the Muxponder Channel Assignment Advance Detail screen.

Note 3: Only summary TCAs are available for path PPs. A maximum of two summary TCAs, one for current 15-min bin and one for current 1-day bin, are raised as minor alarms or events for each direction of a facility no matter how many PPs are collected on that facility. Also, all the TCAs of the paths associated to a port are summarized.

Table 3-22
PPs supported on the OFA circuit pack

Port type	Port #	Direction	PM mode	Facility PPs	Equipment PPs
Optical	1	Tx	SFC	N/A	TxPowerHigh, TxPowerLow
		Rx	SFC	FC, ES	RxPowerHigh, RxPowerLow
Note: The PM mode on the OFA is always SFC. You cannot change the PM mode. The PPs are supported if the facility is provisioned.					

Table 3-23
PPs supported on the APBE circuit pack

Port type	Port #	Direction	PM mode	PPs
Optical	1 to 4	Tx	—	TxPowerLow
	1 to 4	Rx	—	RxPowerLow
	5	Tx	—	TxPowerHigh
Note: You cannot specify a PM mode for the APBE circuit pack. The PPs are supported if the facilities are provisioned.				

Facility performance monitoring

Optical Metro 5100/5200 facility performance monitoring provides cumulative facility counts that measure the quality of the payload signal.

Facility counts are collected and stored in bins for each performance parameter. Bin counts are kept for 15-minute and 1 day intervals, and for one untimed interval. You can query the current values that are being collected, and view historical counts for the previous day, and for 32 previous 15-minute intervals.

Provisionable PM bin zero suppression and history bins

The Optical Metro 5100/5200 Performance Monitoring (PM) system maintains history bins. There are 32 history bins for 15-minute bin readings. Normally the current 15-minute bin rolls over into the history bin and is cleared to begin counting for the next 15-minute period.

With zero suppression, the current bin is not rolled over into history if it has no count (equal to 0) and the bin does not have an Invalid Data Flag (IDF). In this way the history bins contain only the last 32 time periods with non-zero counts and not simply the last eight hours of data (32 x 15 minutes).

The user can provision one of following settings related to PM bin zero suppression for the shelf:

- All Zero Suppression: all PM modes and OMs perform zero suppression

- No Zero Suppression: no zero suppression for all PM modes
- SDH Zero Suppression: perform zero suppression only for SDH PM mode

If you check history bins immediately after the network has been brought up, or after a facility has been added, or after all the counters were reset, there will be no entries for the history bins.

Each bin has a timestamp indicating the start time of the bin. To avoid confusion with local time and installations with sites in several time zones, GMT time is used to mark the time at which a bin was started. 15-minute bins start on the GMT hour and 15, 30 and 45 minutes past the hour. 1-day or 24-hour bins start 00:00:00 GMT, or midnight. 15-minute bins start on the GMT hour on the NE level, but the SMI displays the local time (EST or EDT) providing local timestamps for 15-minute bins. The 24-hour or 1-day begins collecting data for the current day at 00:00:00 GMT. As a result, the timestamp on the bin may vary according to the local time of the location in which an operator is situated. For example, at a site in the Eastern Standard Time (EST) zone the bin timestamp will be 19:00:00 (EST) or 20:00:00 (EDT), not 00:00:00.

Additionally, each bin has an invalid data flag (IDF) which is set when the count is suspected to be inaccurate. Counts on the current bin are cleared at the end of an interval, or when a manual operation is performed to reset the counts. In System Manager, a period (.) in the IDF column indicates that the count is valid. A question mark (?) in the IDF column indicates that an IDF is set for the current bin, and that the validity of the count is questionable.

When the untimed bin is started, it keeps accumulating and is never rolled over into history. There is no time limit imposed on this bin. The timestamp on the untimed bin indicates when the bin was started. The untimed bin does not have TCAs. The untimed bin restarts when the counter is reset, the card is inserted, or the facility state changes between out-of-service and in-service. The untimed bin IDF flag is set to false (.) when the bin is reset. The untimed bin IDF flag is set to true (?) when the count is believed to be inaccurate.

The current 15-minute and 1-day bins have thresholds for threshold crossing alert.

When their corresponding facility admin state is changed from IS to OOS or vice versa, SONET, SDH, SFC, GigE, and 8B/10B facility PPs are reset to 0. Then the facility PPs continue to count. Agile (aggregate and path) PPs are not reset when their corresponding facility admin or equipment state is changed.

For the OCI SRM ESCON circuit pack, the optical (8B/10B) and path (B3) PPs are reset to 0 and continue to count but raise IDFs against all bins when the corresponding facility admin state is changed from IS to OOS. The optical

(8B/10B) and path (B3) PPs are reset to 0 and continue to count but do not raise IDFs against all bins, when the corresponding facility admin state is changed from OOS to IS.

For the OCI SRM ESCON circuit pack, aggregate PPs are reset to 0 and continue to count but raise IDFs against all bins when the facility entities admin state of all eight ports is changed from IS to OOS and the equipment admin state is changed from IS to OOS. The aggregate PPs are reset to 0 and continue to count but do not raise IDFs against all bins, when the corresponding equipment entity admin state is changed from OOS to IS.

SONET section layer PPs

SONET section layer PPs include:

- Section coding violation (CVS)

    — counts the number of BIP-8 errors (from B1 bytes) in the section overhead

    — up to eight CVS may be counted per frame

    Note: CVS counts are inhibited in severely errored seconds (SESS). See "Section severely errored second (SESS)" for more information.

- Section errored second (ESS)

    — counts the number of one second intervals that contain one or more CVS, or one or more severely errored frame (SEF) defects

    — for the OCI SRM GbE/FC only, also counts the number of one second intervals that contain one or more loss of signal (LOS) defects

- Section severely errored second (SESS)

    — counts the number of one second intervals that contain n or more CVS, or one or more SEF defects. Refer to Table 3-24 for appropriate n values in a SONET system.

    — for the OCI SRM GbE/FC circuit pack only, also counts the number of one second intervals that contain one or more loss of signal (LOS) defects

Table 3-24
Rate specific CVS values for SESS counts

Bit rate	n value for CVS
OC-1	52
OC-3	155
OC-12	616
OC-24	1220
OC-48	2392
OC-192	8554

- Section severely errored frame second (SEFSS)

    — counts the number of one second intervals that contain one or more SEF defects

    — an SEF defect occurs when a minimum of four consecutive frames have invalid framing bytes (A1/ A2) up to a maximum detection time of 625 ms

— an SEF defect is cleared when two consecutive frames can be aligned

---

ATTENTION

The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UASS)

    — counts the number of unavailable seconds of a signal based on SESS

    A facility is defined to be unavailable if 10 consecutive seconds are severely errored. Once in the unavailable state, subsequent seconds are unavailable until 10 consecutive non-SESS are observed. The UASS count includes the leading ten consecutive SESS, but not the trailing ten non-SESS. During periods of unavailability, other section facility performance parameters continue to count.

SDH regenerator section PPs

SDH regenerator section PPs include

- Regenerator section errored block (EBS)

    — counts the number of blocks that contain one or more BIP errors in the B1 Byte of regenerator section overhead

    — only one errored block is counted per STM-n frame

    Note: EBS counts are inhibited in severely errored seconds (SESS). See "Regenerator section severely errored seconds (SESS)" for more information.

- Regenerator section errored second (ESS)

    — counts the number of one second intervals that contain one or more errored blocks, or one or more severely errored frame (SEF) defects

    — for the OCI SRM GbE/FC circuit pack, also counts the number of one second intervals that contain one or more LOS defects

- Regenerator section severely errored seconds (SESS)

    — counts the number of one second intervals that contain more than 30% (2400) errored blocks, or one or more SEF defects

    — for the OCI SRM GbE/FC circuit pack, also counts the number of one second intervals that contain one or more LOS defects

- Regenerator section out of frame seconds (OFSS)

    — counts the number of seconds that contain one or more loss of frame defects

— a loss of frame defect occurs when a minimum of four consecutive frames have invalid framing bytes (A1/ A2) up to a maximum detection time of 625 ms

— a loss of frame defect is cleared when two consecutive frames can be aligned

- Unavailable seconds (UASS)

    Note: See "Unavailable seconds (UASS)" on page 3-29 for more information.

SONET near-end line PPs

SONET near-end line PPs include

- Near-end line coding violation (CVL)

    — counts the number of BIP-8 errors from B2 bytes in the line overhead

    — a total of 8 x n BIP-8 errors per frame are counted for the OC-n signal

    Note: CVL counts are inhibited in severely errored seconds (SESL) or unavailable seconds (UASL).

- Near-end line errored second (ESL)

    — counts the number of one second intervals that contain one or more CVL, AIS-L, LOF, or LOS defects

    — this count does not accumulate if a line is in an unavailable state (UASL is counting)

- Near-end line severely errored second (SESL)

    — counts the number of one second intervals that contain *n* or more CVL, or one or more AIS-L, LOF, or LOS defects. Refer to Table 3-25 for appropriate *n* values in a SONET system.

    — this count does not accumulate if a line is in an unavailable state

Table 3-25
Rate specific CVL values for SESL counts in a SONET system

Bit rate	*n* value for CVLs
OC-1	51
OC-3	154
OC-12	615
OC-24	1229
OC-48	2459
OC-192	9835

- Near-end line unavailable seconds (UASL)

    — counts the number of unavailable seconds of a signal based on SESL

    A facility is defined to be unavailable if 10 consecutive seconds are severely errored. Once in the unavailable state, subsequent seconds are unavailable until 10 consecutive non-SESL seconds are observed. The UASL count includes the leading 10 consecutive SESL, but not the trailing 10 non-SESL. During periods of unavailability, CVL, ESL, and SESL do not include the leading 10 consecutive seconds of SESL.

SDH near-end multiplex section PPs

SDH near-end multiplex section PPs include

- Near-end multiplex section errored block (EBL)

    — counts the number of errored blocks from B2 bytes in the multiplex section overhead

    — a total of 8 x n errored blocks per frame are counted for the STM-n signal

    Note: EBL counts are inhibited in severely errored seconds (SESL) or unavailable seconds (UASL).

- Near-end multiplex section errored second (ESL)

    — counts the number of one second intervals that contain one or more errored blocks, EBL, AIS-L, LOF, or LOS defects

    — this count does not accumulate if a line is in an unavailable state

- Near-end multiplex section severely errored seconds (SESL)

    — counts the number of one second intervals that contain n *(Y%)* or more EBL, or one or more AIS-L, LOF, or LOS defects. Refer to Table 3-26 for appropriate n and *Y%* values in an SDH system.

    — this count does not accumulate if a line is in an unavailable state

Table 3-26
Rate specific EBL values for SESL counts in an SDH system

Bit rate	*Y%*	*n* number of EBLs
STM-0	15	8 x 8000 x 15% = 9600
STM-1	15	24 x 8000 x 15% = 28,800
STM-4	25	96 x 8000 x 25% = 192,000
STM-16	30	384 x 8000 x 30% = 921,000
STM-64	30	1536 x 8000 x 30% = 3,686,400

- Near-end line unavailable seconds (UASL)

— see "Near-end line unavailable seconds (UASL)" on page 3-31 for information.

SONET far-end line PPs

SONET far-end line PPs include

- Far-end line coding violation (CV-LFE)

  — counts the number of BIP errors detected by the far-end LTE and reported back to the near-end LTE using the REI-L indication in the line overhead, that is bits 5 through 8 of M0 byte for OC-1 and of M1 byte for OC-n (where n is greater or equal to 3)

  — this count does not accumulate during near-end AIS-L, SES-LFE, or UAS-LFE. An IDF is raised during near-end AIS-L.

- Far-end line errored second (ES-LFE)

  — counts the number of one second intervals that contain one or more CV-LFE, or one or more RDI-L defects

  — this count does not accumulate during near-end AIS-L or UAS-LFE. An IDF is raised during near-end AIS-L.

- Far-end line severely errored second (SES-LFE)

  — counts the number of one second intervals that contain more than n CV-LFE, or more than one RDI-L defects. Refer to Table 3-27 for appropriate n values in an SDH system.

  — this count does not accumulate during near-end AIS-L or UAS-LFE. An IDF is raised during AIS-L.

Table 3-27
Rate specific CV-LFE values for SES-LFE counts in a SONET system

Bit rate	n value for CV-LFEs
OC-1	51
OC-3	154
OC-12	615
OC-24	1229
OC-48	2459
OC-192	9835

- Far-end line unavailable seconds (UAS-LFE)

  — counts the number of unavailable seconds of a signal based on SES-LFE

  — this count does not accumulate during near-end AIS-L. An IDF is raised during AIS-L.

Note: A facility is defined to be unavailable if 10 consecutive seconds are severely errored. Once in the unavailable state, subsequent seconds are unavailable until 10 consecutive non-SES-LFE are observed. The UAS-LFE count includes the leading 10 consecutive SES-LFE, but not the trailing 10 non-SES-LFE. During periods of unavailability, CV-LFE, ES-LFE, and SES-LFE do not include the leading 10 consecutive seconds of SES-LFE.

SDH far-end multiplex section PPs

SDH far-end multiplex section PPs include

- Far-end multiplex section errored block (EB-LFE)
    - counts the number of block errors from REI-L (M0 and M1 bytes)
    - this count does not accumulate during near-end AIS-L, SES-LFE, or UAS-LFE. An IDF is raised during AIS-L.
- Far-end multiplex section errored second (ES-LFE)
    - counts the number of one second intervals that contain one or more EB-LFE, or one or more RDI-L defects
    - this count does not accumulate during near-end AIS-L or UAS-LFE. An IDF is raised during AIS-L.
- Far-end multiplex section severely errored seconds (SES-LFE)
    - counts the number of one second intervals that contain more than *n (Y%)* EB-LFE, or more than one RDI-L defects. Refer to Table 3-28 for appropriate *n* and *Y%* values in an SDH system.
    - this count does not accumulate if a line is in the event of unavailable seconds (UASL)

Table 3-28
Rate specific EB-LFEs values for SES-LFE counts in an SDH system

Bit rate	*Y%*	*n* value for EB-LFEs
STM-0	15	8 x 8000 x 15% = 9600
STM-1	15	24 x 8000 x 15% = 28,800
STM-4	25	96 x 8000 x 25% = 192,000
STM-16	30	384 x 8000 x 30% = 921,000
STM-64	30	1536 x 8000 x 30% = 3,686,400

- Far-end multiplex section unavailable seconds (UAS-LFE)
    - see "Far-end line unavailable seconds (UAS-LFE)" on page 3-32 for information.

SONET near-end path PPs

SONET near-end path PPs include

- Near-end path coding violation (CVP)
  - counts the number of BIP-8 errors from B3 bytes at the path overhead
  - up to eight CVP may be counted per frame

  Note: CVP counts are inhibited in severely errored seconds (SESP) or unavailable seconds (UASP).

- Near-end path errored second (ESP)
  - counts the number of one second intervals that contain one or more CVP, AIS-L, LOF, LOS, LOP-P, or AIS-P defects
  - this count does not accumulate if a line is an unavailable state

  Note: LOS, LOP-P, LOF, and AIS-L are not supported on the OCI SRM ESCON circuit pack.

- Near-end path severely errored second (SESP)
  - counts the number of one second intervals that contain 2400 or more CVP, or one or more AIS-L, LOF, LOS, LOP-P, or AIS-P defects
  - this count does not accumulate if a line is in the event of unavailable seconds (UASP)

  Note: LOS, LOP-P, LOF, and AIS-L are not supported on the OCI SRM ESCON circuit pack.

- Near-end path unavailable seconds (UASP)
  - counts the number of unavailable seconds of a signal based on SESP

  Note: A facility is defined to be unavailable if 10 consecutive seconds are severely errored. Once in the unavailable state, subsequent seconds are unavailable until 10 consecutive non-SESP are observed. The UASP count includes the leading 10 consecutive SESP, but not the trailing 10 non-SESP. During periods of unavailability, CVP, ESP, and SESP do not include the leading 10 consecutive seconds of SESP.

SDH near-end path PPs

SDH near-end path PPs include

- Near-end path errored block (EBP)
  - counts the number of errored blocks from B3 bytes in the path overhead
  - only one errored block is counted per STM-n frame

  Note: EBP counts are inhibited in severely errored seconds (SESP) or unavailable seconds (UASP).

- Near-end path errored second (ESP)

  — counts the number of one second intervals that contain one or more errored blocks, or one or more AIS-L, EBL, LOF, LOS, LOP-P, or AIS-P defects

  — this count does not accumulate if a line is in an unavailable state

  Note: LOF, LOS, LOP-P, and AIS-L are not supported on the OCI SRM ESCON circuit pack.

- Near-end path severely errored seconds (SESP)

  — counts the number of one second intervals that contain 30% (2400) or more EBP, or one or more AIS-L, LOF, LOS, LOP-P, or AIS-P defects

  — this count does not accumulate if a line is in an unavailable state

  Note: LOF, LOS, LOP-P, and AIS-L are not supported on the OCI SRM ESCON circuit pack.

- Near-end path unavailable seconds (UASP)

  — see for information.

SONET far-end path PPs

SONET far-end path PPs include

- Far-end path coding violation (CV-PFE)

  — counts the number of BIP errors from REI-P (bits 1 through 4 of G1 byte) at the path layer

  — this count does not accumulate during one second intervals containing near-end AIS-P, LOP-P, UNEQ-P defects, or far-end SES-PFE or UAS-PFE defects. An IDF is raised if near-end AIS-P, LOP-P, or UNEQ-P defects occur.

- Far-end path errored second (ES-PFE)

  — counts the number of one second intervals that contain one or more CV-PFE, or one or more RDI-P (bits 4 through 8 of G1 byte) defects

  — this count does not accumulate during one second intervals containing near-end AIS-P, LOP-P, or UNEQ-P defects, or far-end UAS-PFE defects. An IDF is raised if AIS-P, LOP-P, or UNEQ-P defects occur.

- Far-end path severely errored second (SES-PFE)

  — counts the number of one second intervals that contain 2400 or more CV-PFE, or one or more RDI-P defects

  — this count does not accumulate during one second intervals containing near-end AIS-P, LOP-P, or UNEQ-P defects, or far-end UAS-PFE defects. An IDF is raised if AIS-P, LOP-P, or UNEQ-P defects occur.

- Far-end path unavailable seconds (UAS-PFE)

    — counts the number of unavailable seconds of a signal based on SES-PFE

    — this count does not accumulate during one second intervals containing near-end AIS-P, LOP-P, or UNEQ-P defects. An IDF is raised if AIS-P, LOP-P, or UNEQ-P defects occur.

    Note: A facility is defined to be unavailable if 10 consecutive seconds are severely errored. Once in the unavailable state, subsequent seconds are unavailable until 10 consecutive non-SES-PFE are observed. The UAS-PFE count includes the leading 10 consecutive SES-PFE, but not the trailing 10 non-SES-PFE. During periods of unavailability, CV-PFE, ES-PFE, and SES-PFE do not include the leading 10 consecutive seconds of SES-PFE.

SDH far-end path PPs

SDH far-end path PPs include

- Far-end path errored block (EB-PFE)

    — counts the number of block errors from REI-P (bits 1 through 4 of G1 byte) at the path layer

    — this count does not accumulate during one second intervals containing near-end AIS-P, LOP-P, UNEQ-P defects, or far-end SES-PFE or UAS-PFE defects. An IDF is raised if near-end AIS-P, LOP-P, or UNEQ-P defects occur.

- Far-end path errored second (ES-PFE)

    — counts the number of one second intervals that contain one or more EB-PFE, or one or more RDI-P defects

    — this count does not accumulate during one second intervals containing near-end AIS-P, LOP-P, UNEQ-P defects, or far-end UAS-PFE defects. An IDF is raised if near-end AIS-P, LOP-P, or UNEQ-P defects occur.

- Far-end path severely errored seconds (SES-PFE)

    — counts the number of one second intervals that contain 2400 or more EB-PFE, or one or more RDI-P defects

    — this count does not accumulate during one second intervals containing near-end AIS-P, LOP-P, or UNEQ-P defects, or far-end UAS-PFE defects. An IDF is raised if AIS-P, LOP-P, or UNEQ-P defects occur.

- Far-end path unavailable seconds (UAS-PFE)

    — see for information.

8B/10B PPs

8B/10B layer PPs include:

- Coding violation (CV)

    — counts the number of detected invalid characters or disparity errors

    — active only when synchronization has been acquired

- Errored second (ES)

    — counts the number of one second intervals that contain one or more CV or one or more loss of synchronization defects

- Severely errored seconds (SES)

    — counts the number of one second intervals that contain X or more CV errors or one or more loss of synchronization defects, where the value of X reflects the number of CV errors that would occur with a bit error rate of 10^{-6}

ATTENTION

The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UAS)

    — counts the number of one second periods of unavailability. Unavailability begins at the onset of 10 consecutive severely errored seconds (SES) and ends at the onset of 10 consecutive seconds of no SES. Other performance parameters continue to count.

8B/10B WAN PPs

For the LAN-side signal, 8B/10B WAN PPs (ES, SES, and UAS) are defined the same as 8B/10B PPs. See .

For the WAN-side signal, 8B/10B WAN PPs include:

- Errored second (ES)

    — counts the number of one second intervals that contain one or more uncorrectable errored super block or loss of frame delineation (LFD) defects

- Severely errored seconds (SES)

    — counts the number of one second intervals that contain two or more errored super block or one or more LFD defects

---

ATTENTION

The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UAS)

  — counts the number of one second periods of unavailability. Unavailability begins at the onset of 10 consecutive severely errored seconds (SES) and ends at the onset of 10 consecutive seconds with no SES. Other performance parameters continue to count.

Agile PPs

Agile PPs are only supported on the backplane port Tx direction of OCI SRM circuit packs. In the case of the OCI SRM, a SONET path like wrapper is added at the ingress point on the tributary signal. Another SONET-like wrapper is added when the tributary signals are aggregated into the line signal rate. Bit errors are measured at the egress point. See for PM collection points on the OCI SRM circuit pack.

Agile PPs include two subcategories:

- agile aggregate PPs
- agile path PPs

Agile aggregate PPs

Agile aggregate PPs are collected on the aggregate signal made up of the four client signals and the aggregate overhead (1.25 Gbit/s). Agile aggregate PPs are based on the B1-like bytes in the aggregate signal wrapper.

Agile aggregate PPs include:

- Coding violation (CV)

  — counts the number of BIP-8 errors from the SONET-like B1 bytes of the agile signal

  Note: CV counts are inhibited in severely errored seconds (SES).

- Errored second (ES)

  — counts the number of one second intervals that contain one or more CV, or one or more SONET-like loss of frame (LOF) defects

- Severely errored second (SES)

  — counts the number of one second intervals that contain 1220 or more CV, or one or more SONET-like LOF defects

- Severely errored frame second (SEFS)

  — counts the number of one second intervals that contain one or more SONET-like LOF defects

---

> **ATTENTION**
> The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UAS)
  - counts the number of one second periods of unavailability. Unavailability begins at the onset of 10 consecutive severely errored seconds (SES) and ends at the onset of 10 consecutive seconds with no SES. Other performance parameters continue to count.

Agile path PPs
Agile path PPs are collected on the individual tributary signals corresponding to the optical ports. Agile path PPs are based on the error monitoring byte on the tributary signal wrapper. Agile path PPs do not monitor the client signals. They monitor the assembled (mux/demux) signals when an OCI SRM disassembles the client signals.

Agile path PPs include:

- Coding violation (CV)
  - counts the number of BIP-8 errors from the SONET-like B3 bytes of the agile signal

  Note: CV counts are inhibited in severely errored seconds (SES).

- Errored second (ES)
  - counts the number of one second intervals that contain one or more CV defects
- Severely errored second (SES)
  - counts the number of one second intervals that contain 1220 or more CV defects

Figure 3-2
OCI SRM facility performance parameters

OM1938t.
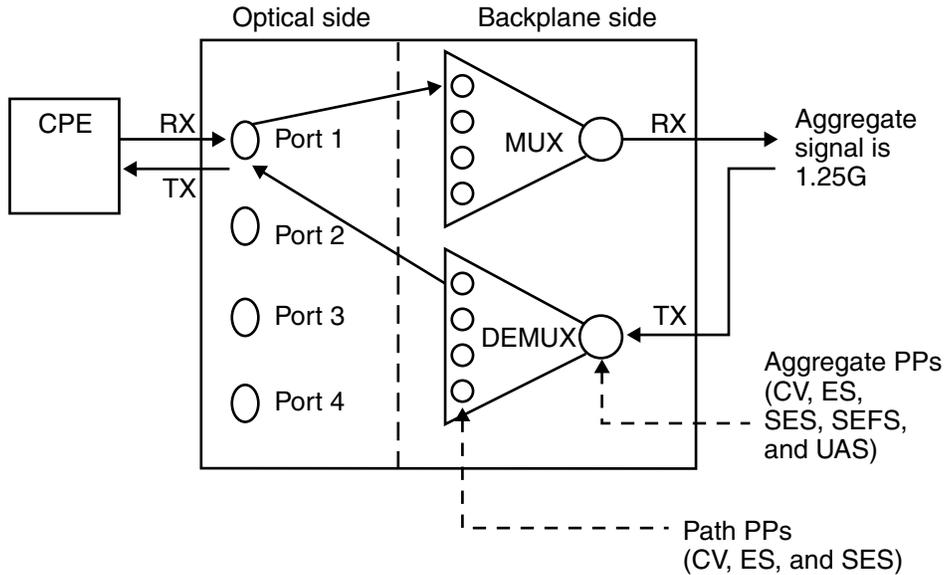
Note: PP counts, TCA thresholds, and reporting status are not reset when the facility admin state is changed because the OCI SRM circuit pack does not have an aggregate facility.

GigE PPs

For the Ethernet LAN-side signal, GigE PPs include:

- Errored second (ES)

  — counts the number of one second intervals that contain one or more Frame Check Sequence errors, or one or more LOS or Loss of sync, or LAN link down defects

- Severely errored second (SES)

  — counts the number of one second intervals that contain more than a ratio of 0.01 InFramesErr to InFrames, or one or more LOS or Loss of sync, or LAN link down defects

Note: Seconds where INFrames are 0 are not considered SES.

ATTENTION

The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UASS)

— counts the number of one second periods of unavailability. Unavailability begins at the onset of 10 consecutive severely errored seconds (SES) and ends at the onset of 10 consecutive seconds with no SES. Other performance parameters continue to count.

For the Ethernet WAN-side signal, GigE PPs include:

- Errored second (ES)

    — counts the number of one second intervals that contain one or more InFramesErr or LFD defects

- Severely errored second (SES)

    — counts the number of one second intervals that contain more than a ratio of 0.01 InFramesErr to InFrames or LFD defects

    Note: Seconds where INFrames are 0 are not considered SES.

ATTENTION

The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UASS)

    — counts the number of one second periods of unavailability. Unavailability begins at the onset of 10 consecutive severely errored seconds (SES) and ends at the onset of 10 consecutive seconds with no SES. Other performance parameters continue to count.

GigEWAN PPs

For the Ethernet LAN-side signal, GigEWAN PPs include:

- Errored second (ES)

    — counts the number of one second intervals that contain one or more Frame Check Sequence errors, or one or more LOS or Loss of sync, or LAN link down defects

- Severely errored second (SES)

    — counts the number of one second intervals that contain more than a ratio of 0.01 InFramesErr to InFrames, or one or more LOS or Loss of sync, or LAN link down defects

    Note: Seconds where INFrames are 0 are not considered SES.

ATTENTION

The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UASS)

    — counts the number of one second periods of unavailability. Unavailability begins at the onset of 10 consecutive severely errored seconds (SES) and ends at the onset of 10 consecutive seconds with no SES. Other performance parameters continue to count.

For the Ethernet WAN-side signal, GigEWAN PPs include:

- Errored second (ES)

    — counts the number of one second intervals that contain one or more uncorrectable errored super block or loss of frame delineation (LFD) defects

- Severely errored seconds (SES)

    — counts the number of one second intervals that contain two or more errored super block or one or more LFD defects

---

ATTENTION

The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UAS)

    — counts the number of one second periods of unavailability. Unavailability begins at the onset of 10 consecutive severely errored seconds (SES) and ends at the onset of 10 consecutive seconds with no SES. Other performance parameters continue to count.

Digital wrapper PPs

Digital wrapper section layer PPs include:

- FEC-CE

    — counts the number of errors that were corrected in forward error correction

- FEC-UF

    — counts the number of uncorrected frames

- Coding violation (CV)

    — counts the number of BIP-8 errors in the digital wrapper overhead after forward error correction has been applied

    Note: CV counts are inhibited in severely errored seconds (SES).

- Errored second (ES)

    — counts the number of one second intervals that contain one or more CV defects

- Severely errored seconds (SES)

    — counts the number of one second intervals that contain 9850 or more CV errors, LOS or LOF defects. The value of 9850 reflects the number of CV errors that would occur with a random error rate of 10^{-6}

LAN PHY PPs

64B66B PPs include:

- Coding violation (CV)

    — counts the number of decoding errors

    Note: CV counts are inhibited in severely errored seconds (SES).

- Errored second (ES)

    — counts the number of one second intervals that contain one or more CV defects

- Severely errored seconds (SES)

    — counts the number of one second intervals that contain 9999 or more CV errors, LOS sync or LOS defects. The value of 9999 reflects the number of CV errors that would occur with a random error rate of 10^{-6}

ATTENTION
The following definition of UAS is a proprietary, non-standard definition of UAS.

- Unavailable seconds (UAS)

    — counts the number of one second periods of unavailability. Unavailability begins at the onset of 10 consecutive severely errored seconds (SES) and ends at the onset of 10 consecutive seconds with no SES. Other performance parameters continue to count.

Signal failure count PPs

Signal failure counts (SFC) PPs are supported on the Rx signal of the OCI (except OCI SONET/SDH), OCI SRM, OCLD, OTR, and OFA circuit packs when no other type of facility PM is available for the configured protocol.

SFC PPs include

- Failure count (FC)

    — counts the number of signal interruptions, including those too short to become alarms

- Errored second (ES)

    — counts the number of one second intervals that contain at least one of the traffic-affecting defects

SFC PPs are collected on a circuit pack when certain traffic-affecting defects occur. Although the collected SFC PPs on a circuit pack may be caused by a defect (as shown in Table 3-29), the defect may not persist long enough to raise an alarm.

Table 3-29
Defects that generate SFC PPs

Circuit pack	Rx optical port	Defects
OCI 622 Mbit/s 1310 nm OCI 1.25 Gbit/s 1310 nm OCI 1.25 Gbit/s 850 nm OCI ISC 1310 nm OCI GbE 1310 nm OCI GbE 850 nm	Port 1	loss of lock (LOL), optical power receive low (OPRL)
OCI OC-48/STM-16 1310 nm	Port 1	LOL, OPRL, optical power receive high (OPRH)
OCI SRM	Port 1, 2, 3, and 4	LOL, OPRL, OPRH, overflow and underflow (OUF), phase lock loop (PLL)
OCLD 1.25 Gbit/s OCLD 2.5 Gbit/s OCLD 2.5 Gbit/s Flex OCLD 2.5 Gbit/s Universal	Port 1	loss of synchronization (LOSYNC), LOL, receive_automatic laser shutdown (Rx_ALS), surrogate payload signal (SPS), OPRL, OPRH
OTR 10 Gbit/s—client side OTR 10 Gbit/s Enhanced—client side	Port 1 and 2	LOL, OPRL, OPRH
OTR 10 Gbit/s—line side	Port 1 and 2	loss of signal (LOS), loss of frame (LOF), remote alarm indication signal (RAIS), OPRL, OPRH, Rx_ALS
OTR 2.5 Gbit/s Flex—client side	Port 1 and 2	LOSYNC, LOL, OPRL, OPRH
OTR 2.5 Gbit/s Flex—line side	Port 1 and 2	LOSYNC, OPRL, OPRH, Rx_ALS, SPS, invalid signal (IVS)
OFA	Port 1	OPRL, OPRH

Facility PP collection and reporting

Facility PPs reported in Optical Metro 5100/5200 represent a period of surveillance that occurred in the past. In order to accurately report on the performance of the network through each of the various performance parameters, it is necessary to delay the accumulation of current PM counts by 20 seconds. Although counting takes place on each of the individual circuit packs instantaneously, an update to the value of the current PM count bin for every performance parameter occurs every 10 seconds, and the update includes data for the period 10 to 20 seconds ago.

The 20 second delay in reporting counts has the following implications:

- PM counts reported in the System Manager reflect a period of time up to 20 seconds in the past
- PM threshold crossing alerts (TCAs) are raised as a result of a condition that occurred between 10 and 20 seconds in the past

Facility PM TCA thresholds

In a reliable network, PM counts or measures fall within acceptable, pre-determined thresholds. When a threshold is reached or crossed, a threshold crossing alert (TCA) is raised.

Each facility PM count has two provisionable thresholds

- a 15 minute threshold that generates an alert if the PM count in the current 15-minute bin meets or exceeds the threshold value
- a 1 day (24 hour) threshold that generates an alert if the PM count in the current 1-day bin meets or exceeds the threshold value

Table 3-30 lists the default threshold values for the facility performance parameters.

Table 3-30
Facility PP default threshold values

Facility PPs	Description	15 minute bin	1 day bin
Section			
CVS	Coding violation, Section	1772	4430
EBS	Errored blocks, Section	1772	4430
ESS	Errored seconds, Section	346	864
OFSS	Out of frame seconds, Section	7	17
SESS	Severely errored seconds, Section	2	4
SEFSS	Severely errored frame seconds, Section	7	17
UASS	Unavailable seconds, Section	0	0
Line			
CVL	Coding violation, Line	1772	4430
EBL	Errored blocks, Line	1772	4430
ESL	Errored seconds, Line	346	864
SESL	Severely errored seconds, Line	2	4
UASL	Unavailable seconds, Line	10	10

Table 3-30 (continued)
Facility PP default threshold values

Facility PPs	Description	15 minute bin	1 day bin
CV-LFE	Coding violation, Line, Far-end	1772	4430
EB-LFE	Errored blocks, Line, Far-end	1772	4430
ES-LFE	Errored seconds, Line, Far-end	346	864
SES-LFE	Severely errored seconds, Line, Far-end	2	4
UAS-LFE	Unavailable seconds, Line, Far-end	10	10
Path			
CVP	Coding violation, Path	15	125
EBP	Errored blocks, Path	15	125
ESP	Errored seconds, Path	12	250
SESP	Severely errored seconds, Path	3	7
UASP	Unavailable seconds, Path	10	10
CV-PFE	Coding violation, Path, Far-end	15	125
EB-PFE	Errored blocks, Path, Far-end	15	125
ES-PFE	Errored seconds, Path, Far-end	12	250
SES-PFE	Severely errored seconds, Path, Far-end	3	7
UAS-PFE	Unavailable seconds, Path, Far-end	10	10
Non-standard (8B/10B, 8B/10BWAN, 64B66B, Digital Wrapper, SFC, GigE)			
CV	Coding violation	1772	4430
ES	Errored seconds	346	864
FC	Failure count	0	0
SEFS	Severely errored frame seconds	7	17
SES	Severely errored seconds	2	4
UAS	Unavailable seconds	0	0
FEC-CE	FEC corrected errors	193 201 524	0
FEC-UF	FEC uncorrected frames	0	0

lists the performance parameter user-provisionable threshold ranges. The lower boundary is always 0 and is never crossed. A lower boundary of 0 disables the TCAs regardless of the TCA reporting status.

Table 3-31
Facility PP user-provisionable threshold ranges

Facility PPs	Bin type	Upper boundary	Lower boundary	Notes for upper boundary
Section				
CVS	15-minute	57,600,000	0	Maximum number of BIP-8 error in the bins based on 8000 frames per second and 8 BIP-8 error per frame
	1-day	2,147,483,647		31-bit register. The value is less than all possible seconds in a day (5,529,600,000).
ESS/SESS/ SEFSS/UASS	15-minute	900	0	100% possible seconds in the bin period
	1-day	86,400		
EBS	15-minute	7,200,000	0	Maximum number of block error in the bins based on 8000 frames per second and 1 block error per frame
	1-day	691,200,000		
OFSS	15-minute	900	0	100% possible seconds in the bin period
	1-day	86,400		
Line				
CVL/EBL/ CV-LFE/EB-LFE	15-minute	2,147,483,647	0	31-bit register. The value is less than all possible seconds in a day (5,529,600,000).
	1-day			
ESL/SESL/UASL/ ES-LFE/SES-LFE/ UAS-LFE	15-minute	900	0	100% possible seconds in the bin period
	1-day	86,400		
Path				
CVP/CV-PFE	15-minute	57,600,000	0	Maximum number of BIP-8 error in the bins based on 8000 frames per second and 8 BIP-8 error per frame
	1-day	2,147,483,647		31-bit register. The value is less than all possible seconds in a day (5,529,600,000).

Table 3-31 (continued)
Facility PP user-provisionable threshold ranges

Facility PPs	Bin type	Upper boundary	Lower boundary	Notes for upper boundary
EBP/EB-PFE	15-minute	7,200,000	0	Maximum number of block error in the bins based on 8000 frames per second and 1 block error per frame
	1-day	691,200,000		
ESP/SESP/UASP/ ES-PFE/SES-PFE/ UAS-PFE	15-minute	900	0	100% possible seconds in the bin period
	1-day	86,400		
Non-standard				
CV	15-minute	2,147,483,647	0	31-bit register for the bin period.
	1-day			
ES/SES/UAS	15-minute	900	0	100% possible seconds in the bin period
	1-day	86,400		
FC	15-minute	2,147,483,647	0	If the threshold is not changed, TCAs are not raised.
	1-day			
FEC-CE/ FEC-UF	15-minute	2,147,483,647	0	31-bit register for the bin period.
	1-day			
Note: These numbers comply with the standard ANSI.T1.231.1997.				

Facility PM TCA reporting

When the current PM counts are bigger or equal to the TCA threshold, TCAs are raised. TCAs are cleared when the current PM counts are less than the TCA threshold. TCAs are subject to masking by other alarms or events.

A TCA is raised only if its reporting is enabled and the threshold is greater than 0. TCA notification type can be either alarms with warning severity or events depending on the configuration. All TCAs are disabled by default. The TCA type can only be changed at the shelf level.

Summary TCAs are available to reduce the number of TCA notifications and are recommended for shelves that have several PM collecting circuit packs. When you provision TCAs to be raised as a summary alarm or summary event, a maximum of two summary TCAs, one for current 15-min bin and one for current 1-day bin, are raised as minor alarms or events for each direction of a facility no matter how many PPs are collected on that facility. Summary TCAs reduce the clutter of TCA s when a failure occurs.

In the Performance Monitor window of the System Manager, the "TCA Status" column indicates whether alerting for a PP is currently enabled or disabled. The "TCA" column indicates whether a bin count has crossed its TCA threshold. You can change the TCA reporting status on a per parameter or location basis, or for a shelf as a whole.

Operational measurements

Operational measurements (OMs) are counts that can be asynchronously retrieved and cleared for the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced, OCI SRM GbE, OTR 10 Gbit/s Enhanced, and Muxponder circuit packs.

Two type of OMs are supported:

• generic OMs which are not specific to an interface type

• Ethernet OMs which are only collected for Ethernet interfaces

All OM counters are 64-bit counters. OMs are binned into 15-minute, 1-day, and untimed bins. OMs do not have TCAs associated with them. OM counters are updated every second.

OMs are available for the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced, Muxponder 10 Gbit/s GbE/FC VCAT or OCI SRM GbE circuit pack only if the corresponding channel assignment and at least one path is provisioned. OMs are available for the OTR 10 Gbit/s Enhanced circuit packs only if the corresponding channel assignment is provisioned.

The following tables display the Generic OMs supported by circuit pack:

• Table 3-32 for the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced and OCI SRM GbE circuit packs

• Table 3-33 for the OTR 10 Gbit/s Enhanced circuit pack

• Table 3-34 for Gigabit Ethernet protocol supported on the Muxponder 10 Gbit/s GbE/FC VCAT circuit pack

• Table 3-35 for FC and FICON protocols supported on the Muxponder 10 Gbit/s GbE/FC VCAT circuit pack

The following tables display the Ethernet OMs supported by circuit pack:

• Table 3-36 for the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced and OCI SRM GbE circuit packs

• Table 3-37 for the OTR 10 Gbit/s Enhanced circuit pack

• Table 3-38 for the Muxponder 10 Gbit/s GbE/FC VCAT circuit packs

System manager does not display OMs in the following cases:

• the OM does not exist because provisioning is not complete or because the software was unable to retrieve the value from the circuit pack

- the circuit pack does not support this OM

    Note: In the case of a Muxponder 10 Gbit/s GbE/FC VCAT circuit pack, if the SP is reseated or rebooted, the OM current bin displays and invalid data flag (IDF).

Table 3-32
Generic OMs supported on the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced and OCI SRM GbE circuit packs

Generic OM Counter	Gigabit Ethernet		FC-100/FICON(see Note 1)	
	LAN (see Note 2)	**WAN**	**LAN** (see Note 2)	**WAN**
InFrames	Total number of frames received (including errored frames)	Total number of GFP frames received (including errored frames but excluding CMFs)	Total number of Class 2, 3 and F FC frames received. **Note:** Only available on the OCI SRM GbE/FC Enhanced circuit pack.	Total number of super-blocks received
InFramesErr	Total number of frames with • FCS errors • fragments • jabbers	Total number of GFP frames received with FCS errors or with invalid HEC	Not supported	Total number of super-blocks with uncorrectable errors
InFramesDiscds (see Note 3)	Total number of frames discarded when the ingress FIFO overflows. Ingress FIFO overflows can occur when Ethernet PAUSETX flow control is disabled and that the Gigabit Ethernet is mapped into a sub-rate WAN bandwidth.	Always returns 0 since frames are not discarded at the WAN input	Not supported	Not supported

Table 3-32 (continued)
Generic OMs supported on the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced and OCI SRM GbE circuit packs

Generic OM Counter	Gigabit Ethernet		FC-100/FICON(see Note 1)	
	LAN (see Note 2)	**WAN**	**LAN** (see Note 2)	**WAN**
InOctets	Total number of frame octets received including the DA, SA, T/L, data and LAN FCS fields	Total number of octets received (including errored frames). Includes GFP/HEC headers and payload FCS. Does not include octets from Client Management Frames (CMF).	Total number of octets received in FC frames excluding SOF and EOF primitives	Not supported
InOctetsErr	Not supported	Not supported	Total number of disparity errors and symbol errors	Not supported
OutFrames	Total number of frames transmitted	Total number of GE frames transmitted via GFP to the Optical Metro 5100/5200 network	Total number of Class 2, 3 and F FC frames transmitted. **Note:** Only available on the OCI SRM GbE/FC Enhanced circuit pack.	Total number of super-blocks transmitted
OutFramesErr	Total number of errored GE frames transmitted via GFP	Always reads 0 since the hardware never forwards errored frames to the WAN	Not supported	Always reads 0 since the hardware never forwards errored super-blocks to the WAN
OutFramesDiscds	Total number of frames dropped because of an egress FIFO overflow. This occurs when the client port is operationally down while far end frames are received.	Always reads 0	Not supported	Not supported

Table 3-32 (continued)
Generic OMs supported on the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced and OCI SRM GbE circuit packs

Generic OM Counter	Gigabit Ethernet		FC-100/FICON(see Note 1)	
	LAN (see Note 2)	WAN	LAN (see Note 2)	WAN
OutOctets	Total number of frame octets transmitted including the DA, SA, T/L, data and LAN FCS fields	Total number of octets transmitted (includes GFP/HEC headers and payload FCS)	Total number of octets transmitted in FC frames excluding SOF and EOF primitives	Not supported
OutOctetsErr	Not supported	Always reads 0 since the hardware never forwards errored frames to the WAN	Total number of Tx 10B_ERR	Not supported
Note 1: This protocol is not supported on the OCI SRM GbE circuit pack.				
Note 2: The LAN port is identified as "optical" in the System Manager Performance Monitoring interface.				
Note 3: Count is missing when 64 byte frame size is chosen with 100% utilization and 1-v V-Cat transport structure.				

Table 3-33
Generic OMs supported on the OTR 10 Gbit/s Enhanced

Generic OM Counter	10 Gigabit Ethernet
	LAN (see Note)
InFrames	Total number of frames received (including errored frames)
InFramesErr	Not supported
InFramesDiscds	Always reads 0
InOctets	Not supported
InOctetsErr	Not supported
OutFrames	Total number of frames transmitted
OutFramesErr	Not supported
OutFramesDiscds	Always reads 0

Table 3-33 (continued)
Generic OMs supported on the OTR 10 Gbit/s Enhanced

Generic OM Counter	10 Gigabit Ethernet
	LAN (see Note)
OutOctets	Not supported
OutOctetsErr	Not supported
Note: The LAN port is identified as "1 CS" (for client side) in the System Manager Performance Monitoring interface.	

Table 3-34
Generic OMs for Gigabit Ethernet protocol supported on the Muxponder 10 Gbit/s GbE/FC VCAT

Generic OM Counter	GFP-F		GFP-T	
	LAN (see Note 1)	**WAN**	**LAN** (see Note 1)	**WAN**
InFrames (see Note 2)	Total number of frames received (including errored frames)	Total number of GFP frames received (including errored frames but excluding CMFs)	Total number of frames received (including errored frames)	Not supported
InFramesErr (see Note 2)	Total number of frames with • FCS errors • fragments • jabbers	Total number of GFP frames received with FCS errors or with invalid HEC **Note:** 8-bit counter. Also, there is an overlap between the 2 counters and therefore the final count may be higher than expected.	Total number of frames with • FCS errors • fragments • jabbers	Total number of super-blocks with uncorrectable errors **Note:** 8-bit counter
InFramesDiscds	Total number of frames discarded when the ingress FIFO overflows or the WAN side is down. Ingress FIFO overflows can occur when Ethernet PAUSETX flow control is disabled and that the Gigabit Ethernet is mapped into a sub-rate WAN bandwidth. **Note:** 8-bit counter (see Note 3)	Always returns 0 since frames are not discarded at the WAN input	Total number of frames discarded when the ingress FIFO overflows or the WAN side is down. Ingress FIFO overflows can occur when Ethernet PAUSETX flow control is disabled and that the Gigabit Ethernet is mapped into a sub-rate WAN bandwidth. **Note:** 8-bit counter (see Note 3)	Not supported

Table 3-34 (continued)
Generic OMs for Gigabit Ethernet protocol supported on the Muxponder 10 Gbit/s GbE/FC VCAT

Generic OM Counter	GFP-F		GFP-T	
	LAN (see Note 1)	**WAN**	**LAN** (see Note 1)	**WAN**
InOctets (see Note 4)	Total number of frame octets received including the DA, SA, T/L, data and LAN FCS fields	Not supported	Total number of frame octets received including the DA, SA, T/L, data and LAN FCS fields	Not supported
InOctetsErr	Not supported	Not supported	Not supported	Not supported
OutFrames (see Note 2)	Total number of frames transmitted	Not supported	Not supported	Not supported
OutFramesErr (see Note 2)	Total number of errored GE frames transmitted via GFP	Always reads 0 since the hardware never forwards errored frames to the WAN	Not supported	Not supported
OutFramesDiscds	Total number of frames dropped because of an egress FIFO overflow. This occurs when the client port is operationally down while far end frames are received or when the far end data rate exceeds the near end frequency compensation capability. Note: 8-bit counter	Always reads 0	Not supported	Not supported

Table 3-34 (continued)
Generic OMs for Gigabit Ethernet protocol supported on the Muxponder 10 Gbit/s GbE/FC VCAT

Generic OM Counter	GFP-F		GFP-T	
	LAN (see Note 1)	**WAN**	**LAN** (see Note 1)	**WAN**
OutOctets (see Note 4)	Total number of frame octets transmitted including the DA, SA, T/L, data and LAN FCS fields	Not supported	Not supported	Not supported
OutOctetsErr	Not supported	Always reads 0 since the hardware never forwards errored frames to the WAN	Total number of Tx 10B_ERR	Not supported

Note 1: The LAN port is identified as optical in the System Manager Performance Monitoring interface.

Note 2: When a burst of errors are present on the WAN port of a Muxponder 10 Gbit/s GbE/FC VCAT circuit pack, the client laser shuts down. If the burst has a duration of less than 2.5 seconds the Client Service Mismatch alarm is not raised even though the client laser shuts down. Errors with a duration of more than 2.5 seconds raise the Client Service Mismatch alarm. Because the laser shuts down on the client side, there will be discrepancies between number of InFrames on the WAN side and OutFrames on the LAN side. WAN OM error counts increment as bursts of errors occur.

Note 3: InFramesDiscds (LAN) displays incorrect counts when there is an overload on the link (even if the overload is very small). Use this count as an overflow indication only.

Note 4: InOctets and OutOctets count inaccuracy is 1%.

Table 3-35
Generic OMs for FC and FICON protocols supported on the Muxponder 10 Gbit/s GbE/FC VCAT

Generic OM Counter	GFP-T	
	LAN (see Note)	**WAN**
InFrames	Not supported	Not supported
InFramesErr	Not supported	Total number of super-blocks with uncorrectable errors **Note:** 8-bit counter
InFramesDiscds	Not supported	Not supported
InOctets	Not supported	Not supported
InOctetsErr	Total number of disparity errors and symbol errors	Not supported
OutFrames	Not supported	Not supported
OutFramesErr	Not supported	Not supported

Table 3-35 (continued)
Generic OMs for FC and FICON protocols supported on the Muxponder 10 Gbit/s GbE/FC VCAT

Generic OM Counter	GFP-T	
	LAN (see Note)	**WAN**
OutFramesDiscds	Not supported	Not supported
OutOctets	Not supported	Not supported
OutOctetsErr	Total number of Tx 10B_ERR	Not supported
Note: The LAN port is identified as optical in the System Manager Performance Monitoring interface.		

Table 3-36
Ethernet OM counters supported on the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced and OCI SRM GbE circuit packs

Ethernet OM Counter	LAN (see Note)
AlignErr	Since this counter does not apply to Gigabit Ethernet, a value of 0 will always be returned.
FCSErr	Total number of frames received that are an integral number of octets in length and do not pass the FCS check. This count does not include those frames that are also too short or too long.
SingleCollisionFrames	Since this counter does not apply to full duplex, a value of 0 will always be returned.
MultiCollisionFrames	Since this counter does not apply to full duplex, a value of 0 will always be returned.
SQETestErr	Since this counter does not apply to full duplex, a value of 0 will always be returned.
DeferredTrans	Since this counter does not apply to full duplex, a value of 0 will always be returned.
LateCollision	Since this counter does not apply to full duplex, a value of 0 will always be returned.
ExcessCollision	Since this counter does not apply to full duplex, a value of 0 will always be returned.
InternalMacRxErr	Total number of frames for which the reception fails because of an internal MAC sub-layer receive error.
CarrierSenseErr	Since this counter does not apply to full duplex, a value of 0 will always be returned.
FrameTooLong	Total number of frames received that exceed the maximum permitted frame size (as defined by the MTU attribute of the Ethernet facility) but have no FCS error.

Table 3-36 (continued)
Ethernet OM counters supported on the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced and OCI SRM GbE circuit packs

Ethernet OM Counter	LAN (see Note)
FrameTooShort	Total number of frames whose length, including FCS, is less than 64 bytes but did not have an FCS error.
InternalMacTxErr	Total number of frames for which the transmission fails because of an internal MAC sub-layer transmit error.
SymbolErr	Total number of GMII data reception errors.
InPauseFr	Total number of MAC control frames received with an op-code indicating a PAUSE frame.
OutPauseFr	Total number of OCI SRM GbE/FC port originated MAC control frames transmitted with an op-code indicating a PAUSE frame.
Jabbers	Total number of frames whose length, including FCS, is greater than the maximum permitted frame size (as defined by the MTU attribute of the Ethernet facility) that have an FCS error.
Fragments	Total number of frames whose length, including FCS, is less than 64 bytes that have an FCS error.
ControlFrames	Total number of frames that contain any MAC control frames (typically indicated by the "Type" field in the Ethernet header with a value of 0x8808).
Note: The LAN port is identified as "optical" in the System Manager Performance Monitoring interface.	

Table 3-37
Ethernet OM counters supported on the OTR 10 Gbit/s Enhanced

Ethernet OM Counter	LAN (see Note)
AlignErr	Not supported.
FCSErr	Total number of frames received that are an integral number of octets in length and do not pass the FCS check. This count does not include those frames that are also too short or too long.
SingleCollisionFrames	Since this counter does not apply to full duplex, a value of 0 will always be returned.
MultiCollisionFrames	Since this counter does not apply to full duplex, a value of 0 will always be returned.
SQETestErr	Since this counter does not apply to full duplex, a value of 0 will always be returned.
DeferredTrans	Since this counter does not apply to full duplex, a value of 0 will always be returned.

Table 3-37 (continued)
Ethernet OM counters supported on the OTR 10 Gbit/s Enhanced

Ethernet OM Counter	LAN (see Note)
LateCollision	Since this counter does not apply to full duplex, a value of 0 will always be returned.
ExcessCollision	Since this counter does not apply to full duplex, a value of 0 will always be returned.
InternalMacRxErr	Not supported.
CarrierSenseErr	Since this counter does not apply to full duplex, a value of 0 will always be returned.
FrameTooLong	Total number of frames whose length, including FCS, is greater than 1522 bytes but did not have an FCS error.
FrameTooShort	Total number of frames whose length, including FCS, is less than 64 bytes but did not have an FCS error.
InternalMacTxErr	Not supported.
SymbolErr	Not supported.
InPauseFr	Not supported.
OutPauseFr	Not supported.
Jabbers	Not supported.
Fragments	Not supported.
ControlFrames	Not supported.
Note: The LAN port is identified as "1 CS" (for client side) in the System Manager Performance Monitoring interface	

Table 3-38
Ethernet OM counters supported on the Muxponder 10 Gbit/s GbE/FC VCAT

Ethernet OM Counter	LAN (see Note)
AlignErr	Since this counter does not apply to Gigabit Ethernet, a value of 0 will always be returned.
FCSErr	Total number of frames received that are an integral number of octets in length and do not pass the FCS check. This count does not include those frames that are also too short or too long.
SingleCollisionFrames	Since this counter does not apply to full duplex, a value of 0 will always be returned.
MultiCollisionFrames	Since this counter does not apply to full duplex, a value of 0 will always be returned.

Table 3-38 (continued)
Ethernet OM counters supported on the Muxponder 10 Gbit/s GbE/FC VCAT

Ethernet OM Counter	LAN (see Note)
SQETestErr	Since this counter does not apply to full duplex, a value of 0 will always be returned.
DeferredTrans	Since this counter does not apply to full duplex, a value of 0 will always be returned.
LateCollision	Since this counter does not apply to full duplex, a value of 0 will always be returned.
ExcessCollision	Since this counter does not apply to full duplex, a value of 0 will always be returned.
InternalMACRxErr	Not supported
CarrierSenseErr	Since this counter does not apply to full duplex, a value of 0 will always be returned.
FrameTooLong	Total number of frames received that exceed the maximum permitted frame size (as defined by the MTU attribute of the Ethernet facility) but have no FCS error. Note: When using GFP-T, the MTU value cannot be set. The circuit pack passes frames with any frame size. However, a frame with frame size greater than 9600 bytes is considered a FrameTooLong and increments the FrameTooLong Ethernet OM counter.
FrameTooShort	Total number of frames whose length, including FCS, is less than 64 bytes but did not have an FCS error.
InternalMACTxErr	Not supported
SymbolErr	Not supported
InPauseFrames	Not supported.
OutPauseFrames	Total number of Muxponder port originated MAC control frames transmitted with an op-code indicating a PAUSE frame.
Jabbers	Total number of frames whose length, including FCS, is greater than the maximum permitted frame size (as defined by the MTU attribute of the Ethernet facility) that have an FCS error. Note: When using GFP-T, the MTU value cannot be set. The circuit pack passes frames with any frame size. However, a frame with frame size greater than 9600 bytes is considered a FrameTooLong and increments the Jabbers Ethernet OM counter if the frame has an FCS error.

Table 3-38 (continued)
Ethernet OM counters supported on the Muxponder 10 Gbit/s GbE/FC VCAT

Ethernet OM Counter	LAN (see Note)
Fragments	Total number of frames whose length, including FCS, is less than 64 bytes that have an FCS error.
ControlFrames	Total number of Ethernet control frames received (T/L=8808). This includes PAUSE frames and other control frames. Note that PAUSE frame is the only currently defined control frame. This counter is operational only when the PASSCTRL parameter is set to disable.
Note: The LAN port is identified as optical in the System Manager Performance Monitoring interface.	

Equipment performance monitoring

Equipment PPs are a real-time reading of the optical receive and transmit power levels. The readings are used to measure the degradation of lasers or of the fiber plant.

Factors that affect the performance of the fiber plant include:

- bent fibers (Optical signals degrade if you exceed a 1.18-inch (30-mm) bend radius when you coil or bend the fiber.)
- pinched or broken fibers
- dirty connectors
- degraded electro-optical components

Four parameters are monitored:

- TxPowerHigh
- TxPowerLow
- RxPowerHigh
- RxPowerLow

The current reading of the TxPowerHigh and TxPowerLow parameters is the transmit optical power value. The current reading of the RxPowerHigh and RxPowerLow parameters is the receive optical power value.

In the Performance Monitor window of the System Manager, the Degrade and Fail Threshold columns do not display a threshold value if the information is not available. For example, when a circuit pack is missing from the shelf, the field displays a "not available" message for that circuit pack. The optical receive and transmit power levels are not monitored for the OCI SRM and the OCI SRM SONET/SDH. As a result, the fields in the System Manager will display the "not available" message.

Equipment PM TCA thresholds

In a reliable network, PM measures fall within acceptable, pre-determined thresholds. When a threshold is reached or crossed, a threshold crossing alert (TCA) is raised, depending on the severity of the problem, and the type of parameter.

Each equipment gauge PP has two non-provisionable thresholds:

- a degradation threshold that is used to generate a major alarm if the PM gauge exceeds the threshold value
- a failure threshold that is used to generate a critical or major alarm if the PM gauge exceeds the threshold value, depending on whether the facility is on an active or protected path

Each equipment gauge PP also has one user provisionable threshold that generates a minor alarm if the PM gauge exceeds the user-defined threshold value. Default threshold values are determined by the circuit pack type.

Power threshold performance monitoring is supported by the following circuit packs:

- all OCLD
- all OFA
- OCI SONET/SDH
- OCI 2.5 Gbit/s
- OCI 1.25 Gbit/s GbE (no TCA on Tx port)
- OTR 10 Gbit/s and OTR 10 Gbit/s Enhanced, (Tx and Rx ports for both line-side and client-side)
- OTR 2.5 Gbit/s Flex and OTR 2.5 Gbit/s Universal (Tx and Rx ports for both line-side and client-side)
- all Muxponder (Tx and Rx ports for both line-side and client-side)
- all APBE

The OCI SRM, OCI SRM SONET/SDH, OCI SRM SONET/SDH LTE, OCI SRM ESCON, OCI SRM GbE/FC, and OCI SRM GbE circuit packs do not currently support power threshold performance monitoring.

The current Tx and Rx power reading is also available on the Facilities tab under Equipment in the System Manager. Power levels for each circuit pack are listed in the "Tx (dBm)" and "Rx (dBm)" columns.

Users can also define their own thresholds. User provisionable thresholds allow users to set a value for early warnings to monitor a sudden decrease or increase in signal strength over 10-second intervals without relying on the standard degrade and fail thresholds defined by the circuit pack.

The user provisionable threshold ranges are bounded by the following rule:

Degrade High > User High > User Low > Degrade Low

Equipment degrade, fail, clear, and user provisionable default threshold values for specific circuit packs are listed in Chapter 2, "Circuit pack specifications" in *Technical Specifications*, 323-1701-180.

Equipment PM collection and reporting

Equipment PPs reported in Optical Metro 5100/5200 represent a period of surveillance that occurred in the past. The value of each Equipment PP reported in the System Manager is the optical power level of the signal 10 seconds ago.

The 10 second delay in reporting Equipment PPs does not affect the raising of alarms when the optical power level crosses the fail or degrade threshold. The appropriate alarm is raised at the time when the condition is detected. Similarly, the alarm is cleared when the condition has cleared.

Equipment PM TCA reporting

Table 3-39 lists the conditions to raise and clear Equipment PM TCAs.

Table 3-39
Equipment PM TCA reporting conditions

TCA type	Raise	Clear
Degrade TCA	When the current counts reach the Degrade threshold	When the current counts reach the Clear threshold
Fail TCA	When the current counts reach the Fail threshold	When the current counts reach the Degrade threshold
User TCA	When the current counts reach the user-defined threshold	When the current counts reach the user-defined threshold
Note: Fail TCA masks Degrade TCA. Degrade TCA masks User TCA.		

You can enable or disable only the user TCA reporting. You can not disable the degrade or failed TCA reporting. All user TCAs are disabled by default. In the Performance Monitor window of the System Manager, the "User TCA Status" column indicates whether alerting for a PP is currently enabled or disabled. You can change the TCA reporting status on a per parameter or for a shelf as a whole.

PM user interfaces

The System Manager and TL1 support performance monitoring.

PM main window

The Performance Monitor main window is context-sensitive, and consists of three distinct areas:

- the top, which is the PM Query Criteria view
- the middle, which is the PM Query Results view; this portion has the following views
  - one for equipment PM
  - one for facility PM
  - one for generic OMs
  - one for Ethernet OMs
- the bottom, which is the PM Details view

  Note: For illustrated procedures on making PM queries, viewing PP and OM statistics, browsing historical counts, and setting threshold and count controls, refer to "Performance monitoring procedures" chapter in *Provisioning and Operating Procedures*, 323-1701-310.

Accessing the PM window

There are several ways to access the PM window in the System Manager. The access path determines which area of the window is enabled, as outlined in Table 3-40.

Table 3-40
Access path and area enabled

Access path	Area of PM window enabled
Main menu; select Performance; Performance Monitor menu item or Launch PM window; click the Launch button or select Auto Launch; query options	PM Query Criteria
Equipment tab; Inventory tab; select a circuit pack and right click; select PM Info	PM Query Results (see Note 1)
Equipment tab; Facilities tab; select a facility and right click; select PM Info	PM Query Results (see Note 1 and Note 2)
Fault tab; Active alarms tab; select an alarm and right click; select PM Info	PM Query Results (see Note 1)
Note 1: The PM Query Results displays Equipment and Facility PM Query Results (as applicable) for optical PPs only. Path and aggregate PPs are not available when you access PM information in this way.	
Note 2: When you access the PM Query results by right-clicking on a facility, the operational measurement information is not available for the selected facility. To retrieve the OMs for the selected facility, use the main menu or Launch PM window access path.	

When the PM window is displayed, use the scroll bars to move, or to access other areas of the window.

For more information on the PM window, refer to "Performance Monitor window" on page 7-135 in "Appendix—System Manager windows and fields" of this book.

User tips

There are a number of features that facilitate accessing PM information

- Context sensitive fields
  - input choices are constrained by previous, associated selections
  - the mouse displays values related to its location that may be hidden from view due to screen or column width
- Single-column sorting capabilities
  - click on any column heading to sort the list vertically
  - select a column heading and drag it to the right or left, to move the column horizontally
- Multiple-column sorting capabilities
  - from the View menu, select Sort order
  - in the Table Sort Order dialog box, select the columns you want to sort, and then the sort order
  - click OK
- Confirmation messages
  - all PM actions are prefaced by confirmation messages outlining the choices defined and asking for confirmation
- Count refreshing
  - at any PM screen, select a row, right-click on the mouse and select Refresh selected row to refresh the current count or gauge value
  - to refresh all PPs on a screen, simply right-click and select Refresh all rows or press the Refresh All button
- Copy and paste historical counts
  - historical counts can be copied and pasted into other documents by selecting the text and using Ctrl+C to copy, and Ctrl+V to paste
  - if you are at a UNIX workstation, use Ctrl+Insert to copy, and Shift+Insert to paste

TL1 functionality

There is some PM functionality through the TL1 user interface. For more information, refer to the "Performance monitoring commands" and the "Operational measurement commands" chapters in *TL1 Interface,* 323-1701-190.

Related topics

- "Circuit pack specifications" in *Technical Specifications*, 323-1701-180
- "Performance monitoring procedures" chapter in *Provisioning and Operating Procedures*, 323-1701-310
- "Provisioning circuit packs and managing traffic" chapter in the *Provisioning and Operating Procedures*, 323-1701-310
- "Clearing PM alarms" chapter in *Trouble Clearing and Alarm Reference Guide,* 323-1701-542

Protection switching

In this chapter

Introduction

This chapter describes the protection switching features provided by the Optical Metro 5100/5200, and explains the available user commands for non-revertive and revertive protection switching. This chapter does not describe the concept of protection switching.

General description of path protection in the Optical Metro 5100/5200

In order to provide more reliable transmission of client signals over optical channels during maintenance and upgrade activities or during failure conditions (such as fibre cuts and node failures), optical channels can be protected. Optical channel protection can be achieved by providing duplicate, geographically diverse paths for each service.

By definition, optical protection switching is the switching of activity from one piece of telecommunication equipment (active) to a second piece of telecommunication equipment (standby) when the active equipment fails.

Figure 4-1 shows a path protected ring network, using a standard protection scheme. In this case, the signal is transmitted over two diverse routes that originate at a single network element, and terminate at a single network element. Only one instance of the client signal is received and transmitted. One optical channel (working) travels in one direction around the ring (east or

west) while the duplicate signal (protection) passes in the opposite direction (west or east). A path selector continuously monitors both the working and protection signals at each end of the path and automatically switches to the protection signal in the event of optical span, equipment, or node failure. For a list of conditions that can cause protection switching, see "Automatic protection switching" on page 4-7.

Figure 4-1
Standard protection in an Optical Metro 5100/5200 network

OM1117p

Protected

Working

Client equipment

Client equipment
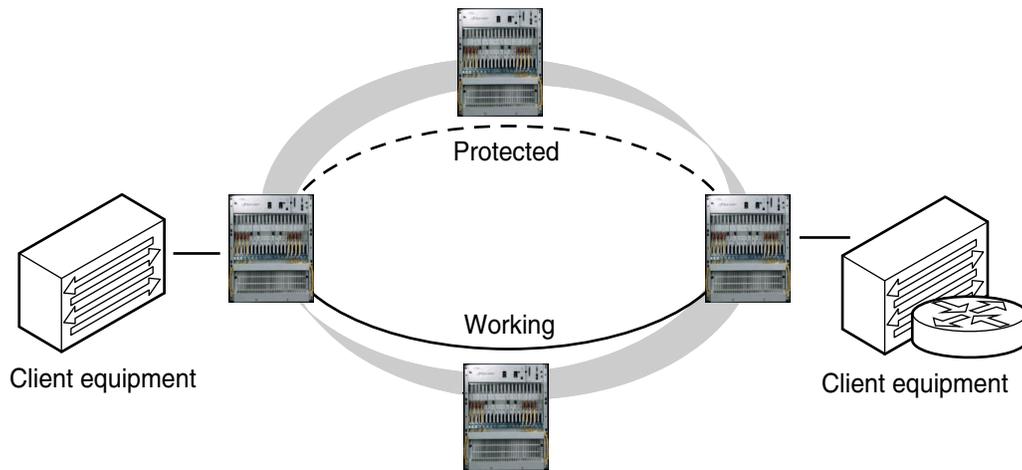
Optical Metro 5100/5200 protection schemes

Optical Metro 5100/5200 offers the following protection schemes:

- OCM equipment protection
  Optical Channel Manager (OCM) circuit packs are used to protect the channel assignments on the shelf. For information about OCM equipment protection, see "OCM equipment protection" on page 4-11.

- Optical protection equipment
  External standalone components provide optical path protection for Optical Metro 5100/5200 networks. The transponder protection tray provides protection for networks using OTR circuit packs, and the optical trunk switch provides protection for point-to-point networks. The enhanced trunk switch (ETS) provides optical path protection for point-to-point unamplified and amplified configurations

- Standard protection
  When Optical Metro 5100/5200 shelves are configured with OCI and OCLD circuit packs, you can implement path protection by provisioning a channel assignment between one OCI and two OCLDs. As well, the Muxponder circuit packs provide both bidirectional and unidirectional point-to-point line-side protection.

System-initiated and user-initiated protection switching

In an Optical Metro 5100/5200 network element, protection switching can be initiated either by the network element itself or by a user.

The network element can initiate system-initiated or automatic protection switching. The network element monitors its own performance, and when a failure occurs in one of its working components, the protection unit takes over the functions of the failed unit. For information about switching time, refer to the section "Protection switch times" in *Technical Specifications,* 323-1701-180.

You can initiate protection switching by entering a lockout command, forced-switching command or a manual-switching command. The Lockout command has the highest priority. Forced protection switching can override system-initiated or automatic protection switching, but manual protection switching cannot. Furthermore, forced switching does not verify if the protection path (the standby unit) is "healthy".

Note: In the case of the Muxponder, an automatic switch (that is, failed protection line) has a higher priority than a force switch.

Non-revertive and revertive protection switching

Two types of protection switching are supported on a per channel basis in Optical Metro 5100/5200: revertive and non-revertive.

The terms revertive and non-revertive refer to what happens after automatic protection switching has occurred, the original failure, and the unit that failed is ready to resume its function.

Note: The Muxponder 10 Gbit/s GbE/FC supports only 1+1 revertive protection switching.

Non-revertive protection switching

With non-revertive protection switching, two units are paired. At any time, one of the units is the working unit and the second unit is the protection unit. If a failure occurs in the first (working) unit, the activity switches to the second (protection) unit, which then becomes the working unit. The second unit remains the working unit even after the failure on the first unit clears. When the failure clears, the unit that failed becomes the protection unit. Each time a protection-switching request occurs, the two units exchange roles.

For example, if unit A (working) fails, unit B (protection) takes over the activity. Later, the failure clears, and although unit A is in good working order once again, unit B continues to carry out the activity as the working unit and unit A becomes the protection unit.

Operation of non-revertive commands
Manual switch request

- causes a path to switch from east to west or vice versa. An event is generated. The manual switch cannot be released. No alarms are raised as a result of this operation.

Force switch request

- causes traffic to switch from east to west or vice versa even if the path being switched to, is in a failed state. If the path fails after the switch is completed, traffic will stay on the failed path.
- causes an alarm (forced switch to east/west path active) to be raised and cleared when the switch is released.
- has a higher priority than the manual command. If a second force switch is performed, then the initial force switch needs to be released first.

Lockout

- locks traffic onto the current path. An alarm (path lockout active) is raised and cleared when the lockout is released.
- has a higher priority than the manual or force switch commands

Hierarchy of non-revertive protection switching commands and system operations
Table 4-1 lists all of the non-revertive commands from highest to lowest priority, and indicates how each command or system operation can be activated.

Table 4-1
Hierarchy of non-revertive protection switching commands and system operations

	Command or system operation	Source of control	
		User	**System**
Highest priority	Lockout	√	
	Force	√	
	Automatic		√
Lowest priority	Manual	√	

Note 1: Higher order switch requests override lower level requests or states.

Note 2: A user command that is superseded by a higher level request will be released automatically. For example, a lockout command on a path that already has a force switch request active will cause the force command to be released.

Revertive protection switching

With revertive protection switching, a designated protection unit backs up one primary unit. In normal operation, each primary unit carries out its activity. When a failure occurs in a primary unit, the protection unit takes over the activity. When the failure on the primary unit clears, the activity reverts to the primary unit (after a "Wait-To-Restore" has elapsed during which there are no additional failures on the primary path), and the protection unit resumes its backup role.

For example, if unit A (working) fails, unit B (protection) takes over the activity. Later, the failure clears and unit A is in good working order once again. The activity reverts to unit A (after a "Wait-To-Restore" has elapsed), and unit B resumes its role as the protection unit again.

Operation of revertive commands
When you specify a path as being revertive, you are given the option of specifying a wait-to-restore (WTR) period from 1 to 12 minutes, in one minute increments.

You can also specify which paths (east or west) are to be the working and protection channels. When a failure occurs on a working channel, the system switches the traffic to the protection channel. Once the working channel has

recovered, the traffic will revert back to the working channel when the WTR period has expired. The WTR feature prevents oscillations in the system when traffic switches back and forth between working and protection channels.

Manual switch request

- can only be performed when both paths are in a healthy state.

- causes a path to switch from working channel to protection channel, or vice versa. An event is produced to report the switch. The manual switch must be released, or a higher priority command must be executed in order to remove this state.

- causes an alarm (manual switch to east/west active) to be raised when a manual switch is active and cleared when the operation is released.

- can be executed on both the working and protection channels. When executed on the protection channel, the manual switch can be used to clear a WTR state. When releasing the manual switch, no switch will occur if the traffic is on the working path.

- is cancelled (released) when a higher priority switch request is performed.

Force switch request

- causes traffic to switch from the working channel to the protection channel only if the path being switched to is in a healthy state. If the path fails after the switch is completed, then traffic will stay on the failed path. A release operation is required to revert the traffic back to the working path.

- can also be used to force traffic from the protection to working path. In this case, when the force switch is released, traffic will remain on the working path unless there is a failure on the working path.

- causes alarm (forced switch to east/west path active) to be raised and cleared when the force switch is operated and released.

- has a higher priority than the manual command and the WTR.

- can be performed to an unhealthy path in the case of the Muxponder. Muxponder connections do not allow forced switches to unhealthy protection paths, but forced switches to unhealthy working paths are allowed.

- if performed on the working channel followed by another force switch on the protection channel, then the initial switch needs to be released first.

Lockout

- prevents traffic from being switched away from the working path. An alarm (path lockout active) is raised when a lockout is performed and is cleared when the lockout is released has a higher priority than the manual force switch commands and the WTR and auto states.

- if the command is applied when traffic is on the protection path, will cause the traffic to revert back to the working channel.

Auto switch state

- occurs when the traffic is switched from the working to the protection channel. An alarm (Auto Switch to Protection Path active) is raised for the duration of the failure and until the WTR period has expired.

Wait-to-restore (WTR) state

- is a transitory state where traffic has been switched to the protection channel, and the failure of the working channel has cleared.
- causes events to be generated (WTR started, expired or cleared).

Hierarchy of revertive protection switching commands and system operations
Table 4-2 lists all of the revertive commands from highest to lowest priority, and indicates how each command or system operation can be activated.

Table 4-2
Hierarchy of revertive protection switching commands and system operations

	Command or system operation	Source of control	
		User	**System**
Highest priority	Lockout	√	
	Force	√	
	Automatic		√
	Manual	√	
Lowest priority	Wait-to-restore		√

Note 1: Higher order switch requests override lower level requests or states.

Note 2: A user command that is superseded by a higher level request will be released automatically. For example, a force command on a path that already has a manual switch request active will cause the manual command to be released.

Note 3: The automatic switch request overrides a force switch request for Muxponder connections.

Automatic protection switching

Depending on the network configuration, the system can initiate protection switching when it detects any of the following:

- OCLD/OTR/Muxponder not present
- Loss of activity from the OCLD detected by the OCM
- OCLD/OTR/Muxponder Loss of signal
- OCLD/OTR/Muxponder Invalid signal

- OCLD facility OOS

- OTR line or client facility OOS

- Muxponder line facility OOS

- OCLD/OTR/Muxponder High Optical input power

- OCLD SPS (Surrogate payload signal)

- OCLD/OTR/Muxponder Loss of lock

- OCLD/OTR/Muxponder Loss of frame (for SONET/SDH protocols only)

- OCLD/OTR/Muxponder Line AIS (for SONET/SDH protocols only with 2.5 Gbit/s Flex OCLD only and 2.5 Gbit/s or 10 Gbit/s OTRs)

- OTR/Muxponder Wrapper AIS

- OCLD/OTR/Muxponder Automatic Laser Shutdown

- backplane faults that cause Muxponder protection switching are detected on the working Muxponder circuit pack. Disengaging the protection circuit pack from the backplane causes the working Muxponder to detect backplane defects.

Automatic switches in Optical Metro 5200
Automatic switches are performed from the receive direction only.

Both revertive and non-revertive connections raise switch events. Revertive connections raise alarmed events whereas non-revertive connection raise non-alarmed events.

Using Figure 4-2 as an example, where point A is the active path in a revertive connection. If there is a fiber cut at point A, the OCLD detects a Loss of Signal (LOS) condition and inserts Surrogate Payload Signal (SPS) towards the backplane. This causes the OCM to switch to the other path and an auto switch alarm is raised. In a non-revertive mode, an auto switch event is raised instead.

If at point B the OCM detects a Loss of Activity or invalid signal condition from the active OCLD, the OCM will switch to the protection channel and an auto switch alarm is raised. This state is communicated to the second OCM which also switches to the protection channel.

   Note: In either mode, both OCMs are always selecting from either the working or protection channel. In revertive or non-revertive mode, the OCMs are transmitting to both OCLDs.

If at point C an OCI detects either a Loss of Activity or invalid signal condition, the OCI will switch to the other OCM and no auto switch alarm is raised. An event will be raised in this case as well. Generally, any automatic protection switch (whether it is a path switch or an equipment switch) will cause an event to be generated.

Figure 4-2
Standard protection in an Optical Metro 5100/5200 network

OM2696t

Legend

———▶ = Working path

– – –▶ = Protected path
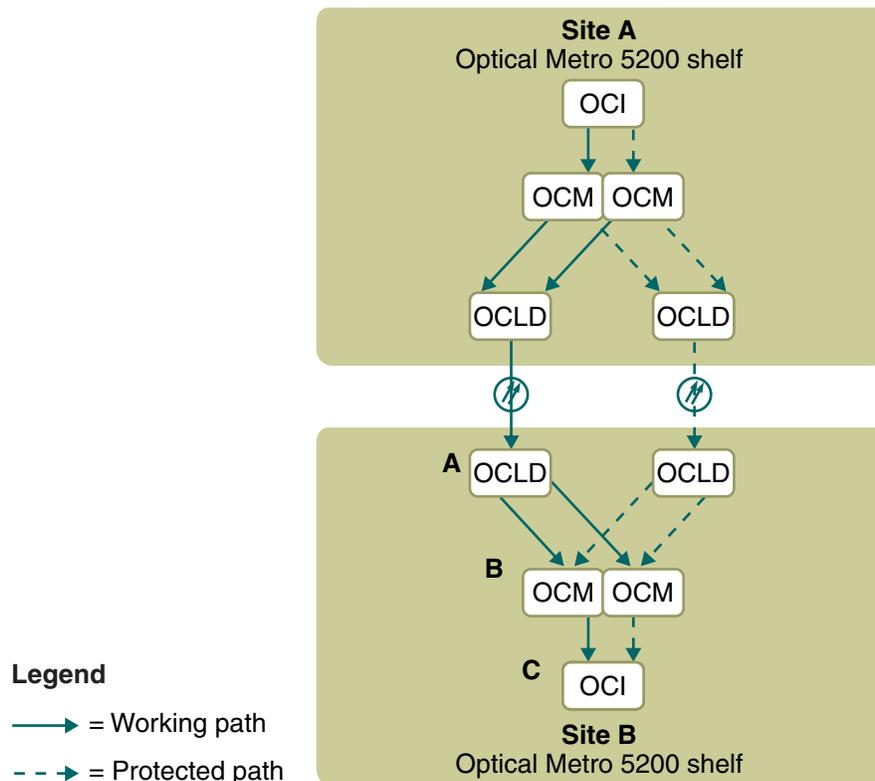
Automatic switches in Optical Metro 5200 or Optical Metro 5100 networks using OTR circuit packs

- Path and equipment protection is provided for signals carried on the OTR circuit pack through the Transponder Protection Tray.

- Each tray supports a fully populated shelf, four pairs or 2 pairs of OTR circuit packs depending on the filter tray type.

- Each tray requires 1 U of rack space and is composed of four or two passive splitter/coupler devices depending on the filter tray type.

- Each one of these devices takes in one client signal, splits it into two optical fibers and transmits it to two OTRs.

- The power of each signal transmitted to the two OTRs is approximately 50% of the power of the signal that was received. There is a 3 dB loss of power when the signal passes through the splitter/coupler.

- The software within both OTRs determines which line signal is best, based on LOS, LOF, LOL, Wrapper AIS, equipment failure and AIS conditions. The OTR with the better signal transmits to the Transponder Protection Tray which transmits it to the subtending equipment. At any given time, only one signal is transmitted on the client side.

Figure 4-3 shows an example of an Optical Metro 5200 network with OTR circuit packs.

Figure 4-3
Automatic switches with OTR circuit packs

OM2697p
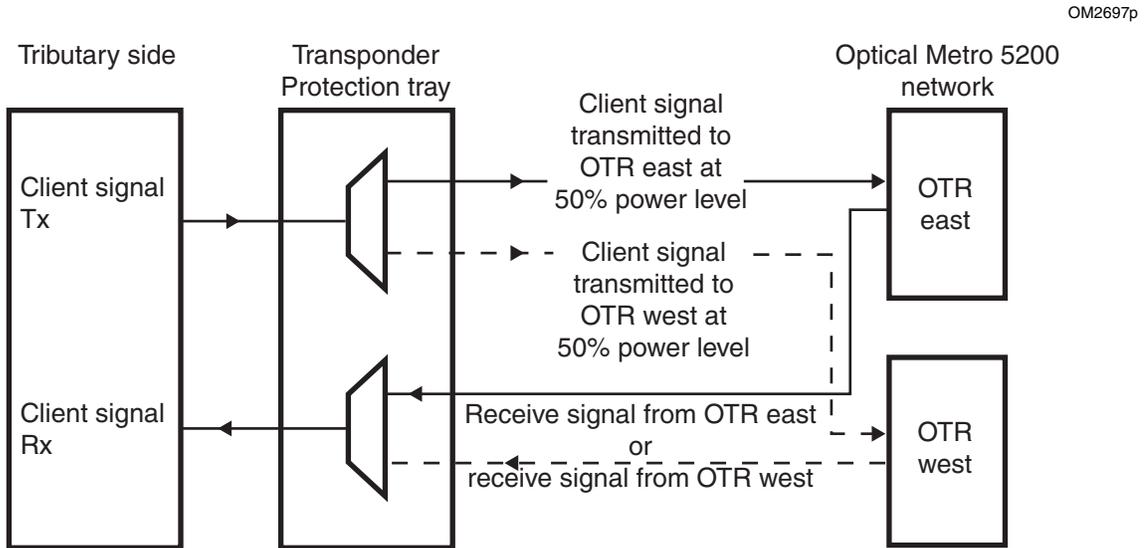
Automatic switches in Optical Metro 5100
The Optical Metro 5100 is not equipped with OCMs, which control the internal shelf protection scheme for the Optical Metro 5200. The Optical Metro 5100 internal protection is managed by the OCI.

Figure 4-4 shows an example of OCI protection in an Optical Metro 5100 network.

Figure 4-4
Optical Metro 5100 OCI protection

OM2698t
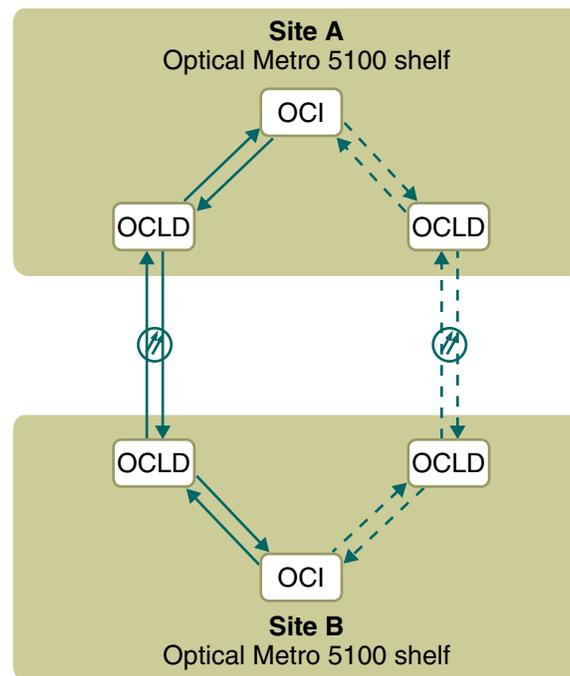
Legend

——▶ = Working path

– – ▶ = Protected path

OCM equipment protection

In an Optical Metro 5200 network, optical channel manager (OCM) circuit packs are used to protect the channel assignments on the shelf.

In all Optical Metro 5200 shelf configurations there are two OCMs. For shelves with OCIs and OCLDs, each OCM carries traffic. If one OCM fails or if you take an OCM out-of-service, a backplane signal is detected by the circuit packs in the shelf, indicating that one OCM is not available. The other circuit packs in the shelf automatically switch to the redundant OCM. Equipment switching guarantees that a single failure cannot cause an outage.

Note: To access the OCM Equipment Protection feature, right-click and select Protection on an OCM entry in the Equipment Inventory screen. A dialog box opens listing all the connections that are active on the selected OCM. That is, the set of OCIs that are receiving from each OCM and the set of OCLDs that are selected by each OCM. This can be used by network operators to determine what channels and customers will be impacted if maintenance is performed on an OCM.

Operation of commands

Two commands are available on the OCM Protection dialog box: Manual and Forced

Manual switch request:

- causes all traffic on the specified OCM (OCIs and OCLDs active on that OCM) to be moved to the other OCM. An event is generated to report the activity, but no alarm is raised. Traffic will not be switched if the "to" OCM is in a failed state.

Force switch request:

- causes all connections to be moved from one OCM to the other even if the "to" OCM is in a failed state. An alarm is raised to indicate that the switch took place, an event is also generated by each circuit pack to report the activity. The force switch must be released in order to clear the state and the alarm.

Path protection using a trunk switch

Path protection using an optical trunk switch

The optical trunk switch (OTS) is a standalone component that provides optical line protection for Optical Metro 5100/5200 point-to-point configurations.

When the OTS is installed at each site in a point-to-point system, it provides protection to the fiber-optic cable between each site. If one fiber-optic cable is damaged, the OTS switches bi-directionally to a redundant optical fiber path.

Figure 4-5 on page 4-13 shows a typical application of the OTS in an Optical Metro 5100/5200 network.

Figure 4-5
OTS path protection

OM2416p.eps
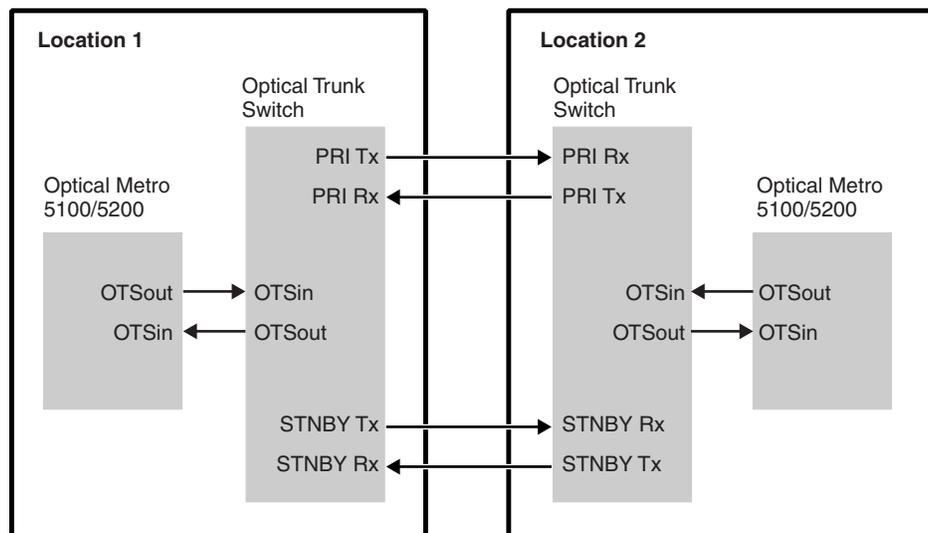
The OTS can operate in two modes:

- Manual
- Automatic

Manual mode
Manual mode is used for trouble-shooting purposes only or to restore a pair of OTSs to a known good state. Always use automatic mode to ensure bi-directional switching. Also, ensure that both OTSs are synchronized after using manual mode (i.e., ensure that both OTSs are using the same path).

In manual mode:

- toggling the Rx link selection between the primary and standby link can be done using the PRI/STNBY push button, TL1 command or menu option
- switching is traffic-affecting and uni-directional
- single-ended only
- switches even if the link you select has failed.

> ⚠ **CAUTION**
> **Risk of affecting service**
> When the Optical Trunk Switch is in manual mode and you switch to the primary or standby link, the module switches traffic regardless of whether or not that link is operating normally. This switching is not synchronized with the Optical Trunk Switch at the other end of the link, and may be service-affecting.

Upon a double path failure, the OTS will always end up switched to Standby. Restoring the standby fibers will return the OTS to normal operation. A switchback command is needed to return the OTS to the primary path (once that fiber path is restored).

Automatic mode
Automatic is the normal operating mode for the Optical Trunk Switch. The Optical Trunk Switches at both ends must be in automatic mode for the system to operate normally.

In automatic mode:

- traffic is switched bi-directionally in less than 100 ms when the target link is operational and the power received on the active path drops below -30 dBm

- switching is non-revertive

- bi-directional switching from the primary link to the standby link occurs if:

    — there is a failure on one or both of the primary links and the standby link is bi-directionally sound

    — there has been a force switch command executed from the maintenance interface from the primary link to the standby link and the standby link is bi-directionally sound

- bi-directional switching from the standby link to the primary link occurs if:

    — there is a failure on one or both of the standby links and the primary link is bi-directionally sound

    — the SWBK button is pressed on the front panel of a module at either site and the primary link is bi-directionally sound

    — the "trigger switch back to PRI" menu option is elected from the maintenance interface and the primary link is bi-directionally sound

In this mode, each OTS uses the information available on the power taps at the input to the 1x2 switch to determine when to switch. The tap on the active link is used to monitor the working signals. If the power level at this point drops below the threshold, the switch then looks for the pilot tone on the inactive

path. If the pilot tone is present, this indicates that the inactive fibre link is valid, causing the OTS to switch. If the pilot tone is not present on the inactive link, the OTS does not switch.

At the other end of the link, the active signal drops below the threshold, causing the OTS at the other end to switch.

Path protection using an enhanced trunk switch
The ETS consists of three components: the ETS shelf, the ETS Switch module and the ETS Comms module. The ETS can be deployed in unamplified point-to-point configurations, and in amplified point-to-point configurations that contain a single pre-amplifier in the link, see Figure 4-6.

Note: The ETS does not replace the OTS, nor is it backward compatible with the OTS. You cannot deploy the ETS and the OTS modules in the same point-to-point link.

Figure 4-6
ETS path protection

OM2553t
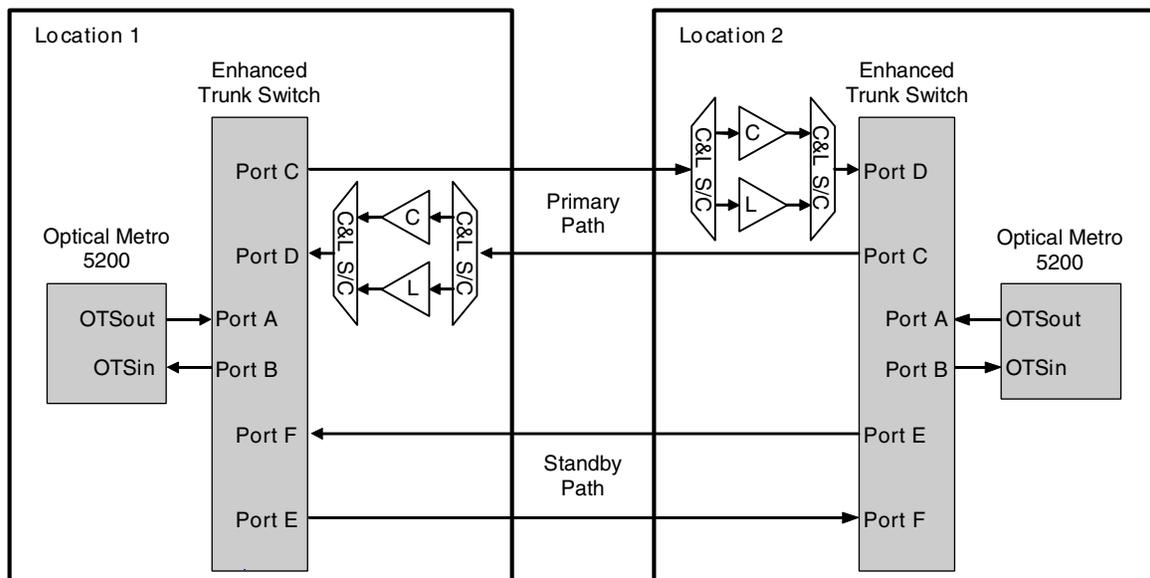
The ETS Switch module can operate in two modes:

• Manual

• Automatic

Manual mode
When the ETS Switch module is operating in manual mode, all automatic and revertive switching is disabled. The only way to switch traffic to the alternate path is to press the THR/PRI/SEC button on the front panel, or through an explicit command issued through TL1.

Automatic mode
In automatic mode, the module switches traffic between paths when the measured signal power is less than a preset threshold.

Two switching modes are available when automatic mode is selected:

• Absolute switching
• Window switching

The absolute switching mode uses a threshold called the absolute switching limit threshold (ASLTH) to determine when to switch traffic to the alternate path. By default, ASLTH is set to -35 dBm and is not user-programmable. If the incoming signal power on the active path is less than the ASLTH, the module automatically switches traffic to the alternate path. The default switching mode is absolute switching.

Enabling automatic switch-back ensures that the ETS will revert back to the primary path once the fault on the primary line clears and its power returns to an acceptable level. To avoid instability, the module applies a 2 dB hysteresis to determine when the power level is within the normal operating range. It also requires 3 seconds hold off time.

Window switching mode allows you to define an acceptable power range (window) for the incoming signal, as shown in Figure 4-7.

Figure 4-7
Window switching mode thresholds

OM2554t

UWSLTH maximum (0 dBm)

Upper Window Switching Limit Threshold (UWSLTH)

Upper Window Switching Range (UWSR)
(-6 +/-2 dB relative to RPL)

RPL +/- 2 dBm

Reference Power Level (RPL)

Lower Window Switching Range (LWSR)
(-6 +/-2 dB relative to RPL)

Lower Window Switching Limit Threshold (LWSLTH)

-35 dBm

LWSLTH minimum (-35 dBm)
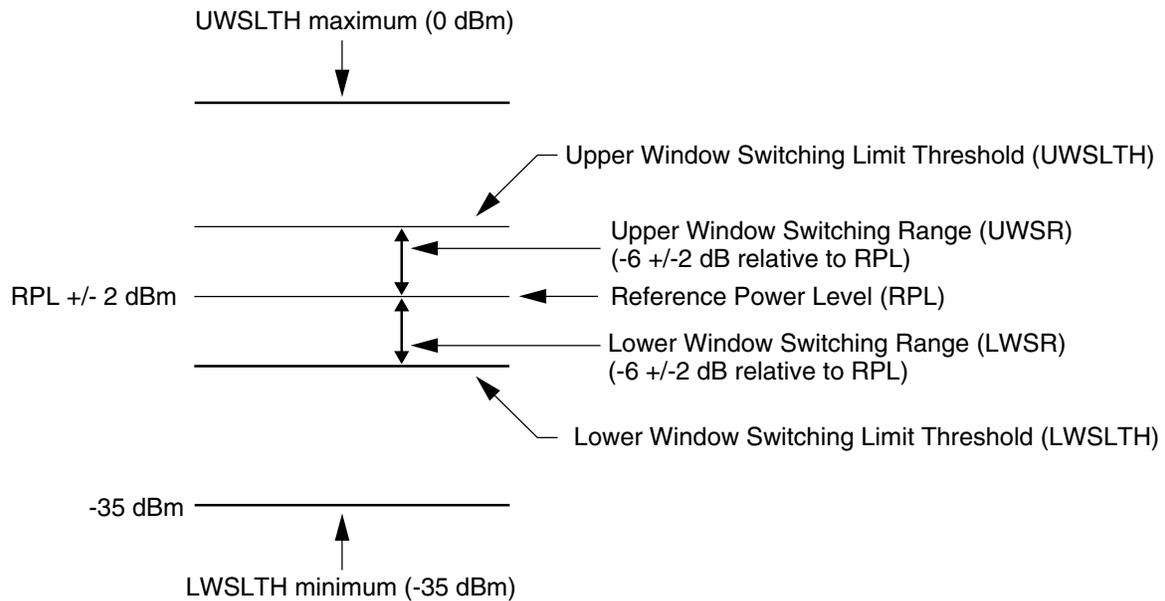
Note: All values shown are the factory default values.

Window Switching mode requires a measured reference power level (RPL), and a lower window switching limit threshold (LWSLTH), to determine when to activate the switch.

The RPL, UWSR, and LWSR values are all user-configurable. UWSLTH and LWSLTH cannot be configured. The ETS Switch module calculates values for these thresholds as follows:

- Both the UWSR and LWSR must be greater than or equal to 6.0 dB

- LWSLTH = RPL–LWSR --> LWSLTH $\geq$ –35 dBm --> RPL $\geq$ –29 dBm

- UWSLTH = RPL+UWSR --> UWSLTH $\leq$ 0 dBm --> RPL $\leq$ –6 dBm

Enabling automatic switch-back ensures that the ETS will revert back to the primary path once the fault on the primary line clears and its power returns to an acceptable level. To avoid instability, the module applies a 2 dB hysteresis to determine when the power level is within the normal operating range. It also requires 3 seconds hold off time.

Switching criteria
In automatic mode, the ETS Switch module switches paths when one of the following conditions occurs.

- The active path receives a loss of signal (LOS) when the measured power of the incoming signal is
  - less than the ASLTH (if in Absolute switching mode) or
  - less than the LWSLTH (if in Window switching mode)
- The power level measured on the incoming signal on the alternate path is
  - greater than the ASLTH (if in Absolute switching mode) or
  - greater than the LWSLTH (if in Window switching mode)

Automatic switch-back

The automatic switch-back (revertive) feature allows the module to switch traffic back to the primary path automatically, when the optical power returns to an acceptable level. By default, auto-switch-back is disabled, but you can enable it using TL1.

To prevent oscillations and unintended switch activation, the module applies a 2 dB hysteresis and switch-back hold time, before switching traffic back to the primary path. The switch-back hold time prevents the module from switching traffic back to the primary path too soon. The switch-back hold time is 3 seconds and is not user-programmable.

Operational considerations for the automatic switching modes

The default switching mode is Absolute switching. Select the switching mode that is appropriate for your application. Refer to Table 4-3 on page 4-18 for a list of operational considerations for each mode.

Table 4-3
Absolute switching and Window switching mode operational considerations

Absolute switching mode	Window switching mode
The operating aggregate received power level can be as high as 19 dBm.	The operating aggregate received power level can be as high as 0 dBm. The captured Reference Power Level (RPL) at the moment the link is set up should not exceed -6 dBm.
The switching threshold is fixed at a low power and does not depend on the actual link loss.	The switching threshold is based on the received power level (reference power level) and a programmable window size.
Since the switching threshold is not user provisionable, it requires no further maintenance after initial network installation.	The switching threshold is user provisionable. To maintain the same degree of protection, it is necessary to reprovision the threshold after each change to the wavelength profile (addition or removal of bands or channels).

Table 4-3 (continued)
Absolute switching and Window switching mode operational considerations

Absolute switching mode	Window switching mode
Provides protection against fiber cuts only. Does not offer protection against excessive power fluctuations that can occur on the line.	Provides protection against fiber cuts and provides improved fiber degradation resiliency since the window size is set according to expected power fluctuations on the line.
—	Addition or removal of bands or channels can cause the aggregate power to cross the window thresholds, which can lead to simultaneous failures on both the working and protection paths.
—	The Amplified Spontaneous Emission (ASE) noise from a pre-amplifier can mask the line-side signal change especially at low channel counts, and prevents the ETS from switching upon a power degrade condition.

Table 4-4 shows the different scenarios of the ETS and describes its switch state tables.

Table 4-4
ETS switch state table

Initial Condition	Operation Mode	Auto Switch Mode	Revertive	Original Switch Position	Action	Final Switch Position
Light present on both PRI and SEC	Automatic	Absolute Switching	No	Primary	LOS on PRI	Switches to SEC. Does not return to PRI
					LOS on SEC	Switch remains on PRI
				Secondary	LOS on PRI	Switch remains on SEC
					LOS on SEC	Switches to PRI
			Yes	Primary	LOS on PRI	Switches to SEC. Reverts back in 3 seconds once light returns to PRI
					LOS on SEC	Switch remains on PRI

Table 4-4 (continued)
ETS switch state table

Initial Condition	Operation Mode	Auto Switch Mode	Revertive	Original Switch Position	Action	Final Switch Position
Light present on both PRI and SEC	Automatic	Window Switching	No	Primary	LOS on PRI	Switches to SEC. Does not return to PRI
					LOS on SEC	Switch remains on PRI
				Secondary	LOS on PRI	Switch remains on SEC
					LOS on SEC	Switches to PRI
			Yes	Primary	LOS on PRI	Switches to SEC. Reverts back in 3 seconds once light returns to PRI
					LOS on SEC	Switch remains on PRI
	Manual	N/A	N/A	Primary	LOS on PRI	Switch remains on PRI
					LOS on SEC	Switch remains on PRI
				Secondary	LOS on PRI	Switch remains on SEC
					LOS on SEC	Switch remains on SEC

Table 4-4 (continued)
ETS switch state table

Initial Condition	Operation Mode	Auto Switch Mode	Revertive	Original Switch Position	Action	Final Switch Position
Light present on both PRI and SEC	Automatic	PRI	PRI	Pull PRI Rx at Near End	SEC = Green MINOR = Yellow	PRI = Green
				Pull IN fiber at Near End	PRI = Green	PRI = Yellow MAJOR = Red MINOR = Yellow
				Power off at Near End	LEDs OFF	PRI = Green
		SEC	PRI	Pull SEC Rx at Near End	PRI = Green MINOR = Yellow	PRI = Green
			SEC	Pull IN fiber at Near End	SEC = Green	PRI = Yellow MAJOR = Red MINOR = Yellow
				Power off at Near End	LEDs OFF	SEC = Green
		OFF	PRI	Power up at Near End	PRI = Green	PRI = Green
			SEC	Power up at Near End	SEC = Green	SEC = Green

Table 4-4 (continued)
ETS switch state table

Initial Condition	Operation Mode	Auto Switch Mode	Revertive	Original Switch Position	Action	Final Switch Position
Light missing on both PRI and SEC	Automatic	PRI	PRI	Replace IN fiber at Near End	PRI = Green	PRI = Green
		PRI	SEC	Replace IN fiber at Near End	PRI = Green	SEC = Green
		SEC	PRI	Replace IN fiber at Near End	SEC = Green	PRI = Green
PRI failed due to LOS	Automatic	SEC	PRI	Replace PRI Rx at Near End	SEC = Green	PRI = Green
SEC RX fiber pulled	Automatic	PRI	PRI	Replace SEC RX fiber at Near End	PRI = Green	PRI = Green

Path protection using a Transponder Protection Tray

Optical transponder (OTR) circuit packs operate without OCLDs, and their signals do not pass through the OCMs. Instead, path protection for OTRs is implemented by pairing OTRs, and installing a Transponder Protection Tray. Two types of Transponder Protection Trays are available in both single-mode and multimode variations: one contains four optical splitter/couplers, and one contains two optical splitter/couplers. When Transponder Protection Trays are deployed, they are connected directly to the customer equipment and function as the entry and exit points to the Optical Metro 5100/5200 network.

As an entry point to the network, each splitter/coupler receives a signal from one client fiber. The splitter/coupler splits the power of the signal and then transmits it over two diverse fibers, to two OTRs through a protected channel assignment. The receiving OTRs assesses, based on protection criteria, which signal is transmitted to the subtending equipment on the receiving end.

As an exit point from the network, each splitter/coupler can receive a signal from two OTRs. Only one OTR in the pair transmits at a time. When the splitter/coupler receives a signal, it transmits the signal to one client fiber.

Figure 4-8 on page 4-23 shows how the Transponder Protection Tray provides path protection for pairs of OTRs.

Figure 4-8
OTR path protection

OM2417p
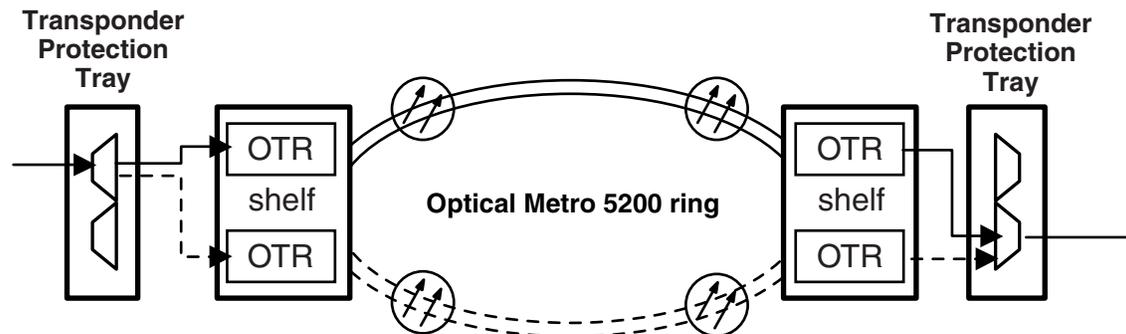
Legend

───   Working path

- - -   Protection path

1+1 APS protection using Muxponders

When Optical Metro 5100/5200 shelves are configured with Muxponder circuit packs, you can implement 1+1 APS protection by provisioning a channel assignment between two Muxponders. In this protection scheme, the same signal is transmitted over two diverse paths, one east and one west. If the fibers in the working (active) path are cut or are out of service, the protected path ensures that the signal reaches its destination.

Client signals are connected to the working Muxponder only. The working Muxponder is bridged onto the line as well as across the shelf backplane to the mate protection Muxponder. The protection Muxponder does not have any client Small Form Factor Pluggable (SFP) modules populated, it provides line protection only. Failure of the working Muxponder or a client interface causes traffic loss (i.e., no client or equipment protection).

Muxponder line side protection is implemented using the 1+1 APS (Automatic Protection Switch) protocol using the K1 and K2 bytes in the SONET line overhead or SDH Multiplex Section overhead. The K1 byte is used to indicate a request by a Muxponder for a switch action, through a request code, as well as an indication as to the channel number making the switch request. The K2 byte is used to indicate the bridging action, the provisioned architecture (1+1 or 1:1), and mode of operation (unidirectional or bidirectional).

Both bi-directional and uni-directional protection switching modes are supported. Only revertive switching is supported, non-revertive switching is not supported. In uni-directional mode, the receiver that detects a fault requests

a switch to the protection line. The working and protection signals are always the same or permanently bridged. In bi-directional mode, the receiver that detects the fault requests that both the near-end and far-end switch to protection. Requests to the far-end are transmitted via the APS channel (K1 and K2 bytes) protocol.

> *Note:* When there is a mismatch in protection modes between the near-end and far-end Muxponder, the Muxponder that is provisioned with bi-directional mode will automatically change to uni-directional protection mode to match the Muxponder at the other end.

Figure 4-9 on page 4-25 shows an example of protected signal paths in Optical Metro 5200 network using Muxponders. Figure 4-10 on page 4-26 shows an example of protected signal paths in Optical Metro 5100 network using Muxponders.

Figure 4-9
Example of protected signal paths in Optical Metro 5200 network using Muxponders

OM2485p

Figure 4-10
Example of protected signal paths in Optical Metro 5100 network using Muxponders
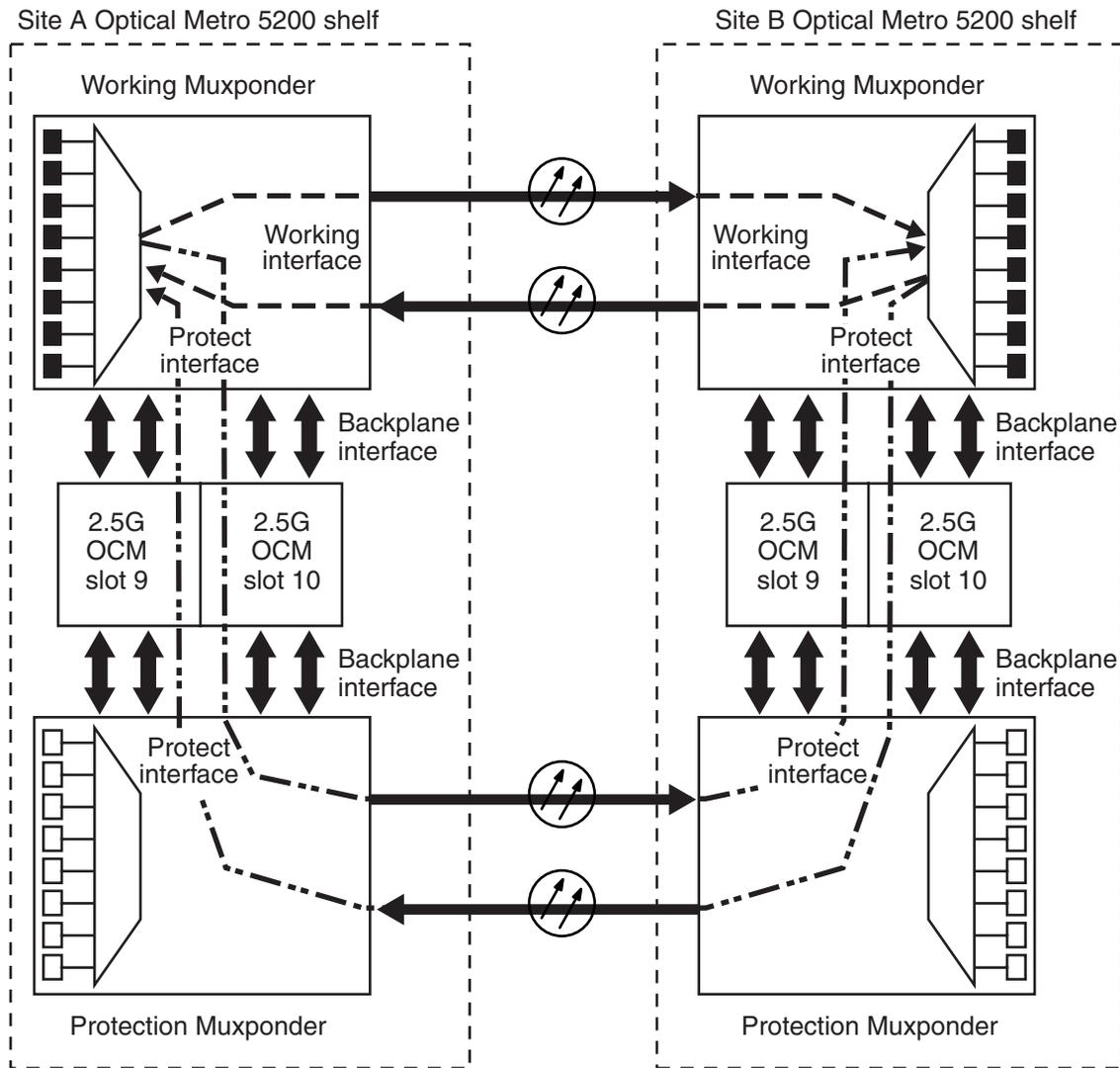
OM2486p
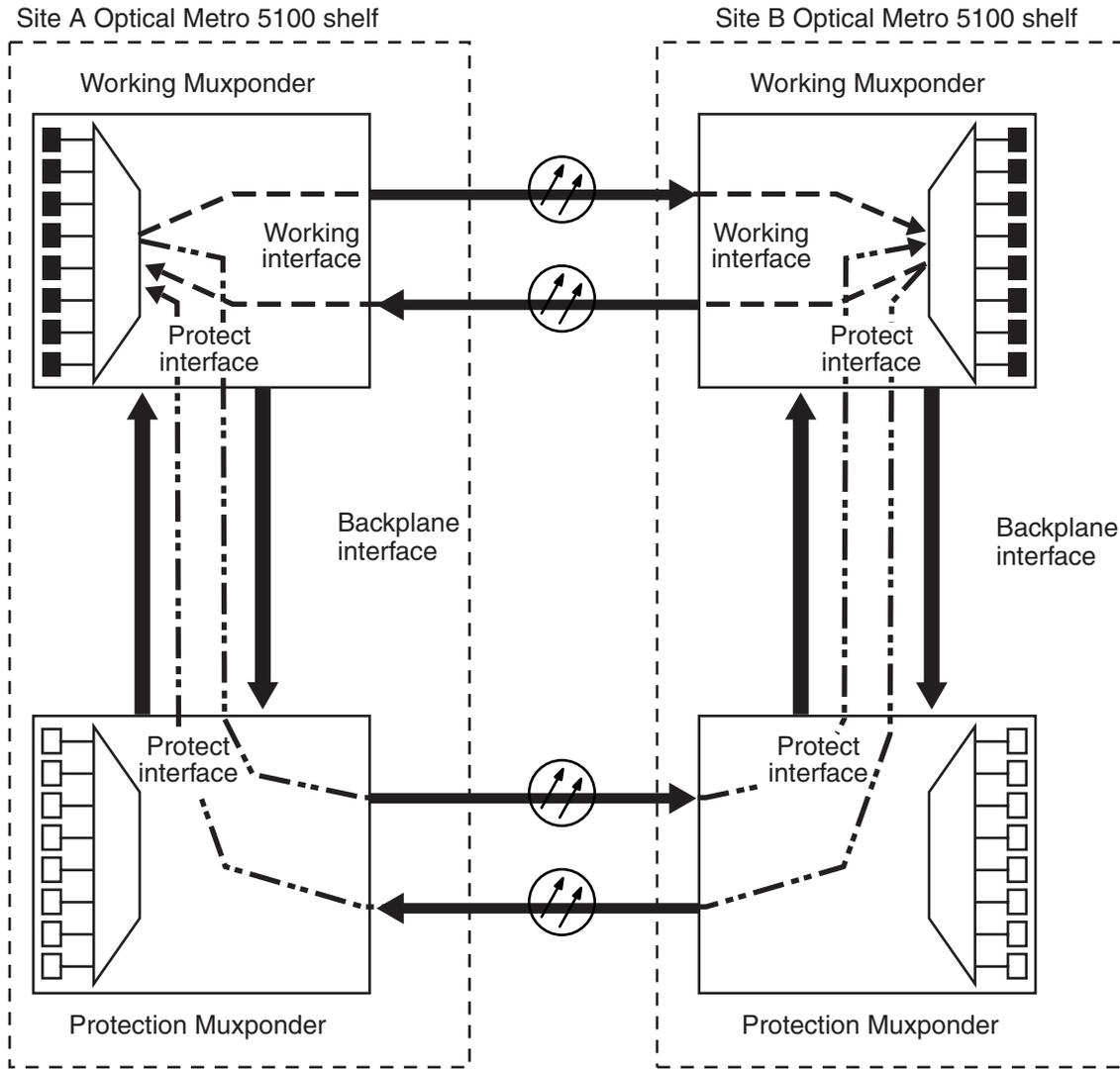
Legend

- – – – = Working

—··— = Protection

Dual homing protection

Dual homing protection refers to an optical channel that is routed over two diverse paths within an Optical Metro 5100/5200 network and is transmitted out of the network over two diverse client interfaces. On the second network, the two signals enter another Optical Metro 5100/5200 network as two independent client interfaces and are diversely routed around the ring where

they then come together at a single shelf at the remote end. At the remote end, the two signals come into two line side interface circuit packs (for example, two 2.5 Gbit/s Flex OCLD circuit packs), and the standard protection criteria is used to select the best signal.

If the signal is a SONET/SDH signal, the signal between the two Optical Metro 5100/5200 rings may be sent through a SONET/SDH network in order to provide longer reach between the source and destination nodes. In this case, a form of protection, using line-AIS is available where if one span fails, the remote Optical Metro 5100/5200 network element can perform a protection switch.

Using Figure 4-11 on page 4-28 as an example, line-AIS based protection occurs as follows:

- a fiber break occurs between transmission nodes (see Figure 4-11)
- the SONET/SDH system transmits line AIS towards the Optical Metro 5100/5200 network
- the remote network element detects that there is line-AIS on one side, but not the other, and causes the OCLD that was active to become inactive, and vice versa
- the protection switch is complete

The circuit packs that support line-AIS protection are:

- OTR 2.5 Gbit/s Flex
- OTR 10 Gbit/s
- OTR 10 Gbit/s Enhanced (for SONET, SDH, and WAN PHY modes only)
- OCLD 2.5 Gbit/s Flex
- Muxponder (when connected to a SONET network with an OTR 10 Gbit/s Enhanced passthrough connection)

    Note: If the SONET/SDH equipment is transmitting path-AIS instead of line-AIS, a protection switch cannot take place.

Figure 4-11
Dual ring configuration with line-AIS based protection
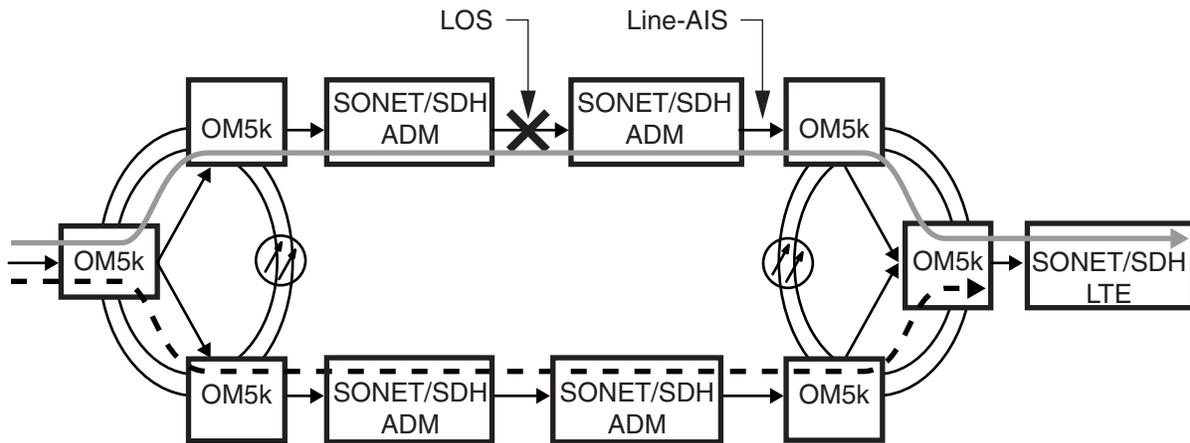
Figure 4-12 on page 4-29 shows how the protection switch takes place when a loss of signal occurs in the SONET system, and line-AIS is injected towards the Optical Metro 5100/5200 system.

Figure 4-12
Dual ring configuration with AIS-based protection

OM0766p

Legend

⋯ – ▶ Working path interrupted

──▶ New working path
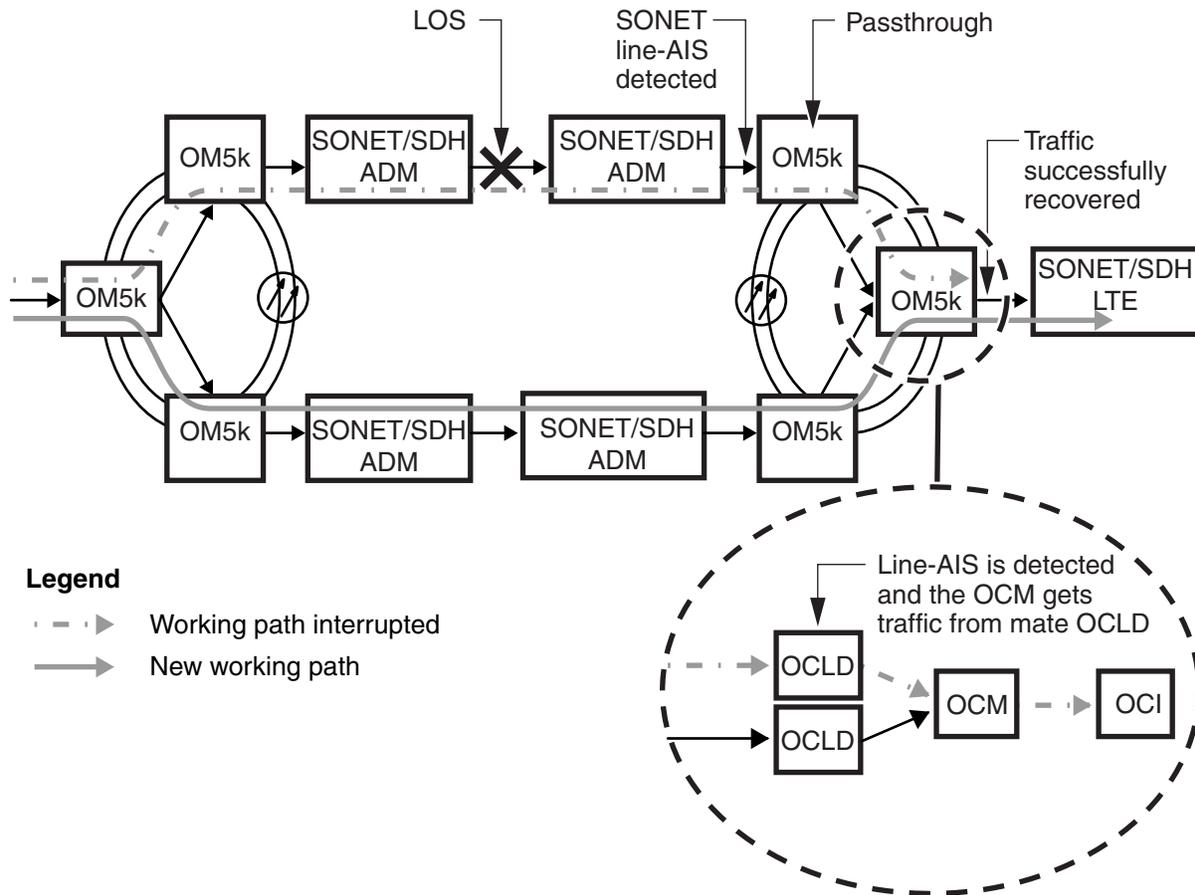
Dual homing protection for Muxponder circuit packs
For dual homing protection configurations using the Muxponder 10 Gbit/s
GbE/FC circuit packs, see Chapter 3 "Supported configurations" in *Network
Planning and Link Engineering*, 323-1701-110.

SNMP surveillance MIB

In this chapter

Introduction

This chapter describes the SNMP MIB for the Optical Metro 5100/5200 shelves and the ETS shelves.

SNMP for Optical Metro 5100/5200 shelves

This SNMP MIB is provided to support an alarm surveillance interface to a third-party SNMP management platform. This interface includes definitions necessary to identify Optical Metro 5100/5200, query alarms, and receive Optical Metro 5100/5200 SNMP traps.

Note 1: SNMP support is provided only for the interface definitions provided by this MIB. This MIB is intended for alarm surveillance only; any other usage of the SNMP interface on an Optical Metro 5100/5200 shelf is neither licensed nor supported by Nortel Networks.

Note 2: Optical Metro 5100/5200 SNMP agent does not provide traps for Loss/Gain of Contact to a network element as it is the SNMP manager's responsibility to monitor the NE contact state. An external SNMP manager can periodically poll the MIB-2 variable sysUpTime to determine whether it is in contact with a network element. If monitoring the alarm state is desired as well, a SNMP manager can periodically poll the following five MIB variables: notifShelfLastAlarm, notifShelfNumActiveAlarmsMajor, notifShelfNumActiveAlarmsCritical, notifShelfNumActiveAlarmsMinor and notifShelfNumActiveAlarmsAlert to determine the new alarms and NE contact state.

Optical Metro 5100/5200 Enterprise MIB

The Optical Metro 5100/5200 SNMP MIB is defined under the enterprises portion of the management hierarchy.

It is strongly recommended that to configure the SNMP manager with a timeout no less then 5 second for any SNMP operations that attempt to modify Optical Metro 5100/5200 enterprise MIB variables.

MIB structure

The Optical Metro 5100/5200 MIB is organized into the following groups:

- shelf
- software
- notifications
- log
- admin

Shelf group

The 'shelf' group contains shelf-level information for the Optical Metro 5100/5200 shelf.

Software group

The 'software' group contains information about the current software load running on the shelf. The 'swVersion' variable in this group identifies the current software version on the shelf.

Notifications group

The 'notifications' group provides detailed alarm surveillance information for Optical Metro 5100/5200. This is the primary group provided by this SNMP MIB. This group contains both scalar variables for shelf-level alarm information as well as two tables providing detailed alarm information:

- notifActiveAlarmTable
- notifAlarmTable

notifActiveAlarmTable

This table provides a list of the active alarms on the shelf. In Optical Metro 5100/5200 releases prior to Release 4.0, it was used to provide an index into the notifAlarmTable and contained only enough information to key into the detailed notifAlarmTable. From release 4.0, there has been new fields added which provide all the information required for the active alarm in one table.

With all the information required there would be no need to query the notifAlarmTable for additional information.

notifAlarmTable
This table provides alarm information for specific alarm Id and location on the shelf. It will still return alarm information but will be deprecated in the near future.

notifEventIdTable
This table provides the complete list of all possible events on the shelf.

notifAlarmDescriptionTable
This table provides a complete list of all possible alarms/alerts Ids on the shelf, along with severity and description.

Log group

The 'log' group provides access to the local event log stored on the Optical Metro 5100/5200 shelf. The local event log is a circular buffer containing the last 400 events that occurred on the shelf. It is important to note that while the log is a circular buffer, the indexes into the log do not wrap at 400; instead, the indexes continue to increase for each subsequent log entry until finally wrapping to zero when reaching the maximum size of a 32-bit integer ($2^{32} - 1$).

Since a trap is sent for every event stored in this log, it is possible to retrieve missed traps if the last logIndex (sent with the trap) is known.

Admin group

The 'admin' group allows the SNMP manager to administer alarm surveillance functions on the shelf. The main table provided in this group is the adminTrapDestination table. This table is used to register the SNMP manager with the shelf to receive SNMP traps.

Trap definitions

The traps emitted by an Optical Metro 5100/5200 shelf are described at the end of the MIB file. The following traps are defined:

- eventTrap
  - Describes an asynchronous, stateless event, which has occurred, on the shelf.
- userRequestTrap
  - Describes an operation initiated by a maintenance operator – e.g. Optical System Manager user.
- alarmCriticalTrap
  - Describes an alarm state change for a 'critical' severity alarm.
- alarmMajorTrap
  - Describes an alarm state change for a 'major' severity alarm.

- alarmMinorTrap

    — Describes an alarm state change for a 'minor' severity alarm.

- alertTrap

    — Describes an 'alert' state change.

Conducting alarm surveillance

This section provides a description of the correct method of performing alarm surveillance using the Optical Metro 5100/5200 SNMP MIB.

Trap registration

For open SNMP managers, there are two types of trap receiving mechanisms available:

- Single shelf trap receiving mechanism
- System wide (sometimes called ring-wide) trap receiving mechanism

In the following discussion on trap registration, the term *system* is used to refer to the set of two or more shelves all managed by the same shelf list.

Single shelf trap receiving mechanism means that the SNMP manager will receive only those traps related to that shelf. To receive traps from all shelves in the system via this mechanism, the SNMP manager must register for the traps with each shelf in the system. Note that if the system is to be configured in private IP mode, this form of registration is *only* available on the Gateway Network Element (GNE) shelf. Registration on any remote shelf will fail in private IP mode.

System wide receiving trap mechanism means that the SNMP manager will receive traps related to all shelves in the system. To receive traps via this mechanism, the SNMP manager needs to be registered with only one shelf. Use the Gateway Network Element (GNE) shelf for this type of registration. Note that if the system is to be configured in private IP mode, this form of registration is the *only* one available by which to obtain traps for the whole system.

The first step necessary to perform alarm surveillance is to register with the Optical Metro 5100/5200 shelf to receive SNMP traps. This registration is accomplished by creating a new row in the adminTrapDestinationTable.

Note: The row is created by finding an empty row in the index range of 1-8 in the table. SNMP Managers registering with a shelf must ensure that they only allow the use of indexes 1 through 8 since the System Manager owns exclusive use of indexes 9 through 16.

To register the SNMP manager to receive traps via the above-mentioned mechanisms, use table entries 1-8 as follows:

- 1-4: for single shelf trap receiving mechanism

- 5-8: for system wide trap receiving mechanism

Information provided in the row-create operation is:

- adminTrapDestMgrIpAddr

  — the IP address of the SNMP manager, which is to receive the SNMP traps.

- adminTrapDestPort

  — the port number required by the SNMP manager.

- adminTrapDestCommunity

  — the community string to be used in the SNMP TRAP-PDU.

- adminTrapDestFilter

  — the type of filtering, if any, to be applied for this SNMP manager. Trap filters are available to filter out user request traps and/or event traps. Alarm state change traps cannot be filtered.

- adminTrapDestRowStatus

  — This variable should be set to 'createAndGo'. The entry is created using the supplied variables in the variable-binding list.

- adminTrapDestSecurity

  — This variable should be set to 'true' if security-related events are to be received by the SNMP manager and 'false' if security-related events are to be filtered out

SNMP traps will be sent to the given <IP Address>:<port> combination given in this table, with a community string as given by the adminTrapDestCommunity variable.

De-registration

To de-register an entry in this table, simply issue an SNMP SET request to the adminTrapDestRowStatus variable. Setting this variable to 'destroy' causes the row entry to be deleted.

Note: It is the responsibility of the SNMP manager to de-register with the Optical Metro 5100/5200 shelf when it no longer requires SNMP traps from the shelf. Entries in the adminTrapDestinationTable are stored on the shelf in persistent store and will therefore remain in the table until explicitly deleted by the SNMP management station.

Receiving SNMP traps

After registering for single shelf traps, the management station will receive alarm state changes, events, and user request traps (or a subset if filtering is applied) related to that shelf only.

After registering for ring wide traps, the management station will receive alarm state changes, events, and user request traps (or a subset if filtering is applied) related to all shelves in the ring.

If the same SNMP manager is registered for ring wide traps and for single shelf traps, the management station will receive duplicate traps.

Upgrade

Prior to Release 5.0, only a single shelf trap receiving mechanism was available for SNMP managers.

The following case scenarios should be considered if upgrading Optical Metro 5100/5200 shelves running software load lower than Release 5.0:

*   *Case 1*: If the SNMP manager is registered with one or more shelves for traps, in adminTrapDestinationTable as entry (5-8), the SNMP manager will start receiving ring wide traps from these shelves after the upgrade.

*   *Case 2*: If your SNMP manager is registered with one or more shelves for traps in adminTrapDestinationTable as entry (1-4), the SNMP manager will still receive single shelf traps from these shelves after the upgrade.

To continue receiving single shelf traps, follow the procedures indicated below for the above-mentioned case scenarios:

*   *Case 1 procedure*: De-register the SNMP manager from all shelves where the SNMP manager is registered for traps in adminTrapDestinationTable as entry in the range 5-8, and re-register them in the range 1-4.

*   *Case 2 procedure*: No action is necessary.

To start receiving ring wide traps, follow the procedures indicated below for above-mentioned scenarios:

*   *Case 1 procedure*: De-register the SNMP manager entry in adminTrapDestinationTable from all shelves. Register the SNMP manager in this table with GNE (Gateway Network Element) shelf for ring wide traps as entry in the range 5-8.

*   *Case 2 procedure*: De-register the SNMP manager entry in adminTrapdestinationTable from all shelves. Register the SNMP manager in this table with GNE (Gateway Network Element) shelf for ring wide traps as entry in the range 5-8.

Querying alarm status

It is also possible to poll the shelf for alarm status. The notifActiveAlarmTable and notifAlarmTable contain everything necessary to find information about all alarms on the shelf. Scalar variables also exist to find a summary of the existing alarm counts and timestamp of the last alarm state change on the shelf.

Observer and surveillance communities

Members of the observer community, as of release 6.1, have write access to the (private) area of the MIB used for local user-account management so that these users can change their respective passwords. A new, strictly read-only, community class called the 'surveillance' community is available in Release 6.1. The surveillance community string can be changed using SMI or TL1.

All community strings can be changed using SMI or TL1. Nortel Networks recommends that the administrator change all community strings to non-default values to secure the network element.

Configuring the external SNMP manager when using private IP addressing

When the Optical Metro 5100/5200 network is provisioned to use private IP addressing, the external SNMP manager must be setup so that each network node has its IP address and port number manually configured. When private IP addressing is used, the SNMP manager can only send requests to the GNE's IP address. However, to issue requests to remote (i.e., non-GNE) shelves, the SNMP manager must use the IP address of the GNE along with a UDP port number of "8000 + Shelf ID" (the Shelf ID is of the shelf which the SNMP Manager wants to access).

For example, if there are 3 shelves in the system in private IP mode, with Shelf IDs "1, 2, and 3" respectively (with a GNE IP address of 47.134.99.1), then the SNMP manager must be configured with the following information for it to communicate with each of the three shelves:

Shelf #1 GNE: 47.134.99.1 / default UDP port (i.e., 161)
Shelf #2 RNE: 47.134.99.1 / UDP port # 8002
Shelf #3 RNE: 47.134.99.1 / UDP port # 8003

The only way any SNMP manager can gain access to a Remote NE (RNE) is by using the GNE's IP address along with the appropriate UDP port number. The GNE's SNMP Relay function relays the packet to appropriate RNE based on the the UDP port number of "8000 + Shelf ID".

History of MIB changes

Differences introduced in Release 3.0

Release 3.0 of the OPTera Metro 5200 Network Element software introduces a new Sub-Rate Multiplexor (SRM) circuit pack. This new circuit pack has four ports, which introduces a new requirement for managing multiple ports per circuit pack (Release 2.1 version of the surveillance MIB was limited to modeling a single port per circuit pack).

'location'
The introduction of the new four-port SRM dictates that SNMP tables which were previously indexed by a slot are now indexed by a combination of slot and port information. Rather than break the tables out into multiple indexes, this new index is called 'location' and is mapped onto the old 32-bit 'slot' into a new 32-bit 'location' as shown in Figure 5-1.

Figure 5-1
'location'

Un-used	Port 2	Direction	Port Type	Port	Slot
Bit 31	Bits 30:27	Bits 26:25	Bits 24:22	Bits 21:8	Bits 7:0

32 Bits

Slot
This is an 8-bit number specifying the circuit pack slot number

Port
This is an 8-bit number specifying the port number. The port may or may not be applicable, depending on the entity that this location refers to. If the port is not applicable, these bits will be '0'.

> *Note:* Ports associated with circuit pack entities range from 1 to 4. Any management software written for NE Release 2.1 indexing based on the old 'slot' index must take into account that the 'location' field may now include port information as well as slot information. The management software must now decode the location into port and slot information.

Port Type
This is a 3-bit number representing the type of port in this location. This field is only used in Performance Monitoring areas (such as Threshold Crossing Alerts).

Port type is one of: 0 (not applicable), 1 (optical), 2 (backplane), 3 (wan), 4 (path), or 5 (aggregate).

Direction
This is a 2-bit number representing direction; one of 0 (not applicable), 1 (tx), or 2 (rx).

Port 2
This is a 4-bit number representing the number of port when Port Type is path.

See "Differences introduced in Release 7.0" on page 5-40 for examples on location decoding.

Differences introduced in Release 3.1

While Nortel Networks has combined the 3.0 and 3.1 MIB into one there are a few differences. First, OPTeraReturnCodes invalid-switch-to-failed-timing-clock(71) and invalid-timing-clock-for-port-notConnected(72) apply only to shelves with Release 3.1.

Second, the OPTeraAlarmIDs in Table 5-1 are only applicable to Release 3.1.

Table 5-1
OPTeraAlarmIDs

New Optera Alarm IDs	ID number	Definition
alarm-rx-loc	161	S-SRM Rx LOC
alarm-rx-alert-ploc	162	S-SRM Rx alert ploc
alarm-rx-alert-sloc	163	S-SRM Rx alert sloc
alarm-tx-lof	164	S-SRM Tx LOF
alarm-prim-clock-not-prov	165	S-SRM Primary clock not provisioned
alarm-sec-clock-not-prov	166	S-SRM Secondary clock not provisioned
alarm-clock-not-prov	167	S-SRM Clock not provisioned

Differences introduced in Release 3.2

Most of the changes in the surveillance MIB for Release 3.2 are related to introduction of the Optical Service Channel (OSC) card. The following areas of surveillance MIB were affected:

• ReturnCode definitions (see Table 5-2)

• AlarmId definitions (see Table 5-3)

Table 5-2
ReturnCode definitions

New ReturnCode definitions in Rel. 3.2	ID number
supporting-osc-facility-notprovisioned	73
supporting-wsc-facility-must-be-deleted-first	74
supporting-osc-facility-is-out-of-service	75
supporting-wsc-facility-is-in-service	76

Table 5-2 (continued)
ReturnCode definitions

New ReturnCode definitions in Rel. 3.2	ID number
wsc-connection-must-be-add-drop	77
wsc-connection-already-in-specified-state	78
both-wsc-facilities-must-be-provisioned	79
invalid-wsc-port	80
Note: WSC = Way Side Channel	

Table 5-3
AlarmId definitions

New AlarmId definitions in Rel. 3.2	ID number	Description
alarm-bit-disparity	168	Bit Disparity
alarm-db-backup-failure	169	Data Base backup failure
alarm-db-restore-failure	170	Data Base restore failure
alarm-osc-invalid-data	171	OSC Invalid data
alarm-osc-oh-link-fail-rem-e	172	OSC overhead link fail remote east
alarm-osc-oh-link-fail-rem-w	173	OSC overhead link fail remote west
alarm-oh-link-fail-east	174	OSC overhead link fail east
alarm-oh-link-fail-west	175	OSC overhead link fail west
alarm-loss-of-link	176	OSC loss of link
alarm-uneqpt-remote-port	177	OSC unequipped remote port
alarm-osc-shelf-input-failure	178	OSC Shelf Input Failure
alarm-osc-remote-loss-of-signal	179	OSC Remote Loss of Signal
alarm-osc-remote-loss-of-frame	180	OSC Remote Loss of Frame
alarm-osc-remote-invalid-signal	181	OSC Remote Invalid Signal
alarm-osc-e-w-fiber-mismatch	182	OSC East/West Fiber Mismatch
alarm-osc-wayside-ais	183	OSC Wayside Alarm Indication Signal
alarm-osc-loss-of-signal	184	OSC loss of signal
alarm-software-below-baseline	185	Software below baseline
alarm-osc-invalid-signal	186	OSC invalid signal
alarm-osc-loss-of-frame	187	OSC loss

Differences introduced in Release 4.0

Most of the changes in the surveillance MIB for Release 4.0 are related to introduction of the 10 Gbit/s circuit pack and additional fields to the traps. The following areas of surveillance MIB were affected:

- New data type definition: CardType (see Table 5-4)
  - — CardType is an integer which indicates the values in Table 5-4
- ReturnCode definitions (see Table 5-5)
- AlarmId definitions (see Table 5-6)
- EventId definitions (see Table 5-7)
- NotifActiveAlarmTable (see Table 5-8)
- NotifAlarmDescriptionTable (see Table 5-9)
- logTable (see Table 5-10)
- Trap definitions (see Table 5-11)

Table 5-4
CardType definitions

New CardType definitions in Rel. 4.0
undefined (0)
ocld (1)
ocm (2)
oci (3)
omx (4)
sp (5)
mp (6)
ofa (7)
ect (8)
srm (9)
osc (10)
otr (11)
filler (12)

Table 5-5
ReturnCode definitions

New ReturnCode definitions in Rel. 4.0	ID number
band-or-channel-unavailable	81
maximum-card-count-reached	82
entity-in-adjasent-slot-exist	83

Table 5-6
AlarmId definitions

New AlarmId definitions in Rel. 4.0	ID number	Description
alarm-ocld-fiber-mismatch	188	OCLD Fiber Mismatch
alarm-remote-defect-indication	189	Remote defect indication
alarm-band1-input-failure-west	190	Band 1 Input Failure West
alarm-band2-input-failure-west	191	Band 2 Input Failure West
alarm-band3-input-failure-west	192	Band 3 Input Failure West
alarm-band4-input-failure-west	193	Band 4 Input Failure West
alarm-band5-input-failure-west	194	Band 5 Input Failure West
alarm-band6-input-failure-west	195	Band 6 Input Failure West
alarm-band7-input-failure-west	196	Band 7 Input Failure West
alarm-band8-input-failure-west	197	Band 8 Input Failure West
alarm-band1-input-failure-east	198	Band 1 Input Failure East
alarm-band2-input-failure-east	199	Band 2 Input Failure East
alarm-band3-input-failure-east	200	Band 3 Input Failure East
alarm-band4-input-failure-east	201	Band 4 Input Failure East
alarm-band5-input-failure-east	202	Band 5 Input Failure East
alarm-band6-input-failure-east	203	Band 6 Input Failure East
alarm-band7-input-failure-east	204	Band 7 Input Failure East
alarm-band8-input-failure-east	205	Band 8 Input Failure East
alarm-bit-error-rate-degrade	206	Bit Error Rate Degrade

Table 5-7
EventId definitions

New EventId definitions in Rel. 4.0	ID number
event-eqpt-manual-to-ocm-a	22
event-eqpt-manual-to-ocm-b	23
event-path-start-wrt-timer	24
event-path-Cancel-wrt-timer	25
event-path-end-wtr-timer	26
event-incompatible-load	27
event-primary-clk-prov	28
event-secondary-clk-prov	29
event-primary-clk-deprov	30
event-secondary-clk-deprov	31
event-auto-switch-to-pri-clk	32
event-auto-switch-to-sec-clk	33
event-man-switch-to-pri-clk	34
event-man-switch-to-sec-clk	35
event-primary-clk-change	36
event-secondary-clk-change	37
event-db-backup-in-progress	38
event-db-backup-failure	39
event-db-backup-complete	40
event-db-restore-in-progress	41
event-db-restore-failure	42
event-db-restore-complete	43
event-db-restore-commit-failure	44
event-db-restore-commit-complete	45
event-db-restore-cancel-failure	46
event-db-restore-cancel-complete	47
event-incompatible-sp-load-size	48
event-sp-load-not-found	49

Table 5-7 (continued)
EventId definitions

New EventId definitions in Rel. 4.0	ID number
event-health-check-in-progress	50
event-health-check-completed	51
event-health-check-failed	52
event-flash-error	53
event-ftp-failed	54
event-ftp-file-too-big	55
event-flash-locked	56
event-load-header-invalid	57
event-load-checksum	58
event-distributed-loads-removed	59
event-no-response	60
event-trib-suppress-backplane10-event	61
event-trib-suppress-backplane9-event	62
event-trib-restore-backplane10-event	63
event-trib-restore-backplane9-event	64
event-set-alarm-SA	65
event-set-alarm-NSA	66
event-mask-OH-alarms	67
event-unmask-OH-alarms	68
event-BIF-event	69
event-mask-LOS	70
event-unmask-LOS	71
event-mask-BIF	72
event-unmask-BIF	73

Table 5-8
NotifActiveAlarmTable fields

New fields to notifActiveAlarmTable in Rel. 4.0	
notifActiveAlarmCardType	CardType
notifActiveAlarmSeverity	AlarmSeverity
notifActiveAlarmTimeStamp	TimeAndDate
notifActiveAlarmDescr	DisplayString
notifLocationDescr	DisplayString

NotifAlarmDescriptionTable is introduced in Release 4.0, which contains the complete list of all alarms/alerts ID's, severity and descriptions.

Table 5-9
NotifAlarmDescriptionTable definitions

NotifAlarmDescriptionTable definition	
notifAlarmDescId	OPTeraAlarmId
notifAlarmDescSeverity	AlarmSeverity
notifAlarmDescription	DisplayString

Table 5-10
LogTable fields

New fields to logTable in Rel. 4.0	
logCardType	CardType
logLocationDescr	DisplayString

Table 5-11
Trap fields

New fields to traps in Rel. 4.0	
notifActiveAlarmCardType	CardType
notifLocationDescr	DisplayString

Differences introduced in Release 4.1

Most of the changes in the surveillance MIB for Release 4.1 are related to introduction of the new circuit packs (for example, the APBE circuit pack) and new software features (for example, Intra-site Fault Sectionalization). The following areas of surveillance MIB were affected:

•   New shelf variable

- Slotnum definition
- CardType definitions (see Table 5-12)
- ReturnCode definitions (see Table 5-13)
- AlarmId definitions (see Table 5-14)
- EventId definitions (see Table 5-15)
- Location field

ShelfHwiShelfID is added to the shelf group along with the introduction of the 5100 shelf. This variable provides the interface to discover the platform identifier for OPTera 5000 shelves.

Slotnum definition has been extended from range (0..26) to (0..47).

The Intra-site Fault Sectionalization feature introduced concept of virtual slots (28-47). Virtual slots are used by alarm system to raise alarms against specific OMX band and direction or OSC, C and L splitter directions.

Virtual slots are mapped as follows:
- 28   - OMX ,WEST, BAND 1
- 29   - OMX ,WEST, BAND 2
- 30   - OMX ,WEST, BAND 3
- 31   - OMX ,WEST, BAND 4
- 32   - OMX ,WEST, BAND 5
- 33   - OMX ,WEST, BAND 6
- 34   - OMX ,WEST, BAND 7
- 35   - OMX ,WEST, BAND 8
- 36   - OMX ,EAST, BAND 1
- 37   - OMX ,EAST, BAND 2
- 38   - OMX ,EAST, BAND 3
- 39   - OMX ,EAST, BAND 4
- 40   - OMX ,EAST, BAND 5
- 41   - OMX ,EAST, BAND 6
- 42   - OMX ,EAST, BAND 7
- 43   - OMX ,EAST, BAND 8
- 44   - OSC SPLITTER , WEST
- 45   - OSC SPLITTER , EAST
- 46   - C and L SPLITTER , WEST
- 47   - C and L SPLITTER , EAST

Table 5-12
Card definitions

New CardType definitions in Rel. 4.1	ID number
osc-splitter	13
c-and-l-splitter	14
apbe	15

Table 5-13
ReturnCode definitions

New ReturnCode definitions in Rel. 4.1	ID number
incompatible-lambda	84
incompatible-card-types	85
traffic-being-forced-to-specified-ocm	86
invalidDirection	87
invalid-configuration	88
invalid-ERN	89
apbe-evoa-facilities-must-be-oos	90
apbe-aggregate-facility-must-be-oos	91
apbe-provision-power-out-of-range	92
apbe-invalid-prov-mode	93
ern-edit-not-allowed-for-osc-ifs-state	94
conflicting-direction-and-configuration	95
functionality-not-supported	96
backup-restore-in-progress	97
band-facilities-must-be-deleted-first	98
aggregate-facility-must-be-provisioned-first	99
ifs-enable-not-allowed-with-ern0	100

Table 5-14
AlarmId definitions

New AlarmId definitions in Rel. 4.1	ID number	Description
alarm-environmental-type5	207	Telemetry input port 5
alarm-environmental-type6	208	Telemetry input port 6
alarm-environmental-type7	209	Telemetry input port 7
alarm-environmental-type8	210	Telemetry input port 8
alarm-broken-fiber	211	Broken fiber alarm
alarm-band-ais	212	Band Alarm Indication Signal
alarm-ofa-ais	213	OFA Alarm Indication Signal
alarm-remote-ifs-failure	214	Remote IFS failure
alarm-incomplete-ofa-provisioning	215	Incomplete OFA provisioning
alarm-ifs-shelf-remove	216	IFS shelf remove
alarm-db-Redundancy-Minor	217	Database redundancy lost
alarm-db-Redundancy-Critical	218	Both databases are OOS
alarm-Auto-Laser-Shutdown	219	Auto laser shutdown
alarm-Remote-ALS	220	Remote auto laser shutdown
alarm-Incompatible-Eqpt-Ring-Number	221	Incompatible equipment ring number
alarm-power-not-attainable-low	222	Target Power Not Attainable Low
alarm-power-not-attainable-high	223	Target Power Not Attainable High
alarm-unexpected-power-change	224	Unexpected optical Power Change
alarm-power-out-of-range-low	225	Optical Power Out of Range Low
alarm-power-out-of-range-high	226	Optical Power Out of Range High
alarm-optical-power-low	227	Optical Power low
alarm-duplicated-eqpt-ring-num	228	Duplicated Eqpt Ring Number
alarm-eqpt-ring-number-mismatch	229	Eqpt Ring Number Mismatch
alarm-optical-span-failed-tx	230	Optical span failed TX
alarm-optical-span-failed-rx	231	Optical span failed RX

Table 5-15
EventId definitions

New EventId definitions in Rel. 4.1	ID number
event-eqpt-delete	74
event-eqpt-add	75
event-IFS-On	76
event-IFS-Off	77
event-IFS-clear	78
event-IFS-clear-complete	79
event-IFS-shelf-remove	80
event-ALS-summary	81
event-ALS-enabled	82
event-ALS-disable	83
event-laser-active	84
event-transferload-from-NE-failed	85
event-Apbe-band-atMaxloss	86
event-Apbe-band-Eqcomplete	87
event-database-agent-started	88
event-start-ERN-change	89
event-ERN-change-done	90
event-card-upgrade-success	91
event-card-upgrade-failed	92
event-forced-to-ocm-a	93
event-forced-to-ocm-b	94
event-Apbe-corrupt-data	95

The ring number is inserted into the Location field along with the introduction of the IFS (Intra-site Fault Sectionalization) feature in the Release 4.1. This is a 6-bit number that specifies the provisioned equipment ring number. The default value is 0. See Figure 5-2.

Figure 5-2
'location'
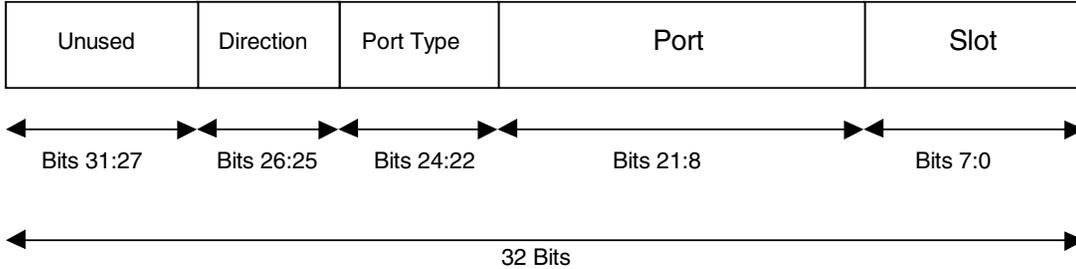
Differences introduced in Release 5.0

See Conducting alarm surveillance for changes introduced in alarm surveillance functionality for Release 5.0.

The following MIB type definitions are expanded in release 5.0:

- OPTeraReturnCode definitions (see Table 5-16)
- OPTeraAlarmId definitions (see Table 5-17)
- OPTeraEventId definitions (see Table 5-18)

Table 5-16
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 5.0	ID number
als-is-not-enabled	107
Shelf-spare1	108
Shelf-spare10	117
dns-servers-not-configured	118
dns-service-not-disabled	119
dns-not-primary-shelf	120
dns-invalid-suffix	121
invalid-ofa-type	122
identical-band-channel-per-plane	123
non-alpha-numeric-desc-entry	124
cannot-perform-path-lockout	125
cannot-perform-path-force-switch	126

Table 5-16 (continued)
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 5.0	ID number
cannot-perform-eqpt-force-switch	127
cannot-perform-eqpt-manual-switch	128
cannot-set-gne-enet1-dhcp	129
Enet1-dhcp-address-is-nonzero	130
gateway-ip-addr-is-nonzero	131
bgp-must-be-disabled	132
Ospf-must-be-disabled	133
subnet-mask-too-large-for-gne	134
Note: OPTeraReturnCode values from 101 to 106 (inclusive) are intentionally skipped.	

Table 5-17
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 5.0	ID number	Description
alarm-cv-8b10b-15Min	232	CV CV 8B10B 15 Min
alarm-es-8B10B-15Min	233	ES 8B10B 15 Min
alarm-SES-8B10B-15Min	234	SES 8B10B 15 Min
alarm-cv-8b10b-1day)	235	CV 8B10B 15 Min
alarm-es-8B10B-1day	236	ES 8B10B 15 Min
alarm-ses-8B10B-1day	237	SES 8B10B 15 Min
alarm-tx-high-reflection	238	High Reflection
alarm-tx-user-power-high	239	Optical Power Transmit High
alarm-tx-user-power-low	240	Optical Power Transmit Low
alarm-rx-user-power-high	241	Optical Power Receive High
alarm-rx-user-power-low	242	Optical Power Receive Low
alarm-unassigned-ern	243	Unassigned Equipment Ring Number
alarm-tx-invalid-signal1	244	Invalid Alarm 244
alarm-tx-invalid-signal2	245	Invalid Alarm 245

Table 5-17 (continued)
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 5.0	ID number	Description
alarm-tx-invalid-signal3	246	Invalid Alarm 246
alarm-tx-invalid-signal4	247	Invalid Alarm 247
alarm-circuit-card-below-baseline	248	Circuit Pack below Baseline
alarm-circuit-card-non-baseline	249	Invalid Alarm 249
alarm-fpga-below-baseline	250	Invalid Alarm 250
alarm-bootloader-below-baseline	251	Bootloader below Baseline
alarm-fac-oos-opt-signal-failure	252	Facility Out Of Service - Optical Signal Failure
alarm-site-input-failure	253	Site Input Failure
alarm-invalid-provisioning	254	Invalid Provisioning
alarm-ifs-version-mismatch	255	Intrasite Fault Sectionalization Version Mismatch
alarm-ifs-multiple-faults	256	Fault Sectionalization Unresolved
alarm-protection-not-available	257	Protection Not Available
alarm-dns-suffix-mismatch	258	DNS suffix mismatch
Note: Alarms 244 to 247, 249 and 250 are not used in this release.		

Table 5-18
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 5.0	ID number
event-alr-enabled	96
event-alr-disabled	97
event-CV-SONET-15Min	98
event-ES-SONET-15Min	99
event-SES-SONET-15Min	100
event-SEFS-SONET-15Min	101
event-CV-SONET-1Day	102
event-ES-SONET-1Day	103
event-SES-SONET-1Day	104

Table 5-18 (continued)
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 5.0	ID number
event-SEFS-SONET-1Day	105
event-EB-SDH-15Min	106
event-ES-SDH-15Min	107
event-SES-SDH-15Min	108
event-OFS-SDH-15Min	109
event-EB-SDH-1Day	110
event-ES-SDH-1Day	111
event-SES-SDH-1Day	112
event-OFS-SDH-1Day	113
event-CV-OCHPath-15Min	114
event-ES-OCHPath-15Min	115
event-SES-OCHPath-15Min	116
event-SEFS-OCHPath-15Min	117
event-CV-OCHPath-1Day	118
event-ES-OCHPath-1Day	119
event-SES-OCHPath-1Day	120
event-SEFS-OCHPath-1Day	121
event-CV-MUXTrib1-15Min	122
event-ESMUXTrib1-15Min	123
event-SESMUXTrib1-15Min	124
event-CV-MUXTrib1-1Day	125
event-ES-MUXTrib1-1Day	126
event-SES-MUXTrib1-1Day	127
event-CV-MUXTrib2-15Min	128
event-ES-MUXTrib2-15Min	129
event-SES-MUXTrib2-15Min	130
event-CV-MUXTrib2-1Day	131
event-ES-MUXTrib2-1Day	132

Table 5-18 (continued)
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 5.0	ID number
event-SES-MUXTrib2-1Day	133
event-CV-MUXTrib3-15Min	134
event-ES-MUXTrib3-15Min	135
event-SES-MUXTrib3-15Min	136
event-CV-MUXTrib3-1Day	137
event-ES-MUXTrib3-1Day	138
event-SES-MUXTrib3-1Day	139
event-CV-MUXTrib4-15Min	140
event-ES-MUXTrib4-15Min	141
event-SES-MUXTrib4-15Min	142
event-CV-MUXTrib4-1Day	143
event-ES-MUXTrib4-1Day	144
event-SES-MUXTrib4-1Day	145
event-CV-8B10B-15Min	146
event-ES-8B10B-15Min	147
event-SES-8B10B-15Min	148
event-CV-8B10B-1Day	149
event-ES-8B10B-1Day	150
event-SES-8B10B-1Day	151
event-tx-user-power-high	152
event-tx-user-power-low	153
event-rx-user-power-high	154
event-rx-user-power-low	155
event-apply-fac-loopback	156
event-remove-fac-loopback	157
event-circuit-card-below-baseline	158
event-circuit-card-unknown	159
event-mask-user-power-TCA	160

Table 5-18 (continued)
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 5.0	ID number
event-unmask-user-power-TCA	161
event-admin-community-name-change	162
event-operator-community-name-change	163
event-observer-community-name-change	164
event-circuit-card-non-baseline	165
event-fpga-below-baseline	166
event-software-version-check-begin	167
event-software-version-check-end	168
event-bootloader-below-base-line	169
event-APBE-data-backup-completed	170
event-APBE-data-backup-failed	171

The following MIB definition names were changed:

- In OPTeraReturnCode type:
    - entity-in-adjasent-slot-exist (83) to entity-in-adjacent-slot-exist (83)

- In OPTeraEventId type:
    - event-transferload-froNE-failed   (85) to event-transferload-from-NE-failed (85)
    - event-Apbe-band-Eqcomplete   (87) to event-Apbe-band-eqpt-complete   (87)

The following MIB definition range values were changed:

- In shelf group:
    - shelfShelfId   OBJECT-TYPE
      SYNTAX   INTEGER (1..250)   to   SYNTAX   INTEGER (1..64)

Differences introduced in Release 6.0

The following MIB type definitions are expanded in release 6.0:

- CardType definitions (see Table 5-19)
- OPTeraReturnCode definitions (see Table 5-20)
- OPTeraAlarmId definitions (see Table 5-21)
- OPTeraEventId definitions (see Table 5-22)
- NotifActiveAlarmTable (see Table 5-23)

- logTable (see Table 5-24)
- Trap definitions (see Table 5-25 and Table 5-26)

Table 5-19
CardType definitions

New CardType definitions in Rel. 6.0	ID number
gfsrm	16

Table 5-20
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 6.0	ID number
invalid-path	135
invalid-transport	136
path-out-of-sequence	137
operation-failed	138
osc-missing	139

Table 5-21
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 6.0	ID number	Definition
alarm-cvl-15min	259	CV CVL 15 Min
alarm-ebl-15min	260	EBL 15 Min
alarm-esl-15min	261	ESL 15 Min
alarm-sesl-15min	262	SESL 15 Min
alarm-uasl-15min	263	UASL 15 Min
alarm-cv-lfe-15min	264	CV-LFE 15 Min
alarm-eb-lfe-15min	265	EB-LFE 15 Min
alarm-es-lfe-15min	266	ES-LFE 15 Min
alarm-ses-lfe-15min	267	SES-LFE 15 Min
alarm-uas-lfe-15min	268	UAS-LFE 15 Min
alarm-cvl-1day	269	CVL 1 day
alarm-ebl-1day	270	EBL 1 day
alarm-esl-1day	271	ESL 1 day
alarm-sesl-1day	272	SESL 1 day

Table 5-21 (continued)
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 6.0	ID number	Definition
alarm-uasl-1day	273	UASL 1 day
alarm-cv-lfe-1day	274	CV-LFE 1 day
alarm-eb-lfe-1day	275	EB-LFE 1 day
alarm-es-lfe-1day	276	ES-LFE 1 day
alarm-ses-lfe-1day	277	SES-LFE 1 day
alarm-uas-lfe-1day	278	UAS-LFE 1 day
alarm-cvp-15min	279	CVP 15 Min
alarm-ebp-15min	280	EBP 15 Min
alarm-esp-15min	281	ESP 15 Min
alarm-sesp-15min	282	SESP 15 Min
alarm-uasp-15min	283	UASP 15 Min
alarm-cv-pfe-15min	284	CV-PFE 15 Min
alarm-eb-pfe-15min	285	EB-PFE 15 Min
alarm-es-pfe-15min	286	ES-PFE 15 Min
alarm-ses-pfe-15min	287	SES-PFE 15 Min
alarm-uas-pfe-15min	288	UAS-PFE 15 Min
alarm-cvp-1day	289	CVP 1 day
alarm-ebp-1day	290	EBP 1 day
alarm-esp-1day	291	ESP 1 day
alarm-sesp-1day	292	SESP 1 day
alarm-uasp-1day	293	UASP 1 day
alarm-cv-pfe-1day	294	CV-PFE 1 day
alarm-eb-pfe-1day	295	EB-PFE 1 day
alarm-es-pfe-1day	296	ES-PFE 1 day
alarm-ses-pfe-1day	297	SES-PFE 1 day
alarm-uass-pfe-1day	298	UASS-PFE 1 day
alarm-uass-15min	299	UASS 15 Min
alarm-sefs-15min	300	SEFS 15 Min

Table 5-21 (continued)
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 6.0	ID number	Definition
alarm-uas-15min	301	UAS 15 Min
alarm-fc-15min	302	FC 15 Min
alarm-uass-1day	303	UASS 1 day
alarm-sefs-1day	304	SEFS 1 day
alarm-uas-1day	305	UAS 1 day
alarm-fc-1day	306	FC 1 day
alarm-los-sync	307	Loss of Synchronization
alarm-lof-delineation	308	Loss of Frame Delineation
alarm-client-signal-mismatch	309	Client Service Mismatch
alarm-client-link-down	310	LAN Link Down
alarm-rclient-signal-failed	311	Far End Client Rx Signal Fail
alarm-loss-of-pointer	312	Loss of Pointer
alarm-path-unequipped	313	Unequipped
alarm-signal-label-mismatch	314	Payload Label Mismatch
alarm-loss-of-mul-frame	315	Loss of MultiFrame
alarm-loss-of-sequence	316	Loss of Sequence
alarm-loss-of-alignment	317	Loss of Alignment
alarm-link-capacity-mismatch	318	Insufficient Link Capacity
alarm-loss-time-reference	319	Loss of Timing Reference

Table 5-22
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 6.0	ID number
event-cvl-15min	172
event-ebl-15min	173
event-esl-15min	174
event-sesl-15min	175
event-uasl-15min	176
event-cv-lfe-15min	177

Table 5-22 (continued)
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 6.0	ID number
event-eb-lfe-15min	178
event-es-lfe-15min	179
event-ses-lfe-15min	180
event-uas-lfe-15min	181
event-cvl-1day	182
event-ebl-1day	183
event-esl-1day	184
event-sesl-1day	185
event-uasl-1day	186
event-cv-lfe-1day	187
event-eb-lfe-1day	188
event-es-lfe-1day	189
event-ses-lfe-1day	190
event-uas-lfe-1day	191
event-cvp-15min	192
event-ebp-15min	193
event-esp-15min	194
event-sesp-15min	195
event-uasp-15min	196
event-cv-pfe-15min	197
event-eb-pfe-15min	198
event-es-pfe-15min	199
event-ses-pfe-15min	200
event-uas-pfe-15min	201
event-cvp-1day	202
event-ebp-1day	203
event-esp-1day	204
event-sesp-1day	205

Table 5-22 (continued)
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 6.0	ID number
event-uasp-1day	206
event-cv-pfe-1day	207
event-eb-pfe-1day	208
event-es-pfe-1day	209
event-ses-pfe-1day	210
event-uas-pfe-1day	211
event-uass-15min	212
event-sefs-15min	213
event-uas-15min	214
event-fc-15min	215
event-uass-1day	216
event-sefs-1day	217
event-uas-1day	218
event-fc-1day	219
event-enet2-access-ctrl-none	220
event-enet2-access-ctrl-filter	221
event-enet2-access-ctrl-encrypt	222

Table 5-23
NotifActiveAlarmTable fields

New fields to notifActiveAlarmTable in Rel. 6.0	
notifOptSysId	DisplayString

Table 5-24
LogTable fields

New fields to logTable in Rel. 6.0	
logOptSysId	DisplayString

Table 5-25
Event and userRequest traps fields

New fields to event and userRequest traps in Rel. 6.0	
logOptSysId	DisplayString

Table 5-26
Alarm traps fields

New fields to alarm traps in Rel. 6.0	
notifOptSysId	DisplayString

The following MIB definition names were changed:

- In OPTeraReturnCode type:
  - apbe-evoa-facilities-must-be-oos (90) to other-facilities-must-be-oos (90)
  - apbe-aggregate-facility-must-be-oos (91) to aggregate-facility-must-be-oos (91)
  - band-facilities-must-be-deleted-first (98) to other-facilities-must-be-deleted-first (98)

Differences introduced in Release 6.1

See Observer and surveillance communities for changes introduced for the new surveillance community in Release 6.1.

The following MIB type definitions are expanded in release 6.1:

- SlotNum defintions (see Table 5-27)
- CardType definitions (see Table 5-28)
- OPTeraReturnCode definitions (see Table 5-29)
- OPTeraAlarmId definitions (see Table 5-30)
- OPTeraEventId definitions (see Table 5-31)
- Shelf group variable definitions (see Table 5-32)
- Trap definitions (see Table 5-33, and Table 5-34)

Table 5-27
SlotNum definitions

New SlotNum definitions in Rel. 6.1	
invalid-slot (0)	
slot-1 (1)	slot-2 (2)
slot-3 (3)	slot-4 (4)

Table 5-27 (continued)
SlotNum definitions

New SlotNum definitions in Rel. 6.1	
slot-5 (5)	slot-6 (6)
slot-7 (7)	slot-8 (8)
slot-9 (9)	slot-10 (10)
slot-11 (11)	slot-12 (12)
slot-13 (13)	slot-14 (14)
slot-15 (15)	slot-16 (16)
slot-17 (17)	slot-18 (18)
slot-19 (19)	slot-20 (20)
slot-21 (21)	slot-22 (22)
slot-23 (23)	slot-24 (24)
cooling-unit-slot (25)	shelf-common-slot (26)
telemetry-slot (27)	
virtual-slot-omx-w-band-1 (28)	virtual-slot-omx-w-band-2 (29)
virtual-slot-omx-w-band-3 (30)	virtual-slot-omx-w-band-4 (31)
virtual-slot-omx-w-band-5 (32)	virtual-slot-omx-w-band-6 (33)
virtual-slot-omx-w-band-7 (34)	virtual-slot-omx-w-band-8 (35)
virtual-slot-omx-e-band-1 (36)	virtual-slot-omx-e-band-2 (37)
virtual-slot-omx-e-band-3 (38)	virtual-slot-omx-e-band-4 (39)
virtual-slot-omx-e-band-5 (40)	virtual-slot-omx-e-band-6 (41)
virtual-slot-omx-e-band-7 (42)	virtual-slot-omx-e-band-8 (43)
virtual-slot-osc-splt-w (44)	virtual-slot-osc-splt-e (45)
virtual-slot-c-and-l-splt-w (46)	virtual-slot-c-and-l-splt-e (47)
eqpt-inv-port-1-eiu-slot-1 (64)	eqpt-inv-port-1-eiu-slot-2 (65)
eqpt-inv-port-1-eiu-slot-3 (66)	eqpt-inv-port-1-eiu-slot-4 (67)
eqpt-inv-port-1-eiu-slot-5 (68)	eqpt-inv-port-1-eiu-slot-6 (69)
eqpt-inv-port-1-eiu-slot-7 (70)	eqpt-inv-port-1-eiu-slot-8 (71)
eqpt-inv-port-1-eiu-slot-9 (72)	eqpt-inv-port-1-eiu-slot-10 (73)
eqpt-inv-port-1-eiu-slot-11 (74)	eqpt-inv-port-1-eiu-slot-12 (75)

Table 5-27 (continued)
SlotNum definitions

New SlotNum definitions in Rel. 6.1	
eqpt-inv-port-1-eiu-slot-13 (76)	eqpt-inv-port-1-eiu-slot-14 (77)
eqpt-inv-port-1-eiu-slot-15 (78)	eqpt-inv-port-1-eiu-slot-16 (79)
eqpt-inv-port-2-eiu-slot-1 (80)	eqpt-inv-port-2-eiu-slot-2 (81)
eqpt-inv-port-2-eiu-slot-3 (82)	eqpt-inv-port-2-eiu-slot-4 (83)
eqpt-inv-port-2-eiu-slot-5 (84)	eqpt-inv-port-2-eiu-slot-6 (85)
eqpt-inv-port-2-eiu-slot-7 (86)	eqpt-inv-port-2-eiu-slot-8 (87)
eqpt-inv-port-2-eiu-slot-9 (88)	eqpt-inv-port-2-eiu-slot-10 (89)
eqpt-inv-port-2-eiu-slot-11 (90)	eqpt-inv-port-2-eiu-slot-12 (91)
eqpt-inv-port-2-eiu-slot-13 (92)	eqpt-inv-port-2-eiu-slot-14 (93)
eqpt-inv-port-2-eiu-slot-15 (94)	eqpt-inv-port-2-eiu-slot-16 (95)
eqpt-inv-port-3-eiu-slot-1 (96)	eqpt-inv-port-3-eiu-slot-2 (97)
eqpt-inv-port-3-eiu-slot-3 (98)	eqpt-inv-port-3-eiu-slot-4 (99)
eqpt-inv-port-3-eiu-slot-5 (100)	eqpt-inv-port-3-eiu-slot-6 (101)
eqpt-inv-port-3-eiu-slot-7 (102)	eqpt-inv-port-3-eiu-slot-8 (103)
eqpt-inv-port-3-eiu-slot-9 (104)	eqpt-inv-port-3-eiu-slot-10 (105)
eqpt-inv-port-3-eiu-slot-11 (106)	eqpt-inv-port-3-eiu-slot-12 (107)
eqpt-inv-port-3-eiu-slot-13 (108)	eqpt-inv-port-3-eiu-slot-14 (109)
eqpt-inv-port-3-eiu-slot-15 (110)	eqpt-inv-port-3-eiu-slot-16 (111)
eqpt-inv-port-4-eiu-slot-1 (112)	eqpt-inv-port-4-eiu-slot-2 (113)
eqpt-inv-port-4-eiu-slot-3 (114)	eqpt-inv-port-4-eiu-slot-4 (115)
eqpt-inv-port-4-eiu-slot-5 (116)	eqpt-inv-port-4-eiu-slot-6 (117)
eqpt-inv-port-4-eiu-slot-7 (118)	eqpt-inv-port-4-eiu-slot-8 (119)
eqpt-inv-port-4-eiu-slot-9 (120)	eqpt-inv-port-4-eiu-slot-10 (121)
eqpt-inv-port-4-eiu-slot-11 (122)	eqpt-inv-port-4-eiu-slot-12 (123)
eqpt-inv-port-4-eiu-slot-13 (124)	eqpt-inv-port-4-eiu-slot-14 (125)
eqpt-inv-port-4-eiu-slot-15 (126)	eqpt-inv-port-4-eiu-slot-16 (127)

Table 5-28
CardType definitions

New CardType definitions in Rel. 6.1	ID number
w-splitter	17
voa	18
tpt	19
eiu	20

Table 5-29
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 6.1	ID number
fac-SSM-not-supported	140
fac-SD-not-supported	141
aggregate-encoding-mode-not-supported	142
invalid-SSM	143
invalid-fac-SD-Threshold	144
invalid-aggregate-encoding-mode	145
invalid-sync-state	146
not-primary-shelf	147
not-GNE-shelf	148
not-radius-gateway	149
user-cmnty-name-exist	150
user-Cmnty-not-found	151
user-name-exist	152
user-name-not-found	153
user-id-already-used	154
user-id-not-found	155
user-not-supported-operation	156
user-table-full	157
data-manager-not-available	158
radius-gateway-not-provisioned	159
radius-server-not-provisioned	160

Table 5-29 (continued)
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 6.1	ID number
invalid-authentication-mode	161
invalid-alternate-method	162
invalid-idle-timeout	163
invalid-attempt-threshold	164
invalid-lockout-duration	165
shared-secret-out-of-range	166
invalid-server-rank	167
radius-gateways-are-the-same	168
invalid-char-in-user-name	169
invalid-char-in-password	170
user-index-out-of-range	171
can-not-disable-default-admin	172
Note: The range of 173 up to 199 is reserved	
reserved	200
invalid-gateway-ip-address	201
invalid-dhcp-ip-address	202
lmg-invalid-state	203
lmg-string-too-long	204
lmg-itc-error	205
lmg-flash-error	206
lmg-ftp-failed	207
lmg-file-too-big	208
lmg-load-record-not-found	209
lmg-flash-semaphore-not-available	210
lmg-zone-A-invalid	211
lmg-zone-B-invalid	212
lmg-database-not-initialized	213
lmg-software-library-missing	214

Table 5-29 (continued)
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 6.1	ID number
lmg-software-load-missing	215
lmg-incompatible-download	216
lmg-software-load-not-valid	217
lmg-zone-not-valid	218
lmg-software-checksum-error	219
lmg-host-load-info-not-valid	220
lmg-no-response	221
lmg-downgrade-requested	222
lmg-downgrade-rejected	223
lmg-string-is-null	224
lmg-archiving-in-progress	225
lmg-software-load-size-mismatch	226
facility-path-monitor-not-supported	227
invalid-facility-path-monitor	228
dependent-eqpt-is-in-service	229
dependent-eqpt-must-be-deleted-first	230
network-of-ip-address-unreachable	231
opt-software-error	232

Table 5-30
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 6.1	ID number
alarm-loss-of-activity-1	23
alarm-loss-of-activity-17	39
alarm-loss-of-activity-18	40
alarm-optical-tray-missing	66
alarm-optical-tray-mismatch	67
alarm-FECCE15Min	320
alarm-FECCE1Day	321

Table 5-30 (continued)
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 6.1	ID number
alarm-FECUF15Min	322
alarm-FECUF1Day	323
alarm-BDI	324
alarm-TxLossOfSync	325
alarm-TxAIS	326
alarm-TxLocal	327
alarm-TxRemote	328
alarm-TxHighBER	329
alarm-Local	330
alarm-Remote	331
alarm-HighBER	332
alarm-APDOverload	333
alarm-SumTCA15min	334
alarm-SumTCA1day	335
alarm-intrusion	336
alarm-signal-failure	337
alarm-signal-degrade	338
alarm-path-alarm-indication-signal	339
alarm-primary-radius-failed	340
alarm-secondary-radius-failed	341
alarm-radius-failed	342
alarm-eiu-missing	343
alarm-eiu-mismatch	344
alarm-pm-tick-failed	345
alarm-remote-fault-notify	346
alarm-pathProtection-Not-Available	347

Table 5-31
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 6.1	ID number
event-fec-ce-15min	223
event-fec-ce-1day	224
event-fec-uf-15min	225
event-fec-uf-1day	226
event-summary-1day	227
event-summary-15min	228
event-degraded-primary-clock	229
event-degraded-secondary-clock	230
event-clock-switch-to-free-run	231
event-clock-switch-to-hold-over	232
event-transfer-load-from-server-failed	233
event-upgrade-control-status	234
event-backup-load-to-server-failed	235
event-user-logout	236
event-user-login-failed	237
event-upgrade-distribute-started	238
event-upgrade-distribute-in-progress	239
event-upgrade-distribute-complete	240
event-upgrade-distribute-failure	241
event-upgrade-restart-started	242
event-upgrade-restart-in-progress	243
event-upgrade-restart-complete	244
event-upgrade-restart-failure	245
event-upgrade-commit-started	246
event-upgrade-commit-in-progress	247
event-upgrade-Commit-complete	248
event-upgrade-commit-failure	249
event-upgrade-cancel-started	250

Table 5-31 (continued)
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 6.1	ID number
event-upgrade-cancel-in-progressE	251
event-upgrade-cancel-complete	252
event-upgrade-cancel-failure	253
event-upgrade-backout-started	254
event-upgrade-cackout-in-progress	255
event-upgrade-backout-complete	256
event-upgrade-backout-failure	257
event-WCV-disabled	258
event-EFEW-set-to-any	259
event-EFEW-set-to-same	260
event-RFN-enabed	261
event-RFN-disabled	262
event-max-Id	263

Table 5-32
Shelf group variable

New variable to Shelf group in Rel. 6.1	
shelfIpAddress	IpAddress

Table 5-33
AdminTrapDestinationTable fields

New fields to adminTrapDestinationTable in Rel. 6.1	
adminTrapDestSecurity	Bool

Table 5-34
Event, userRequest alarm, and alert trap fields

New fields to event, userRequest, alarm and alert traps in Rel. 6.1	
logClass	Integer
shelfIpAddress	IpAddress

Differences introduced in Release 7.0

The following MIB type definitions are expanded in release 7.0:

- CardType definitions (see Table 5-35)
- OPTeraReturnCode definitions (see Table 5-36)
- OPTeraAlarmId definitions (see Table 5-37)
- OPTeraEventId definitions (see Table 5-38)
- Active Alarm notification definitions (see Table 5-39)
- logTable (see Table 5-40)
- Trap definitions (see Table 5-41 and Table 5-42)

Table 5-35
CardType definitions

New CardType definitions in Rel. 7.0	
motr line facility	11
sfp facility	12
motr	21
motrsfp	22

Table 5-36
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 7.0	ID number
mate-time-is-only-for-protected	232
incompatible-protocol-pluggable	233
path-num-is-high	234
path-num-is-low	235
path-num-is-out-of-range	236
path-not-aligned	237
no-paths-available-for-transport	238
path-already-taken	239
c-cat-transport-crosses-boundary	240
invalid-client-path-num	241
invalid-scheme-or-protection-mode	242
connection-must-be-revertive	243
invalid-line-transport-mode	244

Table 5-36
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 7.0	ID number
invalid-protection-edit-request	245
higher-priority-switch-request-active	246
client-and-line-lbs-cant-coexist	247
opt-software-error	248

Table 5-37
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 7.0	ID number
alarm-sw-download-incomplete	348
alarm-opt-receiver-degrade	349
alarm-opt-transmitter-degrade	350
alarm-pluggable-missing	351
alarm-pluggable-failed	352
alarm-pluggable-mismatch	353
alarm-unknown-pluggable	354
alarm-pluggable-sanity-timeout	355
alarm-APS-channel-match-fail	356
alarm-APS-byte-fail	357
alarm-APS-mode-mismatch	358
alarm-APS-schema-mismatch	359
alarm-APS-far-end-fail	360
alarm-APS	361
alarm-APS-fiber-mismatch	362
alarm-wrapper-AIS	363
alarm-wrapper-LOF	364
alarm-GFP-RDI	365
alarm-sum-AIS	366
alarm-sum-RDI	367
alarm-sum-LOP	368

Table 5-37 (continued)
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 7.0	ID number
alarm-sum-UEQ	369
alarm-sum-PLM	370
alarm-sum-LMF	371
alarm-sum-LOS	372
alarm-incompatible-provisioning	373

Table 5-38
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 7.0	ID number
event-CID-created	263
event-CID-deleted	264
event-CID-modified	265
event-telmetry-output-operated	266
event-telmetry-ouput-released	267
event-eqpt-state-change-oos	268
event-eqpt-state-change-ins	269
event-VGAmp-adjustment-Start (See Note:)	270
event-VGAmp-adjustment-fail (See Note:)	271
event-VGAmp-adjustment-succeed (See Note:)	272
event-plug-removed	273
event-plug-inserted	274
event-path-switch-to-west-fac-oos	275
event-path-switch-to-west-eqpt-fail	276
event-path-switch-to-west-signal-fail	277
event-path-switch-to-west-signal-degrade	278
event-path-switch-to-west-revert	279
event-path-switch-to-west-remote	280
event-path-switch-to-east-fac-oos	281
event-path-switch-to-east-eqpt-fail	282

Table 5-38 (continued)
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 7.0	ID number
event-path-switch-to-east-signal-fail	283
event-path-switch-to-est-signal-degrade	284
event-path-switch-to-east-revert	285
event-path-switch-to-east-remote	286
event-max-Id	287
Note: In release 7.0, this event is not displayed.	

Table 5-39
NotifActiveAlarmTable fields

New fields to notifActiveAlarmTable in Rel. 7.0	
notifActiveAlarmPathList	DisplayString (See Note:)
notifActiveAlarmUpsnNum	UpsnNum
Note: In release 7.0, this variable returns an empty string.	

Table 5-40
LogTable fields

New fields to logTable in Rel. 7.0	
logUpsnNum	UpsnNum

Table 5-41
Even and userRequest fields

New fields to event and userRequest traps in Rel. 7.0	
logUpsnNum	UpsnNum

Table 5-42
Alarm traps fields

New fields to alarm traps in Rel. 7.0	
notifActiveAlarmUpsnNum	UpsnNum

Differences introduced in Release 8.0

The following MIB type definitions are expanded in release 8.0:

- CardType definitions (see Table 5-43)

- OPTeraReturnCode definitions (see Table 5-44)

- OPTeraAlarmId definitions (see Table 5-45)
- OPTeraEventId definitions (see Table 5-46)
- Active Alarm notification definitions (see Table 5-47)
- Alarm description notification definitions (see Table 5-48)
- logTable (see Table 5-49)
- Event and UserRequest (see Table 5-50)
- Trap definitions (see Table 5-51)
- Log branch definitions (see Table 5-52)
- logCircuitPackHistoryTable definitions (see Table 5-53)

Table 5-43
CardType definitions

New CardType definitions in Rel. 8.0	
dscm	23

Table 5-44
OPTeraReturnCode definitions

New OPTeraReturnCode definitions in Rel. 8.0	ID number
invalid-fec-mode	248
card-mismatch-alert	249
opt-software-error	250

Table 5-45
OPTeraAlarmId definitions

New OPTeraAlarmId definitions in Rel. 8.0	ID number
alarm-surrogate-ais	374
alarm-farend-circuitpack-mismatch	375
alarm-band9-input-failure-west	376
alarm-band9-input-failure-east	377
alarm-circuitpack-minor-mismatch	378

Table 5-46
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 8.0	ID number
event-sys-equalization-start	287
event-sys-equalization-complete	288
event-sys-equalization-fail	289
event-sys-equalization-abort	290
event-sys-equalization-override	291
event-slec-update-fail	292
event-slec-component-fail	293
event-slec-site-fail	294
event-vgamp-fail-upc	295
event-vgamp-fail-low	296
event-vgamp-fail-high	297
event-vgamp-fail-conv	298
event-auto-slec-start	299
event-slec-site-complete	300
event-alm-severity-changed	301
event-alm-severity-reset	302
event-alm-severity-reset-all	303
event-user-password-chg-event-type	304
event-user-password-chg-failed-event-type	305
event-plug-eqpt-add-event	306
event-plug-eqpt-delete-event	307
event-apply-term-loopback	308
event-remove-term-loopback	309
event-facility-add-event	310
event-facility-delete-event	311
event-ch-assgnmt-add-event	312
event-ch-assgnmt-delete-event	313
event-port-assgnmt-add-event	314

Table 5-46 (continued)
OPTeraEventId definitions

New OPTeraEventId definitions in Rel. 8.0	ID number
event-port-assgnmt-delete-event	315
event-path-add-event	316
event-path-delete-event	317
event-max-Id	318

Table 5-47
NotifActiveAlarmTable fields

New fields to notifActiveAlarmTable in Rel. 8.0	
notifActiveAlarmSubCardType	DisplayString
notifActiveAlarmAdditionalInfo	DisplayString

Table 5-48
notifAlarmDescriptionTable fields

New fields to notifAlarmDescriptionTable in Rel. 8.0	
notifAlarmDescNSADefaultSeverity	AlarmSeverity
notifAlarmDescSASeverity	AlarmSeverity
notifAlarmDescNSASeverity	AlarmSeverity
notifAlarmDescProvisionState	Bool
notifAlarmDescSetToDefault	Bool

Table 5-49
LogTable fields

New fields to logTable in Rel. 8.0	
logSubCardType	DisplayString
logAdditionalInfo	DisplayString

Table 5-50
Event and userRequest fields

New fields to event and userRequest traps in Rel. 8.0	
logSubCardType	DisplayString

Table 5-51
Alarm traps fields

New fields to alarm traps in Rel. 8.0	
notifActiveAlarmSubCardType	DisplayString
notifActiveAlarmAdditionalInfo	DisplayString

Table 5-52
Log branch entries

New entries to log branch in Rel 8.0	
logCicuitPackIndexQuery	DisplayString
logCircuitPackHistoryTable	Sequence

Table 5-53
logCircuitPackHistoryTable entries

Entries to logCircuitPackHistoryTable in Rel 8.0	
logCircuitPackIndex	Counter
logCircuitPackLocation	INTEGER
logCircuitPackTimeStamp	INTEGER
logCircuitPackPort	INTEGER
logCircuitPackPortType	INTEGER
logCircuitPackDir	INTEGER
logCircuitPackPath	INTEGER
logCircuitPackAlarmState	INTEGER
logCircuitPackAlarmDesc	DisplayString

Decoding location value to slot, port, port type and direction

Location value can be obtained from:

- logSlotNum trap filed
- OID of trap fields

logSlotNum field

The following two Optical Metro trap types contain logSlotNum field:

- eventTrap
- userRequestTrap

logSlotNum field contains the location value. From Release 3.0, logSlotNum value does not necessarily translate to a slot value (multi port cards). See above definition of the location.

Example 1:
As mentioned earlier, the location is 32-bit integer with slot, port, port type, and direction mapped in to the value. See Figure 5-3.

Figure 5-3
Example 1

```
logSlotNum = 263
Location as Decimal: 263

Location as Hex:       107



Location as binary: 0001 0000 0111



       00000  00 000 000000 0000 0001 0000 0111




                    0   0      0      1       7
Not used

Direction    Port Type Ring No. Port No.  Slot No.



PortTypes:  0=NIL, 1=Optical, 2=Backplane, 3=wan, 4=path,
5=aggregate
Directions: 0=NIL, 1=Tx,      2=Rx
```

OID and location

The location is also present as a part of the OID of a few fields in the following Optical Metro trap types:

- alarmCriticalTrap
- alarmMajorTrap
- alarmMinorTrap
- alertTrap

These fields are:

- notifAlarmTimeStamp
- notifAlarmState
- notifAlarmDescrLast

The last two dot-separated numbers in the OID of these fields are
location.alarmId values.

See Figure 5-4 and Figure 5-5.

Figure 5-4
Example 2a

```
- Minor Tue Apr 03 15:51:04  47.180.104.32
[1] private.enterprises.optera-solutions.optera-
80.log.logTable.logTableEntry.logIndex.269 (Counter): 269
[2] private.enterprises.optera-solutions.optera-80.shelf.shelfSiteId.0
(Integer): 1
[3] private.enterprises.optera-solutions.optera-80.shelf.shelfShelfId.0
(Integer): 1
[4] private.enterprises.optera-solutions.optera-
80.notifications.notifAlarmTable.notifAlarmTableEntry.notifAlarmTimeStamp.
37749511.9 (Integer): 986327993
[5] private.enterprises.optera-solutions.optera-
80.notifications.notifAlarmTable.notifAlarmTableEntry.notifAlarmState.
37749511.9 (Integer): active
[6] private.enterprises.optera-solutions.optera-
80.notifications.notifAlarmTable.notifAlarmTableEntry.notifAlarmDescr.
37749511.9 (OctetString): Loss of Lock
[7] private.enterprises.optera-solutions.optera-
80.notifications.notifAlarmTable.notifAlarmTableEntry.notifActiveAlarmCardType.
37749511.9 (Integer): srm(9)
[8] private.enterprises.optera-solutions.optera-
80.notifications.notifAlarmTable.notifAlarmTableEntry.notifLocationDescr.
37749511.9 (OctetString): slot:7,port:3,portType:1,direction:1,ringNumber:0
[9] private.enterprises.optera-solutions.optera-
80.notifications.notifAlarmTable.notifAlarmTableEntry.notifOptSysId.37749511.9
(OctetString): ring 1
```

Figure 5-5
Example 2b

```
Location = 37749511
AlarmId = 9

Location as Decimal: 37749511
Location as Hex:      2 4 0 0 3 0 7

Location as
binary:      0010 0100 0000 0000 0011 0000 0111

           00000  01 001 00 0000 0000 0011 0000 0111

                      1   1    0        3        7
   Not used

      Direction    Port Type Ring No.  Port No. Slot No.


PortTypes:  0=NIL, 1=Optical,2=Backplane,3=wan,4=path,5=aggregate
Directions: 0=NIL, 1=Tx, 2=Rx
```
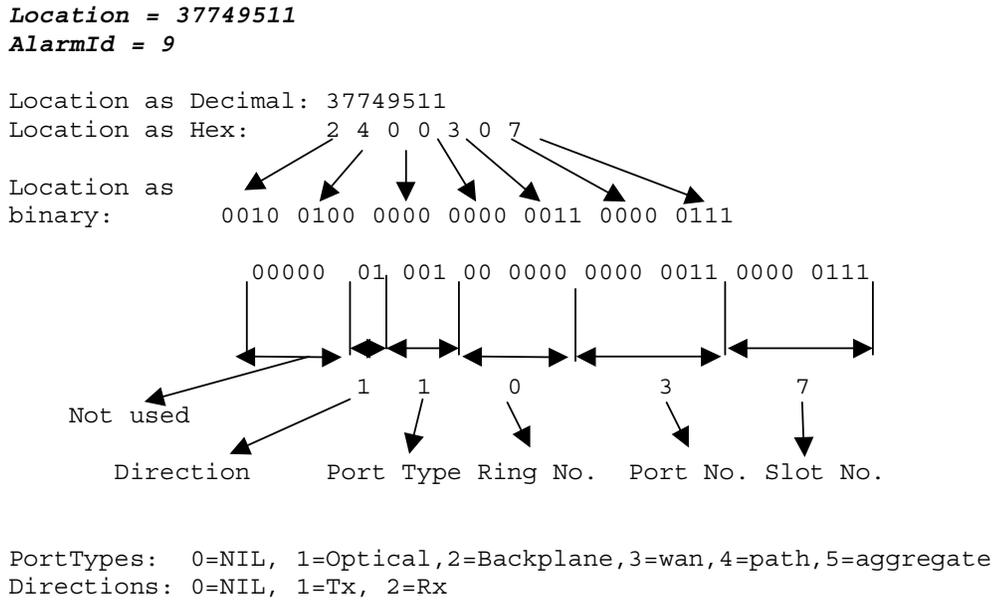
SNMP for Enhanced Trunk Switch shelves

The Enhanced Trunk Switch shelves also support a SNMP interface for
OAM&P functionality. The MIBs will allow alarm surveillance report to a
third-party SNMP management platform.

SNMP MIB files

The SNMP MIBs are files that specify the ETS information that needs to be
controlled and monitored. Table 5-54 identifies the proprietary MIB files that
are required.

Table 5-54
Proprietary SNMP MIB files

File name	MIB name	Description
global.my	JDSU-GLOBAL-MIB	The root of the JDS Uniphase MIBs
comm100.my	JDSU-COMM100-MIB	The table of alarms and alarm traps

The ETS supports the standard MIBs listed in Table 5-55.

Table 5-55
Standard MIBs supported

File name	MIB name	Description
rfc1213.mib	RFC1213-MIB	The system MIB

MIB structure

There are two MIBs provided by the ETS:

- MIB-II
- Alarm

The MIB-II is organized into the following group:

- admin:

The Alarm is organized into the following groups:

- raiseAlarm
- clearAlarm

SNMP MIB-II Support

The ETS supports the MIB-II (RFC1213) MIB with this exception; only the following MIBs are user-configurable:

- sysContact—System administrator contact information. User-configurable and persistent. Default: "not available".
- sysName—System administrative name; by convention the fully qualified name (FQN). User-configurable and persistent. Default: "WaveReady".
- sysLocation—A text description of the physical location of the managed unit, for example "Building M1.3 G9". User-configurable and persistent. Default: "not available".

SNMP Alarm MIB Support

The ETS MIB defines entries for the alarm table, as well as for the raiseAlarm and clearAlarm events. Table 5-56 lists the meaning of the defined entries, and Table 5-57 lists the entries associated with each alarm trap.

Table 5-56
Alarm Table

Supported Alarm Entry	Meaning
alarmIndex	An index that uniquely identifies this entry in the alarm table. Each entry represents an alarm in the system.
alarmSeverity	The alarm severity as perceived by the point of origin.
alarmCondition	The alarm condition specific to this alarm.
alarmSA	Indicates if the alarm is affecting customer service. *Note:* This is not supported in this release.
alarmDateTime	The data and time when the alarm occurred.
alarmShelf	The number of the shelf where this alarm is raised.
alarmSlot	The number of slot in the shelf where this alarm is raised.

Table 5-56 (continued)
Alarm Table

Supported Alarm Entry	Meaning
alarmPort	The number of the port in the slot where the alarm is raised.
alarmFEPort	The number of the far-end port where this alarm is raised (if applicable).
alarmGroup	Indicates if this alarm relates to the near-end or the far-end node.
alarmDescription	A brief text description of this alarm, suitable to display to the operator.

Table 5-57
Alarm entries associated with alarm traps

Alarm Name	Associated Alarm Entry
raiseAlarm	alarmIndex, alarmSeverity, alarmGroup, alarmCondition, alarmDateTime, alarmShelf, alarmSlot, alarmPort, alarmFEPort, alarmDescription
clearAlarm	alarmIndex, alarmSeverity, alarmGroup, alarmCondition, alarmDateTime, alarmShelf, alarmSlot, alarmPort, alarmFEPort, alarmDescription

SNMP Community Strings
Community strings are passwords used in the requests and responses that are exchanged between an SNMP management station and a network device. The current release of the ETS does not allow the user to reconfigure the access level associated with the community strings.

Table 5-58 lists the access level for each community string.

Table 5-58
Community string values

Access Level	Community String Value
Read-only	"public"
Read-write	"private"
Traps	"traps"

Supported Protocols
The ETS supports SNMP Version 1 (SNMPv1) and SNMP Version 2c (SNMPv2c).

Trap definitions
The ETS generates two type of traps:

- the MIB-II standard trap (coldstart)
- enterprise traps (raiseAlarm, clearAlarm)

The coldstart trap is sent on system startup, and it is generated in both SNMPv1 and SNMPv2 format.

The raiseAlarm and clearAlarm traps are sent when alarms are added or removed from the alarm table. Alarm traps are generated in SNMPv1 format.

Alarms are only generated if all of the following conditions are met.

- The SNMP agent is enabled
- The traps are enabled
- At least one of the trap destination addresses is set

The raiseAlarm and clearAlarm traps are defined in SMIv2 as NOTIFICATION-TYPE in a none reversible manner. They are generated as SNMPv1 with an OID corresponding to sysObjectID plus ".0" plus the NOTIFICATION-TYPE ID. This translates to:

- 1.3.6.1.4.1.2079.1.1.1.1.0.1 for raiseAlarm trap
- 1.3.6.1.4.1.2079.1.1.1.1.0.2 for clearAlarm trap

Release 2.2.2 updates

The AlarmCondition definition in Table 5-59 are applicable to the ETS.

Table 5-59
AlarmCondition definition

ETS AlarmCondition definition	ID number
unknown	0
activeLoopback	1
cardMissing	2
wavelengthMismatch	3
oscFailure	4
oscDisabled	5
moduleCommunicationFailure	6
fan2Failure	7
improperRemoval	8
hardwareFailure	9
laserAging	10
activeLinkFailure	11
lossOfLock	12

Table 5-59 (continued)
AlarmCondition definition

ETS AlarmCondition definition	ID number
lossOfSignal	13
apsOverridden	14
powerFailure	15
rateMismatch	16
softwareFailure	17
throttlingLimitFault	18
fan1Failure	19
throttlingMonitorFault	20
laserFailure	21
wavelengthOutOfRange	22
backFacetMonitorOutOfRange	23
gigEthernetLossOfSignal	24
unitFailed	25
tecOutOfRange	26
laserPumpDisabled	27
lossOfOutputPower	28
highInputPower	29
sensePriorityMode	30

Software features

In this chapter

Optical System Identifier

The Optical System Identifier is an essential configuration element used to uniquely identify the optical components associated with the different basic systems within an Optical Metro 5100/5200 network. This feature is mandatory for compound network topologies such as interconnected rings and hub-and-spoke, where multiple basic systems exist in the same network. Each basic system must be identified with a unique OSID. OSID values can be an alphanumeric string of up to eight characters.

Only line-facing circuit packs (OCLD, OTR, Muxponder, APBE, OFA, and OSC) and the OMX can have an OSID. When line-facing circuit packs autoprovision, the OSID is unassigned and the OSID field is blank.

Correct OSID provisioning requires a clear understanding of the deployed network topology. It is essential to know the following:

- what systems are present
- which equipment at each site belongs to which system

Rules for provisioning OSIDs

If you only have one system in the network, these provisioning rules are not essential, and an unassigned OSID is acceptable.

A unique OSID must be specified for all line-facing equipment for the following:

- on systems that will have intrasite fault sectionalization enabled
- for each system at a bridge site even if one system does not have the intrasite fault sectionalization feature enabled
- for each spoke on a hub and spoke system. Make sure to assign the endpoint equipment at either end of the spoke the same OSID.

Nortel Networks recommends that you provision each system in your network with a unique OSID. The same value is used for all equipment in the system. Using the System Manager, you can provision the OSID at the shelf level or the circuit pack level.

When you provision the OSID at the shelf level, you assign one system number to all the line-facing circuit packs on the shelf. Make sure that you assign the same OSID to the other shelves in the system.

When you provision the OSID at the circuit pack level, you assign one system number to one line-facing circuit pack on a shelf. Make sure that the number you assign is the same OSID as the OSID assigned to other line-facing circuit packs on the same system.

Because bridge and hub-and-spoke shelves may contain identical circuit packs (band and channel) that belong to different systems, OSIDs should be provisioned at the circuit pack level to make sure that they are correct.

Considerations

To change the OSID for a piece of equipment that currently has the same OSID as the OSC circuit pack, you must first disable IFS at the site, if IFS is enabled.

When identical circuit packs (same band and channel) are seated in the same plane on a shelf they must have different OSIDs. If they do not, an Unassigned Optical System Identifier alarm is raised. The alarm is cleared only when the OSID on the circuit pack with the alarm is manually changed. It does not clear if the first OSID is changed or the first circuit pack is deleted.

Per-wavelength optical service channel (PWOSC)

The per wavelength optical service channel is an out-of-band communication signal carried with each OCLD, OTR, and Muxponder channel. Overhead information stored in this signal is received and transmitted on the same optical path as the main payload channel but at a relatively lower bit rate of 128 Kbit/s. The PWOSC provides connectivity and route redundancy in the Optical

Metro 5100/5200 data communications network. On the OTR 10 Gbit/s Enhanced and Muxponder 10 Gbit/s GbE/FC circuit packs, the PWOSC communication signal is carried over the G.709 Wrapper optical overhead channel.

In-service disabling and enabling of PWOSC allows you to suppress the alarms associated with this feature in networks where the overhead data communication channel is not required. A typical application for disabling the PWOSC is a network where the OCLD or OTR line facilities are connected directly to equipment which does not support the Optical Metro 5100/5200 proprietary overhead link facility. There is no impact on existing traffic when the PWOSC is disabled on in-service circuit packs. When you disable the PWOSC feature on the OTR 10 Gbit/s Enhanced and Muxponder 10 Gbit/s GbE/FC circuit packs, the G.709 wrapper overhead is not filled with any Optical Metro 5100/5200 overhead information which disables the communication channel.

Only disable the PWOSC feature in applications that do not require the overhead data communications channel and the reporting of alarms associated with this facility. It is not recommended that you disable the PWOSC in standard Optical Metro 5100/5200 networks.

PWOSC provisioning is supported with the System Manager and TL1 as follow:

- In System Manager, the Optical Metro Inventory window allows you to enable or disable the Overhead State when the line facility is in-service or out-of-service. The Overhead State is enabled by default. Disable the PWOSC to deactivate the data communication channel on the line facility and to clear the alarms associated with the overhead channel. Refer to Provisioning and Operating Procedures, 323-1701-310, for more details.

- TL1 commands are introduced to enable and disable the PWOSC feature. Commands (RMV-OHCHN, RST-OHCHN and RTRV-OHCHN) are available to disable, restore or query the status of the PWOSC on individual circuit packs. Refer to *TL1 Interface,* 323-1701-190, for more details.

Rules for disabling per wavelength optical service validation

The following rules apply for disabling per wavelength optical service validation:

- in protected connections, the software does not check the OSID if the Wavelength Validation feature is disabled

- in pass-through connections, the software does not check the plane (east or west) if the Wavelength Validation feature is disabled

- only disable the PWOSC feature in applications that do not require the overhead data communications channel and the reporting of alarms associated with this facility. It is not recommended that you disable the PWOSC in standard Optical Metro 5100/5200 networks.

Refer to Table 6-1 for the complete wavelength consistency validation rules.

Table 6-1
Wavelength consistency validation rules

Wavelength	OSID	Plane	Wavelength consistency validation enable		Wavelength consistency validation disable	
			Pass-through	**Protected**	**Pass-through**	**Protected**
Different	Different	Different	Yes - bridge shelf (rel.6.0)	N/A	Yes - bridge shelf	OK (Rel 6.1)
Different	Different	Same	Yes - bridge shelf (rel.6.1)	N/A	Yes - bridge shelf	N/A
Different	Same	Different	Yes - regen shelf (rel.6.0) See *Note 1*	N/A	Yes - regen shelf (rel.6.0)	OK (Rel 6.1)
Different	Same	Same	Yes - regen shelf (rel.6.1) See *Note 1*	N/A	Yes - regen shelf (rel.6.1)	N/A
Same	Different	Different	Yes - bridge shelf (rel.6.0)	Yes (rel 6.0) See *Note 1*	Yes - bridge shelf (rel.6.0)	OK (Rel 6.0)
Same	Different	Same	Yes - bridge shelf (rel.6.1)	N/A	Yes - bridge shelf (rel.6.1)	N/A
Same	Same	Different	Yes - regen shelf (rel.6.0)	Yes (rel 6.0)	Yes - regen shelf (rel.6.0)	OK (Rel 6.0)
Same	Same	Same	N/A See *Note 2*	N/A See *Note 2*	N/A See *Note 2*	N/A See *Note 2*

Note 1: The "Incompatible Optical System Identifier" alarm is raised

Note 2: Two identical circuit packs can not be provisioned in the same plane

Note 3: Equipment in a regen connection has the same OSID while equipment in bridge connections have different OSID.

User provisionable slot numbers

The user provisionable slot numbers feature allows users to specify a representative number for all passive devices that will be treated as the actual slot number by the customer interfaces. This feature operates on a shelf level and is disabled by default.

Nortel Networks recommends that you provision this feature right after the commissioning. It can only be enabled through System Manager.

When the user provisionable slot numbers feature is enabled for the first time, all passive slot numbers are mapped to their default values. Refer to Table 6-2 for the default slot assignment.

Table 6-2
Default slot numbers

Passive device identification	User provisionable slot number assignment		
	Disabled	Optical Metro 5200 Enabled	Optical Metro 5100 Enabled
EIP1-0	EIP1-0	22	22
EIP2-0	EIP2-0	24	24
EIP3-0	EIP3-0	21	21
EIP4-0	EIP4-0	23	23
EIP1-n where n = 1 to 16	EIP1-n where n = 1 to 16	64 to 79	64 to 79
EIP2-n where n = 1 to 16	EIP2-n where n = 1 to 16	80 to 95	80 to 95
EIP3-n where n = 1 to 16	EIP3-n where n = 1 to 16	96 to 111	96 to 111
EIP4-n where n = 1 to 16	EIP4-n where n = 1 to 16	112 to 127	112 to 127

Rules for user provisionable slot numbers

- The user provisionable slot number feature is only available in System Manager.
- Only one instance of the UPSN value is allowed on a shelf.
- When the feature is enabled, default values are assigned to the equipment. This user provisionable slot number can be edited for a passive device. Alarms, events, and inventory information display the UPSN value.
- The network element provides AID values for passive devices that contains both the EIP value and the UPSN value separated by the character %. If the UPSN feature is not enabled, the NE only provides the EIP value.
- UPSN values are preserved over restarts and feature disabling and re-enabling.
- Valid UPSN values for an Optical Metro 5200 range from 21 to 255. Valid UPSN values for an Optical Metro 5100 range from 7 to 255. Once the UPSN feature is enabled, these values can be edited.

Passive devices slot numbering in Shelf Level Graphics

Passive devices slot numbers are indicated in the System Manager Shelf Level Graphics screen (see Figure 6-1) when the passive device is connected to the shelf's Equipment Inventory Ports (EIP). By default, the four Equipment Inventory Ports are displayed as EIP1, EIP2, EIP3 and EIP4.

If the UPSN (User Provisionable Slot Number) feature is enabled, the slot numbers displayed will be the user provisioned value, rather than the values of EIP1, EIP2, EIP3, and EIP4.

Figure 6-1
Shelf Level Graphics screen
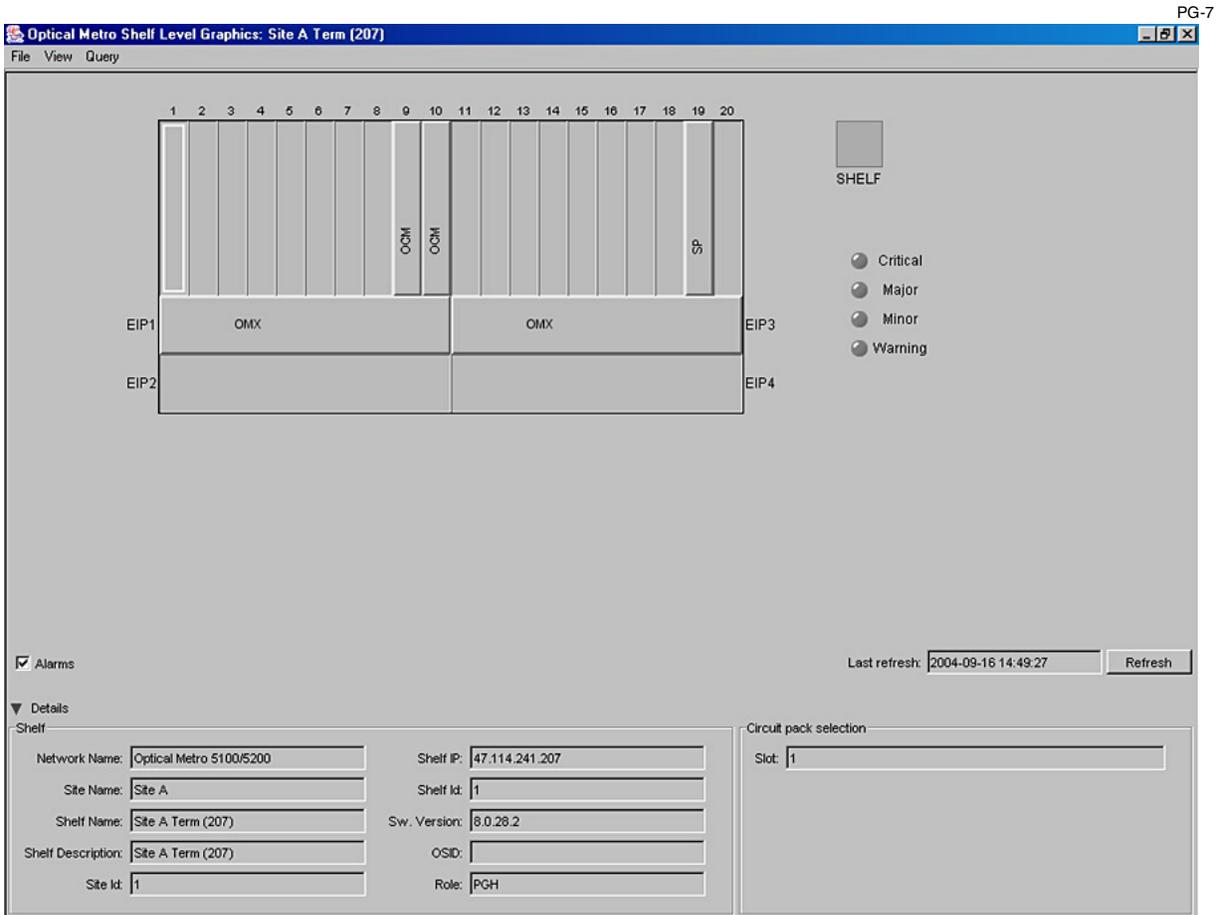
Additional troubleshooting window

The Troubleshooting window is available in System Manager only. The Troubleshooting window provides IP routing tables and the interface statistics of the network. Users with privilege class of Admin, Operator or Observer can view all troubleshooting data from this window.

Customer user classes

The customer user classes (Customer1 and Customer 2) provides two additional user classes. These classes are designed for customers who share one network.

The customer user classes named Customer1 and Customer2

- have less privileges than the Observer user privilege class.
- have limited read access; one user class will have access to the performance monitoring information and the other does not.

Alarm filtering for Customer1 and Customer2 user privilege classes differ:

- For Customer1 user privilege class, all events, user requests and non-service affecting alarms (except AIS, RDI and PM alarms) are filtered.
- For Customer2 user privilege class, all events, user requests and non-service affecting alarms are filtered.

Rules for customer user classes

Customer user classes can be provisioned through the System Manager and the TL-1 interface. However, it is only accessible in System Manager.

System Manager access privileges for the customer user classes

Table 6-3 on page 6-7 and Table 6-4 on page 6-8 show the System Manager access privileges for Customer1 and Customer2 user classes.

Table 6-3
System Manager top menu area and access privileges for Customer1 and Customer2 user classes

Top menu	Customer1	Customer2
File (Save as, Print, Exit)	Enabled	Enabled
Edit (Add, Modify, Delete, Preferences, Provision alarm severity)	Disabled	Disabled
View (Network Tree, Show Details, Rediscover Network, Refresh Current Window, Sort Order)	Enabled	Enabled
Fault (Active Alarms, Event Console, Clear Event Console, Event History)	Enabled	Enabled
Configuration – Equipment (Inventory, Facilities, Telemetry, Shelf Level Graphics)	Enabled	Enabled
Configuration – Connections (Channel Assignments)	Enabled	Enabled
Configuration (Network Date and Time)	Enabled	Enabled
Configuration (Naming, Communications, External Manager, Shelf List)	Disabled	Disabled
Admin (Software Upgrade, NE Admin, Decommission Shelf, System Level Power Equalization)	Disabled	Disabled

Table 6-3
System Manager top menu area and access privileges for Customer1 and Customer2 user classes

Top menu	Customer1	Customer2
Performance (Performance Monitor)	Enabled	Disabled
Security (Change Password)	Enabled	Enabled
Security (User Profile List, Login User List, Advanced, Authentication Provision, Clear Security Alarm)	Disabled	Disabled
Troubleshooting (IP Routing Table, Interface Statistics)	Disabled	Disabled
Help (Technical Documentation, About System Manager)	Enabled	Enabled

Table 6-4
System Manager tabs access privileges for Customer1 and Customer2 user classes

Tab	Customer1	Customer2
Fault	Visible	Visible
Equipment	Visible	Visible
Connections	Visible	Visible
Configuration	Not Visible	Not Visible
Admin	Not Visible	Not Visible
Performance Monitor	Visible	Not Visible
Troubleshooting	Not Visible	Not Visible
Security	Not Visible	Not Visible

Add User dialog
Customer1 and Customer2, are added to the User Class list in the Add User dialog to enable admin users to provision local users with Customer1 or Customer2 user privilege class. See Figure 6-2 on page 6-9.

Figure 6-2
Add User dialog

Note: The Add User is available to the Admin privilege user only. The
User Name and User Password can not contain commas or double quote
characters.

Change Community Name dialog
There are two SNMP Community Strings to support the customer user classes.
These Community Strings can be provisioned by any user with admin user
class. See Figure 6-3 on page 6-9.

Figure 6-3
Change Community Name dialog

Note: Only the admin privilege user can change Community Name. The
Community Name can not contain commas or double quote characters and
must be 1-8 characters.

External Manager Entry dialog
The External Manger Entry dialog, allows you to set what traps are sent to the
external manager for the trap community name set for the customer user class.
See Figure 6-4 on page 6-10.

Figure 6-4
External Manager Entry dialog

om265p
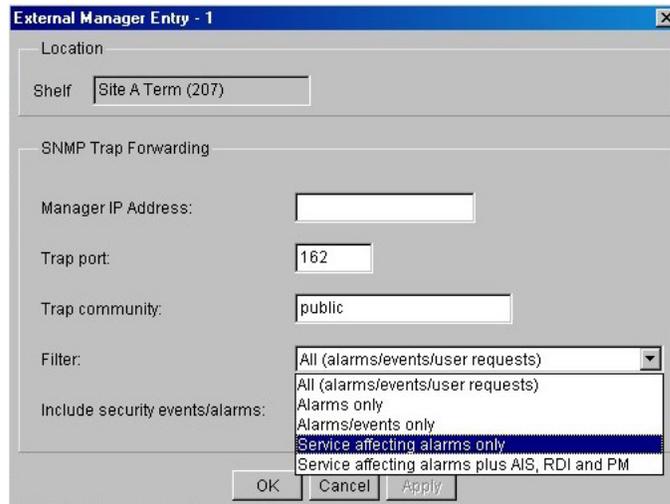
Note: Only the admin privilege user can set what traps are sent to the external manager.

SNMP community views

Table 6-5 on page 6-10 lists the SNMP community views for all user classes including Customer1 and Customer2.

Table 6-5
SNMP community views

SNMP Community	Read Access to MIB Groups	Write Access to MIB Groups
Admin	All	All
Operator	Exclude security	Exclude security, DNS, enet2, TID groups and trapDestination Table
Observer	Exclude security	Include adminUserAccountTable and connQuery only

Table 6-5
SNMP community views

SNMP Community	Read Access to MIB Groups	Write Access to MIB Groups
Surveillance	Exclude security, DNS, enet2, TID, admin (except adminMibVersion) and software (except swVersion) groups	None
Customer1	Exclude security, DNS, enet2, TID, software (except swVersion) groups and trapDestination Table	Include adminUserAccountTable and connQuery only
Customer2	Exclude security, DNS, enet2, TID, software (except swVersion), PM groups and trapDestination Table	Include adminUserAccountTable and connQuery only

Alarm Indication Detail

This feature provides the following additional detailed information in alarm, event and log messages:

- sub card type
- signal layer rate information

The sub card type information is valid for most equipment and facility alarms but not for some shelf alarms, such as environment and telemetry alarms. The signal layer rate information is valid for most facility alarms but not for other alarms such as equipment or environment alarms.

Alarm Details window

By double-clicking on an active alarm in the System Manager Active Alarms screen, the Alarm Details window is displayed. In the Alarm Details window (see Figure 6-5 on page 6-13), the following parameters are included:

- Type: This field displays the provisioned card sub-type. For example, for the OCI card, the following OCI types can be displayed:
  - 622MB Transparent
  - 1.25GB Transparent 1310nm
  - 1.25GB ISC
  - 1.25GB Transparent 850nm
  - 1.25GB GE 1310nm
  - 1.25GB GE 850nm
  - 2.5GB SONET/SDH
  - 2.5GB Transparent

Note: This field is displayed but left empty for alarms that are not raised against a specific circuit pack (e.g., shelf, environmental or telemetry alarms).

- Layer: This field displays the alarmed layer. For example, for the Muxponder 10 Gbit/s GbE/FC circuit pack, some of the alarm layers that can be displayed include:
  — Line-Multiplex Section
  — Path Group
  — Optical channel Transport Unit

  Note: This field is not displayed if both Layer and Signal is unavailable.

- Signal: This field displays the alarmed signal. For example, for the Muxponder 10 Gbit/s GbE/FC circuit pack, some of the alarm signals that can be displayed include:
  — STS192
  — STS3C-7V
  — OTN2

  Note: This field is not displayed if both Layer and Signal is unavailable.

- Path: displays the affected client-side paths and is only applicable to summary path alarms raised by the Muxponder 10 Gbit/s circuit packs. When a path fault is detected on a path associated with a client-side facility, a summary path alarm is generated against the client-side facility. If a fault is detected on a different path associated with the same client-side facility, a new summary alarm is not raised. However, when a user double-clicks on the summary alarm in the Active Alarms list, the software polls the circuit pack to determine the existing faulty paths and this information is displayed in the Path field of the Alarm Details window.

  — next to the path field is the Mappings button. When pressed, this button brings up the Client to Line Side Path Mappings screen (see Figure 6-6 on page 6-13) so that client-side paths can be correlated to line-side paths.

  Note: This Path field is not displayed if the path information is not unavailable.

Figure 6-5
Alarm Details window

om2743t
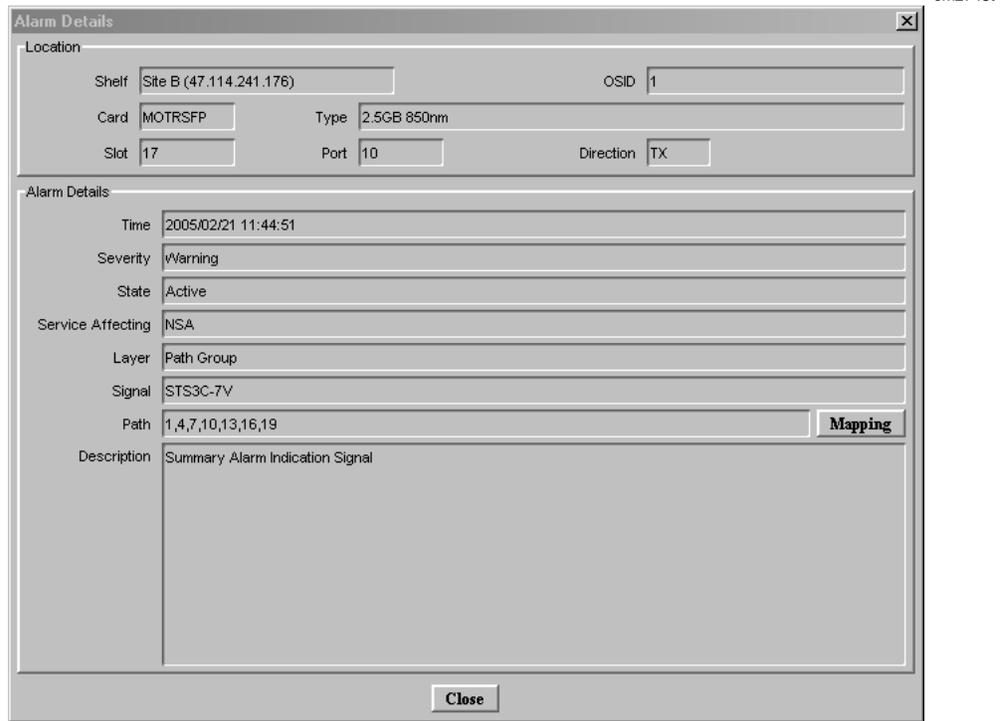
Figure 6-6
Muxponder Path Mapping screen

OM2746t
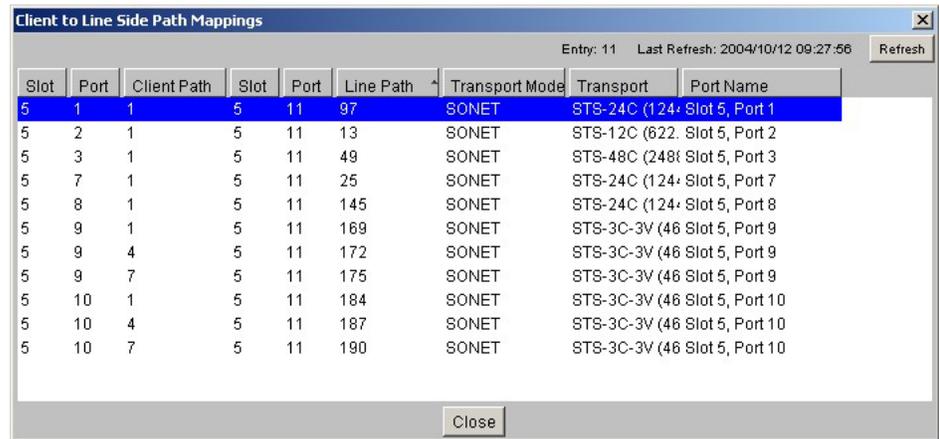
Note: For a description of all parameters contained in the Alarms Detail window, see Table 7-15.

Event Details window from the Event Console screen

By double-clicking on an alarm in the System Manager Event Console screen, the Event Details window is displayed. In the Event Details window (see Figure 6-7 on page 6-14), the Type, Layer and Signal fields are also included. The field definitions are the same as those presented in "Alarm Details window" on page 6-11.

Figure 6-7
Event Details window from the Event Console screen

om2776t

Event Details window from the Event History screen

By double-clicking on an alarm in the System Manager Event History screen, the Event Details window is displayed. In the Event Details window (see Figure 6-8 on page 6-15), the Type, Layer and Signal fields are also included. The field definitions are the same as those presented in "Alarm Details window" on page 6-11.

This window also includes a new **Show Circuit Pack Event** button that provides the ability to tunnel deeper into the circuit pack to trace outstanding events against the circuit pack that may have contributed to the historical event. The events are actually stored and retrieved from the circuit pack. This functionality is only available on the Muxponder circuit packs.

Figure 6-8
Event Details window from the Event History screen

om2748t
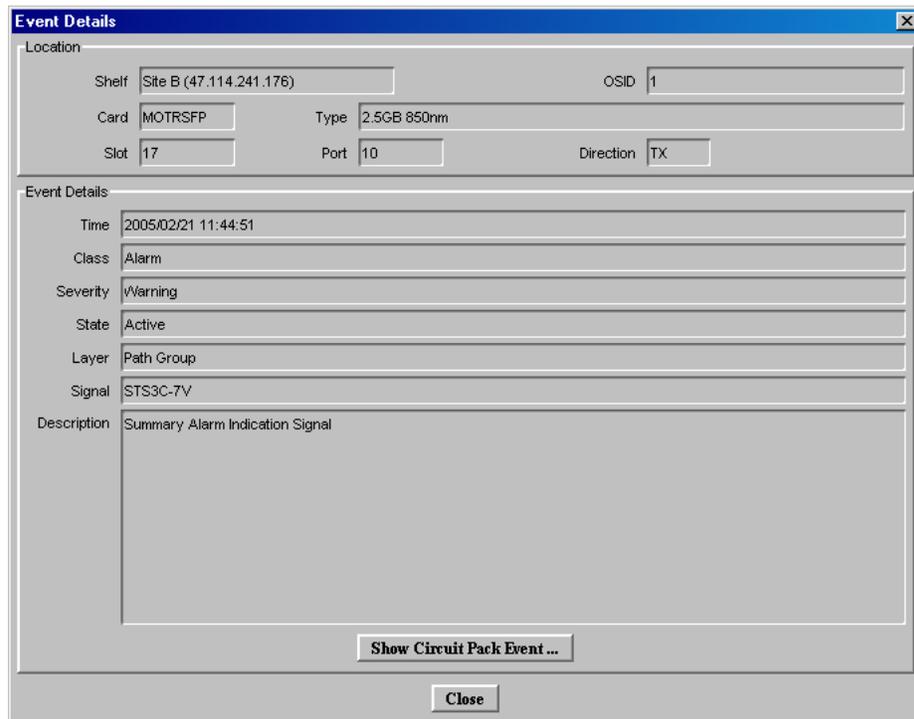
Figure 6-9
Circuit Pack Event History window

OM2749t
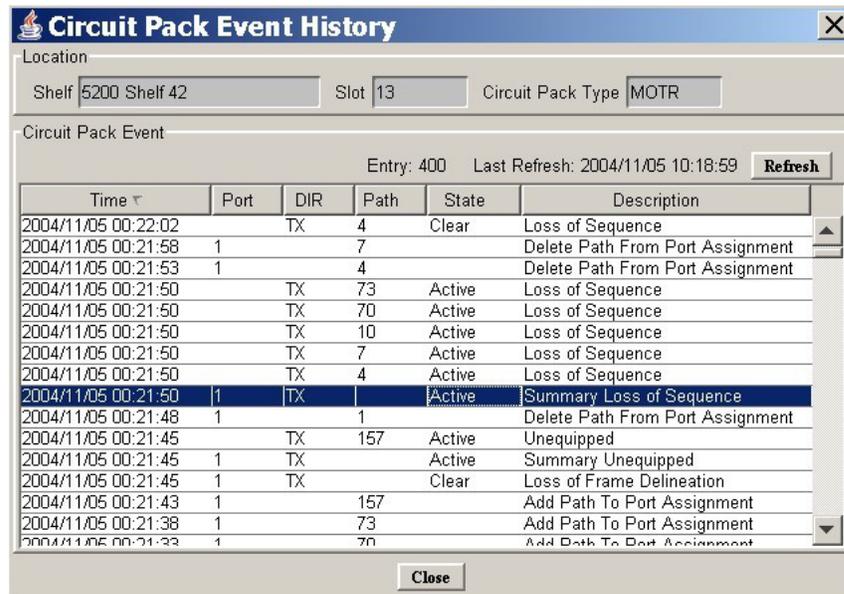
SNMP information

Additional information such as sub card type and signal layer rate are included in the active alarm table, log table and alarm traps (Critical, Major, Minor, Alert).

The subCardType is added to the physical equipment group as a column(string) in the manufacturing data and provisioning data. The string is 32 bytes long and read-only.

Surrogate Alarm Indication Signal and Alarm Indication Signal alarm

The Surrogate Alarm Indication Signal is raised for an Surrogate Payload Signal (SPS) fault. The Alarm Indication Signal alarm is raised for the SONET/SDH AIS fault. See Figure 6-10 on page 6-16 for the fault scenarios.

Figure 6-10
Surrogate AIS and AIS fault scenarios

om2737

Alarm Indication Signal fault scenario

```
                    Alarm Indication Signal              Alarm Indication Signal
                    alarm                                alarm

 Client-side                                   Client-side

SONET/SDH AIS  ┌──────────┐  SONET/SDH AIS   ┌──────────┐  SONET/SDH AIS
 ─────────────►│ 2.5G OTR │ ───────────────► │ 2.5G OTR │ ───────────────►
               └──────────┘                  └──────────┘
                                                        Laser ON
```

Surrogate Alarm Indication Signal fault scenario

```
                    Loss of signal alarm                 Surrogate Alarm Indication
                                                         Signal alarm

 Client-side                                   Client-side

   LOS         ┌──────────┐     SPS           ┌──────────┐
 ─────────────►│ 2.5G OTR │ ───────────────► │ 2.5G OTR │ ───────────────►
               └──────────┘                  └──────────┘
                                                        Laser OFF
```
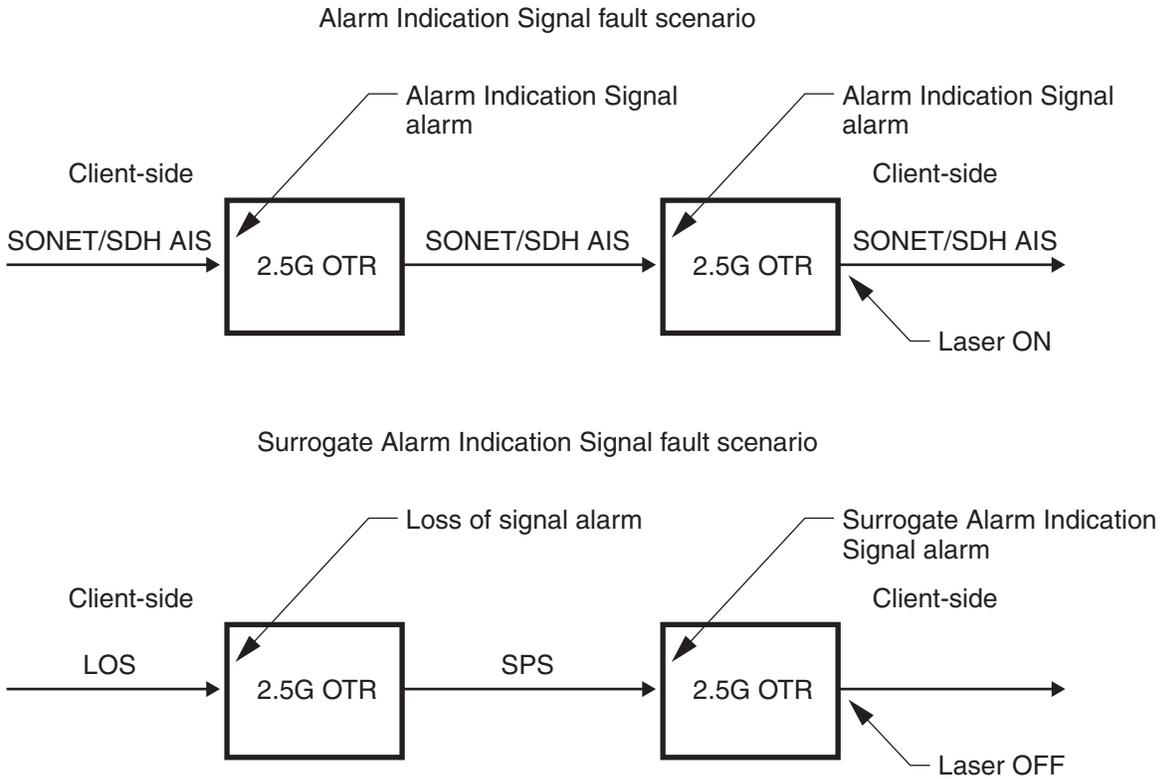
All OTR 2.5 Gbit/s circuit packs and all OCLD circuit packs have the ability to inject and detect SPS. All OTR 2.5 Gbit/s circuit packs and all OCLD circuit packs (except OCLD 1.25 Gbit/s and OCLD 2.5 Gbit/s) have the ability to detect SONET/SDH AIS. When both fault conditions exist (SONET/SDH AIS and SPS), the Surrogate Alarm Indication Signal alarm masks the Alarm Indication Signal (SONET/SDH AIS) alarm.

Alarm severity provisioning

This feature allows nodal-based alarm severity provisioning for each individual alarm using System Manager. Once the alarm severity is provisioned, alarms are raised with the provisioned alarm severity. Also, the behavior of the shelf lamps (Critical, Major, Minor) and ACO (Alarm Cut Off) are consistent with the provisioned alarm severity.

If there is an active alarm during a provisioning change, the active alarm with the old alarm severity is cleared and the alarm is raised again with the new alarm severity.

Severity is the only attribute of an alarm that can be edited. All other alarm information, such as alarm text and whether or not the alarm is service affecting, is not editable. This feature does not allow alarms to be disabled. Moreover, the alarm hierarchy is not altered by this feature. As a result, it is possible that a minor alarm mask a major alarm. For example, suppose the severity of the "Circuit pack mismatch" alarm is changed from major to minor, and the "Loss of Signal" severity is kept as default (i.e., major). Based on the alarm hierarchy, the "Circuit pack mismatch" alarm masks the "Loss of Signal" alarm. The shelf will raise a minor "Circuit pack mismatch" alarm instead of a major "Circuit pack mismatch" alarm.

The TL1 interface does not support the provisioning of alarm severity. However, it is consistent to the System Manager when reporting alarms. For example, if the LOS alarm is provisioned as Minor/NSA. Both System Manager and TL1 reports the LOS alarm as Minor/NSA whenever the LOS is raised.

System Manager

The System Manager provides the interface to provision the severity of individual alarms as Critical, Major, Minor, or Warning. Some alarms have dual severities; a severity for a service affecting condition and a severity for a non-service affecting condition. This feature allows each of these dual severities to be provisioned.

For each alarm, the System Manager provides an indication as to whether the alarm severity is default or not. It provides the ability to reset the alarm severity to the default value for an individual alarm or for all alarms.

The Provision Alarm Severity menu is available from the Edit top level menu. This menu item is enabled only for users with the Admin user privilege class.

The Configure Alarm Severity screen (see Figure 6-11) is displayed once the Provision Alarm Severity menu is selected.

Figure 6-11
Configure Alarm Severity screen

om2773t
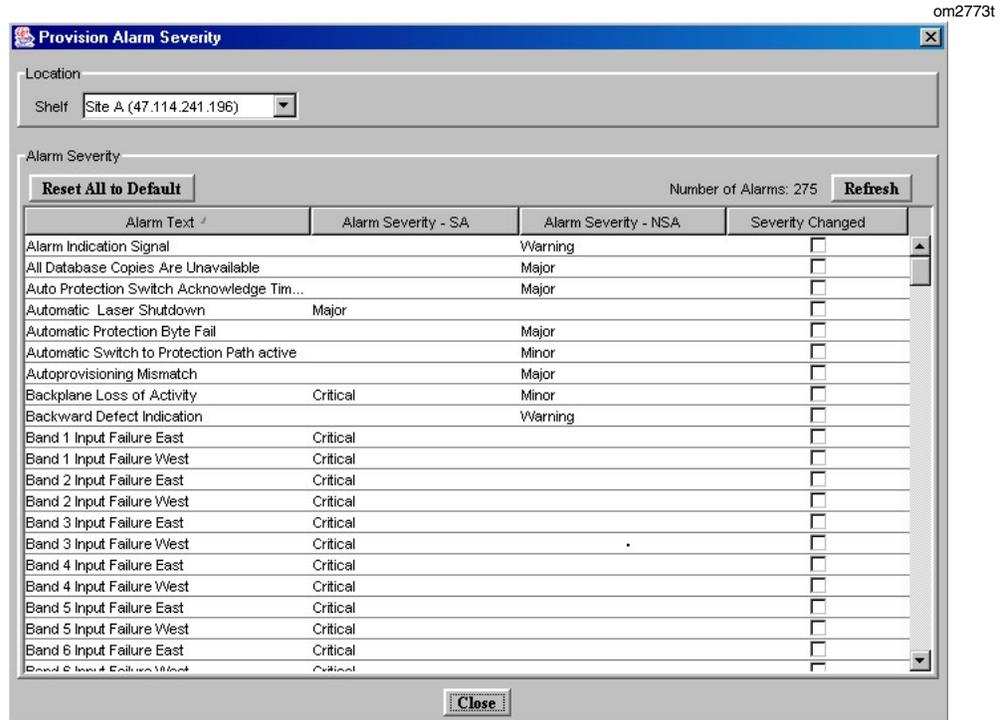
The Shelf field contains a list of shelf names provisioned in the network. The Reset All to Default button returns the alarm severity for all alarms back to their default state. Double-clicking a table row brings up the Change Alarm Severity window in order to change the selected alarm's severity (see Figure 6-12 and Figure 6-13). The Reset Severity To Default check box is only enabled when the Alarm Severity Changed check box is checked.

Figure 6-12
Change Alarm Severity window for an alarm with dual severity

OM2774t
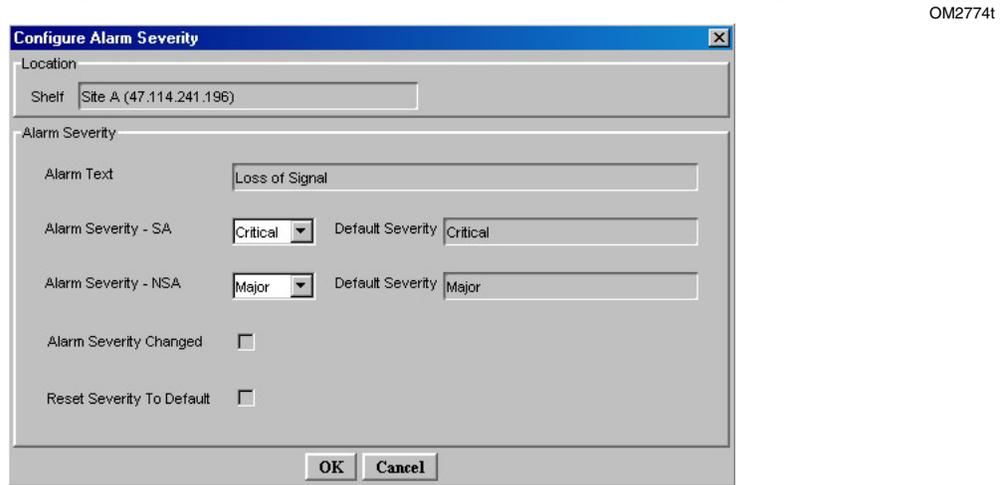
Figure 6-13
Change Alarm Severity window for an alarm with single severity

OM2775t

Automatic Laser Shutdown

The Automatic Laser Shutdown (ALS) feature shuts down DWDM lasers and consequently brings the power level down to the Class I hazard level (10 dBm) within three seconds. In case of a fiber cut, this feature provides safety to people repairing the broken fiber.

The implementation of the ALS feature consists of three main steps:

- laser shutdown when either the remote or local shelf detects a Loss of Signal alarm
- signal monitoring for the clearing of the Loss of Signal alarm on an individual channel basis
- a manual or automatic laser recovery (ALR) operation on an affected shelf through the System Manager or TL1 to restore all spans in ALS mode after the fiber is repaired

ALS is disabled by default. The default value of the ALS feature is "Disable" after an upgrade to Release 7.0.

ALS has been introduced in compliance with the following standards:

- ITU-T G.664 - Optical safety procedures and requirements for optical transport systems
- IEC 60825-2: Safety of laser products - safety of optical fiber communication systems.

When a network is in ALS mode, you cannot rely on the light in the fiber to locate a fiber cut. Nortel Networks recommends that you use an optical time domain reflectometer (OTDR) to project light in the fiber when a Loss of Signal alarm is detected. The OTDR device provides information about the

location of the fiber cut. You can also use a light source device to generate an optical signal into the fiber. In this case, you troubleshoot the fiber cut in the same way as when the ALS feature is disabled.

Note 1: If ALS or ALR is enabled on a fiber, there are some impacts on the behavior of the alarms in a system when a fiber break occurs and is being repaired. If you use light to test the broken fiber (with a light source or an OTDR), you clear the ALS alarms. This is because the shelf receives light, which clears the Loss of Signal (LOS) condition. As a result, the shelf and the remote shelf power up lasers (depending on whether both Tx and Rx fibers are cut or only one of them is cut). When you remove the light, if a Remote Automatic Laser Shutdown alarm was present on the shelf, it is replaced by an LOS alarm. Also, when the fiber is powered up, the Automatic Laser Shutdown alarm is cleared if all the channels impacted by the fiber break see light. This is an expected behavior because a shelf cannot distinguish between a light source from an optical test set or a light source from a remote shelf.

Note 2: When ALS is used in an amplified system, inconsistent behavior in the reporting of the Remote ALS alarm can occur and may be replaced by a Loss of Signal alarm under the following conditions:

— a fiber cut occurs at the same time in both directions

— an overhead link failure alarm occurred on the link and the line circuit packs are not able to communicate with each other

— the power going into an amplifier fluctuates for some wavelengths. In this case, other wavelengths that should not be impacted can see a variance of power coming out of the amplifier. When the input power changes, the amplifier generates noise (ASE) at different levels for the unused channel coming out of the amplifier. This variance of output power can cause the Remote alarm to momentarily clear, and to be substituted by a Loss of Signal alarm.

Note 3: If you are using two OCLD circuit packs with different Product Engineering Codes (PECs), a Loss of Signal alarm may be raised instead of the Remote Automatic Laser Shutdown alarm. The situation may occur if you are using an OCLD from Column 1 with an OCLD from Column 2, as shown in Table 6-6.

Table 6-6
OCLD 1.25 Gbit/s PECs

Column 1	Column 2
NT0H01NA-NH	NT0H01AA-AH
NT0H01PA-PH	NT0H01BA-BH
NT0H01QA-QH	NT0H01CA-CH
NT0H01RA-RH	NT0H01DA-DH

Table 6-6 (continued)
OCLD 1.25 Gbit/s PECs

Column 1	Column 2
NT0H01SA-SH	NT0H01JA-JH
NT0H01TA-TH	NT0H01KA-KH
NT0H01UA-UH	NT0H01LA-LH
NT0H01VA-VH	NT0H01MA-MH

Note 4: When ALS is enabled in an amplified network using APBEs, alarms are raised against the APBEs if unused line-side circuit packs (OCLD or OTR) are seated in the shelf but their facilities are OOS or deleted. An OCLD that is seated, but has its facility OOS or deleted, still transmits light, but it does not report alarms. If the OCLD is connected to the OMX but its corresponding OCLD in the far end is not, the OCLD transmits light, but does not receive light. If ALS is enabled, the OCLD shuts down its laser because it is not receiving any light. As a result, any APBEs in the path between the OCLD and its missing mate at the far end experiences a drop in band power. This triggers a Power Out of Range alarm on the APBEs.

Note 5: If an OCLD/OTR circuit pack is reseated in the shelf while the Automatic Laser Shutdown alarm is active, the circuit pack laser is active for a short period of time (20 seconds) after the circuit pack is seated. This causes the LOS condition to temporarily clear on that span, if the fiber is not actually broken. As soon as the circuit pack is fully initialized, the laser will be shut down as was the case before the circuit pack was reseated.

Note 6: After ALS recovery from any major fiber plant disturbance (fiber cut/splice, fiber replacement, adding or removing bands or channels) the optical signal should be re-equalized. Follow the appropriate procedure in *Testing and Equalization Procedures*, 323-1701-222.

Configurations supporting ALS

The ALS feature is applicable to all OADM, Mixed and terminal shelves. It is available on all OCLD and OTR circuit packs. The OSC channel, if present, remains operational when ALS is enabled. The ALS feature is applicable to all supported Optical Metro 5100/5200 configurations.

Alarm strategy

The ALS feature does not interfere with the standard operation of the alarm system in Optical Metro 5100/5200 products. The LOS, Band Input Failure (BIF), and Shelf Input Failure (SIF) alarms are generated whether or not the ALS feature is enabled or disabled. When ALS is enabled, additional fibers appear to fail, and in order to determine which fibers are actually broken, the user can correlate the LOS, BIF, and SIF alarms with the Automatic Laser Shutdown alarm.

Protection switching

The ALS feature has no impact on the equipment and path protection schemes that are implemented on the Optical Metro 5100/5200 products. If a fiber break occurs in a span, the system will attempt to take the traffic from the alternate direction.

Example

The following example illustrates the steps that the system takes in order to shut down the laser.

- Figure 6-14 assumes that a single fiber break took place between Shelf A and Shelf B.

- Shelf B detects a 0.5 second LOS condition and shuts down the Tx laser.

- Shelf A then detects the same type of LOS condition in the opposite direction and shuts down its Tx laser.

- The entire round trip from the fiber cut completes within 3 seconds in order to comply with industry standards. If the fiber cut is not repaired, within 3 seconds the power level in the system is brought down to a hazard level 1.

After the power is shut down for all channels impacted by the fiber break, the system monitors the LOS condition, waiting for it to be cleared on an individual channel basis. In this feature, the LOS does not clear until a manual operation is issued or automatic laser recovery is enabled through the System Manager. The manual recovery command must be performed once (only at one end of the span) for each network element that is impacted by the failure.

Figure 6-14
Laser shutdown operation

OM2564t

Shutdown procedure as per ITU-T G.664 and IEC 60825.2
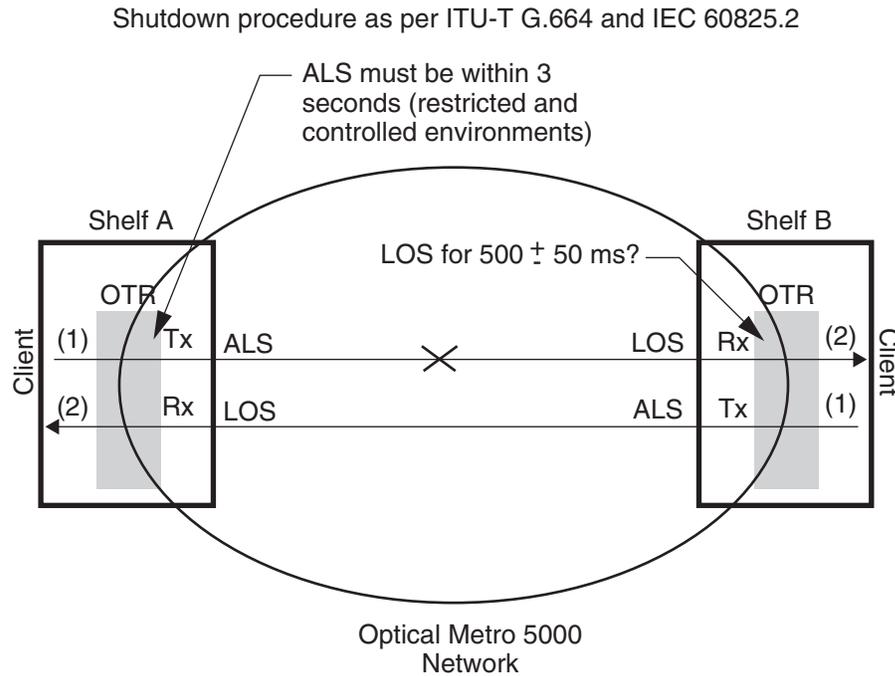
Figure 6-15 illustrates how manual recovery works after the fiber is repaired:

- You issue the Manual Activation command to initiate the recovery at one end of the impacted span (Shelf A).

- Shelf B detects the clearing of the LOS and activates its Tx laser.

- Shelf A then detects the clearing of the LOS and keeps its Tx laser on.

- The entire round trip completes within 3 seconds in order to meet the G.664 specification. If the fiber cut is repaired, the lasers will stay on. If the fiber cut is not repaired, within 3 seconds the power level in the system will be brought down to a hazard level 1.

Figure 6-15
Manual recovery operation

OM2563t

The round trip of each
channel must be within 3
seconds or the Tx
laser will switch off.

Shelf A

From SMI the laser
activation command
is sent to either site.

Shelf B

OTR

OTR

Client

(1)   Tx   Laser on   Fiber is repaired   LOS Clears   Rx   (2)

(2)   Rx   LOS Clears   Laser on   Tx   (1)

Client

.85 secs

Optical Metro 5000
Network
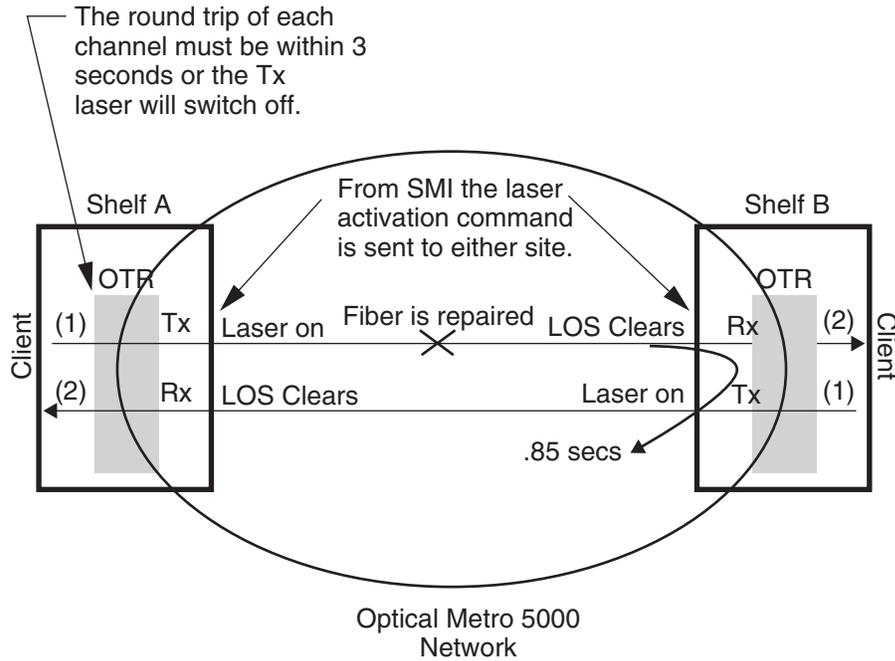
Figure 6-16 illustrates how automatic recovery works after the fiber is
repaired:

- You enable Automatic Laser Recovery at Shelf A.

- Shelf A initiates pulses to the remote end. It may take up to five minutes
  for the first pulse to occur. After the first pulse, the circuit pack will pulse
  at the rate of 200 seconds.

- Shelf B detects the clearing of the LOS and activates its Tx laser.

- Shelf A then detects the clearing of the LOS and keeps its Tx laser on.

- The entire round trip from the fiber cut completes within 3 seconds in order
  to comply with industry standards. If the fiber cut is repaired, the lasers
  will stay on. If the fiber cut is not repaired, within 3 seconds the power
  level in the system will be brought down to a hazard level 1.

Figure 6-16
Automatic recovery operation

OM2699p

Pulses are sent to the remote end
at a regular interval (from 100 to 300 secs)
Pulse duration is 2 ± 0.25 secs.

Shelf A

Shelf B

OTR

OTR

Client

(1)   Tx Laser on   Fiber is repaired   LOS Clears Rx   (2)

Client

(2)   Rx LOS Clears   Laser on Tx   (1)

0.85 secs

Optical 5000 Network

The round trip for each channel must be within 3 secs.
Otherwise, the TX laser will switch back off.
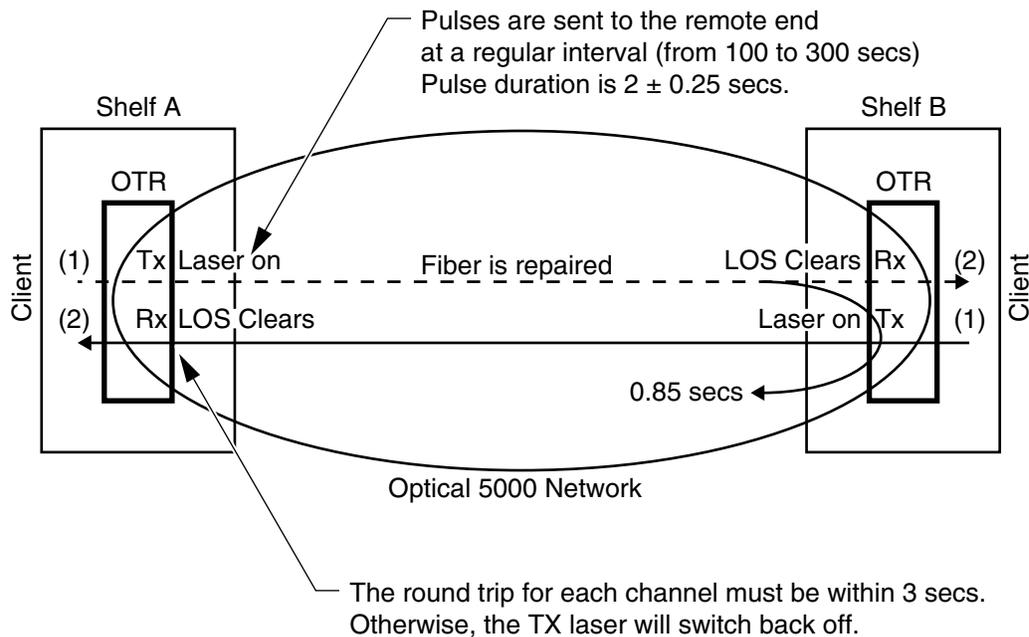
Remote fault notification

Remote fault notification allows a user to provision a shelf to optionally raise
a service-affecting alarm at the near-end line-side circuit pack when the
far-end line-side circuit pack has a traffic affecting alarm. This is important in
scenarios when the communication between the two nodes may be down (for
example, when the overhead link is the only connection between the far-end
node and the GNE in a point-to-point or hub-and-spoke configuration).

The user has the ability to enable or disable the Remote Fault Notification
(RFN) through either TL-1 or System Manager. The default setting is disabled.

Once RFN is enabled at the far-end node, an additional service-affecting alarm
is raised at the near-end node whenever the far-end node detects any
traffic-affecting condition. This ensures that at least one service-affecting
alarm is reported by the system in case the communications between the
far-end node and the GNE is lost.

The RFN alarm is raised as a Critical, Service-Affecting "Remote Defect
Indication" alarm.

Feature considerations

The following considerations apply if the Remote Fault Notification is
enabled.

Automatic Laser Shutdown (ALS)
If the "Remote Defect Indication" alarm is raised on a shelf where ALS is enabled, the alarm clears after a cold reboot of the shelf.

Fiber disconnection
If you pull both fibers at the same time, the "Remote Defect Indication" alarm may not be raised against the OCLD, OTR, or Muxponder.

System Level Equalization Control (SLEC)

System Level Equalization Control (SLEC) provides coordinated system-wide equalization or re-equalization of an amplified network. SLEC calculates the necessary information including topology and power levels, and performs the equalization activities by triggering the power control nodes to equalize in the calculated order.

SLEC can be triggered at anytime from a System Manager session. The current status of the equalization task is displayed in System Manager.

Note: SLEC is not supported using the TL1 interface.

Summary of features

The following features exist for SLEC capable networks:

- hitless addition and removal of wavelengths provided that the OMXs for the wavelengths are present or the stacked wiring configuration is used and the system has been pre-link engineered to support the full wavelength counts

- equalization of the entire network eliminating the need to know the topology of the network

- removes human error from the equalization process, current system complexities include:

  — computation of average per channel power levels

  — user's ability to use an optical spectrum analyzer to measure the power levels and adjust screwdriver VOAs to appropriate levels with accuracy

  — user's ability to determine fiber connectivity of the amplifiers, PBEs, APBEs to ensure that the correct device is being adjusted

  — ensure that the system is adjusted in the proper order and then come back in the reverse direction for the return path

- reduces the amount of time required for installation of services for the following reasons:

  — no truck roll to all amplifier locations

  — less special equipment required (i.e., no Optical Spectrum Analyzer needed)

  — less likelihood of human error

- reduces the amount of time to recover the system in the event of a failure. The replacement of equipment currently requires re-equalization (e.g., OMX replacement would have different loss characteristics). This can now be done with the push of a button from the NOC and no truck rolls to the location in which the equipment was replaced.

- reduces the amount of time to get the system up and running on installation

- automatically puts APBE/APBE Enhanced facilities and OFA facilities in-service

For a detailed overview of SLEC, provisioning rules, and for procedures on equalizing an amplified network using SLEC, see *Testing and Equalization Procedures,* 323-1701-222.

For troubleshooting SLEC, see *Trouble Clearing and Alarm Reference Guide*, Part 1, 323-1701-542.

SLEC System Manager details

OSC Inventory screen

The OSC equipment attributes are included in the OSC Equipment screen (see Figure 6-17):

- West Neighbor

- East Neighbor

Possible values for each are: Connected or Not Connected.

These parameters default to Connected and must be set to Not Connected in linear (i.e., non-ring) systems that use SLEC. Not Connected must be set for either the West Neighbor attribute or the East Neighbor attribute at the end-point nodes.

For provisioning the West Neighbor and East Neighbor, see Procedure 3-2, Manually provisioning a circuit pack or SFP, in *Provisioning and Operating Procedures,* 323-1701-310.

Figure 6-17
OSC Inventory screen

OM2762t

System Level Equalization Control screen
The SLEC interface, allows SLEC to be started and stopped and it provides
SLEC status (see Figure 6-18). This screen is accessed from the **Admin** menu.

This interface:

- allows users to select a system to equalize using the OSID

- displays the sites associated with the OSID

- allows users to start or stop the equalization

This screen provides an interface to select a the OSID where SLEC is to be
applied. Once the OSID is selected, a list of sites that belong to the OSID are
listed.

When the Equalize System button is clicked, SLEC first checks that the
selected system is in the correct state to perform equalization. If the validation
passes, SLEC starts. If the validation fails, a descriptive reason is displayed
and SLEC does not perform equalization.

While SLEC is in progress, users can cancel the process at anytime by clicking
the Stop Equalization button.

Figure 6-18
SLEC main screen

OM2758t
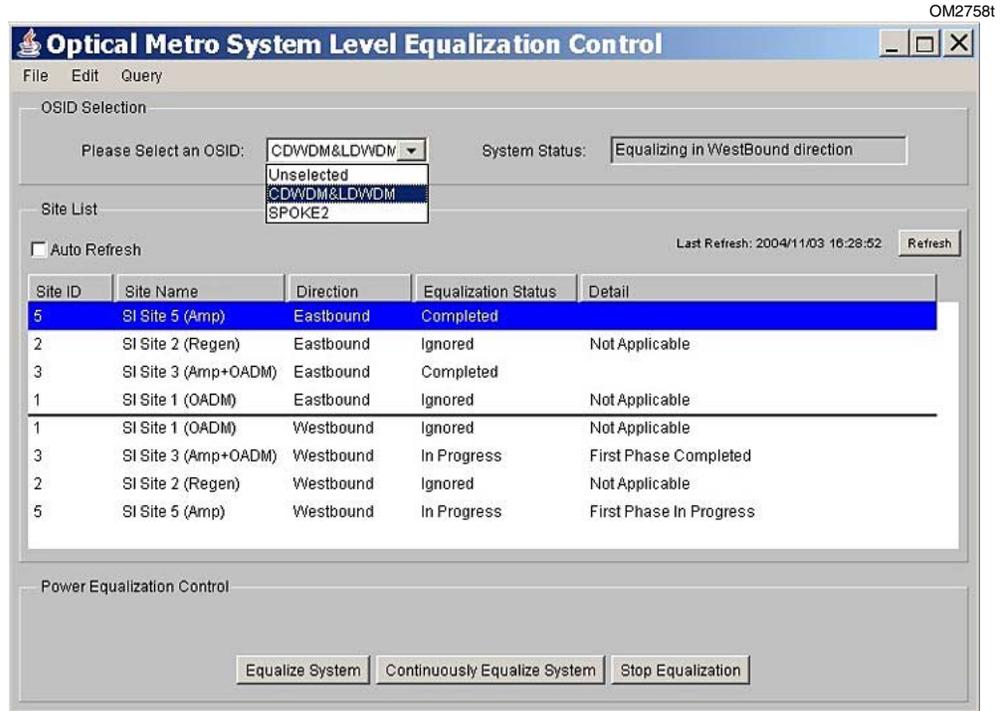
While SLEC is in progress, users can double-click on the site (a table entry) to view the details (see Figure 6-19) of the SLEC process down to the component level (per facility). See Table 7-4 for details on this window.

Figure 6-19
Site details screen

OM2759t
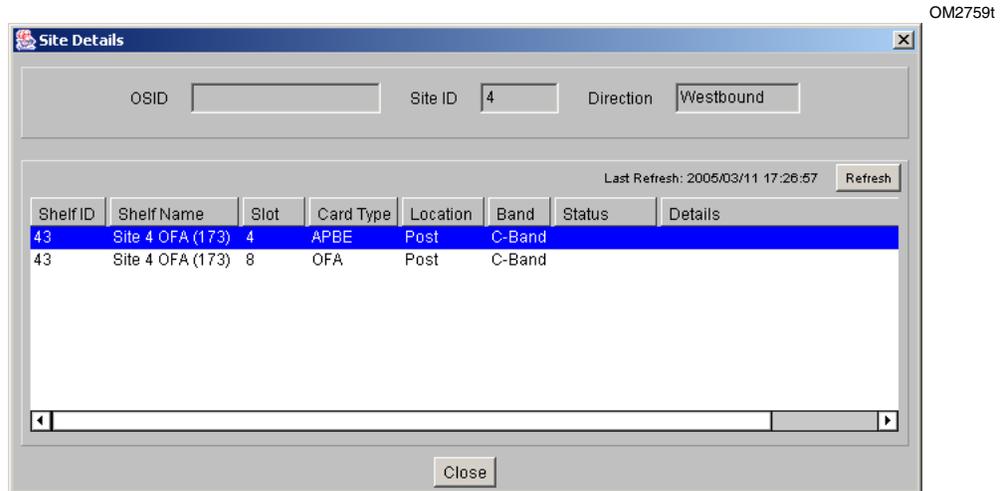
Appendix—System Manager windows and fields

In this chapter

System Manager main window

This section describes how to use the different parts of the System Manager main window.

Network shelf selector icons

Colored icons indicate the status of the shelves selected in the drop-down list. Table 7-1 lists icon colors and the shelf status that each represents. When multiple alarm types occur on a shelf, the color of the drop-down list icon represents the most severe alarm type.

Table 7-1
Network shelf selector icons

Icon color	Status
Green	There are no alarms on the shelf.
Red	There are critical alarms on the shelf.
Red	There are major alarms on the shelf.
Orange	There are minor alarms on the shelf.
Yellow	There are warnings on the shelf.
Blue solid	The System Manager is out of contact with the shelf.
	The shelf icon will turn blue if the System Manager is out of contact with the shelf for more than approximately two minutes.
Blue outline	The icon is displayed with a blue outline when you log in and System Manager is in the process of retrieving shelf data. When the shelf data has been retrieved, the color of the respective shelf icon changes to indicate the color status described above.

Commands and menu options

Table 7-2 lists the System Manager commands and menu options.

Table 7-2
System Manager command and menu options

Menu	Menu option	Description	Value or range
File	Save As...	This option saves the contents of the current information window to a file.	—
	Print...	This option prints the contents of the current information window.	—
	Exit	This option exits and logs off the System Manager.	Yes or No

Table 7-2 (continued)
System Manager command and menu options

Menu	Menu option	Description	Value or range
Edit	Add...	This option adds an entry to the item at the selected location.	—
	Modify	This option enables modification to the selected item.	—
	Details (when the Fault window is active)	This option provides alarm or event details.	—
	Delete	This option removes an entry from the location of the selected item.	—
	Preferences	This option opens a window that allows the user to modify application colors.	—
	Provision Alarm Severity...	This option opens a window that allows the user to modify the severity of alarms and warnings.	Select a Shelf IP and: either highlight the alarm to modify its severity or, click on Reset All to Default
View	Network Tree	This option activates the network shelf selector.	—
	Show Details...	This option opens a window with detailed information about the selected item. **Note:** This option is enabled when the Faults window is active.	—
	Rediscover Network	This option reinitializes communications with the other shelves in the network.	—
	Refresh Current Window	This option refreshes the currently selected main window.	—
	Sort Order...	This option changes the order in which network data is presented.	Column Select an item, for example, Shelf or Slot.
			Sort Select one of the following: • None • Ascending • Descending

Table 7-2 (continued)
System Manager command and menu options

Menu	Menu option	Description	Value or range
Fault	Active Alarms	This option opens a window that lists the active alarms.	—
	Event Console	This option displays the event log from the event log buffer of the System Manager.	—
	Clear Event Console	This option is enabled when Event Console window is active. It clears the event log from the event log buffer of the System Manager. You can also click on the Clear button on the Event Console window.	Yes or No
	Event History	This option retrieves the logs stored in the shelves in the Event History window.	—
Config-uration	Equipment	This option enables the Equipment Inventory, Facility, Telemetry, and Shelf Level Graphics menu items.	Select one of the following: • Inventory • Facility • Telemetry • Shelf Level Graphics
	Connections	This option enables the Channel Assignments window.	Channel Assignments
	Naming	This option enables the Naming window. Use the Naming window to edit shelf configuration naming parameters.	—
	Communications	This option enables the Communications window. Use the Communications window to edit shelf communications parameters.	—
	External Manager	This option displays the External Manager settings.	—
	Network Date and Time	This option synchronizes the date and time on the shelf with the date and time on the System Manager computer or sets the date and time of the shelf manually.	—
	Shelf List	This option lists the active shelves in the network. You can sort the shelves from this window.	—

Table 7-2 (continued)
System Manager command and menu options

Menu	Menu option	Description	Value or range
Admin	Software Upgrade	This option enables the Software Upgrade window.	—
	NE Admin	This option enables the NE Admin window.	—
	Decommission Shelf	This option deletes the commissioning information stored in the shelf. **Note:** This option is enabled when the Naming window is active.	—
	System Level Equalization Control	This option opens the Optical Metro System Level Equalization Control window.	See Table 7-3 on page 7-9 and Table 7-4 on page 7-11 for details.
Perform-ance	Performance Monitor...	This option opens the Performance Monitor window.	—
Security	User Profile List	This option lists the user accounts for a shelf and the associated details.	—
	Login User List	This option lists the users who logged in to the network.	—
	Change Password	This option, opens the Change Password window and allows both centralized and local users to change their own password. **Note:** Only the current mode password is changed.	User Name Displays the user name for the logged in user.
			Old Password Enter the current password.
			New Password Enter the new password. Password must be 8 to 10 characters with no control characters. Do not use commas and double quotation marks.
			Confirm Password Confirm the new password. This entry must match the New password entry.

Table 7-2 (continued)
System Manager command and menu options

Menu	Menu option	Description	Value or range
Security	Advanced...	This option opens the Change Community Name window and allows you to change the community name.	User Class Select a user level from the pull-down menu. The user levels include: • Admin • Operator • Observer • Customer1 • Customer2 • Surveillance
			New Community Name Enter the new community name for the selected user level. Community Name must be 1 to 8 characters with no commas.
			Confirm Community Name Must be identical to New Community Name.

Table 7-2 (continued)
System Manager command and menu options

Menu	Menu option	Description	Value or range
Security	Authentication Provision...	This option opens the Authentication Provision window.	Authentication Mode Selection: — Authentication Mode: Local, Centralized — Alternate Login Method: Challenge/Response, Local User See Note 1. — Shared secret See Note 2. — Primary Security Gateway: not provisioned, nnn.nnn.nnn See Note 3. — Secondary Security Gateway: not provisioned, nnn.nnn.nnn See Note 4.
			Login Control: — Failed Login Attempt Threshold: 2 - 20 (Default: 5) — Lockout Interval (Seconds): 0 - 60 (Default: 60)
			Radius Servers: This field displays the IP addresses of the primary and secondary radius servers as provisioned in the Primary Security Gateway and Secondary Security Gateway fields
	Clear Security Alarms...	This option allows you to clear specific security alarms.	—

Table 7-2 (continued)
System Manager command and menu options

Menu	Menu option	Description	Value or range
Trouble-shooting	IP Routing Table	This option enables the IP Routing Table window.	See Table 7-60 on page 7-147.
	Interface Statistics	This option enables the Interface Statistics window.	See Table 7-61 on page 7-148.
Help	Technical Documentation	This option displays the Optical Metro 5100/5200 technical documentation.	—
	About System Manager...	This option displays the name of the host shelf, the software version, the build date, the user name and user class.	—
Note 1: This field is enabled when Centralized is selected as the Authentication Mode.			
Note 2: This field is enabled when Challenge/Response is selected as the Alternate Login Mode.			
Note 3: This field is enabled when Centralized is selected as the Authentication Mode.			
Note 4: This field is enabled when Centralized is selected as the Authentication Mode.			

Table 7-3
System Level Equalization Control

Data field	Description	Value
Please Select an OSID	Used to select the site (by OSID) where SLEC is to take place. All OSIDs in the network with OSCs deployed are displayed.	An alphanumeric string (up to eight characters).
System Status	If SLEC is not currently active on this OSID, the System Status is Idle. If SLEC is in the validation phase, the System Status is Checking. If SLEC is currently executing in continuous mode, the System Status is Continuous Equalization.... If a one-time SLEC is in progress, the System Status indicates which direction is currently equalizing. The status is either Equalizing in Eastbound direction... or Equalizing in Westbound direction...	• Idle • Checking • Continuous Equalization In Progress • Continuous Equalization Mode • Continuous Equalization round finished - Successful • Continuous Equalization round finished - Failed • Equalizing in Eastbound direction • Equalizing in Westbound direction • Equalization finished in Eastbound direction - Successful • Equalization finished in Westbound direction - Successful • Equalization in Eastbound direction - Failed • Equalization in Westbound direction - Failed
Site ID	This field indicates the user-assigned number of the site. The sites are shown in the order that SLEC is applied for the eastbound and westbound directions.	A number from 1 to 64.
Site Name	This field indicates the user-assigned name of the site. Nortel Networks recommends that all shelves at a site have the same site name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Direction	Direction of SLEC.	• Westbound • Eastbound

Table 7-3 (continued)
System Level Equalization Control

Data field	Description	Value
Equalization Status	For each site, the current equalization status is listed. If SLEC is not running but has run before the status column displays the last status. If SLEC has not been run since the last restart the equalization status and details columns will be blank. When SLEC is running the equalization status column is used to track progress. While SLEC is executing in the eastbound direction, the westbound status will be blank.	• <Blank> • Unknown • Checking • Ready • In Progress • Failed • First Phase Completed • Completed • Aborted • Canceled
Detail	For each site, the current equalization status and details are listed. Depending on site configuration or if SLEC fails at a site, the Details column briefly describes the status of SLEC at this site.	• <Blank> • Component configuration does not support SLEC • Equalization not required • Equalization Incomplete • Invalid Equipment Configuration • First Phase • First Phase Completed, Post Side • First Phase Completed • First Phase In Progress • First Phase Post Side • Second Phase In Progress • Post Side • Post Side Equalization Not Required • System detected an error at another site • User Request
Equalize System button	Starts SLEC in the one time equalization mode.	—
Continuously Equalize System button	Starts SLEC in a system in the continuous monitoring and equalization mode.	—
Stop Equalization button	Cancel equalization request. Stops SLEC.	—

Double-click on a System Level Equalization Control table entry to view the site details of the SLEC process down to the component level.

Table 7-4
System Level Equalization Control/Site Details

Data field	Description	Value
OSID	This field displays the site OSID.	An alphanumeric string (up to eight characters).
Shelf ID	This field indicates the user-assigned unique ID of the shelf that the SLEC details are being displayed for.	A number from 1 to 64.
Direction	Direction of SLEC.	• Westbound • Eastbound
Shelf Name	This field indicates the user-assigned name of the shelf that the SLEC details are being displayed for.	A character string that can be any combination of letters and numbers, up to 31 characters.
Slot	This field indicates the slot number of the component that the SLEC details are being displayed for.	See Table 7-7 for the possible values.
Card Type	This field indicates the circuit pack type that the SLEC details are being displayed for.	• APBE • OFA
Location	For OFA and APBE equipment, this field indicates the amplifier location in the site topology.	• Pre • Pre2 • Post • Thru • Thru2 • Nil

Table 7-4 (continued)
System Level Equalization Control/Site Details

Data field	Description	Value
Band	For OFA and APBE equipment, this field indicates the band type of the circuit pack.	• C-Band • L-Band
Status	This field indicates the current equalization status for each component.	• <Blank> • Checking • In Progress • Ready • Completed • Blocked • Failed • Aborted • Canceled
Details	This field provides addition information on the current equalization status of each component.	• Equalization not required • No channels present • A component upstream failed to equalize • A component at this site failed to equalize • Blocked by downstream fault conditions • Blocked by downstream fault conditions • Detected incomplete channel transmit/receive pair • Failed to equalize • Invalid state for equalization • Component not provisioned properly for SLEC • Invalid Equipment Configuration • No response from component • Target Power Not Attainable Low • Target Power Not Attainable High • Unexpected Power Change • Topology Error

Alarm banner colors

The alarm banner has a top and a bottom row. The top row shows the alarm count for the whole network. The bottom row shows the alarm count for the shelves you selected with the network shelf selector.

Table 7-5 lists the different alarm colors and their indications.

Table 7-5
Alarm banner colors

Color	Indication
Red	Critical alarm
Red	Major alarm
Orange	Minor alarm
Yellow	Warning
Gray (no color/ transparent)	Acknowledged alarm counts and warnings ***Note:*** If an alarm or warning is unacknowledged and clears automatically, its alarm banner color remains highlighted until you acknowledge the alarm or warning. This convention makes sure that the System Manager reports all alarm activity to you.
Blue	The System Manager cannot poll a shelf for alarm status. System Manager has lost connection to the SP/shelf.

Accessing information windows

Access the different information windows by clicking on the labelled tabs in the System Manager.

Note: All tabs are also accessible through the menus.

Windows in the System Manager belong to the following categories:

- Fault
- Equipment
- Connections
- Configuration
- Admin
- Performance Monitor
- Troubleshooting
- Security

You can access more detailed information windows by clicking on the tabs displayed in each of these windows. Figure 7-1 shows the window hierarchy in the System Manager.

Figure 7-1
Hierarchy of windows in the System Manager

OM2315t
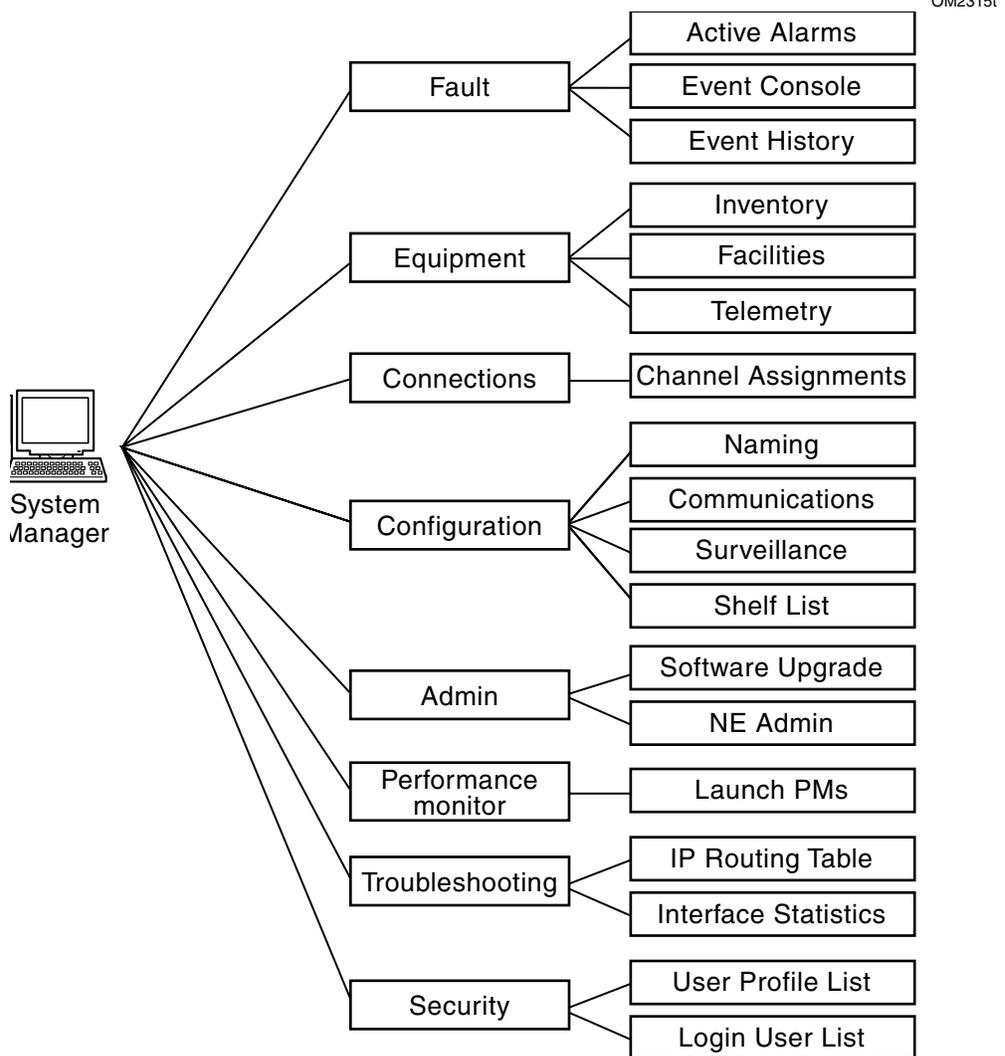
Refreshing System Manager windows

The System Manager automatically updates the Fault—Active Alarms window if the Auto Refresh box is selected. To refresh all other windows select the View > Refresh Current Window option from the main menu, or click the **Refresh** button if available.

System Manager common data fields

System Manager uses many of the same fields on its windows and dialog boxes. The following tables describe some of the common data fields and values in System Manager:

- Table 7-6 for Card or Circuit Pack Type
- Table 7-7 for Slot
- Table 7-8 for Port
- Table 7-9 for Layer and Signal

Table 7-6
System Manager field description and values for Card

Data field	Description	Value
Card or Circuit Pack Type	This field indicates the type of circuit pack or component.	• OCI • SRM (See Note 1) • GFSRM (See Note 2) • OCLD • OTR • MOTR (See Note 3) • MOTRSFP (See Note 4) • OSC • OFA • OCM • OMX • SP • ECT • APBE • OSC tray • EIU • TPT • VOA • OSC-SPLT (See Note 5) • W-SPLT (See Note 6) • DSCM

Note 1: SRM includes OCI SRM, OCI SRM SONET/SDH, OCI SRM SONET/SDH LTE, and OCI SRM ESCON circuit packs.

Note 2: GFSRM is used to represent the OCI SRM GbE/FC and the OCI SRM GbE circuit packs.

Note 3: MOTR is used to represent the Muxponder circuit packs.

Note 4: MOTRSFP is used to represent the Muxponder SFP pluggable units.

Note 5: OSC-SPLT is used to represent an OSC splitter/coupler.

Note 6: W-SPLT is used to represent a 1310 splitter/coupler.

Table 7-7
System Manager field description and values for Slot

Data field	Description	Value
Slot	This field indicates the shelf or slot number of the circuit pack or component.	• For Optical Metro 5200: a number from 1 to 20. • For Optical Metro 5100: a number from 1 to 6. • Optical Metro 5100 and Optical Metro 5200 shelves: EIP1, EIP2, EIP3, and EIP4 for the equipment inventory unit (EIU) and for passive components connected to the OMX interface cards on the maintenance panel. • Both the Optical Metro 5200 OFA and OADM shelves: B1-West, B2-West, B3-West, B4-West, B5-West, B6-West, B7-West, B8-West, B1-East, B2-East, B3-East, B4-East, B5-East, B6-East, B7-East, B8-East, B9-West, and B9-East. • Shelf designates alarms related to upgrade and power.

Note 1: OMXs, ECTs, and other passive components are external components that do not occupy slots, but for management purposes these components appear in the Prov and Actual columns.

Note 2: EIP1 through EIP4 represent the four ports on the OMX interface cards on the maintenance panel.

Note 3: When an EIU is connected to an OMX interface card (one of the EIP ports), if you double-click on the EIP, 16 more lines appear in the Slot column to represent the 16 ports on the EIU. For example, EIP2-12 represents output port 12 on the EIU connected to EIP2.

Note 4: Some alarms use virtual slots, such as B1-West.

Table 7-8
System Manager field description and values for Port

Data field	Description	Value

Port	This field displays the port of the circuit pack or component.	• For Optical Metro 5200: a number from 1 to 11.
		
		• For Optical Metro 5100: a number from 1 to 11.
		
		• Ports displayed for OSC: OSC-E, OSC-W, WSC-E, and WSC-W.
		
		• Ports displayed for OCI SRM GbE/FC and OCI SRM GbE (GFSRM):
		  — 1 and 2 for client-side facilities
		  — 1-AG for aggregate facility
		  — 1-AG-x for alarms where x is the first of the STS-3c paths affected by the alarm
		
		• Ports displayed for OCI SRM SONET/SDH LTE:
		  — 1, 2, 3, and 4 for client-side facilities
		  — 1-AG for aggregate facility
		
		• Ports displayed for OTR: 1-CS and 2-LS.
		
		• Ports displayed for OMX: OTS and Thru.
		
		• Ports displayed for the C/L splitter/coupler tray: OTS, C-Band, and L-Band.
		
		• Ports displayed for the OSC tray: OTS, Thru, and OSC.

Table 7-9
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
APBE	Optical Multiplex Section		• Band Alarm Indication Alarm
	Optical Transmission Section		• FacilityOOS-Optical Signal Failure
			• High Optical Power
			• High Optical Power Warning
			• Loss of Signal
			• Low Optical Power
			• Low Optical Power Warning
			• Optical Signal Failure Rx
			• Optical Signal Failure Tx
			• Power Out of Range High/Low
			• Target Power Not Attainable High/Low
			• Unexpected Input Power Change
GFSRM	Optical Signal	• FC100 • FICON • GIGE	• Loss Of Signal
	Digital Signal Rate	• FC100 • FICON • GIGE	• Facility Loopback (client)
	Digital Signal Rate (Aggregate)	• OC48/STM16	• Backplane Loss Of Activity • Backplane Invalid Signal • Loss of Timing Reference

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
GFSRM	Generic Frame Procedure	• FC100 • FICON	• Client Signal Mismatch • Far End Client Signal Failed • Insufficient Link Capacity • Loss Of Frame Delineation • Terminal Loopback
		• GIGE	• Client Signal Mismatch • Far End Client Signal Failed • Loss Of Frame Delineation • Remote Client Signal Failed • Remote Defect Indication • Terminal Loopback
	Path/Administrative Unit	• OC48/STM16	• Alarm Indication Signal • Loss Of Pointer • Pay Label Mismatch • Remote Defect Indication • Unequipped
	Physical Coding Sublayer	• FC100 FICON • GIGE	• LAN Link Down • Loss Of Sync
MOTR	Digital Signal Rate		• Facility Loopback
	Digital Signal Rate (Aggregate)	• STS192/STM64	• Invalid Signal • Loss Of Timing Reference
	Generic Framing Procedure	• FC100 FICON FC200 FICONEXPRESS	• Client Service Mismatch • Far End Client Signal Failed • Loss Of Frame Delineation • Terminal Loopback
	Generic Framing Procedure	• GIGE	• Client Service Mismatch • Far End Client Signal Failed • GFP Remote Defect Indication • Loss of Frame Delineation • Terminal Loopback

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
MOTR	Line/Multiplex Section	• STS192/STM64	• Alarm Indication Signal • Far End Protection Line Failure • Protection Channel Match Failure • Protection Mode Mismatch • Protection Scheme Mismatch • Protection Switch Acknowledgment Timeout • Protection Switching Byte Failure • Remote Defect Indication • Signal Failure • Working/Protection Fiber Mismatch
	Optical Channel	• OTM2	• High Optical Power • High Optical Power Warning • Loss Of Signal • Low Optical Power Warning • Remote Auto Laser Shutdown • Remote Fault Notification
	Optical Channel Transport Unit	• OTM2 OTR 10G	• Backward Defect Indication • Wrapper AIS • Wrapper LOF
	Optical Signal	• FC100 FICON FC200 FICONEXPRESS • GIGE	• Loss Of Signal
	Optical Transmission Section	• FC100 FICON FC200 FICONEXPRESS • GIGE	• Fiber Mismatch

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
MOTR	Path Group	• STS3C-7V/VC1-7 • STS3C-13V/VC1-13V GIGE FC100 FICON FC200 FICONEXPRESS	• Summary P_AIS • Summary P_DRI • Summary P_LOP • Summary P_UEQ • Summary P_PLM • Summary P_LOM • Summary P_LOSeq • Loss Of Alignment
	Physical Coding Sublayer	• FC100 FICON FC200 FICONEXPRESS	• LAN Link Down • Loss Of Sync
		• GIGE	• LAN Link Down (GFP-F only) • Loss Of Sync
	Point to Point Protocol	• OTM2	• Overhead Link Failure
	Section/Regenerator Section	• STS192/STM64	• Facility Loopback • Loss Of Frame

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OCI	Optical Signal	• ASYNC150M, ASYNC565M, CLO, D1VIDEO, ESCON, ETR, FDDI, FC12, FC25, FC100, FICON, FASTETHERNET, GIGE, ISC, STM1, STM4, STM16, GLINK	• High Optical Power • High Optical Power Warning • Loss Of Signal • Loss Of Signal Warning
	Digital Signal Rate	• ASYNC150M, ASYNC565M, CLO, D1VIDEO, ESCON, ETR, FDDI, FC12, FC25, FC100, FICON, FASTETHERNET, GIGE, ISC, STM1, STM4, STM16, GLINK	• LossOf Lock • Facility Loopback (client)
	Digital Signal Rate (Aggregate)	• ASYNC150M, ASYNC565M, CLO, D1VIDEO, ESCON, ETR, FDDI, FC12, FC25, FC100, FICON, FASTETHERNET, GIGE, ISC, STM1, STM4, STM16, GLINK	• Backplane Loss Of Activity • Backplane Invalid Signal • Terminal Loopback
	Section/Regenerator Section	• OC1, OC3, OC12, OC48, STM1, STM4, STM16	• Loss Of Frame

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OCLD	Analog Modulation General Communications Channel	• AM_GCC1 ASYNC150M, ASYNC565M, CLO, D1VIDEO, DV6000, ESCON, ESRM250G, ETR, FASTETHERNET, FDDI, FC12, FC25, FC50, FC100, FC200, FICONEXPRESS, GIGE, GLINK, HDTV29, HDTV30, ISC, ISC3, OC1, OC3, OC12, OC48, SRM150G, SRM250G, STM1, STM4, STM16	• Overhead Sync Failure
	Digital Signal Rate	• AM_GCC1 • ASYNC150M, ASYNC565M, CLO, D1VIDEO, DV6000, ESCON, ESRM250G, ETR, FASTETHERNET, FDDI, FC12, FC25, FC50, FC100, FC200, FICONEXPRESS, GIGE, GLINK, HDTV29, HDTV30, ISC, ISC3, OC1, OC3, OC12, OC48, SRM150G, SRM250G, STM1, STM4, STM16	• Surrogate Alarm Indication Signal • Far End Circuit Pack Mismatch • Bit Disparity • Facility Loopback • Invalid Signal • Protection Mate Circuit Pack Not Available

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OCLD	Digital Signal Rate (Aggregate)	• ASYNC150M, ASYNC565M, CLO, D1VIDEO, DV6000, ESCON, ESRM250G, ETR, FASTETHERNET, FDDI, FC12, FC25, FC50, FC100, FC200, FICONEXPRESS, GIGE, GLINK, HDTV29, HDTV30, ISC, ISC3, OC1, OC3, OC12, OC48, SRM150G, SRM250G, STM1, STM4, STM16	• Backplane Loss Of Activity • Backplane Invalid Signal • Terminal Loopback
	Optical Channel	• ASYNC150M, ASYNC565M, CLO, D1VIDEO, DV6000, ESCON, ESRM250G, ETR, FASTETHERNET, FDDI, FC12, FC25, FC50, FC100, FC200, FICONEXPRESS, GIGE, GLINK, HDTV29, HDTV30, ISC, ISC3, OC1, OC3, OC12, OC48, SRM150G, SRM250G, STM1, STM4, STM16	• APD Overload • High Optical Power • High Optical Power Warning • Loss Of Signal • Loss Of Signal Warning • Remote Auto Laser Shutdown • Remote Fault Notification

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OCLD	Optical Transmission Section	• ASYNC150M, ASYNC565M, CLO, D1VIDEO, DV6000, ESCON, ESRM250G, ETR, FASTETHERNET, FDDI, FC12, FC25, FC50, FC100, FC200, FICONEXPRESS, GIGE, GLINK, HDTV29, HDTV30, ISC, ISC3, OC1, OC3, OC12, OC48, SRM150G, SRM250G, STM1, STM4, STM16	• Fiber Mismatch
	Physical Coding Sublayer	• FC100, FC200, FICONEXPRESS, GIGE, ISC, ISC3	• Loss Of Sync
	Point to Point Protocol	• AM_GCC1 ASYNC150M, ASYNC565M, CLO, D1VIDEO, DV6000, ESCON, ETR, FASTETHERNET, FDDI, FC12, FC25, FC50, GIGE, GLINK, HDTV29, HDTV30, ISC, ISC3, SRM150G, SRM250G	• Overhead Link Failure
	Line/Multiplex Section	• OC1, OC3, OC12, OC48, STM1, STM4, STM16	• Alarm Indication Signal • Remote Defect Indication
	Section/Regenerator Section	• ESRM250G, OC1, OC3, OC12, OC48, STM1, STM4, STM16	• Loss Of Frame
OCM	Digital Signal Rate		• Backplane Loss of Activity

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OFA	Optical Multiplex Section		• Band Alarm Indication Alarm
	Optical Transmission Section		• FacilityOOS-Optical Signal Failure • High Optical Power • High Optical Power Warning • Loss of Signal • Low Optical Power • Low Optical Power Warning • Optical Signal Failure Rx • Optical Signal Failure Tx • Power Out of Range High/Low • Target Power Not Attainable High/Low • Unexpected Input Power Change
OMX	Optical Multiplex Section		• Band Input Failure • Band Alarm Indication Signal
	Optical Transmission Section		• Optical Signal Failure Rx • Optical Signal Failure Tx
OSC	Digital Signal Rate	• OSC3	• Facility Loopback (OSC) • OSC Invalid Signal • Remote Invalid Signal
	Optical Channel	• OSC3	• OSC Loss Of Signal • Remote Loss Of Signal
	Optical Transmission Section	• OSC3	• East/West Fiber Mismatch • Shelf Input Failure • Site Input Failure
	Physical Coding Sublayer	• FX100	• Facility Loopback (wayside) • Invalid Data • Loss of Link • UnequippedRemotePort • Wayside AIS

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OSC	Point to Point Protocol	• OSC3	• East/West Overhead Link Failure • East/West Remote Overhead Link Failure
	Section/Regenerator Section	• OSC3	• OSC LOF • Remote OSC LOF
OTR	Analog Modulation General Communications Channel	• AM_GCC1 (OTR 2.5Gbit/s) DV6000, FC100, FC200, FICON, FICONEXPRESS,GIGE, HDTV29, HDTV30, ISC3, OC3, OC12, OC48, STM4, STM16	• Overhead Sync Failure
	Digital Signal Rate	• (OTR 10Gbit/s) 10GLAN	• Facility Loopback (client)
		• (OTR 10Gbit/s) 10GClearChannel, ETHERNET10G, OC192, STM64	• Facility Loopback (client) • Loss Of Lock
		• (OTR 2.5Gbit/s) DV6000, FC100, FC200, FICON, FICONEXPRESS,GIGE, HDTV29, HDTV30, ISC3, OC3, OC12, OC48, STM4, STM16	• Facility Loopback (client) • Loss Of Lock • Facility Loopback (line) • Invalid Signal • Protection Mate Circuit Pack Not Available

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OTR	Digital Signal Rate	• AM_GCC1 (OTR 2.5Gbit/s) DV6000, FC100, FC200, FICON, FICONEXPRESS,GIGE, HDTV29, HDTV30, ISC3, OC3, OC12, OC48, STM4, STM16	• Far End Circuit Pack Mismatch • Surrogate Alarm Indication Signal
		• OTM2 (OTR 10Gbit/s) 10GClearChannel	• Facility Loopback (line) • Protection Mate Circuit Pack Not Available
	Line/Multiplex Section	• (OTR 2.5Gbit/s) OC3, OC12, OC48, STM4, STM16	• Alarm Indication Signal • Remote Defect Indication
		• (OTR 10Gbit/s) ETHERNET10G, OC192, STM64	• Alarm Indication Signal • Remote Defect Indication • Tx Alarm Indication Signal
	Optical Channel	• (OTR 2.5Gbit/s) DV6000, FC100, FC200, FICON, FICONEXPRESS,GIGE, HDTV29, HDTV30, ISC3, OC3, OC12, OC48, STM4, STM16	• APD Overload • High Optical Power • High Optical Power warning • Loss Of Signal • Loss Of Signal warning • Remote Auto Laser Shutdown • Remote Fault Notification
		• OTM2 (OTR 10Gbit/s) 10GClearChannel,10GLAN, ETHERNET10G, OC192, STM64	• APD Overload • High Optical Power • High Optical Power warning • Loss Of Signal • Low Optical Power warning • Remote Fault Notification • Remote Laser Shutdown

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OTR	Optical Channel Transport Unit	• OTM2 (OTR 10Gbit/s) 10GClearChannel,10G LAN, ETHERNET10G, OC192, STM64	• Backward Defect Indication • Bit Error Rate Degrade • Wrapper Alarm Indication Signal • Wrapper Loss Of Frame
	Optical Signal	• (OTR 2.5Gbit/s) DV6000, FC100, FC200, FICON, FICONEXPRESS,GIGE, HDTV29, HDTV30, ISC3, OC3, OC12, OC48, STM4, STM16	• Loss Of Signal • Loss Of Signal Warning • High Optical Power Warning • Signal degrade
		• (OTR 10Gbit/s) 10GClearChannel,10G LAN, ETHERNET10G, OC192, STM64	• Loss Of Signal • High Optical Power
	Optical Transmission Section	• (OTR 2.5Gbit/s) DV6000, FC100, FC200, FICON, FICONEXPRESS,GIGE, HDTV29, HDTV30, ISC3, OC3, OC12, OC48, STM4, STM16	• Fiber Mismatch
		• OTM2 (OTR 10Gbit/s) 10GClearChannel,10G LAN, ETHERNET10G, OC192, STM64	• Fiber Mismatch

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
OTR	Physical Coding Sublayer	• (OTR 2.5Gbit/s) FC100, FC200, FICON, FICONEXPRESS,GIGE, ISC3	• Loss Of Sync
		• (OTR 10Gbit/s) 10GLAN	• Local Fault • Loss Of Sync • High BER • Remote Fault
			• Facility Loopback (line) • Tx High BER • Tx Local Fault • Tx Loss Of Sync • Tx Remote Fault
	Point to Point Protocol	• AM_GCC1 (OTR 2.5Gbit/s) DV6000, FC100, FC200, FICON, FICONEXPRESS,GIGE, HDTV29, HDTV30, ISC3, OC3, OC12, OC48, STM4, STM16	• Overhead Link Failure
		• OTM2 (OTR 10Gbit/s) 10GClearChannel	• Overhead Link Failure
	Section/Regenerator Section	• (OTR 2.5Gbit/s) OC3, OC12, OC48, STM4, STM16	• Loss Of Frame
		• (OTR 10Gbit/s) ETHERNET10G, OC192, STM64	• Rx Loss Of Frame • Tx Loss Of Frame

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
SRM	Optical Signal	• (OCI SRM ESCON) ESCON • (OCI SRM SONET/SDH LTE) OC3, OC12, STM1, STM4 • (OCI SRM GbE/FC) FC100, FICON, GIGE	• Loss Of Signal
		• (OCI SRM SONET/SDH) OC12, STM4 • (OCI SRM) ASYNC150M, D1VIDEO, DV6000, ESCON, FASTETHERNET,FC12, FC25, FDDI, GLINK, OC1, OC3, STM1	• High Optical Power • Loss Of Signal
	Digital Signal Rate	• (OCI SRM) ASYNC150M, D1VIDEO, DV6000, ESCON, FASTETHERNET,FC12, FC25, FDDI, GLINK, OC1, OC3, STM1 • (OCI SRM SONET/SDH) OC12, STM4 • (OCI SRM GbE/FC) FC100, FICON, GIGE • (OCI SRM SONET/SDH LTE) OC3, OC12, STM1, STM4	• Facility Loopback • Invalid Signal

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
SRM	Digital Signal Rate	• (OCI SRM ESCON) ESCON	• Facility Loopback • Loss Of Lock
	Digital Signal Rate (Aggregate)	• OC48 (OCI SRM SONET/SDH LTE) OC3, OC12, STM1, STM4	• Backplane Invalid Signal • Backplane Loss Of Activity
		• OC48/STM16 (OCI SRM GbE/FC) FC100, FICON, GIGE	• Backplane Invalid Signal • Backplane Loss Of Activity • Loss of Timing Reference
		• SRM250G (OCI SRM SONET/SDH) OC12, STM4	• Backplane Invalid Signal • Backplane Loss Of Activity • Terminal Loopback
		• SRM125G (OCI SRM) ASYNC150M, D1VIDEO, DV6000, ESCON, FASTETHERNET,FC12, FC25, FDDI, GLINK, OC1, OC3, STM1	• Invalid Signal • Loss of Activity • Loss Of Frame • Terminal Loopback
		• ESRM250G (OCI SRM ESCON) ESCON	• Backplane Invalid Signal • Backplane Loss Of Activity • Loss Of Frame

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
SRM	Digital Signal Rate (Channel)	• (OCI SRM ESCON) ESCON	• Port AIS • Port Failed • Port Terminal Loopback • SRM Port Mapping Fault • Unequipped or OOS remote SRM Port)
		• (OCI SRM) ASYNC150M, D1VIDEO, DV6000, ESCON, FASTETHERNET,FC12, FC25, FDDI, GLINK, OC1, OC3, STM1	• Port AIS • Port Failed • Port Mapping Fault • Unequipped or OOS remote SRM Port)
		• (OCI SRM SONET/SDH) OC12, STM4	• Port AIS • Port Failed • Port Mapping Fault • Tx Loss Of Frame • Unequipped or OOS remote SRM Port)
		• (OCI SRM SONET/SDH LTE) OC3, OC12, STM1, STM4	• Port Mapping Fault • Port Terminal Loopback
	Generic Framing Procedure	• (OCI SRM GbE/FC) FC100, FICON	• Client Signal Mismatch • Far End Client Signal Failed • Insufficient Link Capacity • Loss Of Frame Delineation • Terminal Loopback
		• (OCI SRM GbE/FC) GIGE	• Client Signal Mismatch • Far End Client Signal Failed • Loss Of Frame Delineation • Remote Client Signal Failed • Remote Defect Indication • Terminal Loopback

Table 7-9 (continued)
System Manager field description and values for Layer and Signal

Card	Layer	Signal	
SRM	Line/Multiplex Section	• (OCI SRM SONET/SDH LTE) OC3, OC12, STM1, STM4	• Alarm Indication Signal • Signal Degrade • Signal Failed • Remote Defect Indication
	Path/Administrative Unit	• STS3, STS12, VC1, VC4 (OCI SRM SONET/SDH LTE) OC3, OC12, STM1, STM4	• Loss Of Pointer • Path Alarm Indication Signal
	Physical Coding Sublayer	• (OCI SRM GbE/FC) FC100, FICON, GIGE	• Loss Of Sync • LAN Link Down
		• (OCI SRM ESCON) ESCON	• Loss Of Frame
	Section/Regenerator Section	• (OCI SRM SONET/SDH LTE) OC3, OC12, STM1, STM4	• Loss Of Frame
		• (OCI SRM SONET/SDH) OC12, STM4	• Loss Of Frame • Tx Loss Of Frame

System Manager band and channel designations

System Manager displays band and channels for all circuit packs, regardless of system type (DWDM 100 GHz, DWDM 200 GHz, CWDM and ITU CWDM). Because CWDM systems do not use channels, and ITU CWDM systems do not use bands or channels, you must be aware of the mapping between the System Manager band and channel designations and the actual (CWDM) bands and (ITU CWDM) wavelengths. Use Table 7-10 to 7-13 to find the correct System Manager band and channel mappings.

The Optical Metro 5100/5200 groups the 32 DWDM 200 GHz wavelengths within the bands into the **conventional band (C-band)** spectrum, which covers band 1 to band 4, and the **long band (L-band)** spectrum, which covers band 5 to band 8. The 36 DWDM 100 GHz wavelengths within the bands/groups are grouped into the **conventional band (C-band)** spectrum, which covers band 1/group 1 to band 9/group 9.

Table 7-10 lists the 200 GHz center wavelengths of each band and channel in an Optical Metro 5100/5200 DWDM system.

Table 7-10
200 GHz center wavelengths of each DWDM band and channel

	DWDM band	Center wavelengths (channels) (nm)			
		Channel 1	**Channel 2**	**Channel 3**	**Channel 4**
C-band	1	1528.77	1533.47	1530.33	1531.90
	2	1538.19	1542.94	1539.77	1541.35
	3	1547.72	1552.52	1549.32	1550.92
	4	1557.36	1562.23	1558.98	1560.61
L-band	5	1570.42	1575.37	1572.06	1573.71
	6	1580.35	1585.36	1582.02	1583.69
	7	1590.41	1595.49	1592.10	1593.80
	8	1600.60	1605.73	1602.31	1604.02

Table 7-11 lists the 100 GHz center wavelengths of each band and channel in an Optical Metro 5100/5200 DWDM system.

Table 7-11
100 GHz center wavelengths of each DWDM band and channel

	DWDM band/group	Center wavelengths (channels) (nm)			
		Channel 1	**Channel 2**	**Channel 3**	**Channel 4**
C-band	1	1530.33	1531.12	1531.90	1532.68
	2	1534.25	1535.04	1535.82	1536.61
	3	1538.19	1538.98	1539.77	1540.56
	4	1542.14	1542.94	1543.73	1544.53
	5	1546.12	1546.92	1547.72	1548.52
	6	1550.12	1550.92	1551.72	1552.52
	7	1554.13	1554.94	1555.75	1556.56
	8	1558.17	1558.98	1559.79	1560.61
	9	1562.23	1563.05	1563.86	1564.68

Table 7-12 lists the System Manager bands and channels and the corresponding CWDM bands and wavelengths.

Table 7-12
System Manager band and channel mapping for CWDM

System Manager band and channel	CWDM band	Wavelength (nm)
B1C2	1	1533.47
B2C3	2	1539.77
B3C4	3	1550.92
B4C3	4	1558.98
B5C2	5	1575.37
B6C1	6	1580.35
B7C1	7	1590.41
B8C4	8	1604.02

Table 7-13 lists the System Manager bands and channels and the corresponding ITU CWDM wavelengths.

Table 7-13
System Manager band and channel for ITU CWDM

System Manager band and channel	ITU CWDM Wavelength (nm)
B5C1	1471.00
B6C1	1491.00
B1C1	1511.00
B2C1	1531.00
B3C1	1551.00
B4C1	1571.00
B7C1	1591.00
B8C1	1611.00

Note: Some Optical Metro 5100/5200 ITU CWDM hardware introduced before the ITU CWDM standard (G.695) was finalized has labels with a center wavelength that differs by 1 nm with respect to the finalized ITU CWDM standard (G.695). For example, for the 1471 nm wavelength, the label shows 1470 nm. However, there is no wavelength incompatibility since the passbands are the same. For example, the pre-finalized ITU CWDM standard 1470 nm channel specified a range of -5.5 to +7.5 nm, that is, a passband of 1464.5 to 1477.5 nm. The finalized ITU CWDM standard 1471 nm channel specifies a range of +/-6.5 nm, that is, the passband is still 1464.5 to 1477.5 nm. The only difference is the labeling.

Fault window

Use the Fault window to

- display a list of system alarms and events
- review the current state of the selected shelves
- access the system history

The System Manager records alarm, warning, and event state changes, and user provisioning requests in the Fault window.

Double-click on any line in the Active Alarms window or the Event Console window to access the Alarm Details or Event Details window.

Fault—Active Alarms window

System Manager automatically updates the Fault—Active Alarms window if the Auto Refresh box is selected. Deselect the Auto Refresh box at the top left of the window to disable automatic updates. The Active Alarms window displays the number of alarms listed at the top right of the window beside "Entries".

Table 7-14 describes the data fields in the Fault—Active Alarms window.

Note: Some of the fields may be absent or not applicable for some alarms.

Table 7-14
Fault—Active Alarms window

Data field	Description	Value
Time	This field indicates the time and date of the raised alarm in the time zone set in the System Manager computer.	The date and time, in the format YYYY/MM/DD HH:MM:SS.
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
Card	This field indicates the type of circuit pack that the alarm is raised against.	All supported active and passive circuit packs. See Table 7-6 for the possible values.
Slot	This field indicates the shelf or slot number of the circuit pack that the alarm is raised against.	See Table 7-7 for the possible values.
Port	This field displays which port of the circuit pack the alarm is raised against.	See Table 7-8 for the possible values.
Dir	This field displays which direction of the port the alarm is raised against.	• Tx • Rx

Table 7-14 (continued)
Fault—Active Alarms window

Data field	Description	Value
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters).
State	This field indicates the state of the alarm.	• Active • Intermittent
Severity	This field indicates the severity of the alarm.	• Critical • Major • Minor • Warning
SA	This field indicates whether the alarm is service affecting or non-service affecting.	• SA • NSA
Description	This field displays a description of the alarm or event.	Text string, such as Circuit Pack Missing

Fault—Active Alarms—Alarm Details window

When you right-click on a highlighted line and select Details, or double-click on a highlighted line in the Active Alarms window, the Alarm Details window appears. Table 7-15 describes the data fields.

Table 7-15
Fault—Active Alarms—Alarm Details window

Data field	Description	Value
Location		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters).
Card	This field indicates the type of circuit pack that the alarm is raised against.	All supported active and passive circuit packs. See Table 7-6 for the possible values.
Type	This field indicates the type or maximum speed of the circuit pack or component provisioned.	e.g., 2.5GB GEFC 850nm
Slot	This field indicates the shelf or slot number of the circuit pack that the alarm is raised against.	See Table 7-7 for the possible values.
Port	This field displays which port of the circuit pack the alarm is raised against.	See Table 7-8 for the possible values.
Direction	This field displays which direction of the port the alarm is raised against.	• Tx • Rx
Alarm Details		
Time	This field indicates the time and date of the raised alarm in the time zone set in the System Manager computer.	The date and time, in the format YYYY/MM/DD HH:MM:SS
Severity	This field indicates the severity of the alarm.	• Critical • Major • Minor • Warning
State	This field indicates the state of the alarm.	• Active • Clear • Intermittent

Table 7-15 (continued)
Fault—Active Alarms—Alarm Details window

Data field	Description	Value
Service Affecting	This field indicates whether the alarm is service affecting or non-service affecting.	• SA • NSA
Layer	This field indicates the alarmed layer	See Table 7-9 for the possible values.
Signal	This field indicates the alarmed signal	See Table 7-9 for the possible values.
Path & mapping button	This field displays the affected paths and is only applicable to summary path alarms raised by the Muxponder 10 Gbit/s GbE/FC VCAT circuit pack. This field is not displayed if the path information is not unavailable.	See Table 7-41 for possible values. ***Note:*** When a path fault is detected on a path associated with a client-side facility, a summary path alarm is generated against the client-side facility. If a fault is detected on a different path associated with the same client-side facility, a new summary alarm is not raised. However, when a user double-clicks on the summary alarm in the Active Alarms list, the software polls the circuit pack to determine the existing faulty paths and this information is displayed in the Path field of the Alarm Details window.
Description	This field displays a description of the alarm or event.	Text string, such as Circuit Pack Missing

Fault—Event Console window

The Event Console window shows all the events in the network in the current System Manager session. The network shelf selector does not affect the Event Console window. The Event Console window shows all current events for all shelves in the network.

Table 7-16 describes the data fields in the Fault—Event Console window. To clear recorded events, select the **Clear** button or select Clear Event Console from the Fault menu.

Table 7-16
Fault—Event Console window

Data field	Description	Value
Time	This field indicates the time and date of the raised trap in the time zone set in the System Manager computer.	The date and time, in the format YYYY/MM/DD HH:MM:SS
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
Class	This field indicates the class of the event.	Alarm Event User Request Security User Request Security Event
Card	This field indicates the type of circuit pack that the alarm is raised against.	All supported active and passive circuit packs. See Table 7-6 for the possible values.
Slot	This field indicates the shelf or slot number of the circuit pack that the alarm is raised against.	See Table 7-7 for the possible values.
Port	This field displays which port of the circuit pack the event is raised against.	See Table 7-8 for the possible values.
Dir	This field displays which direction of the port the alarm is raised against.	• Tx • Rx
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters).
Alarm State	This field indicates the state of the alarm.	• Active • Clear • Intermittent
Alarm Severity	This field indicates the severity of the alarm.	• Critical • Major • Minor • Warning
Description	This field displays a description of the alarm or event.	Text string, such as Circuit Pack Missing

Fault—Event History window

The Event History window shows history events from the shelves that you selected with the network shelf selector.

Table 7-17 describes the data fields in the Fault—Event History window. To refresh this window, select the **Refresh** button.

Table 7-17
Fault—Event History window

Data field	Description	Value
Time	This field indicates the time and date of the raised trap in the time zone set in the System Manager computer.	The date and time, in the format YYYY/MM/DD HH:MM:SS
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
Class	This field indicates the class of the event.	• Alarm • Event • User Request • Security Event • Security User Request
Card	This field indicates the type of circuit pack that the alarm is raised against.	All supported active and passive circuit packs. See Table 7-6 for the possible values.
Slot	This field indicates the shelf or slot number of the circuit pack that the alarm is raised against.	See Table 7-7 for the possible values.
Port	This field displays which port of the circuit pack the event is raised against.	See Table 7-8 for the possible values.
Dir	This field displays which direction of the port the alarm is raised against.	• Tx • Rx
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters).

Table 7-17 (continued)
Fault—Event History window

Data field	Description	Value
Alarm State	This field indicates the state of the alarm.	• Active • Clear • Intermittent
Alarm Severity	This field indicates the severity of the alarm.	• Critical • Major • Minor • Warning
Description	This field displays a description of the alarm or event.	Text string, such as Circuit Pack Missing

Fault—Event Console or Event History—Event Details window

When you right-click and select Details on a highlighted line or double-click on a highlighted line in the Event Console window or the Event History window, the Event Details window appears. Table 7-18 and Table 7-19 describe the data fields.

Table 7-18
Fault—Event Console or Event History—Event Details window

Data field	Description	Value
Location		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, OMX, Muxponder, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters).
Card	This field indicates the type of circuit pack that the alarm is raised against.	All supported active and passive circuit packs. See Table 7-6 for the possible values.
Type	This field indicates the type or maximum speed of the circuit pack or component provisioned.	e.g., 2.5GB GEFC 850nm
Slot	This field indicates the shelf or slot number of the circuit pack that the alarm is raised against.	See Table 7-7 for the possible values.
Port	This field displays which port of the circuit pack the event is raised against.	See Table 7-8 for the possible values.

Table 7-18 (continued)
Fault—Event Console or Event History—Event Details window

Data field	Description	Value
Direction	This field displays which direction of the port the alarm is raised against.	• Tx • Rx
Event Details		
Time	This field indicates the time and date of the raised alarm in the time zone set in the System Manager computer.	The date and time, in the format YYYY/MM/DD HH:MM:SS
Class	This field indicates the class of the event.	• Alarm • Event • User Request • Security Event • Security User Request
Severity	This field indicates the severity of the alarm.	• Critical • Major • Minor • Warning
State	This field indicates the state of the alarm.	• Active • Clear • Intermittent
Layer	This field indicates the alarmed layer	See Table 7-9 for the possible values.
Signal	This field indicates the alarmed signal	See Table 7-9 for the possible values.
Description	This field displays a description of the alarm or event.	Text string, such as Circuit Pack Missing
Show Circuit Pack Event...	This option is only enabled for the Muxponder circuit packs, when the Event History window is active. Clicking the button opens the Circuit Pack Event History window where you can view all history events for that specific circuit pack or component. This button provides the ability to tunnel deeper into the circuit pack to trace outstanding events against the circuit pack that may have contributed to the historical event. The events are actually stored and retrieved from the circuit pack.	See "Circuit Pack Event History" in Table 7-19

Table 7-19
Fault—Event History—Circuit Pack Event History window

Data field	Description	Value
Location		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
Slot	This field indicates the shelf or slot number of the circuit pack that the alarm is raised against.	See Table 7-7 for the possible values.
Circuit Pack Type	This field indicates the type of circuit pack that the alarm is raised against.	All supported active and passive circuit packs. See Table 7-6 for the possible values.
Circuit Pack Event		
Time	This field indicates the time and date of the raised alarm in the time zone set in the System Manager computer.	The date and time, in the format YYYY/MM/DD HH:MM:SS
Port	This field displays which port of the circuit pack the event is raised against.	See Table 7-8 for the possible values.
DIR	This field displays which direction of the port the alarm is raised against.	• Tx • Rx
Path	This field displays affected paths on the Muxponder 10 Gbit/s GbE/FC VCAT. It displays the client-side path that is correlated to line-side path.	The path number of the circuit pack event.
State	This field indicates the state of the alarm.	• Active • Clear • Intermittent
Description	This field displays a description of the alarm or event.	Text string, such as Circuit Pack Missing

Equipment window

Use the Equipment window to

- modify, add or delete equipment and facility information to the network
- view and sort inventory and facility information by shelf, slot, and other attributes
- configure telemetry inputs and outputs
- view telemetry information
- configure OCM equipment protection
- launch the Shelf Level Graphics application

• view performance monitoring information if applicable

Right-click and select Modify or double-click on any line in the Inventory or Facilities window to access the Optical Metro Inventory or Facilities window for the selected circuit pack. The Optical Metro Inventory or Facilities window provides detailed inventory or facilities information. If the selected line has no provisioned circuit pack, the Optical Metro Inventory - Add wizard window opens. This wizard-type window facilitates the provisioning of a new circuit pack.

Apart from circuit packs, which are equipped in the Optical Metro 5100/5200 shelves, the following optical components can also be inventoried by the System Manager:

• all OMX types

• all ECT types and PBE types

• OSC splitter/coupler

• 1310 splitter/coupler

• transponder protection tray

• discrete VOA

• EIU

• DSCM

These optical components can be inventoried provided they are directly connected to the shelf's OMX Interface cards located in the shelf's maintenance panel using data communication cables or are connected to an equipment inventory unit (EIU) which is connected to the maintenance panel.

Equipment—Inventory window

Table 7-20 describes the data fields in the Equipment—Inventory window. To refresh this window click the **Refresh** button. To launch the Shelf Level Graphics application, click the **Shelf Level Graphics** button on the window, or right-click on a row in the table and choose Shelf Level Graphics.

The OCM Protection window is also accessible from the Equipment—Inventory window if you right-click on an OCM and select Protection or click the **Protection** button on the window. The OCM Protection window allows you to switch the active and inactive OCM circuit packs.

Note: For circuit packs that occupy multiple slots, the Equipment—Inventory window will display the circuit pack as a single slot. For OFA/APBE, the circuit pack will be listed in the last slot number it occupies; for other circuit packs such as Muxponder or OTR 10G, the circuit pack will be displayed in the first slot number it occupies. If you

attempt to provision another circuit pack in one of the slots that appear as being empty, but is occupied, SMI will prevent the user from provisioning a new circuit pack.

Table 7-20
Equipment—Inventory window

Data field	Description	Value
Collapse	When this check box is selected, the information regarding EIU port and Muxponder SFP port is masked. Double-clicking on the EIU or Muxponder displays the EIU port and Muxponder SFP port information.	• selected (default) • not selected
Show Provisioned Only	When this check box is selected, only the provisioned slots are displayed.	• selected • not selected (default)
Shelf Level Graphics	Clicking the button opens the Optical Metro Shelf Level Graphics window where you can view a graphical representation of the highlighted shelf.	See "Optical Metro Shelf Level Graphics" in Table 7-22
Protection	This option is only enabled when an OCM circuit pack is highlighted. Clicking the button opens the Optical Metro OCM Protection window.	See "Optical Metro OCM Protection" in Table 7-25
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Slot	This field indicates the slot number of a circuit pack. ***Note:*** A bold slot number indicates that the circuit pack in the slot has database on it. Double-click on the line or right-click on the line and then select Modify, the Equipment–Inventory–Optical Metro Inventory dialog box appears. The dialog box displays the status of the database.	See Table 7-7 for the possible values.
Port	This field displays which port of the circuit pack the event is raised against.	See Table 7-8 for the possible values.
Prov	This field indicates the type of circuit pack or component that you provisioned.	• See Table 7-6 for the possible values. • blank
Prov Type	This field indicates the maximum speed of the circuit pack or component manually provisioned.	e.g., 2.5 GB - Transparent
Actual	This field indicates the type of circuit pack or component associated with the slot. ***Note:*** A bold component name indicates that the component has database on it.	• See Table 7-6 for the possible values. • blank

Table 7-20 (continued)
Equipment—Inventory window

Data field	Description	Value
Actual Type	This field indicates the type of circuit pack or component provisioned in the slot.	e.g., 2.5 GB - Transparent
Admin	This field indicates the user-assigned administrative state of the component.	• IS • OOS
Oper	This field indicates the operational state of the component.	• IS-NR: In-service normal • IS-ANR: In-service abnormal • OOS-MA: Out-of-service maintenance • OOS-AU: Out-of-service autonomous • OOS-AU-MA: Out-of-service autonomous, maintenance • OOS-MAANR: Out-of-service maintenance abnormal
Sec	This field indicates the secondary state of the component.	• IS • OOS • UNEQUIPPED • SUPPORTING-ENTITY-FAILED • SUPPORTING-ENTITY-OUTAGE • FAILED • MISMATCH • Nil
Chan	This field indicates the band and channel that you provisioned. *Note:* For the correct band and wavelength mappings for CWDM and ITU CWDM systems, see "System Manager band and channel designations" on page 7-35.	e.g., B1C3
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters).
PEC	This field indicates the product engineering code for the component.	e.g., NT0H01DD

Table 7-20 (continued)
Equipment—Inventory window

Data field	Description	Value
Revision	This field indicates the hardware version of a component. **Note:** This field is only supported only Muxponder SFP.	Character string, e.g., 7 or DA.
CLEI	This field indicates the Common Language Equipment Identification.	Character string, e.g., LG8C20A.
Serial #	This field indicates the serial number of the component.	Character string, e.g, SN123454.
Description	This field is optional. It can display a description of the equipment. It is available for passive slots only.	Text string

Equipment—Inventory—Optical Metro Shelf Level Graphics window

Use the Optical Metro Shelf Level Graphics window to view a graphical representation of a shelf through the System Manager. The shelf level graphics window displays provisioning information, physical circuit pack information, shelf details, and alarm information on a per slot basis.

Highlight a row for the shelf to view. Select the Shelf Level Graphics button on the Equipment Inventory window to view the Shelf Level Graphics window.

Table 7-21 describes the command and menu options for the Shelf Level Graphics window.

Table 7-21
Optical Metro Shelf Level Graphics command and menu options

Menu	Menu option	Description	Value or range
File	Exit	This option exits the Shelf Level Graphics window of System Manager.	—
View	Show Active Alarms	When you select this menu option, you are returned to the Active Alarms window (Fault tab) of the main System Manager window.	—
Query	Refresh	This option updates the Shelf Graphics Window data.	—

Table 7-22 describes the data fields in the Shelf Level Graphics window. To refresh this window click the **Refresh** button. The time of the last refresh is displayed in the Last refresh field.

Table 7-22
Optical Metro Shelf Level Graphics window

Data field	Description	Value
Alarms	When this check box is unselected, the alarms and warning are masked.	• selected (default) • not selected
Shelf		
Network Name	This field indicates the name of the network. Nortel Networks recommends that all shelves in a ring have the same network name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site Name	This field indicates the user-assigned name of the site. Nortel Networks recommends that all shelves at a site have the same site name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field indicates the user-assigned name of the shelf. Nortel Networks recommends that each shelf in a ring have a different descriptive shelf name, such as Surveillance Site Band 3.	A character string that can be any combination of letters and numbers, up to 31 characters. *Note:* Do not use brackets in the shelf name.
Shelf Description	This field displays a description of the shelf. Nortel Networks recommends that each shelf in a ring have a different shelf description.	A character string that can be any combination of letters and numbers, up to 64 characters.
Site Id	This field indicates the user-assigned number of the site and is used to group shelves logically in the System Manager.	A number from 1 to 64. Assign shelves at the seamed site to site number 1. Assign the other sites in the ring to the next available number.
Shelf IP	This field indicates the IP address of the shelf. Each shelf in a network must have a unique IP address.	IP address mask, e.g., 172.16.283.57
Shelf Id	This field indicates the user-assigned unique ID of the shelf.	A number from 1 to 64. Use Shelf Id 1 to 8 for shelves at the seamed site. Use Shelf ID 9 to 64 for other shelves.

Table 7-22 (continued)
Optical Metro Shelf Level Graphics window

Data field	Description	Value
Sw. Version	This field indicates the current version of the software.	• Release *n.n* • Unknown
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters).
Role	This field indicates the role of the shelf in the network. • DCN gateway (G), also referred to as the GNE, is an Optical Metro 5100/5200 shelf that is designated as a communications gateway between the Optical Metro 5100/5200 network and the customer's DCN. • Host shelf (H) is the shelf on which the SMI session has been started. The SMI is commonly started on a GNE shelf, so it is common to see the G and H roles together. • Primary shelf (P) is the shelf in an Optical Metro 5100/5200 network which collects Optical Metro 5100/5200 network information (referred to as the shelf list) from and distributes the information to the other shelves. This shelf is often configured to be the same as a GNE shelf, but this is not a requirement. • Bridge shelf (B) is an Optical Metro 5100/5200 shelf where all the existing channel assignments in the band are pass-through connections.	• Bridge (B) • Gateway (G) • Host (H) • Primary (P) • Blank

Table 7-22 (continued)
Optical Metro Shelf Level Graphics window

Data field	Description	Value
Circuit Pack selection		
Slot	This field indicates the slot number of a circuit pack.	• For Optical Metro 5200: a number from 1 to 20. • For Optical Metro 5100: a number from 1 to 6. • Optical Metro 5100 and Optical Metro 5200 shelves: EIP1, EIP2, EIP3, and EIP4 for the equipment inventory unit (EIU) and for passive components connected to the OMX interface cards on the maintenance panel. • Both the Optical Metro 5200 OFA and OADM shelves: B1-West, B2-West, B3-West, B4-West, B5-West, B6-West, B7-West, B8-West, B1-East, B2-East, B3-East, B4-East, B5-East, B6-East, B7-East, B8-East, B9-West, and B9-East. • Shelf designates alarms related to upgrade and power.
Circuit Pack Type	This field indicates the type of circuit pack that you provisioned for a slot in the shelf. *Note:* OMXs, ECTs, TPT, EIU, DSCM, OSC-SPLTR, W-SPLT, and VOAs are external components and not circuit packs, but for inventory purposes these components appear in the Circuit Pack Type field.	All supported active and passive circuit packs. See Table 7-6 for the possible values.
Primary State	This field indicates the primary operational state of the component	• IS • OOS
Operation State	This field indicates the operational state of the component.	• IS-NR: In-service normal • IS-ANR: In-service abnormal • OOS-MA: Out-of-service maintenance • OOS-AU: Out-of-service autonomous • OOS-AU-MA: Out-of-service autonomous, maintenance • OOS-MAANR: Out-of-service maintenance abnormal

Table 7-22 (continued)
Optical Metro Shelf Level Graphics window

Data field	Description	Value
Secondary State	This field indicates the secondary state of the component.	• IS • OOS • UNEQUIPPED • SUPPORTING-ENTITY-FAILED • SUPPORTING-ENTITY-OUTAGE • FAILED • MISMATCH • Nil
Channel	This field indicates the band and channel that you provisioned.	• e.g., B1C3
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters). If the OSID is unassigned, the field is blank.
PEC	This field indicates the product engineering code for the component.	e.g., NT0H01DD
Version	This field indicates the hardware version of a component. **Note:** It is only available for Muxponder SFP.	Character string, e.g., 7 or DA.
CLEI	This field indicates the Common Language Equipment Identification.	Character string, e.g., LG8C20A.
Serial #	This field indicates the serial number of the component.	Character string, e.g, SN123454.
WDM Type	This field indicates whether the circuit pack is CWDM, DWDM, or ITU CWDM. *Note:* Only some of the DWDM Muxponder wavelengths correspond to the CWDM and ITU CWDM. For more information, see the Ordering chapter of *Network Planning and Link Engineering*, 323-1701-110.	• OMX: CWDM, DWDM 200 GHz, ITU CWDM • OCLD/OTR: CWDM, DWDM 100 GHz, DWDM 200 GHz, ITU CWDM • MOTR: DWDM 100 GHz, DWDM 200 GHz
Band Type	For OFA and APBE equipment, this field indicates the band type of the circuit pack.	• C-Band (1-4) or C-Band • L-Band (5-8) or L-Band

If you right-click on a provisioned slot, you have the option to display the equipment details information or actual alarms raised against the highlighted slot. Table 7-23 describes the data fields in **Alarms Filtering** window. Table 7-24 describes the data fields in **Equipment Details** window.

Table 7-23
Optical Metro Shelf Level Graphics - Alarm Filtering window

Data field	Description	Value
Time	This field indicates the time and date of the raised trap in the time zone set in the System Manager computer.	The date and time, in the format YYYY/MM/DD HH:MM:SS
Card	This field indicates the type of circuit pack that the alarm is raised against.	All supported active and passive circuit packs. See Table 7-6 for the possible values.
Slot	This field indicates the shelf or slot number of the circuit pack that the alarm is raised against.	See Table 7-7 for the possible values.
Port	This field displays which port of the circuit pack the event is raised against.	See Table 7-8 for the possible values.
Dir	This field displays which direction of the port the alarm is raised against.	• Tx • Rx
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters).
State	This field indicates the state of the alarm, event or warning.	• Active • Clear • Intermittent
Severity	This field indicates the severity of the alarm, event or warning.	• Critical • Major • Minor • Warning
SA	This field indicates whether the alarm is service affecting or non-service affecting.	• SA • NSA
Description	This field displays a description of the alarm or event.	Text string, such as Circuit Pack Missing

Table 7-24
Optical Metro Shelf Level Graphics - Equipment Details window

Data field	Description	Value
Slot	This field indicates the slot number of a circuit pack. ***Note:*** A bold slot number indicates that the circuit pack in the slot has database on it. Double-click on the line or right-click on the line and then select Modify, the Equipment–Inventory–Optical Metro Inventory dialog box appears. The dialog box displays the status of the database.	See Table 7-7 for the possible values.
Port	This field displays which port of the circuit pack the event is raised against.	See Table 7-8 for the possible values.
Prov	This field indicates the type of circuit pack or component that you provisioned.	• See Table 7-6 for the possible values. • blank
Actual	This field indicates the type of circuit pack or component associated with the slot. ***Note:*** A bold component name indicates that the component has database on it.	• See Table 7-6 for the possible values. • blank
Admin	This field indicates the user-assigned administrative state of the component.	• IS • OOS
Oper	This field indicates the operational state of the component.	• IS-NR: In-service normal • IS-ANR: In-service abnormal • OOS-MA: Out-of-service maintenance • OOS-AU: Out-of-service autonomous • OOS-AU-MA: Out-of-service autonomous, maintenance • OOS-MAANR: Out-of-service maintenance abnormal
Sec	This field indicates the secondary state of the component.	• IS • OOS • UNEQUIPPED • SUPPORTING-ENTITY-FAILED • SUPPORTING-ENTITY-OUTAGE • FAILED • MISMATCH • Nil

Table 7-24 (continued)
Optical Metro Shelf Level Graphics - Equipment Details window

Data field	Description	Value
Wavelength	This field indicates the wavelength of the band and channel of the circuit pack that the user provisioned. ***Note 1:*** For OTRs, there are two fields: Line Wavelength and Client Wavelength. For Muxponders, this field becomes Line-Wavelength ***Note 2:*** For MOTRSFP, select Unspecified when pre-provisioning a port if the wavelength is not known in advance. ***Note 3:*** Upon the insertion of an SFP, the wavelength value is updated to correspond with the given wavelength of that SFP.	e.g., 1570.42 nm OCI, SRM, GFSRM:850 nm, 1310 nm MOTRSFP: Unspecified (See Note 2)
PEC	This field indicates the product engineering code for the component.	e.g., NT0H01DD
Revision	This field indicates the hardware version of a component. Currently only used for MOTRSFPs.	Character string, e.g., 7 or DA.
CLEI	This field indicates the Common Language Equipment Identification.	Character string, e.g., LG8C20A.
Serial #	This field indicates the serial number of the component.	Character string, e.g, SN123454.

Equipment—Inventory—Optical Metro OCM Protection dialog box

When you right-click and select Protection on a highlighted line in the Inventory window or select Protection from the Inventory tab, the Optical Metro OCM Protection dialog box appears listing all channel assignments for the selected shelf. This dialog box is accessible if the selected OCM supports channel assignments, and allows the user to toggle the active/standby OCM operation state. Table 7-25 describes the data fields.

Table 7-25
Equipment—Inventory—Optical Metro OCM Protection dialog box

Data field	Description	Value
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Slot	This field indicates the slot number of a circuit pack.	See Table 7-7 for the possible values.
Port	This field displays the port on the circuit pack that is in-service.	See Table 7-8 for the possible values.
Name	This field indicates the name of the facility.	e.g., OCI Facility 5.
Channel Name	This field indicates the name of the channel.	• Character string • notConnected • nil
OCM Selection	This field indicates the active OCM.	• OCM 9 • OCM 10
Switch Request		
Protection switch options	A series of radio buttons for the protection switching options available.	• Release • Manual • Force
To	This field indicates which OCM the switch is applied to.	• OCM 9 • OCM 10

Equipment—Inventory—Optical Metro Inventory dialog box

When you right-click and select Modify on a highlighted line or double-click on a highlighted line in the Inventory window, the Optical Metro Inventory dialog box appears. Table 7-26 describes the data fields.

Note: The data fields are listed in alphabetical or numerical order, and not necessarily in the order in which they appear on the dialog box.

Table 7-26
Equipment—Inventory—Optical Metro Inventory dialog box

Data field	Description	Value
Location		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Slot	This field indicates the slot number of a circuit pack.	See Table 7-7 for the possible values.
Port	This field displays the port on the circuit pack that is in-service.	See Table 7-8 for the possible values.
Provisioning Data		
Amp Type	This field indicates the type of OFA circuit packs.	• Standard • High Input Power • Variable Gain
Band	This field indicates the band of the circuit pack or OMX.	A number from 1 to 8 for most circuit packs. For the quad band coarse OMX the options are C-band or L-band. For the ITU CWDM OMX, the options are ITU4 or ITU8.
Band Type	For OFA, APBE and DSCM equipment, this field indicates the band type of the circuit pack or component. This field becomes Type for the DSCM equipment.	• OFA: C-Band (1-4) L-Band (5-8) • APBE or DSCM: C-Band or L-Band
Circuit Pack Type	This field indicates the type of circuit pack or component that you provisioned for a slot in the shelf.	• See Table 7-6 for the possible values. • blank
Channel	This field indicates the number of the channel. *Note:* For the correct band and wavelength mappings for CWDM and ITU CWDM systems, see "System Manager band and channel designations" on page 7-35.	A number from 1 to 4 for circuit packs.
Direction	This field indicates the signal direction.	• OFA and APBE: Eastbound, Westbound, Nil • OMX: east, west

Table 7-26 (continued)
Equipment—Inventory—Optical Metro Inventory dialog box

Data field	Description	Value
Distance	For the DSCM, this field indicates the distance in km.	• e.g., 30km
DSCM Type	For the DSCM, this field indicates the DSCM type which is determined by the fiber type.	• 1
Filter Type	For ECTs on OFA shelves.	splitter, conventional ECT, long ECT, dual ECT, conventional PBE, long PBE, and dual PBE
Flex Type	For OCLD and OTR 2.5 Gbit/s.	• Standard • Universal
Location	For OFA and APBE equipment, this field indicates the amplifier location in the site topology.	• Pre • Pre2 • Post • Thru • Thru2 • Nil
Max Bit Rate	This field indicates the maximum speed of the circuit pack.	e.g., 2.5 GB - Transparent
Min Bit Rate	This field indicates the minimum speed of the circuit pack: GFSRM, OCI, OCLD, OCM, OTR, Muxponder, SFP, SRM.	e.g., 16 Mbit/s
# Of Channels	This field indicates the number of channels.	1, 4, 8, or 16.
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters). If the OSID is unassigned, the field is blank.
Overhead State	For OCLDs, OTRs, and Muxponders, this field indicates the overhead state of the circuit pack.	• Disable • Enable

Table 7-26 (continued)
Equipment—Inventory—Optical Metro Inventory dialog box

Data field	Description	Value
Wavelength	This field indicates the wavelength of the band and channel of the circuit pack that the user provisioned. ***Note 1:*** For OTRs, there are two fields: Line Wavelength and Client Wavelength. For Muxponders, this field becomes Line-Wavelength ***Note 2:*** For MOTRSFP, select Unspecified when pre-provisioning a port if the wavelength is not known in advance. ***Note 3:*** Upon the insertion of an SFP, the wavelength value is updated to correspond with the given wavelength of that SFP.	e.g., 1570.42 nm OCI, SRM, GFSRM:850 nm, 1310 nm MOTRSFP: Unspecified (See Note 2)
Exp. Far End Wavelength	For OCLDs, OTRs, and Muxponders, this field indicates whether the wavelength at the far-end OCLD, OTR, or Muxponder must be the same as the near-end or can be any wavelength.	• Same • Any
Description	This field indicates the user-assigned text of the passive component.	Character string
WDM Type	This field indicates whether the circuit pack is CWDM, DWDM, or ITU CWDM. ***Note:*** Only some of the DWDM Muxponder wavelengths correspond to the CWDM and ITU CWDM. For more information, see the Ordering chapter of *Network Planning and Link Engineering*, 323-1701-110.	• OMX: CWDM, DWDM 200 GHz, ITU CWDM • OCLD/OTR: CWDM, DWDM 100 GHz, DWDM 200 GHz, ITU CWDM • MOTR: DWDM 100 GHz, DWDM 200 GHz
IFS Enabled	For the OSC, this check box indicates whether intrasite fault sectionalization is enabled.	selected, or not selected
West Neighbor	For the OSC, this field indicates whether the circuit pack is connected to a west neighbor.	• Connected • Not Connected
East Neighbor	For the OSC, this field indicates whether the circuit pack is connected to a east neighbor.	• Connected • Not Connected
Fibering Topology	For the OSC, this field indicates the fibering topology for the site.	• Standard • Single Shelf OADM • Stacked • Nil

Table 7-26 (continued)
Equipment—Inventory—Optical Metro Inventory dialog box

Data field	Description	Value
Fibering Configuration	For the OSC, this field indicates the fibering configuration for the site.	• Parallel • Serial • Nil
Associated Eqpt		
Options	For APBE circuit packs, this field indicates the type of OFA or DSCM, the APBE is associated with.	• None • OFA • DSCM

Type	For APBE circuit packs, this field indicates the type of equipment the APBE is associated with. This field becomes AMP Type for the OFA circuit pack.	• OFA: Standard
		  High Input Power
		  Variable Gain
		• DSCM: 1

State		
Administrative	This field indicates the user-assigned administrative state of the circuit pack.	• IS • OOS
Database	This field indicates the status of the database. The database manages and controls the configuration data, provisioning data, and communication data.	Optical Metro 5100: • Active (for any circuit pack that has active database on it) • Standby (for any circuit pack that has standby database on it) • Not Present (for any circuit pack that has no database on it) Optical Metro 5200: • Active (only for the OCM that has active database on it) • Standby (only for the OCM that has standby database on it) • Not Present (for any non-OCM circuit pack)

Table 7-26 (continued)
Equipment—Inventory—Optical Metro Inventory dialog box

Data field	Description	Value
Operational	This field indicates the operational state of the circuit pack.	• IS-NR: In-service normal • IS-ANR: In-service abnormal • OOS-MA: Out-of-service maintenance • OOS-AU: Out-of-service autonomous • OOS-AU-MA: Out-of-service autonomous, maintenance • OOS-MAANR: Out-of-service maintenance abnormal
Secondary	This field indicates the secondary state of the circuit pack.	• IS • OOS • UNEQUIPPED • SUPPORTING-ENTITY-OUTAGE • SUPPORTING-ENTITY-FAILED • MISMATCHED • FAILED • NIL
Diverse Routing	For OCI SRM GbE/FC, OCI SRM GbE, or OCI SRM GbE/FC Enhanced circuit pack, this field indicates whether diverse routing is enabled.	• Enabled • Disabled
Manufacturing Data		
Amp Type	For OFA circuit packs, this field indicates the type of circuit pack.	• Standard • High Input Power • Variable Gain
Band	This field indicates the band of the circuit pack, OMX or DSCM. ***Note 1:*** The name of the field becomes APBE Band for APBE and OFA Band for OFA. ***Note 2:*** For the correct band and wavelength mappings for CWDM and ITU CWDM systems, see "System Manager band and channel designations" on page 7-35.	• A number from 1 to 9. • For the ITU CWDM OMX, the options are ITU4 or ITU8. • For DSCM and APBE, the options are C-Band or L-Band • For OFA, the options are: C-Band (1-4) or L-Band (5-8)

Table 7-26 (continued)
Equipment—Inventory—Optical Metro Inventory dialog box

Data field	Description	Value
Channel	This field indicates the number of the channel for circuit packs. The name of the field becomes # Of Channels for OMX. ***Note:*** For the correct band and wavelength mappings for CWDM and ITU CWDM systems, see "System Manager band and channel designations" on page 7-35.	• Circuit packs: a number from 1 to 4. • OMX: 1, 4, 8, or 16
Circuit Pack Type	This field indicates the type of pack installed in the slot.	• See Table 7-6 for the possible values. • blank
CLEI	This field indicates the Common Language Equipment Identification.	Character string, e.g., LG8C20A.
Filter Type	For ECTs on OFA shelves.	splitter, conventional ECT, long ECT, dual ECT, conventional PBE, long PBE, and dual PBE.
Flex Type	For OCLD and OTR 2.5 Gbit/s.	• Standard • Universal
Max Bit Rate	This field indicates the maximum speed of the circuit pack.	e.g., 10 Gbit/s
Min Bit Rate	This field indicates the minimum speed of the circuit pack: GFSRM, OCI, OCLD, OCM, OTR, Muxponder, SFP, SRM.	e.g., 16 Mbit/s
PEC	This field indicates the Product Engineering Code for the circuit pack.	e.g., NT0H01DD
Protocol	This field indicates the protocol that the OCI, Muxponder or GFSRM circuit pack supports.	e.g., Sonet/SDH
Serial #	This field indicates the serial number of the circuit pack in a slot.	Character string, e.g., SN123454.
Revision	This field indicates the hardware version of a circuit pack.	Character string, e.g., 7 or DA.
Wavelength	This field indicates the actual wavelength of the circuit pack. ***Note 1:*** For OTRs, there are two fields: Line Wavelength and Client Wavelength. ***Note 2:*** For Muxponders, this field becomes Line-Wavelength	e.g., 1570.42 nm OCI, SRM, GFSRM, SFP: 850 nm, 1310 nm

Table 7-26 (continued)
Equipment—Inventory—Optical Metro Inventory dialog box

Data field	Description	Value
WDM Type	This field indicates whether the circuit pack is CWDM, DWDM, or ITU CWDM. ***Note:*** Only some of the DWDM Muxponder wavelengths correspond to the CWDM and ITU CWDM. For more information, see the Ordering chapter of *Network Planning and Link Engineering*, 323-1701-110.	• OMX: CWDM, DWDM 200 GHz, ITU CWDM • OCLD/OTR: CWDM, DWDM 100 GHz, DWDM 200 GHz, ITU CWDM • MOTR: DWDM 100 GHz, DWDM 200 GHz
Distance	For the DSCM, this field indicates the distance in km.	• e.g., 30km
DSCM Type	For the DSCM, this field indicates the.	• 1
Mac Address Port 1	For the OCI SRM GbE/FC circuit pack, this field indicates the MAC address of Port 1.	XX-XX-XX-XX-XX-XX
Mac Address Port 2	For the OCI SRM GbE/FC circuit pack, this field indicates the MAC address of Port 2.	XX-XX-XX-XX-XX-XX
Bit Rate	For the Muxponder SFP, this field indicates the available bit rates.	• Gigabit Ethernet • FC-100 • FC-200 • FICON • FICON Express
Release	Release number.	Character string, e.g., 01
Details	For the Muxponder circuit pack, clicking this button opens the dialog box where you can view the MAC addresses for the Muxponder SFP ports.	• See Table 7-27

Table 7-27
Equipment—Inventory—Manufacturing Data dialog box

Data field	Description	Value
Location		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Slot	This field indicates the slot number of a circuit pack.	See Table 7-7 for the possible values.
Circuit Pack Type	This field indicates the type of circuit pack or component that you provisioned for a slot in the shelf.	• MOTR
Provisioning Data		
Port	This field displays the port on the circuit pack that is in-service.	• 1 through 10
Mac Address	This field indicates the MAC address of each SFP port.	XX-XX-XX-XX-XX-XX

Equipment—Facilities window

Table 7-28 describes the data fields in the Equipment—Facilities window. To refresh this window click the **Refresh** button.

Table 7-28
Equipment—Facilities window

Data field	Description	Value
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Slot	This field indicates the slot number of a circuit pack.	See Table 7-7 for the possible values.
Port	This field displays the ports of a circuit pack.	See Table 7-8 for the possible values.
Name	This field indicates the name of the facility.	e.g., OCI Facility 5.

Table 7-28 (continued)
Equipment—Facilities window

Data field	Description	Value
Circuit Pack	This field indicates the circuit pack that is provisioned for the slot, which is not necessarily the actual circuit pack in the slot.	• OCI • SRM • GFSRM • OCLD • OTR • MOTR • MOTRSFP • OSC • OFA • APBE • OCM • SP
Admin	This field indicates the user-assigned administrative state of the circuit pack.	• IS • OOS
Oper	This field indicates the operational state of the circuit pack.	• IS-NR: In-service normal • IS-ANR: In-service abnormal • OOS-MA: Out-of-service maintenance • OOS-AU: Out-of-service autonomous • OOS-AU-MA: Out-of-service autonomous, maintenance • OOS-MAANR: Out-of-service maintenance abnormal
Sec	This field indicates the secondary state of the circuit pack.	• IS • OOS • UNEQUIPPED • SUPPORTING-ENTITY-FAILED • SUPPORTING-ENTITY-OUTAGE • FAILED • MISMATCH • Nil

Table 7-28 (continued)
Equipment—Facilities window

Data field	Description	Value
Loop Back	This field applies a facility or terminal loopback. The facility or terminal must be out-of-service to apply a loopback.	• None • Facility • Terminal
Channel Name	This field indicates the name of the channel assignment.	• blank • character string
Tx (dBm) (See Note)	This field displays the output Tx power (dBm) from the OCLD, OTR, OCI, and OFA circuit packs.	• blank or N/A • decimal value, e.g., -3.5
Rx (dBm) (See Note)	This field displays the input Rx power (dBm) to the OCLD, OCI, and OFA circuit packs.	• blank or N/A • decimal value, e.g., 3.5
Note: The System Manager does not automatically update the Equipment—Facilities window. Use the Refresh button to obtain accurate power level readings for the Tx (dBm) and Rx (dBm) data fields. The System Manager obtains the values for the Tx (dBm) and Rx (dBm) data fields from the hardware on the circuit pack. If you independently measure the power meter levels on the hardware of the circuit pack, they may be different from the System Manager values. The optical Transmit (Tx) and receive (Rx) power levels are not monitored for OCI SRM circuit packs. As a result the Tx and Rx fields in the System Manager Facilities window are displayed as N/A.		

Equipment—Facilities—Optical Metro Facility dialog box

When you right-click and select Modify on a highlighted line or double-click on a highlighted line in the Facilities window, the Optical Metro Facility dialog box appears. Table 7-29 describes the data fields.

Table 7-29
Equipment—Facilities—Optical Metro Facility dialog box

Data field	Description	Value
Facilities Tab		
Location		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Slot	This field indicates the slot number of a circuit pack.	See Table 7-7 for the possible values.
Port	This field displays the port on the circuit pack that is in-service.	See Table 7-8 for the possible values.
Card	This field indicates the circuit pack that is provisioned for the slot, which is not necessarily the actual circuit pack in the slot.	• OCI • SRM • GFSRM • OTR • MOTR • MOTRSFP • OSC • OFA • APBE • SP • OCM • blank
Facility		
Name	This field indicates the name of the facility.	e.g., OCI Facility 5
Channel	This field indicates the name of the channel.	• Character string • No channel assignments allowed (OFA or APBE port 5)
Mode	This field indicates the mode of the WSC port on the OSC circuit pack.	• Add-Drop • Pass Through

Table 7-29 (continued)
Equipment—Facilities—Optical Metro Facility dialog box

Data field	Description	Value
Shelf	This field indicates the shelf the OSC is connected to.	A name, e.g., Head Office. • nil
Site	This field indicates the site the OSC facility is connected to.	A name, e.g., Head Office. • nil
State		
Administrative	This field indicates the user-assigned administrative state of the circuit pack.	• IS • OOS
Operational	This field indicates the operational state of the circuit pack.	• IS-NR: In-service normal • IS-ANR: In-service abnormal • OOS-MA: Out-of-service maintenance • OOS-AU: Out-of-service autonomous • OOS-AU-MA: Out-of-service autonomous, maintenance • OOS-MAANR: Out-of-service maintenance abnormal
Secondary	This field indicates the secondary state of the circuit pack.	• IS • OOS • UNEQUIPPED • SUPPORTING-ENTITY-FAILED • SUPPORTING-ENTITY-OUTAGE • FAILED • MISMATCH • NIL
Loop Back		
Loop Back	This field indicates loop backs options.	• Terminal • Facility • None

Table 7-29 (continued)
Equipment—Facilities—Optical Metro Facility dialog box

Data field	Description	Value
eVOA Provision (appears on Facility dialog box for port 1 through port 4 of APBE circuit packs)		
Channel	This field indicates that the provisioning mode is channel-based.	• Enabled • Disabled
Band	This field indicates that the provisioning mode is band-based.	• Enabled • Disabled
Details	This button opens the Band Power Info window.	See Table 7-30.
Channel		
Number of Channels	This field indicates the number of provisioned channels in a band.	0-4
Channel Output Power Target	This field indicates the per-channel power target, as determined by NMT.	—
Aggr. Output Power Target	This field indicates the output per-channel power target, as determined by NMT.	—
Band		
Band Power Target	This field indicates the per-band power target as determined by NMT.	—
Aggr. Output Power Target	This field indicates the output per-band power target as determined by NMT.	—
SSRM LTE Provision Data (appears on Facility dialog box of the OCI SRM SONET/SDH LTE circuit pack)		
Signal Degrade Threshold	This field indicates the signal degrade threshold for SONET/SDH SRM OCI LTE.	• 10e-5 to 10e-9 • Default: 10e-6
Path Monitoring	This field indicates the status of the path monitoring.	• true • false (default)

Table 7-29 (continued)
Equipment—Facilities—Optical Metro Facility dialog box

Data field	Description	Value
Advanced Attributes (as it appears on Facility dialog box of client-side facilities of the OCI SRM GbE/FC, OCI SRM GbE)		
GFP Conditioning	This drop-down list allows you to enable or disable GFP conditioning on the OCI SRM GbE/FC and OCI SRM GbE circuit packs.	• Enable • Disable
GFP FCS	This drop-down list allows you to enable or disable GFP Frame Check Sequence on the OCI SRM GbE/FC, and OCI SRM GbE circuit packs. *Note:* The GFP FCS was included by default in the GFP frame.	• Enable • Disable
Round Trip Delay	This field displays the measured network latency on the OCI SRM GbE/FC, and OCI SRM GbE. *Note:* If the Round Trip Delay field displays UNKNOWN, click **Refresh** repeatedly until the system displays a numerical value. A few refresh attempts may be required because of timeout conditions. However, once a value is returned, it represents the true round trip delay time.	• Time
Update time	This field indicates the time and date of the last Round Trip Delay Refresh on the OCI SRM GbE/FC, and OCI SRM GbE.	e.g. 06:15:00 2001/05/18

Table 7-29 (continued)
Equipment—Facilities—Optical Metro Facility dialog box

Data field	Description	Value
Aggregate Facility (appears on Facility dialog box for the aggregate facility of the OCI SRM GbE/FC circuit pack.)		
Concatenation Type	This drop-down list allows you to select the concatenation type for the channel assignment.	• c-Cat (contiguous concatenation) • v-Cat (virtual concatenation)
Timing Mode	This drop-down list allows you to select the timing mode: local freerun or loop-timed SONET clocking.	• Local (default) • Loop
Transport Mode	This drop-down list allows you to select the transport mode of the aggregate signal. *Note:* This field is only enabled once all paths assignments are deleted.	• SONET (default) • SDH
Advanced Attributes (appears on Facility dialog box for the line-side facilities and the client-side facilities of the Muxponder)		
GFP FCS	This drop-down list allows you to enable or disable GFP Frame Check Sequence on the Muxponder circuit packs, client side facility. *Note:* The GFP FCS was included by default in the GFP frame.	• Enable • Disable
Round Trip Delay	This field displays the measured network latency on the Muxponder circuit packs, client side facility. *Note:* If the Round Trip Delay field displays UNKNOWN, click **Refresh** repeatedly until the system displays a numerical value. A few refresh attempts may be required because of timeout conditions. However, once a value is returned, it represents the true round trip delay time.	• Time
Update time	This field indicates the time and date of the last Round Trip Delay Refresh on the Muxponder circuit packs, client side facility.	e.g. 06:15:00 2001/05/18

Table 7-29 (continued)
Equipment—Facilities—Optical Metro Facility dialog box

Data field	Description	Value
Timing Mode	This drop-down list allows you to select the timing mode on the line facility of the Muxponder: local freerun or loop-timed SONET clocking. ***Note:*** In a protected Muxponder connection, the Mate-timed option is displayed on the protected path. It is for viewing purposes only.	• Local (default) • Loop • Mate-timed
Transport Mode	This drop-down list allows you to select the transport mode of the line-side signal on the Muxponder facility. ***Note:*** This field is enabled once all paths assignments are deleted.	• SONET (default) • SDH

Table 7-29 (continued)
Equipment—Facilities—Optical Metro Facility dialog box

Data field	Description	Value
Auto Negotiation/Pause (appears on Facility dialog box for the client-side facilities of the OCI SRM GbE/FC, OCI SRM GbE, and Muxponder SFP circuit packs if a channel assignment is created on the port and Gigabit Ethernet is the specified protocol and GFP-F is the Encapsulation mode.)		
Auto Negotiation	This field indicates whether auto negotiation is enabled or disabled.	• Enabled • Disabled
Pause	This field indicates whether pause is enabled or disabled. To unlock this field, Auto Negotiation should be disabled.	• Enabled • Disabled
Details	Clicking this button opens the Auto Negotiation and Pause dialog box where you can provision the auto negotiation and pause settings.	See Table 7-31.
Subrate/Extended Reach (appears on Facility dialog box for the client-side facilities of the OCI SRM GbE/FC circuit pack if a channel assignment is created on the port and FC-100 is the specified protocol.)		
SubRate	This field indicates whether the subrate is enabled or disabled.	• Enabled • Disabled
ExtReach	This field indicates whether the extended reach is enabled or disabled.	• Enabled • Disabled
Details	Clicking this button opens the dialog box where you can provision the subrate and extended reach settings.	See Table 7-32.

Equipment—Facilities—Optical Metro Facility—Band Power Info dialog box

In amplified networks, if an APBE is used to provide the equalization, and you select any port 1 through 4, the Details button in the Optical Metro Facility dialog box is enabled. If you click on this button, the Band Power Info dialog box appears. Table 7-31 describes the data fields.

Table 7-30
Equipment—Facilities—Optical Metro Facility—Band Power Info dialog box

Data field	Description	Value
Port	This field indicates the number of provisioned channels in a band.	• 1-5
Prov Mode	This field indicates the user-assigned provisioned mode of the APBE port.	• notProv • perChannel • perBand
# of Channels	This field indicates the channels subject to equalization.	• A number from 0 to 4
Power Target	This field displays the Channel or Band Power Target configured on each port on the APBE circuit pack.	
Rx Power	This field displays the output Tx power from the APBE port	
Tx Power	This field displays the output Tx power from the APBE port	

Equipment—Facilities—Optical Metro Facility—Auto Negotiation and Pause dialog box

If a channel assignment is created on the client-side facility of an OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced, OCI SRM GbE, or Muxponder 10 Gbit/s GbE/FC VCAT circuit pack and the specified protocol is Gigabit Ethernet (and for Muxponder 10 Gbit/s GbE/FC VCAT circuit packs, the

Encapsulation mode is set to GFP-F), when you click the Details button in the Optical Metro Facility dialog box, the Auto Negotiation/Pause dialog box appears. Table 7-31 describes the data fields.

Table 7-31
Equipment—Facilities—Optical Metro Facility—Auto Negotiation/Pause dialog box

Data field	Description	Value
Facility		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Slot	This field indicates the slot number of the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced, OCI SRM GbE, or Muxponder 10 Gbit/s GbE/FC VCAT circuit pack.	• For Optical Metro 5200: a number from 1 to 8 and 11 to 18. • For Optical Metro 5100: 1 and 3.
Port	This field displays the port configured for Gigabit Ethernet on the OCI SRM GbE/FC, OCI SRM GbE or Muxponder 10 Gbit/s GbE/FC VCAT circuit pack.	1 or 2 for OCI SRM 1 to 10 for Muxponder
Card	This field indicates the type of circuit pack installed in the slot.	• GFSRM • MOTRSFP
Name	This field indicates the name of the facility.	e.g., GFSRM Facility 8, Port 2
Auto Negotiation		
Auto Negotiation	This drop-down list allows you to enable or disable auto negotiation (AN).	• Enable (default) • Disable
ETHDPX	If AN is enabled, this field displays the advertised duplex operation capabilities. If AN is disabled, this field displays the current setting.	• FULL (default)
ADVETHDPX	This field indicates the link partner's advertised Duplex capabilities. Only valid when State is COMPLETED.	• HALF • FULL • BOTH • NONE
ANETHDPX	After the completion of an AN cycle, if AN is enabled, this field displays the negotiated duplex operation.	• HALF • FULL • NONE

Table 7-31 (continued)
Equipment—Facilities—Optical Metro Facility—Auto Negotiation/Pause dialog box

Data field	Description	Value
MTU	This drop-down list allows you to select the maximum Ethernet frame size supported. Setting the MTU size influences the distance of the loss-less local flow control (the smaller the MTU, the larger the loss-less distance).	• 1600 (not including 4-byte VLAN tags) (default) • 9600 (not including 4-byte VLAN tags)
State	This field indicates the status of the auto negotiation cycle.	• INPROGRESS • COMPLETED • DISABLED
Speed	If AN is enabled, this field displays the advertised link speed (in Mbit/s) capabilities. *Note:* This field also displays 1000 when AN and State are disabled.	• 1000 (default)
ADVSPEED	This field indicates the link partner's advertised speed capabilities. Only valid when State is COMPLETED.	• 1000 • 0
ANSPEED	After the completion of an AN cycle (State is COMPLETED), when AN is enabled, this field displays the negotiated speed.	• 1000 (default)
PASSCTRL	This drop-down list allows you to select whether received Ethernet control frames (T/L=8808) are passed transparently (Enable) or removed from the flow (Disable). *Note:* PAUSE frame is the only currently defined control frame.	• Enable • Disable (default)
PREAMBLECTRL	This drop-down list allows you to select the preamble and start of frame delimiter transparency when the signal is set to Gigabit Ethernet and encapsulation mode is set to GFP-F on a Muxponder 10 Gbit/s GbE/FC VCAT circuit pack facility. Preamble control can be set to enabled on both Muxponder circuit packs.	• Enable • Disable (default)

Table 7-31 (continued)
Equipment—Facilities—Optical Metro Facility—Auto Negotiation/Pause dialog box

Data field	Description	Value
FLOWCTRL	This drop-down list allows you to select the advertised flow control capabilities. This is ignored if AN is disabled.	• NONE • ASYM (default) • SYM
ADVFLOWCTRL	This field indicates the link partner's advertised flow control capabilities. Only valid when State is COMPLETED.	• NONE • ASYM • SYM • BOTH
PHYSADDR	This field indicates the Ethernet MAC address for this associated facility/port.	48-bit value
Pause		
PAUSETX	When AN is disabled, this drop-down list allows you to control the flow control toward the link partner (the PAUSE transmission). It is ignored when AN is enabled.	• Enable (default) • Disable
ANPAUSETX	This field indicates the negotiated pause transmit when AN is enabled. Only valid when State is COMPLETED.	• Enable • Disable
PAUSERX	When AN is disabled, controls the reception of a pause. This field is always disabled.	• Disabled
ANPAUSERX	This field indicates the negotiated pause receive when AN is enabled. Only valid when State is COMPLETED.	• Enable • Disable
PAUSERXOVRIDE	When AN is enabled, this attribute is used to override (disable) the negotiated PAUSE receive. The received pause frames are either discarded or passed through transparently (based on the PASSCTRL setting).	• Enabled

Equipment—Facilities—Optical Metro Facility—Subrate and Extended Reach dialog box

If a channel assignment is created on the client-side facility of an OCI SRM GbE/FC Enhanced circuit pack and the specified protocol is FC-100, when you click the Details button in the Optical Metro Facility dialog box, the Subrate and Extended Reach dialog box appears. Table 7-32 describes the data fields.

Note: Subrate and extended reach must both be enabled or disabled. You can not enable one and disable the other.

Table 7-32
Equipment—Facilities—Optical Metro Facility—Auto Negotiation/Pause dialog box

Data field	Description	Value
Location		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Slot	This field indicates the slot number of the OCI SRM GbE/FC Enhanced circuit pack.	• For Optical Metro 5200: a number from 1 to 8 and 11 to 18. • For Optical Metro 5100: 1 and 3.
Port	This field displays the port configured for Gigabit Ethernet on the OCI SRM GbE/FC Enhanced circuit pack.	1 or 2
Card	This field indicates the type of circuit pack installed in the slot.	GFSRM
Name	This field indicates the name of the facility.	e.g., GFSRM Facility 8, Port 2
Subrate and Extended Reach		
Subrate	This drop-down list allows you to enable or disable Fiber Channel (FC) subrate capabilities.	• Enable • Disable
Extended Reach	This drop-down list allows you to enable or disable extended reach for the FC rate.	• Enable • Disable
Link State	This field indicates the state of the FC link.	• Active • Link Recovery • Link Failure • Offline • Unknown
BBC Override	This drop-down list allows you to select the number of buffers received before the far-end sends acknowledgement to the near-end equipment.	1, 2, 4, 8, 16, 32, 64, 128
BBC Value	When extended reach is enabled, this field indicates the buffer to buffer credit.	• 1 through 65536 • Unknown

Equipment—Telemetry window

Table 7-33 describes the data fields in the Equipment—Telemetry window. To refresh this window, select View—Refresh Current Window from the menu bar or click on the **Refresh** button.

Table 7-33
Equipment—Telemetry window

Data field	Description	Value
Network	This field indicates the name of the network.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf	This field indicates the user-assigned name of the shelf.	A character string that can be any combination of letters and numbers, up to 31 characters.
Type	This field indicates the type of port.	• In • Out
Id	This field indicates the port number.	• A number from 1 to 4 for Optical Metro 5200 • A number from 1 to 8 for Optical Metro 5100
Admin	This field indicates the user-assigned administrative state of the port.	• OOS • IS
State	This field indicates the state of the port.	• Active • Inactive • Released
Severity	This field indicates the user-assigned severity of the alarm.	• Critical • Major • Minor
Description	This field indicates the user-assigned text of the device	Character string, e.g., Input Device 1
Alarm Description	This field displays the user-assigned text of the alarm.	Character string, e.g., Parallel Telemetry Scan Point 1

Equipment—Telemetry—Parallel Telemetry Input window

When you right-click and select Modify or double-click on the Optical Metro 5200 Input 1 through Input 4 data fields, or on the Optical Metro 5100 Input 1 through Input 8 data fields, the Parallel Telemetry Input window appears. Table 7-34 describes the data fields.

Table 7-34
Equipment—Telemetry—Parallel Telemetry Input window

Data field	Description	Value
Input Port Status		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
Port	This field indicates the port number.	• A number from 1 to 4 for Optical Metro 5200 • A number from 1 to 8 for Optical Metro 5100
Service Status	This field indicates the user-assigned state of the port.	• Out of Service • In Service
Alarm Status	This field indicates the state of the alarm.	• Active • Inactive
Configuration Information		
Description	This field displays the user-assigned text of the input device.	Text string, e.g., Input Device 1
Alarm Severity	This field indicates the severity of the alarm.	• Critical • Major • Minor
Alarm Description	This field displays the user-assigned text of the alarm.	Text string, e.g., Parallel Telemetry Scan Point 1
Service	This field indicates the user-assigned state of the input device.	• In Service • Out Of Service

Equipment—Telemetry—Parallel Telemetry Output window

When you right-click and select Modify or double-click on the Output 1, Output 2, Output 3, or Output 4 data fields, the Parallel Telemetry Output window appears. Table 7-35 describes the data fields.

Table 7-35
Equipment—Telemetry—Parallel Telemetry Output window

Data field	Description	Value
Output Port Status		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
Port	This field indicates the port number.	A number from 1 to 4
Service Status	This field indicates the user-assigned state of the output device.	• In Service • Out of Service
Control Status	This field indicates the current status of the port.	• Released • Operated
Configuration Information		
Description	This field displays the user-assigned text of the output device.	Text string, e.g., Output Device 1
Hardware Config	This field configures how the output device is activated.	• Normally Open • Normally Closed
Service State	This field indicates the status of the output device.	• In Service • Out of Service
Control		
Set State	This field indicates the status of the port.	• Released • Operated

Connections window

Use the Connections window to automatically display the Channel Assignments tab and the Channel Assignments window.

Connections—Channel Assignments window

Use the Channel Assignments window to provision and view channel assignments. Each line of information in the window has a status description, which indicates the state of the channel assignment. You can also use the Channel Assignments window to configure path protection.

When you double-click on a circuit pack that has more than one provisioned facility, the Channel Assignments window can expand or collapse a listing of channel assignments for each provisioned facility.

Table 7-36 describes the data fields in the Channel Assignments window. Select the Band, Channel, or None radio button for the scope of view. Select the **Refresh** button to refresh this window based on the selected scope. The selected scope takes precedence over network tree selection for Channel Assignment screen refresh. Band scope displays all the channel assignments within the ring with the same band as the selected row. Channel scope displays all the channel assignments within the ring with the same channel name as the selected row. A scope of None displays all the channel assignments for all the shelves that are in focus on the Network tree.

Table 7-36
Connections—Channel Assignments window

Data field	Description	Value
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office
OSID	This field indicates the optical system identifier associated with the OCLD, OTR, Muxponder, OMX, OFA, OSC, and APBE when you have interconnected rings.	An alphanumeric string (up to eight characters). If the OSID is unassigned, the field is blank.
Channel	This field indicates the name of the assigned channel.	Character string
Chan. ID	This field indicates the band, channel and direction of the OCLD, OTR, or Muxponder circuit pack. *Note:* For the correct band and wavelength mappings for CWDM and ITU CWDM systems, see "System Manager band and channel designations" on page 7-35.	Character string, e.g., B3C4W
WDM Type	This field displays the OCLD, OTR, or Muxponder WDM type.	• DWDM 200 GHz • DWDM 100 GHz • CWDM • ITU CWDM

Table 7-36 (continued)
Connections—Channel Assignments window

Data field	Description	Value	
Facility	This field displays the OCLD, OTR, or Muxponder facility name.	For example, OCLD Facility 1	
End Point	This field indicates the name of the OCI, OTR, Muxponder SFP, SRM, or GFSRM facility name.	For example, OCI Facility 5	
Bit Rate	This field indicates the protocol that the channel assignment path carries. *Note:* Protocols available are dependent on the facility type.	• FC-12 (133M) • FC-25 (266M) • FC-100 • FC-200 • FICON • FICON Express • Gigabit Ethernet • Fast Ethernet • OC-1, OC-3, OC-12 • 0C-48 • ISC • ISC-3 • CLO • DV6000, • DMIF • Orion	• Async FOTS 150M • Async FOTS 565M • FDDI • ESCON (SBCON) • ESRM-250 • ETR • SDI Video (SMPTE 297M) • STM-1 • STM-4 • STM-16 • STM-125 • STM-250 • HDTV 29Hz • HDTV 30Hz • SRM-125 • GLink
Mode	This field displays the channel assignment type.	• Unprot-east • Unprot-west • Protected • Passthrough	
Status	This field indicates the status of the channel assignment.	• IS • OOS	

Table 7-36 (continued)
Connections—Channel Assignments window

Data field	Description	Value
Path State	This field indicates the current state of a protected channel assignment.	• Force • Lockout • Manual • Force-R • Lockout-R • Manual-R • Auto Sw • WTR • blank
Prov. State	This field indicates the provisioned state of a protected channel assignment.	• Force • Lockout • Manual
Revertive	This field indicates whether revertive has been enabled on a protected channel assignment.	• Active—W (for the working path) • Active—P (for the protected path) • Inactive

Connections—Channel Assignments—Optical Metro Channel Assignments window

When you right-click and select Modify on a highlighted line or double-click on a highlighted line in the Channel Assignments window, the Optical Metro Channel Assignments window appears. Table 7-37 describes the data fields.

Table 7-37
Connections—Channel Assignments—Optical Metro Channel Assignments window

Data field	Description	Value
Channel Assignment tab		
Selected Facility		
Facility Name	This field displays the facility name.	e.g., OCLD Facility 1
Channel ID	This field indicates the band, channel and direction. *Note:* For the correct band and wavelength mappings for CWDM and ITU CWDM systems, see "System Manager band and channel designations" on page 7-35.	Character string, for example, B3C4w
Channel Characteristics		
Mode	This field displays the channel assignment type.	• Unprot-east • Unprot-west • Protected • Passthrough
Scheme	This field indicates the protection scheme of the Muxponder circuit pack for protected channel assignments.	1+1 Protection
Line 1	This field indicates a circuit pack path facility.	e.g., OCLD Facility 2, or OTR Facility 2, port 2 line
Line 2	This field indicates a circuit pack path facility.	e.g., OCLD Facility 17
End point	This field indicates the originating circuit pack facility for the signal.	e.g., OCI Facility 8, or OTR Facility 2, port 1 client
Bit Rate	This field indicates the protocol being used. The drop-list is context sensitive to the selected circuit pack facilities and channel assignment mode.	—

Table 7-37 (continued)
Connections—Channel Assignments—Optical Metro Channel Assignments window

Data field	Description	Value
Client Type	This field indicates the channel assignment type on the client-side. The drop-list is context sensitive to the selected Muxponder circuit pack facilities and channel assignment mode.	• Bi-direction • Uni-add • Uni-drop
Wavelength Validation	This check box indicates whether the wavelengths used for a protected or pass-through connection will be checked to see if they are the same. *Note:* You can only disable wavelength validation as part of the creation of a new channel assignment.	• selected (default) • deselected
Protection...	This button appears if applicable and opens the Optical Metro Protection dialog box. This button only appears when the Mode field on the Channel Assignment tab is set to Protected	See "Optical Metro Protection" below, in this table.
Protection Mode	This field indicates the 1+1 protection mode for protected Muxponder channel assignments.	• Bi-directional • Uni-directional

Table 7-37 (continued)
Connections—Channel Assignments—Optical Metro Channel Assignments window

Data field	Description	Value	
PM Mode	This field indicates the PM Mode associated with the facility in Line 1, Line 2, or the End Point. The drop-list is context sensitive to the mode, path protocol, and facilities. If PM Mode is not applicable, the field is grayed out.	Line 1/Line 2:	• SDH/DigitalWrapper (Muxponder) • SONET/DigitalWrapper (Muxponder) • Digital Wrapper (OTR) • SONET (OCLD, OTR) • SDH (OCLD, OTR) • SFC (OCLD, OTR) • None
		End Point:	• GigE (Muxponder) • GigEWAN (Muxponder) or GigE (GFSRM) • 8B/10BWAN (Muxponder) or 8B/10B (OTR) • SONET (OTR, OCLD) • SDH (OTR, OCLD) • LANPhy • SFC • None
Direction	This field indicates whether the circuit pack facility shown in Line 1 or Line 2 is on the west path or east path. This field is not editable.	• East • West	
Aggr. PM Mode	This field indicates the Aggregate PM Mode. The drop-list is context sensitive to the mode, path protocol, and facilities. If Aggr. PM Mode is not applicable, the field is grayed out (or does not appear).	• None • SONET • SDH • Agile	
Encapsulation	This field indicates the GFP Encapsulation mode on the OCI SRM GbE/FC, OCI SRM GbE/FC Enhanced, OCI SRM GbE and Muxponder circuit packs. The drop-list is context sensitive to the protocol or circuit pack type. If Encapsulation mode is not applicable, the field is grayed out.	• GFP-F • GFP-T *Note:* The encapsulation mode is limited to GFP-T on the Muxponder 10 Gbit/s GbE/FC. However, it is dependent on the protocol selected on the Muxponder 10 Gbit/s GbE/FC VCAT.	

Table 7-37 (continued)
Connections—Channel Assignments—Optical Metro Channel Assignments window

Data field	Description	Value	
Transport	This field indicates the Transport structure of the OCI SRM GbE/FC, OCI SRM GbE, or Muxponder channel assignment. The drop-down list is context sensitive to the selected bit rate, and to the provisioned concatenation type and transport mode of the aggregate facility (OCI SRM GbE/FC or OCI SRM GbE) or transport mode of the line facility (Muxponder). If Transport is not applicable, the field is grayed out (or does not appear). ***Note:*** The STS-48C or VC-4-16C transport rate is only available for port 1 on the OCI SRM GbE/FC and OCI SRM GbE, odd ports on the Muxponder 10Gbit/s GbE/FC, and on any port for the Muxponder 10Gbit/s GbE/FC VCAT.	Contiguous concatenation: • SONET: • SDH: Virtual concatenation: • SONET: • SDH:	STS-12C STS-24C STS-48C (See Note) VC-4-4C VC-4-8C VC-4-16C (See Note) STS-3c-nv where n = 1 ... 7 VC-4-nv where n = 1 ... 7
Advanced...	This button appears on the Muxponder and OCI SRM GbE/FC, or OCI SRM GbE and opens the Optical Metro Channel Assignment Advance Detail dialog box.	See "Optical Metro Channel Assignment Advance Detail" below, in this table.	
Path Assignments...	This button appears on the Muxponder and if applicable on the OCI SRM GbE/FC, or OCI SRM GbE and opens the Path Assignments details dialog box when virtual concatenation is provisioned on the OCI SRM GbE/FC, OCI SRM GbE or contiguous concatenation is provisioned on the Muxponder line facility and a valid Transport structure is specified.	See "Path Assignments" below, in this table.	
Channel Name	This field indicates the user defined channel assignment name. ***Note:*** The name that you put in the Channel field should be unique for each particular traffic path. You should also use the same name throughout the traffic path.	Character string, e.g. unprot OTR ***Note:*** Do not use commas in the Channel Name.	
Channel Description	This field indicates the user defined channel assignment description.	Character string ***Note:*** Do not use commas in the channel description.	

Table 7-37 (continued)
Connections—Channel Assignments—Optical Metro Channel Assignments window

Data field	Description	Value
Port Name	This field indicates the user-assigned name of the port assignment associated with the connection. It only displays if an OCI SRM, OCI SRM GbE/FC, OCI SRM GbE, or SFP facility is added, modified, or selected.	Character string, for example, port 1
Port Description	This field indicates the user-assigned description of the port assignment. It only displays if an OCI SRM, OCI SRM GbE/FC, OCI SRM GbE, or SFP facility is added, modified, or selected.	Character string
Rx traffic path for <band/channel/direction> - <shelf name>		
End Point	This field displays the originating facility for the signal.	e.g. OCI Facility 8, or OTR Facility 2, port 1 client
West Path	This field displays the west path facility for the signal on the shelf.If it is bold, it means that this facility is currently carrying the traffic. It may also display Active or Inactive depending on the current traffic flow.	e.g. OCLD Facility 2, or OTR Facility 2, port 2 line
East Path	This field displays the east path facility for the signal on the shelf.If it is bold, it means that this facility is currently carrying the traffic. It may also display Active or Inactive depending on the current traffic flow.	e.g. OCLD Facility 17
Optical Metro Channel Assignment Advance Details (This dialog box displays the Optical Metro Channel Assignment Advance Details when Muxponder SFP is provisioned.)		
Channel Assignment		
Shelf	This field displays the user-assigned name of the shelf.	A name, e.g., Head Office
End point	This field displays the originating circuit pack facility for the signal.	e.g., OCI Facility 8, or OTR Facility 2, port 1 client
Channel Name	This field displays the name of the channel assignment.	• blank • character string
Port Name	This field displays the user-assigned name of the port assignment associated with the connection.	• blank • character string
Client Side Properties		

Table 7-37 (continued)
Connections—Channel Assignments—Optical Metro Channel Assignments window

Data field	Description	Value
AOC Handoff	This field (Automatic Output Control) indicates the hold off time the client laser requires before shutting off or injecting 8B/10B error codes or idle frames.	• 0ms (default for unprotected) • 100ms • 200ms • 300ms • 400ms • 500ms (default for protected) • 600ms • 700ms • 800ms • 900ms • 1000ms
Path PMs	This drop-down list allows you to collect path PMs on the Muxponder 10 GbE/FC with V-CAT circuit pack.	• Disabled (default) • Enabled

Table 7-37 (continued)
Connections—Channel Assignments—Optical Metro Channel Assignments window

Data field	Description	Value
Path Assignments This dialog box displays the Path Assignments details when virtual concatenation is provisioned on the OCI SRM GbE/FC, OCI SRM GbE, or when virtual concatenation or contiguous concatenation is provisioned on the Muxponder 10 GbE/FC facility and a valid Transport structure is specified. This field is for viewing purposes only on the OCI SRM GbE/FC, OCI SRM GbE and Muxponder 10 Gbit/s GbE/FC. For the Muxponder 10 GbE/FC with V-CAT facility, this field is user-assignable.		
Selected Facility		
Facility Name	This field displays the facility name.	e.g., GFSRM Facility 11, port 1
Transport	This field displays the Transport structure of the channel assignment. *Note:* The STS-48C or VC-4-16C transport rate is only available for port 1 on the OCI SRM GbE/FC and OCI SRM GbE.	• for example STS-12C
Paths or Path Assignments		
Path Assignment	For SONET mode, it displays which STS-48 (OCI SRM GbE/FC, OCI SRM GbE) or STS-192 (Muxponder) paths have been provisioned in the selected transport structure. For SDH mode, it displays which STM-16 (OCI SRM GbE/FC, OCI SRM GbE) or STM-64 (Muxponder) paths have been provisioned in the selected transport structure. *Note:* For the Muxponder 10 GbE/FC V-cat, this field is user editable.	For the Muxponder 10 GbE/FC VCAT: • Unavailable or too fragmented paths appear in gray in STS3c granularity and cannot be selected. Grey checked boxes indicate used paths by other ports. Grey un-checked boxes indicate un-used and un-available paths. • Available paths appear white, in the granularity reflective of the chosen Transport structure. The associated checkbox is not checked. • Currently provisioned paths appear as light blue and the associated checkbox is checked.
Optical Metro Protection (This dialog box displays the protection details.)		
Status		
End Point	This field displays the originating facility for the protected signal.	e.g. OCI Facility 8, or OTR Facility 2, port 1 client
Channel Name	This field displays the name of the assigned channel.	Character string, e.g. prot OTR
Current Rx Selection	This field indicates the facility that is receiving traffic for the protected path in a channel assignment.	e.g. OCLD Facility 2

Table 7-37 (continued)
Connections—Channel Assignments—Optical Metro Channel Assignments window

Data field	Description	Value
Protection Mode	This field displays the 1+1 protection mode for protected Muxponder channel assignments.	• Bi-directional • Uni-directional
Rx Reversion		
Enabled	This field indicates whether reversion is enabled or disabled.	• selected • not selected
WTR	This field indicates the waiting period selected for wait to restore.	• anywhere from 1 to 12 minutes (options in one minute intervals)
Working path	This field indicates which path of the protected facility is the working path.	e.g. OCLD Facility 3
Rx Switch Request		
Current state	This field displays the current state of the protected channel assignment.	• Force • Lockout • Manual • Automatic Switch • Wait to Restore
Proctection switch options	A series of radio buttons for the protection switching options available.	• Release • Manual • Force • Lockout
To	This field indicates to which path the switch is applied.	e.g. OCLD Facility 5

Connections—Channel Assignments—Optical Metro Timing window

When you right-click and select Timing Ref. on a highlighted line for a OCI SRM SONET/SDH or OCI SRM SONET/SDH LTE circuit pack in the Channel Assignments window, the Optical Metro Timing window appears. Table 7-38 describes the data fields.

Table 7-38
Connections—Channel Assignments—Optical Metro Timing window

Data field	Description	Value
Status		
Synchronization Status	This field displays the clock synchronization state of the OCI SRM SONET/SDH or OCI SRM SONET/SDH LTE circuit pack. • Primary indicates that the primary clock reference is the active timing reference • Secondary indicates that the secondary clock reference is the active timing reference • Free Run indicates that the clock is in free run mode • Hold Over indicates that the clock is in holdover mode • Failed indicates that synchronization has failed • Nil indicates that the circuit pack does not support synchronization	• Primary • Secondary • Free Run • Hold Over • Failed • Nil
Port	This field displays the port number.	• Number between 1 and 4 • Aggr (for OCI SRM SONET/SDH LTE only)
Provisioned	This field indicates whether the port is provisioned as the primary or secondary clock reference timer.	• Primary • Secondary
Status	This field indicates the status of the clock reference timer.	• Good • Failed • Wait-to-restore
Clock Signal	This field indicates the status of the signals on the two ports that are provisioned as clock reference timers.	• Active • Standby • Failed

Table 7-38 (continued)
Connections—Channel Assignments—Optical Metro Timing window

Data field	Description	Value
Switch Request		
None/Manual	These radio buttons indicate if a switch is requested or in effect.	• None – there is no switch requested or in effect • Manual – there is a switch requested
To	This field allows you to select the port/clock reference timer that you would like to switch to.	The only port numbers that appear in the menu are ports that are already provisioned as clock reference timers. You can not switch to a port that is not provisioned as a clock reference timer.
Provisioning		
Port	This column lists the ports that can be provisioned as the primary or secondary clock reference timer.	• Number between 1 and 4 • Aggr (for OCI SRM SONET/SDH LTE only)
Provisioned	This column lists whether a port is selected to be the primary or secondary clock reference timer. From the drop-down list, you can provision the primary and secondary clock references.	• Primary • Secondary • None ***Note:*** You can only provision one port to be the primary clock and one port to be the secondary clock.
Sync. Status Message	This field allows you to force the Do not Use for Synchronization (DUS) on a per-port basis in the Tx direction of the OCI SRM SONET/SDH LTE circuit pack.	• Auto (default) • DUS

Connections—Channel Assignments—Path Summary window

When you right-click and select Path Summary on a highlighted line for a Muxponder SFP circuit pack in the Channel Assignments window, the Path Summary window appears. Table 7-39 describes the data fields.

Table 7-39
Connections—Channel Assignments—Path Summary window

Switch Request		
Data field	**Description**	**Value**
Facility Name	This field displays the facility name.	e.g., MOTR Line Facility 11
Paths	This section displays the Path Assignments details for the Muxponder SFP facility when a valid Transport structure is specified. It is for viewing purposes only. The details shown include which paths are provisioned, which paths are still available for provisioning and which paths are provisioned against what port.	See Table 7-41.

Connections—Channel Assignments—Client to Line Side Path Mapping window

When you right-click and select Path Mapping on a highlighted line for a Muxponder SFP circuit pack in the Channel Assignments window, the Client to Line Side Path Mappings window appears. Table 7-40 describes the data fields.

Table 7-40
Connections—Channel Assignments—Client to Line Side Path Mappings window (Muxponder SFP)

Switch Request		
Data field	**Description**	**Value**
Slot	This field indicates the slot number of the Muxponder circuit pack.	• 1-7 and 11- 17 (Optical Metro 5200) • 1-3 (Optical Metro 5100)
Client Port	This field indicates the client port number that is provisioned against the client paths.	• Muxponder 10 Gbit/s GbE/FC 1 to 8 • Muxponder 10 Gbit/s GbE/FC VCAT 1 to 10
Client Path	This field indicates the provisioned client path, that is provisioned against the client port number. Numbers are auto generated when provisioning is completed using the System Manager.	• 1-48

Table 7-40 (continued)
Connections—Channel Assignments—Client to Line Side Path Mappings window (Muxponder SFP)

Switch Request		
Data field	**Description**	**Value**
Line Port	This field indicates the line port number that is provisioned against the line paths.	11
Line Path	This field indicates the line side path number that has been provisioned against the client port.	• 1-192 for SONET • 1-64 for SDH
Transport Mode	This field displays the transport mode of the line-side signal on the Muxponder facility.	• SONET (default) • SDH
Transport	This field indicates the Transport structure.	See Table 7-41.
Port Name	This field displays the user-assigned name of the port assignment associated with the connection.	character string

Table 7-41
Muxponder concatenation

Port assignment rate	SONET Transport Structure	SDH Transport Structure	Allowed paths
Muxponder 10 Gbits/s GbE/FC VCAT			
Gigabit Ethernet (GFP-F)	STS-3c	VC-4-1c	3n+1, where n=1...63
	STS12c	VC-4-4c	1, 13, 25, 37, 47, 61, 73, 85, 97, 109, 121, 133, 145, 157, 169, 181
	STS24c	VC-4-8c	1, 25, 49, 73, 97, 121, 145, 169
	STS48c	VC-4-16c	1, 49, 97, 145
	STS-3c-1v	VC-4-1v	SONET: All V-cat paths can start at 3n+1, where n=0...63 SDH: All V-cat paths can start at n, where n=1...64 *Note:* Port to path mapping is Flex.
	STS-3c-2v	VC-4-2v	
	STS-3c-3v	VC-4-3v	
	STS-3c-4v	VC-4-4v	
	STS-3c-5v	VC-4-5v	
	STS-3c-6v	VC-4-6v	
	STS-3c-7v	VC-4-7v	

Table 7-41 (continued)
Muxponder concatenation

Port assignment rate	SONET Transport Structure	SDH Transport Structure	Allowed paths
Muxponder 10 Gbits/s GbE/FC VCAT			
Gigabit Ethernet (GFP-T)	STS-3c-7v	VC-4-7v	• SONET: All V-cat paths can start at 3n+1, where n=0...63 • SDH: All V-cat paths can start at n, where n=1...64 • When using GFP-T, must run with fullrate, no subrate transports are supported
FC-100 FICON (GFP-T)	STS-3c-6v STS-3c-7v	VC-4-6v VC-4-7v	• SONET: All V-cat paths can start at 3n+1, where n=0...63 • SDH: All V-cat paths can start at n, where n=1...64 • Must run with fullrate, no subrate transports are supported • STS-3c-6v/VC-4-6v is sufficient to carry the maximum capacity. STS-3c-7v/VC-4-7v is offered for interoperability reasons (this will however reduce the number of FC-100/FICON ports supported from 10 to 9)
FC-200 FICON Express (GFP-T)	STS-3c-12v STS-3c-13v	VC-4-12v VC-4-13v	• SONET: All V-cat paths can start at 3n+1, where n=0...63 • SDH: All V-cat paths can start at n, where n=1...64 • Must run with fullrate, no subrate transports are supported • STS-3c-12v/VC-4-12v is sufficient to carry the maximum capacity. STS-3c-13v/VC-4-13v is offered for interoperability reasons (this will however reduce the number of FC-200/FICON Express ports supported from 5 to 4)
Note: When provisioning V-cat paths, the "Insufficient Link Capacity" alarm is raised until the required amount of paths have been provisioned as shown above.			

Table 7-41 (continued)
Muxponder concatenation

Port assignment rate	SONET Transport Structure	SDH Transport Structure	Allowed paths
Muxponder 10 Gbits/s GbE/FC			
Gigabit Ethernet (GFP-T)	STS-24c	VC-4-8c	1, 25, 49, 73, 97, 121, 145, 169
	STS-48c	VC-4-16c	1, 49, 97, 145
FC-100 FICON (GFP-T)	STS-24c	VC-4-8c	1, 25, 49, 73, 97, 121, 145, 169
	STS-48c	VC-4-16c	1, 49, 97, 145
FC-200 FICON Express (GFP-T)	STS-48c	VC-4-16c	1, 49, 97, 145

Configuration window

Use the Configuration window to edit commissioning data for Optical Metro 5100/5200 shelves. You can view shelf names, communications, surveillance, and a shelf list from the Configuration window.

Right-click and select Modify or double-click on any line in the Naming window or Communications window to access the Shelf Configuration window. The Shelf Configuration window displays detailed name, communications and time information about the shelf you selected.

Configuration—Naming window

Table 7-42 describes the data fields in the Configuration—Naming window. Select the **Refresh** button to refresh this window.

Table 7-42
Configuration—Naming window

Data field	Description	Value
Network	This field indicates the name of the network. Nortel Networks recommends that all shelves in a ring have the same network name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site Name	This field indicates the user-assigned name of the site. Nortel Networks recommends that all shelves at a site have the same Site Name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site ID	This field indicates the user-assigned number of the site and is used to group shelves logically in the System Manager.	A number from 1 to 64. Assign shelves at the seamed site to site number 1. Assign the other sites in the ring to the next available number.
Shelf Name	This field indicates the user-assigned name of the shelf. Nortel Networks recommends that each shelf in a ring have a different descriptive shelf name, such as Surveillance Site Band 3.	A character string that can be any combination of letters and numbers, up to 31 characters. ***Note:*** Do not use brackets in the Shelf Name.
Shelf ID	This field indicates the user-assigned unique ID of the shelf.	A number from 1 to 64.
Description (see Note)	This field displays a description of the shelf. Nortel Networks recommends that each shelf in a ring have a different shelf description.	A character string that can be any combination of letters and numbers, up to 63 characters.

Table 7-42 (continued)
Configuration—Naming window

Data field	Description	Value
OSID	This field lists all the optical system identifiers associated with line-side equipment within the selected shelf.	A list of alphanumeric strings.
Role	This field indicates the role of the shelf in the network. • DCN gateway (G), also referred to as the GNE, is an Optical Metro 5100/5200 shelf that is designated as a communications gateway between the Optical Metro 5100/5200 network and the customer's DCN. • Host shelf (H) is the shelf on which the SMI session has been started. The SMI is commonly started on a GNE shelf, so it is common to see the G and H roles together. • Primary shelf (P) is the shelf in an Optical Metro 5100/5200 network which collects Optical Metro 5100/5200 network information (referred to as the shelf list) from and distributes the information to the other shelves. This shelf is often configured to be the same as a GNE shelf, but this is not a requirement. • Bridge shelf (B) is an Optical Metro 5100/5200 shelf where all the existing channel assignments in the band are pass-through connections.	• Bridge (B) • Gateway (G) • Host (H) • Primary (P) • Blank
Note: The Description field cannot contain leading zeros.		

Configuration—Communications window

Table 7-43 describes the data fields in the Configuration—Communications window. Click the **Refresh** button to refresh this window.

Table 7-43
Configuration—Communications window

Data field	Description	Value
Site Name	This field indicates the user-assigned name of the site. Nortel Networks recommends that all shelves at a site have the same site name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field indicates the user-assigned name of the shelf. Nortel Networks recommends that each shelf in a ring have a different descriptive shelf name, such as Surveillance Site Band 3.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf IP	This field indicates the IP address of the shelf. Each shelf in a network must have a unique IP address.	IP address, e.g., 172.16.283.57
Primary IP	This field indicates the address of the primary node shelf in the network. The primary shelf distributes network-level information across all the shelves in a network.	IP address, e.g., 172.16.283.56
Subnet Mask	This field indicates the network mask of the shelf. The shelf mask segments the shelf from other shelves in the network.	IP address mask, e.g., 255.255.0.0
Shelf Type	This field indicates the type of shelf.	OADM, OFA, Mixed or terminal
DHCP	This field indicates the DHCP address of the shelf.	IP address

Table 7-43 (continued)
Configuration—Communications window

Data field	Description	Value
Default Gateway	This field indicates the default gateway address.	IP address
Enet Hubbing Group	This field indicates the Ethernet hubbing group.	A number from 1 to 64.
Enet2 Access Control	This field indicates the access control on Ethernet port 2. • None indicates access control is disabled • Filter indicates unrecognized incoming packets are filtered • Encrypt indicates unencrypted incoming packets are rejected and outgoing packets are encrypted	• None • Filter • Encrypt

Configuration—Naming or Communications— Shelf Configuration window

When you right-click and select Modify on a highlighted line or double-click on a highlighted line in the Configuration—Naming or Communications window, the Shelf Configuration window appears. Table 7-44 lists the data fields and their descriptions.

Table 7-44
Configuration─Naming or Communications─Shelf Configuration window

Data field	Description	Value
Naming tab		
Network Name	This field indicates the name of the network. Nortel Networks recommends that all shelves in a ring have the same network name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site Name	This field indicates the user-assigned name of the site. Nortel Networks recommends that all shelves at a site have the same site name.	A character string that can be any combination of letters and numbers, up to 31 characters.

Table 7-44 (continued)
Configuration⎯Naming or Communications⎯Shelf Configuration window

Data field	Description	Value
Shelf Name	This field indicates the user-assigned name of the shelf. Nortel Networks recommends that each shelf in a ring have a different descriptive shelf name, such as Surveillance Site Band 3.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Description	This field displays a description of the shelf. Nortel Networks recommends that each shelf in a ring have a different shelf description.	A character string that can be any combination of letters and numbers, up to 63 characters.
Site Identifier	This field indicates the user-assigned number of the site and is used to group shelves logically in the System Manager.	A number from 1 to 64. Assign shelves at the seamed site to site number 1. Assign the other sites in the ring to the next available number.
Shelf Identifier	This field indicates the user-assigned unique ID of the shelf. Assign one number to one shelf only.	A number from 1 to 64.
TID	This field indicates the Target Identifier (TID) of the shelf. The TID is a non-confidential code used to identify the network element being addressed.	TIDs must be between 1 and 20 alphanumeric characters. The first character must be a letter. The remaining characters can be any combination of letters, numbers and hyphens (-). The TID is case insensitive. Unsupported characters include semicolon (;), underscore (_), period (.), colon (:), ampersand (&), greater than (>), less than (<), backslash (\), comma (,), spaces, and control characters.
TID Properties...	This button opens the Shelf TID change window.	See "Shelf TID Change", in this table.

Table 7-44 (continued)
Configuration—Naming or Communications—Shelf Configuration window

Data field	Description	Value
Shelf Role	This field indicates the role of the shelf in the network. • DCN gateway (G), also referred to as the GNE, is an Optical Metro 5100/5200 shelf that is designated as a communications gateway between the Optical Metro 5100/5200 network and the customer's DCN. • Host shelf (H) is the shelf on which the SMI session has been started. The SMI is commonly started on a GNE shelf, so it is common to see the G and H roles together. • Primary shelf (P) is the shelf in an Optical Metro 5100/5200 network which collects Optical Metro 5100/5200 network information (referred to as the shelf list) from and distributes the information to the other shelves. This shelf is often configured to be the same as a GNE shelf, but this is not a requirement. • Bridge shelf (B) is an Optical Metro 5100/5200 shelf where all the existing channel assignments in the band are pass-through connections.	• Bridge (B) • Gateway (G) • Host (H) • Primary (P) • Blank
OSID	This field indicates the OSIDs associated with OFA, OTR, OCLD, Muxponder, OMX, APBE, and OSC equipment when you have interconnected rings.	A list of alphanumeric strings.
Change OSID...	This button opens the Shelf Optical System ID change window.	See "Shelf Optical System ID change", in this table.
Backup/Restore		
Backup...	This button saves the current shelf data to a backup file.	—
Restore...	This button opens the Restore dialog to allow the restore of the shelf.	See "Restore", in this table.
Shelf TID Change (This dialog box allows you to modify the TID of a specific shelf.)		
Network Name	This field displays the name of the network.	A character string that can be any combination of letters and numbers, up to 31 characters.

Table 7-44 (continued)
Configuration⎯Naming or Communications⎯Shelf Configuration window

Data field	Description	Value
Site Name	This field displays the user-assigned name of the site. This field is greyed out.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field displays the user-assigned name of the shelf. This field is greyed out by default.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Description	This field displays a description of the shelf. This field is greyed out. Nortel Networks recommends that each shelf in a ring have a different shelf description.	A character string that can be any combination of letters and numbers, up to 63 characters.
TID	This field indicates the target identifier of the shelf. This field is greyed out when the "TID required for all TL1 commands" field is selected.	e.g. OM5000-<siteID>-<shelfID>
Set TID to Shelf Name	This field allows the target identifier to be assigned as the Shelf Name field.	• selected • not selected
TID required for all TL1 commands	This field enforces the use of a target identifier for all TL-1 commands.	• selected • not selected
Shelf Optical System ID change (This dialog box allows you to modify the OSID of a specific shelf.)		
Network Name	This field displays the name of the network.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site Name	This field displays the user-assigned name of the site. This field is greyed out.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field displays the user-assigned name of the shelf. This field is greyed out by default.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Description	This field displays a description of the shelf. This field is greyed out. *Note:* The Description field cannot contain leading zeros.	A character string that can be any combination of letters and numbers, up to 63 characters.
Optical System ID	This field displays the current optical system identifier of the shelf. This field is greyed out.	An alphanumeric number

Table 7-44 (continued)
Configuration—Naming or Communications—Shelf Configuration window

Data field	Description	Value
New Optical System ID	This field allows you to assign a new optical system identifier of the shelf.	An alphanumeric number.
Restore (This dialog box allows you to restore the data of a specific shelf.)		
User Profile	This field indicates whether the user profile is to be restored.	• selected • not selected
Commissioning Data	This field indicates whether the commission data is to be restored.	• selected • not selected
Transfer	This button transfers the backup file to the selected shelf from either a workstation or the local NE. *Note:* If user selects "Local NE", the file to be restored will be identified in the Confirmation window.	• Work Station (Default) • Local NE
Load	This option is enabled once the transfer was successful. It loads the backup file to the selected shelf.	—
Commit	This option is enabled once the Load is completed. It commits the backup file to the selected shelf.	—
Cancel	This button is always enabled. It stops the process of transferring, loading, or committing the backup file to the selected shelf. You can click on the Cancel button to close this window.	—
Communications tab		
DCN Gateway Function Setting		
Shelf is DCN Gateway	When the check box is checked, this indicates that the shelf is connected to the DCN and the shelf is used as a DCN access point for the Optical Metro 5100/5200 system.	• selected • not selected

Table 7-44 (continued)
Configuration⎯**Naming or Communications**⎯**Shelf Configuration window**

Data field	Description	Value
External Routing Mode	Indicates how a GNE (i.e., DCN gateway) shelf interfaces with the DCN for routing IP packets between the DCN and remote Optical Metro 5100/5200 shelves. This parameter can only be set when the "Shelf is a DCN Gateway" check box is checked. Otherwise, its value is automatically set to NONE.	None, ProxyARP, OSPF, BGP For a definition of these values, see the "Data communications in the Optical Metro 5100/5200 network" chapter of *Network Planning and Link Engineering*, 323-1701-110.
Set...	If the external routing mode is OSPF or BGP, this button allows you to change the default values for OSPF or BGP. Clicking the button brings up the OSPF or BGP settings window.	Button. See "OSPF settings" and "BGP settings" below, in this table.

Table 7-44 (continued)
Configuration⎯Naming or Communications⎯Shelf Configuration window

Data field	Description	Value
Shelf Address	This field indicates the IP address of the shelf. Each shelf in a network must have a unique IP address. The IP address chosen for each shelf will depend on whether the Optical Metro 5100/5200 network will be configured with public IP addresses, used when the GNE shelves external routing mode is set to Proxy ARP, OSPF, or BGP, or private IP addresses, used when the GNE shelves external routing mode is set to None. *Note:* For more information, refer to the "Data communications in the Optical Metro 5100/5200 network" chapter of *Network Planning and Link Engineering,* 323-1701-110.	If the Gateway shelves are running Proxy ARP, OSPF, or BGP, all shelves must have an IP address visible from the DCN. When OSPF is running on the GNE shelves, the non-GNE shelves can be, but do not have to be, in the same subnet as the GNE shelves. When BGP is running on the GNE shelves, the non-GNE shelves cannot be in the same subnet as the GNE shelves. When Proxy ARP is running on the GNE shelf, all non-GNE shelves must be in the same subnet as the GNE shelf. If the GNE shelves external routing mode is set to None (private IP address configuration), non-GNE shelves are not visible from the customer DCN and may therefore be assigned private IP addresses. The recommended IP address in this case is 10.1.shelfID.1 (this is the default IP address set by the commissioning wizard). Not permitted: • any IP address with a first octet of "0" (0.nnn.nnn.nnn) • any IP address with a first octet of "127" (127.nnn.nnn.nnn) • any IP address with a first octet of "10" and a second octet of "0" (10.0.nnn.nnn) • any IP address with a first octet of "224 or greater" (224.n.n.n, 225.n.n.n, etc.)

Table 7-44 (continued)
Configuration—Naming or Communications—Shelf Configuration window

Data field	Description	Value
Primary Shelf Address	This field indicates the IP address of the primary node shelf in the Optical Metro 5100/5200 network. The primary shelf distributes network-level information across all the shelves in an Optical Metro 5100/5200 network. You use the primary node to add and remove other shelves in the Optical Metro 5100/5200 network. Assign all shelves in the network the same primary node address. *Note 1:* If you change the Primary IP address after it is in use in the network, the System Manager will not be able to receive shelf list changes or updates. The non-primary shelves will not be able to communicate with the primary shelf. Every non-primary shelf would need to be reconfigured to point to the new primary address. *Note 2:* If you have to change the IP address of the primary shelf for an in-service Optical Metro 5100/5200 network, and some shelves have their internal OSPF area ID set to the default value of 0.0.0.0, you can avoid a loss of contact by explicitly setting the OSPF area ID for these shelves to the current IP address of the primary shelf, before changing the IP address of the primary shelf.	Not permitted: • any IP address with a first octet of "0" (0.nnn.nnn.nnn) • any IP address with a first octet of "127" (127.nnn.nnn.nnn) • any IP address with a first octet of "10" and a second octet of "0" (10.0.nnn.nnn) • any IP address with a first octet of "224 or greater" (224.n.n.n, 225.n.n.n, etc.)

Table 7-44 (continued)
Configuration⎯Naming or Communications⎯Shelf Configuration window

Data field	Description	Value
Subnet Mask	This field sets the subnet mask for the shelf. The value of this field depends on whether the shelf is a GNE or non-GNE, and whether the Optical Metro 5100/5200 network is configured in a public IP address mode or a private IP address mode. ***Note:*** For more information, refer to the "Data communications in the Optical Metro 5100/5200 network" chapter of *Network Planning and Link Engineering,* 323-1701-110.	If the shelf is a GNE, the following applies: GNE shelves must be configured with a subnet mask of 30 bits or less (for example, 255.255.255.252). The size of the subnet is determined by the configuration of the DCN segment to which the GNE is connected. Also, when Proxy ARP is running on the GNE shelf, the subnet mask must be defined large enough to include all the LAN connected devices and all the Optical Metro 5100/5200 IP addresses in the subnetwork. If the shelf is a non-GNE and the network is configured to operate in public IP mode, the following applies: The recommended subnet mask is 32 bits (for example, 255.255.255.255), since only a single IP address from the DCN address space is needed for the shelf. The 10Base-T 1X port is assigned a private address, separate and distinct from the shelf address. Non-GNE shelves may be configured with a larger subnet by setting the subnet mask to 30 bits or less (for example, 255.255.255.252). In this case, the number of IP addresses that need to be allocated from the DCN address space corresponds to the size of the subnet assigned to the shelf. For example, with a subnet mask of 255.255.255.252, four IP addresses from the DCN address space are used (corresponding to the subnet address, the shelf address, an address allocated through DHCP, and the subnet broadcast address). In this configuration, the shelf address and the 10Base-T 1X port address are the same. Continued on next page.

Table 7-44 (continued)
Configuration⎯Naming or Communications⎯Shelf Configuration window

Data field	Description	Value
Subnet Mask (continued)		If the shelf is a non-GNE and the network is configured to operate in private IP mode, the following applies: The subnet mask of the non-GNE shelf must be set between 24 and 30 bits. The recommended value is a 30 bit mask (255.255.255.252) along with a shelf IP of 10.1.shelfID.1.
DHCP Address	The DHCP address is an IP address that allows you to connect a PC to the 10Base-T 1X port on the maintenance panel of the shelf. DHCP issues a lease on the craft interface, initially for 10 minutes and then subsequently renews it for one hour periods. If the craftsperson ends a session and explicitly releases the lease, the port is available for immediate reuse by another computer. If the lease is not explicitly given up, no other computer will be able to use that node until the lease expires. The original lease owner can, however, reconnect since their lease is still valid.	For a GNE shelf, must be "0.0.0.0". For a non-GNE shelf, address must be in the same subnet as shelf address. ***Note:*** When the subnet mask is set as 255.255.255.255, any DHCP address other than 0.0.0.0 causes an error message. Not permitted: • any IP address with a first octet of "0" (0.nnn.nnn.nnn) • any IP address with a first octet of "127" (127.nnn.nnn.nnn) • any IP address with a first octet of "10" and a second octet of "0" (10.0.nnn.nnn) • any IP address with a first octet of "224 or greater" (224.n.n.n, 225.n.n.n, etc.) To use the DHCP address at a non-GNE shelf: • enter an IP address within the subnet of the shelf • configure the System Manager computer to "Obtain an IP address automatically" in the TCP/IP Properties window of the Network Control Panel

Table 7-44 (continued)
Configuration⎯Naming or Communications⎯Shelf Configuration window

Data field	Description	Value
Default Gateway Address	This field sets the default gateway address. ***Note:*** For more information, refer to the "Data communications in the Optical Metro 5100/5200 network" chapter of *Network Planning and Link Engineering,* 323-1701-110.	This field is only set to a non-zero value on a DCN gateway shelf (GNE) that has its external routing mode set to 'Proxy ARP' or 'None'. If the DCN gateway shelf is running Proxy ARP, the following applies: If the System Manager is on the same subnet as the shelf, the Default Gateway Address is set to the shelf's IP address. If the System Manager computer is on a different subnet than the GNE shelf, the Default Gateway Address is set to the IP address of the IP router residing between the DCN and the GNE shelf. If the DCN gateway shelf external routing mode is set to None to operate in private IP address mode, the following applies: The Default Gateway address should be set to the address of the IP router residing between the DCN and the GNE shelf. If the shelf is not a DCN gateway, or is a DCN gateway running OSPF or BGP, the default gateway is set to 0.0.0.0. Not permitted: • any IP address with a first octet of "0" (0.nnn.nnn.nnn) • any IP address with a first octet of "127" (127.nnn.nnn.nnn) • any IP address with a first octet of "10" and a second octet of "0" (10.0.nnn.nnn) • any IP address with a first octet of "224 or greater" (224.n.n.n, 225.n.n.n, etc.)
Shelf Type	This field indicates the type of the shelf. ***Note:*** An OFA shelf can function as a network GNE when used in conjunction with an OSC.	• OADM • OFA • Mixed • terminal

Table 7-44 (continued)
Configuration⎯Naming or Communications⎯Shelf Configuration window

Data field	Description	Value
Communications tab		
Ethernet Hubbing Group	At a site, shelves connected together (either through an Ethernet hub using their 10Base-T 2X ports, or directly together using their 10Base-T 2X ports), must have the same Ethernet hubbing group value. Each site within the system must have a unique Ethernet hubbing group value. For sites with one shelf, a unique Ethernet hubbing group value must be provisioned. It is recommended that you assign a value to the Ethernet hubbing group that matches the Site Identifier value.	A number from 1 to 64.
Advanced...	This button opens a window which enables you to configure the Advanced Communications Settings, such as NAT and DNS.	Button. See "Advanced Communication settings" below, in this table.
Port control	This button opens a window which allows you to enable or disable the ports on the maintenance panel. If you disable all the ports on a shelf you cannot use the System Manager to access the shelf locally. You must access the shelf from another shelf in the network with the same band to enable the ports. If you disable all the ports on all the shelves in a network you must contact Nortel Networks Technical Support to reestablish a network surveillance connection. ***Note:*** Port control changes take effect immediately. No restart is required.	Button. See "Port enabling/disabling" below, in this table.
OSPF Settings (This dialog box allows you to modify the OSPF settings.)		
External Area ID	This field defines the OSPF area used for the customer DCN router interface. In this release, only OSPF backbone routers can be connected to the GNEs. This field is currently grayed out for future use.	Default: 0.0.0.0
Cost	This field indicates the cost of sending a data packet on the interface.	A number from 1 to 200. Default: 10.

Table 7-44 (continued)
Configuration—Naming or Communications—Shelf Configuration window

Data field	Description	Value
Password Enabled	This field indicates if there is a password assigned to the OSPF backbone. The password is for "simple password authentication".	Check box. If there is more than one GNE shelf in the network, you must choose Enabled in all GNE shelves.
Password	This field allows the authentication procedure to generate (or check) the incoming and outgoing OSPF packets.	Character string: 1 to 8 characters. If there is more than one GNE shelf in the network, you must assign the same password to all the GNE shelves on the same subnet.
Transit Delay	This field indicates the number of seconds to transmit a link state update packet over the 10Base-T 1X port.	A number from 1 to 100. Default: 1 second.
Retransmit Interval	This field indicates the number of seconds between link state advertisement retransmission.	A number from 1 to 100. Default: 5 seconds.
Hello Interval	This field indicates the number of seconds between Hello packets that the router sends on the interface.	A number from 1 to 1800. Default: 10 seconds. *Note:* All routers attached to the same subnet must have the same value.
Router Dead Interval	This field indicates the number of seconds before the router's neighbors determine that it is out-of-service (when they stop receiving the Hello packet from the router).	A number from 1 to 3600. Default: 40 seconds. *Note:* All routers attached to the same subnet must have the same value.
BGP Settings (This dialog box allows you to modify the BGP settings.)		
Local AS Number	This field indicates the autonomous system (AS) number assigned to the Optical Metro 5100/5200 system.	A number from 0 to 65535. Default: 0.
Local AS Weight	This field indicates the AS weight assigned to an AS in a path. AS weights provide a way either to prefer or to avoid routes that pass through certain AS(s). The path with the smallest total weight is the preferred path.	A number from 1 to 15, and 65535. Default: 10.
Peer 1 IP Address	This field indicates the IP address of the peering router.	IP address. Default: 0.0.0.0 The IP address has to be in the same subnet as the shelf IP address (Ethernet Port 1).

Table 7-44 (continued)
Configuration—Naming or Communications—Shelf Configuration window

Data field	Description	Value
Peer 1 AS Number	The Autonomous System Number assigned to the AS where the customer router is located.	A number from 0 to 65535. Default: 0.
Peer 2 IP Address	This field indicates the IP address of the peering router.	IP address. Default: 0.0.0.0 The IP address has to be in the same subnet as the shelf IP address (Ethernet Port 1).
Peer 2 AS Number	The Autonomous System Number assigned to the AS where the customer router is located	A number from 0 to 65535. Default: 0.
Retry Interval	This field indicates the retry interval for establishing a peer-to-peer session.	A number from 0 to 65535. Default: 120.
HoldDown Time	This field indicates the amount of time that a peer will wait for either a keep-alive or update message before declaring the connection is down.	A number from 0 to 65535. Default: 90 seconds.

Table 7-44 (continued)
Configuration⸺Naming or Communications⸺Shelf Configuration window

Data field	Description	Value
Advanced Communications Settings (This dialog box allows you to modify internal shelf settings.)		
OSPF Area ID	This field defines the OSPF area used for internal Optical Metro 5100/5200 communication. ***Note:*** Before changing the Primary Shelf Address in any of the shelves of an in-service Optical Metro 5100/5200 network, ensure that the OSPF Area ID is set to a value other than 0.0.0.0. Failure to do so results in a loss of IP routing capability between some of the shelves, which in turn results in a loss of contact with those shelves. Refer to the Primary Shelf Address parameter description above.	All shelves within an Optical Metro 5100/5200 network must have the same internal OSPF Area ID. When the External Routing Mode is not OSPF, then any value can be chosen for the internal OSPF Area ID since this parameter is only used internally. When the External Routing Mode is OSPF, then the internal OSPF Area ID must be chosen to ensure uniqueness within your overall network. If you are managing multiple Optical Metro 5100/5200 networks, each Optical Metro 5100/5200 network needs to have a unique internal OSPF Area ID. Nortel Networks recommends setting the internal OSPF Area ID to match the primary shelf IP address since this is often an easy way to ensure uniqueness. If you use the default value (0.0.0.0), the address of the primary shelf is used as the internal OSPF Area ID. However, if the primary shelf IP address is changed at a later date, then you can experience loss of contact between some of the shelves unless you follow the instructions in the Note in the Description column.
NAT settings (This field allows you to enable or disable the Inbound NAT feature and to set the Inbound NAT alias if Inbound NAT is in use)		
Inbound NAT Enabled	This field indicates if the Inbound NAT feature is enabled. The Inbound NAT feature is only applicable to GNEs in the Optical Metro 5100/5200 ring.	Check box. Default: disabled.

Table 7-44 (continued)
Configuration⸺Naming or Communications⸺Shelf Configuration window

Data field	Description	Value
Inbound NAT Alias	This field indicates the alias address provided by the user for Inbound NAT. One Optical Metro 5100/5200 network supports only one Inbound NAT alias for both single GNE and multiple GNE configurations. For a single GNE configuration, you can change the alias directly in the System Manager. However, for multiple GNE configurations, you must first turn off the inbound NAT alias on all the GNEs, then change the alias value on each individual GNE, and finally turn on the inbound NAT alias on the GNEs to avoid inconsistency. All the GNEs should use the same Inbound NAT alias value. After disabling the inbound NAT alias, you may need to directly connect to the GNE to configure the inbound NAT alias.	Any number from 1 to 126. Default: 47.
Set Port IPs...	Clicking the button opens the Assignable IP Settings window where you can assign the IP addresses for Ethernet port 2 and serial ports 1 and 2.	See "Assignable IP settings" in this table.
View/Set DNS...	Clicking the button opens the DNS Setting window where you can enable/disable Proxy Service, set the IP address of the DNS server, and set the DNS suffix.	See "DNS Setting" below, in this table.
Assignable IP settings (This dialog box allows you to assign the IP addresses for Ethernet port 2 and serial ports 1 and 2)		
Enet Port2 IP	IP address for 10BaseT 2X	IP address. Default: 0.0.0.0
Enet Port2 Mask	Subnet mask for 10BaseT 2X	IP address. Default: 0.0.0.0
Enet Port2 DHCP	DHCP address for 10BaseT 2X	IP address. Default: 0.0.0.0
Serial Port1 Local IP	DTE local	IP address. Default: 0.0.0.0
Serial Port1 Remote IP	DTE remote	IP address. Default: 0.0.0.0

Table 7-44 (continued)
Configuration⸺Naming or Communications⸺Shelf Configuration window

Data field	Description	Value
Serial Port2 Local IP (see Note)	DCE local	IP address. Default: 0.0.0.0
Serial Port2 Remote IP (see Note)	DCE remote	IP address. Default: 0.0.0.0
Note: Serial port 2 is not supported.		
DNS Settings This dialog box allows you to enable or disable Proxy Service, set the IP address of the DNS server, and the DNS suffix)		
Proxy Service	This field enables or disables the DNS proxy service.	• Enable • Disable
DNS Servers	IP address of the 1st and 2nd DNS servers	IP address. Default: 0.0.0.0
DNS Suffix	An optional field, this suffix is provided to a directly connected PC via DHCP. If the PC is configured correctly, this suffix is used whenever a non-FQDN requires name resolution.	A character string that can be any combination of letters and numbers, up to 128 characters.
Port enabling/disabling (This dialog box allows you to enable or disable the ports on the maintenance panel)		
Ethernet Port 1 – 10BASE-T 1X(This field enables communications using the 10Base-T 1X port.)		
I/O	Use this field to prevent access to the shelf by way of a connection to the customer's LAN.	• Enabled • Disabled
Alarm	This field enables or disables alarm reporting against Ethernet port 1.	• Enabled • Disabled
IP Forwarding	This field enables or disables IP forwarding on Ethernet port 1. When IP forwarding is disabled on Ethernet Port 1 of the GNE shelf, all IP access to the customer's DCN that is initiated from any remote shelf through Ethernet Port 1 of the GNE shelf, is blocked.	• Enabled • Disabled
Ethernet Port 2 – 10BASE-T 2X (This field enables communications using the 10Base-T 2X port.)		

Table 7-44 (continued)
Configuration⸺Naming or Communications⸺Shelf Configuration window

Data field	Description	Value
I/O	Use this field to prevent access to the shelf by way of a PC or laptop connected to the 10Base-T 2X port. You impact network surveillance if Ethernet port 2 is disabled on a shelf at a site where shelves connect to an Ethernet hub by way of the 10Base-T 2X port. The System Manager can monitor only shelves with the same band as that of the host shelf (if the shelf is the same band as the shelf with the 10Base-T 2X port disabled) or all of the other bands in the network (if the shelf is a different band than the shelf with the 10Base-T 2X port disabled).	• Enabled • Disabled
Alarm	This field enables or disables alarm reporting against Ethernet port 2.	• Enabled • Disabled
Access Ctrl	This field enables or disables access control on Ethernet port 2. Choose None to disable access control, choose Filter to filter unrecognized incoming packets, choose Encrypt to reject unencrypted incoming packets and to encrypt outgoing packets.	• None • Filter • Encrypt
Serial Port 1 – RS232/V24 1 (DTE) (This field disables communications using the RS232/V24 1 (DTE) port.)		
I/O	Use this field to prevent access to the shelf by way of a dial-up modem.	• Enabled • Disabled
Serial Port 2 – RS232/V24 2 (DCE) (This field disables communications using the RS232/V24 2 (DCE) port.)		
I/O (see Note)	Use this field to prevent access to the shelf by way of a communication port on a PC or laptop.	• Enabled • Disabled
Note: Serial port 2 is not supported. Nortel Networks recommends this port be disabled.		
Time tab (This field allows you to modify the date and time on a shelf)		
Date		
Year	This field indicates the year.	0000 to 9999
Month	This field indicates the month.	01 to 12

Table 7-44 (continued)
Configuration⎯**Naming or Communications**⎯**Shelf Configuration window**

Data field	Description	Value
Day	This field indicates the day.	01 to 31
Time		
Hour	This field indicates the hour.	00 to 23
Minute	This field indicates the minute.	00 to 59
Second	This field indicates the second.	00 to 59

Configuration—Surveillance tab

Table 7-45 describes the data fields in the Configuration—Surveillance tab.

Table 7-45
Configuration—Surveillance tab

Data field	Description	Value
External Manager		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
Index		1 through 8
Type		• per shelf • ringwide
IP Address	This field indicates the IP address of the external management application.	A valid IP address.
Port	This field determines which port the traps are sent to at the IP address of the external manager.	e.g., 162
Community	This field allows you to configure the community name in traps sent to the external manager.	e.g., public
Filter	This field determines what traps are sent to the external manager.	• All (alarms/events/user requests) • Alarms only • Alarms/events only • Service affecting alarms only • Service affecting alarms plus AIS, RDI and PM

Table 7-45 (continued)
Configuration—Surveillance tab

Data field	Description	Value
Include security events/alarms	This field indicates whether security events/alarms are included as part of the traps sent to the external manager.	• Yes • No
Audible Alarm		
Two radio buttons that indicate whether the audible alarm is enabled or disabled.		• Enable • Disable
Actions		
An icon of a muted speaker appears when the Audible Alarm is disabled.		• Crossed out, if audible alarms are disabled • Not crossed out, if audible alarms are enabled.
Alarm cut off	This button allows you to disable audible alarms. Confirm Audible Alarm Cutoff dialog box opens.	• Yes • No
Lamp test	Button for activating a lamp test.	• Yes • No

Configuration—Surveillance tab—External Manager Entry

When you right-click and select Modify or double-click on an entry or a line in the surveillance tab of the Configuration window, the External Manager Entry dialog appears. Table 7-46 describes the data fields.

You can add an address for Simple Network Management Protocol (SNMP) trap forwarding using the External Manager entry window.

Table 7-46
Configuration—Surveillance—External Manager Entry window

Data field	Description	Value
Location		
Shelf	This field indicates the user-assigned name of the shelf.	A name, e.g., Head Office.
SNMP Trap Forwarding		
Manager IP Address	This field indicates the IP address of the external management application.	A valid IP address.

Table 7-46 (continued)
Configuration—Surveillance—External Manager Entry window

Data field	Description	Value
Trap Port	This field determines which port the traps are sent to at the IP address of the external manager.	e.g., 162
Trap Community	This field allows you to configure the community name in traps sent to the external manager.	e.g., public
Filter	This field determines what traps are sent to the external manager.	• All (alarms/events/user requests) • Alarms only • Alarms/events only • Service affecting alarms only • Service affecting alarms plus AIS, RDI and PM
Include security events/alarms	This check box indicates whether security events/alarms are included in the traps sent to the external manager.	• selected • not selected

Configuration—Shelf List window

Table 7-47 describes the data fields in the Configuration—Shelf List window. Select the **Refresh** button to refresh this window. Select the **Delete** button to delete the selected shelf. To reorder a shelf list, right-click on a shelf and select Order Shelves....

Table 7-47
Configuration—Shelf List window

Data field	Description	Value
Site Name	This field indicates the user-assigned name of the site. Nortel Networks recommends that all shelves at a site have the same site name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field indicates the user-assigned name of the shelf. Nortel Networks recommends that each shelf in a ring have a different descriptive shelf name, such as Surveillance Site Band 3.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site ID	This field indicates the user-assigned number of the site and is used to group shelves logically in the System Manager.	A number from 1 to 64. Assign shelves at the seamed site to site number 1. Assign the other sites in the ring to the next available number.
Shelf ID	This field indicates the user-assigned unique ID of the shelf. Assign one number to one shelf only	A number from 1 to 64. Use shelf ID 1 to 8 for shelves at the seamed site. Use Shelf ID 9 to 64 for other shelves.
Shelf IP	This field indicates the shelf IP address.	IP address, e.g., 172.16.283.57

Configuration—Shelf List window—Arrange Shelves window

When you right-click on a highlighted line in the Shelf List window and select Order Shelves..., the Arrange Shelves window appears. Table 7-48 describes the data fields in the Configurations—Shelf List—Arrange Shelves window.

Table 7-48
Configuration—Shelf List—Arrange Shelves window

Data field	Description	Value
Site Name	This field indicates the user-assigned name of the site. Nortel Networks recommends that all shelves at a site have the same site name.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field indicates the user-assigned name of the shelf. Nortel Networks recommends that each shelf in a ring have a different descriptive shelf name, such as Surveillance Site Band 3.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site ID	This field indicates the user-assigned number of the site and is used to group shelves logically in the System Manager.	A number from 1 to 64. Assign shelves at the seamed site to site number 1. Assign the other sites in the ring to the next available number.
Shelf ID	This field indicates the user-assigned unique ID of the shelf. Assign one number to one shelf only	A number from 1 to 64. Use shelf ID 1 to 8 for shelves at the seamed site. Use Shelf ID 9 to 64 for other shelves.
Shelf IP	This field indicates the shelf IP address.	IP address, e.g., 172.16.283.57
Shelf Order	This field indicates the order of the highlighted shelf in the shelf list.	A number from 1 to 64.
Up	This field allows the user to move the selected shelf up. For a multiple-site ring, when the top shelf within the site is selected and the Up button is pressed, all the shelves of the site move up.	—
Down	This field allows the user to move the selected shelf down. For a multiple-site ring, when the bottom shelf within the site is selected and the Down button is pressed, all the shelves of the site move up.	—
Group Shelves By Site	This field allows the user to group all the shelves by site.	—

Admin window

Use the Admin window to view information about software upgrades and shelf administration.

Admin—Software upgrade window

Table 7-49 describes the data fields in the Admin—Software Upgrade window. To refresh this window, click the **Refresh** button.

Table 7-49
Admin—Software Upgrade window

Data field	Description	Value
All shelves	When this check box is selected, all shelves with the same site ID are listed.	• selected • not selected
Site Name	This field indicates the name of the site where the shelf you are upgrading is located.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field indicates the name of the shelf whose software you need to upgrade. Select a shelf name by clicking up and down arrows.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf ID	This field indicates the unique user-assigned ID of the shelf. Assign one number to one shelf only.	A number from 1 to 64. Use shelf ID 1 to 8 for shelves at the seamed site. Use Shelf ID 9 to 64 for other shelves.
Type	This field indicates the type of shelf with respect to the software loads required to upgrade it.	• OADM • OFA • Mixed

Table 7-49 (continued)
Admin—Software Upgrade window

Data field	Description	Value
Version	This field indicates the current version of the software.	• Release *n.n* • Unknown
State	This field indicates the current state of the software.	• Uncommitted • Committed • CommitInProgress • BackoutDone • BackoutInProgress • BackupOriginalLoadInProgress • BackupOriginalLoadDone • DistributingShelfLoad • DistributeLoadFailed • ShelfDistributionComplete • TransferDone • TransferInProgress • WaitForRestoreOriginalLoad • RestoreOriginalLoadInProgress
2nd Load	This field indicates the load of the software to which you are upgrading the shelf during the upgrade process. If the shelf is in uncommitted state, this field indicates the load which the shelf can be backed out to.	Version number of the software. e.g., 4.1.13.2

Software Upgrade command and menu options

Table 7-50 describes the command and menu options available when you right-click on a shelf in the Software Upgrade window.

Table 7-50
Software Upgrade command and menu options

Menu option	Description	Value or range
Health Check	This option starts Health Check for the selected shelf.	—
Report	This option is for saving and retrieving Health Check reports.	—
Missing Library	This option updates the SP circuit pack with missing data and clears Missing Library alarms after an SP only upgrade.	—

Table 7-50 (continued)
Software Upgrade command and menu options

Menu option	Description	Value or range
Backup Original Load	This option backs up the current load on the shelf to a PC.	—
Transfer	This option transfers selected catalog files during an upgrade.	—
Distribute Load	This option distributes the new software load to all circuit packs on the shelf.	—
Cancel	This option allows the user to terminate a software upgrade that is in progress.	—
Restart	This option restarts the shelf after a software upgrade.	—
Commit	This option commits the target shelf or shelves to the new software load.	—
Backout	This option backs out the new load to the original load. A restart is necessary following this option.	—
Restore Original Load	This option transfers the original load back to the shelf after a software upgrade is canceled.	—

Admin—NE Admin window

Table 7-51 describes the data fields in the Admin—NE Admin window. To refresh this window, click the **Refresh** button.

Table 7-51
Admin—**NE Admin window**

Data field	Description	Value
Site Name	This field indicates the name of the site where the shelf you are administrating is located.	A character string that can be any combination of letters and numbers, up to 31 characters
Shelf Name	This field indicates the user-assigned name of the shelf.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site ID	This field indicates the user-assigned number of the site and is used to group shelves logically in the System Manager.	A number from 1 to 64. Assign shelves at the seamed site to site number 1. Assign the other sites in the ring to the next available number.

Table 7-51 (continued)
Admin⎯NE Admin window

Data field	Description	Value
Shelf ID	This field indicates the user-assigned unique ID of the shelf. Assign one number to one shelf only.	A number from 1 to 64. Use shelf ID 1 to 8 for shelves at the seamed site. Use Shelf ID 9 to 64 for other shelves.
Shelf IP	This field indicates the shelf IP address.	IP address, e.g., 172.16.283.57
ALS	This field indicates if ALS is enabled or not.	• Yes • No
ALR	This field indicates if ALR is enabled or not.	• Yes • No
Passive Slot Numbering	This field indicates if the user-assigned slot numbering for passive devices is enabled or not.	• Yes • No

NE Admin command and menu options

Table 7-52 describes the command and menu options available when you right-click on a shelf in the NE Admin window.

Table 7-52
NE command and menu options

Menu option	Description	Value
Restart	This option allows you restart a shelf. When you select this command, the Restart Shelf Confirmation dialog box appears.	—
Decommission	This option allows you decommission a shelf. When you select this command, the Confirm Shelf Decommission Delete dialog box appears.	—
Lamp Test	This option allows you to perform a lamp test. When you select this command, the Confirm Lamp Test dialog box appears.	—
Audible Alarm	This option allows you to enable or disable audible alarms. When you select this command, the Audible Alarms dialog box appears.	—
Auto Laser Shutdown	This option allows you to enable or disable the automatic laser shutdown or recovery feature. This option also allows you to enable the manual laser recovery.	• Select Enable/Disable to open the Auto. Laser Shutdown Enable/Disable window. • Select Manual Restore to open the Auto. Laser Shutdown Manual Restore window.

Table 7-52 (continued)
NE command and menu options

Menu option	Description	Value
Remote Fault Notification	This option allows you to enable or disable remote fault notification.	See Remote Fault Notification below, in this table
Passive Slot Numbering	This option allows you to enable or disable the passive slot numbering feature. When you select this command, the Passive Slot Numbering dialog box appears. If you enable Passive Slot Numbering, you can assign slot numbers to passive devices.	See Passive Slot Numbering below, in this table
Auto. Laser Shutdown Enable/Disable (This dialog box allows you to enable or disable ALS and ALR).		
Network Name	This field indicates the name of the network. This field is greyed out.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site Name	This field indicates the user-assigned name of the site. This field is greyed out	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field indicates the user-assigned name of the shelf. This field is greyed out	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Description	This field displays a description of the shelf. This field is greyed out	A character string that can be any combination of letters and numbers, up to 63 characters.
Auto. Laser Shutdown	Two radio buttons that indicate whether the automatic laser shutdown feature is enabled or disabled on the shelf.	• Enable • Disable
Auto. Laser Recovery	Two radio buttons that indicate whether the automatic laser recovery feature is enabled or disabled on the shelf. *Note:* This field is greyed out if Auto. Laser Shutdown is set to Disable.	• Enable • Disable
Auto. Laser Shutdown Manual Restore (This dialog box allows you to manually activate the laser after ALS).		
Network Name	This field indicates the name of the network. This field is greyed out.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site Name	This field indicates the user-assigned name of the site. This field is greyed out	A character string that can be any combination of letters and numbers, up to 31 characters.

Table 7-52 (continued)
NE command and menu options

Menu option	Description	Value
Shelf Name	This field indicates the user-assigned name of the shelf. This field is greyed out	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Description	This field displays a description of the shelf. This field is greyed out	A character string that can be any combination of letters and numbers, up to 63 characters.
Auto. Laser Shutdown	When clicking on the Manual Restore button, the laser recovery is manually activated on the shelf *Note:* This field is greyed out if Auto. Laser Shutdown is set to Disable.	An ALS window informs the status of the manual recovery
Remote Fault Notification (This dialog box allows you to manually enable remote fault notification).		
Network Name	This field indicates the name of the network. This field is greyed out.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site Name	This field indicates the user-assigned name of the site. This field is greyed out	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Name	This field indicates the user-assigned name of the shelf. This field is greyed out	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Description	This field displays a description of the shelf. This field is greyed out	A character string that can be any combination of letters and numbers, up to 63 characters.
Remote Fault Notification	This option allows you to enable or disable remote fault notification. When you enable remote fault notification on the far-end node and a service affecting alarm is raised on the far-end node, a service affecting alarm is also raised on the near-end node.	• Enable • Disable
Passive Slot numbering (This dialog box allows you to enable or disable the passive slot numbering).		
Network Name	This field indicates the name of the network. This field is greyed out.	A character string that can be any combination of letters and numbers, up to 31 characters.
Site Name	This field indicates the user-assigned name of the site. This field is greyed out	A character string that can be any combination of letters and numbers, up to 31 characters.

Table 7-52 (continued)
NE command and menu options

Menu option	Description	Value
Shelf Name	This field indicates the user-assigned name of the shelf. This field is greyed out	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf Description	This field displays a description of the shelf. This field is greyed out	A character string that can be any combination of letters and numbers, up to 63 characters.
Passive Slot Numbering	This option allows you to enable or disable the passive slot numbering feature. When you select this command, the Passive Slot Numbering dialog box appears. If you enable Passive Slot Numbering, you can assign slot numbers to passive devices.	• Enable • Disable

Performance Monitor window

Use the Performance Monitor window to view, set, or modify performance parameter values and enable or disable TCA reporting.

Performance Monitor—Launch PMs window

Table 7-53 describes the data fields in the Performance Monitor—Launch PMs window. Select the Performance Monitor tab to view this window.

Note: If the Auto Launch check box is deselected, click on the Launch button to open the Optical Metro Performance Monitor window.

Table 7-53
Performance Monitor—Launch PM window

Data field	Description	Value
Launch	This field launches the Performance Monitor portion of System Manager.	Button. See Table 7-55 on page 7-137.
Auto Launch	This checkbox when selected automatically launches the Performance Monitor portion of System Manager each time the Performance Monitor tab is selected for the remainder of the System Manager session.	• Selected • Not selected

Table 7-54 describes the command and menu options for the Optical Metro Performance Monitor window.

Table 7-54
Optical Metro Performance Monitor command and menu options

Menu	Menu option	Description	Value or range
File	Save As	This option saves the contents of the query results display.	—
	Print	This option prints the contents of the query results display.	—
	Exit	This option exits the performance monitor portion of System Manager.	Yes or No
Edit	Shelf Level Parameters	This option displays the Shelf Level PM portion of the screen. Select to perform shelf level operations.	See Shelf Level Parameters in Table 7-54.
	Card Level Parameters	This option displays the Card Level PM portion of the screen. Select to perform card level operations such as reset Generic and Ethernet OM counts.	See Card Level Parameters in Table 7-59.

Table 7-54 (continued)
Optical Metro Performance Monitor command and menu options

Menu	Menu option	Description	Value or range
View	Details/Modify attributes	This option displays the details of the currently selected row in the Query Results display. If the Equipment PM tab is selected, you can view/modify (where applicable) the User, Degrade, and Fail Thresholds. If the Facility PM tab is selected, you can view/modify (where applicable) the Current count, Historical counts, and Threshold.	See Details for equipment PMs or Details for facility PMs in Table 7-55.
	Remove from list	This option removes the selected rows from the query results display.	—
	Refresh selected row	This option refreshes the currently selected row in the query results display.	—
	Refresh all rows	This option refreshes all rows in the query results display.	—
	Sort order...	This option sorts the order in which PM Query Results are presented for multiple columns.	Columns Select an item, for example, Shelf or Slot.
			Sort Order Select one of the following: • None • Ascending • Descending
Query	New	This option clears the query results portion of the screen for a new query.	—
	Refresh Shelf List	This option updates the current shelf list.	—
	Retrieve	This option retrieves the PM data for the parameters and location specified in the query criteria display.	—

Table 7-55 describes the data fields in the Optical Metro Performance Monitor window.

Table 7-55
Optical Metro Performance Monitor window

Data field	Description	Value
Location		
NE	This field indicates the name of the shelf for which you want to view PMs. Click the arrow to display the list of shelves available in the same ring.	Alphanumeric string.
Direction	This field indicates the direction of the circuit pack for which you want to display PMs.	• Rx • Tx
Slot	This field indicates the slot number of the circuit pack for which you want to view PMs. Click the arrow to choose from the list of possible slot numbers.	An integer value from 1 to 20.

Port	This field indicates the port for which you want to view PMs. Click the arrow to choose from the list of possible ports.	• n optical
		  where n = 1...11
		• m wan
		  where m = 1...10
		• t optical/paths
		  where m = 1...10
		• 1 CS
		• 2 LS
		• aggr/paths
		• all

Performance Parameters		
Select All	Use this field to select all performance parameters displayed in the Performance Parameters display window.	• selected • not selected
Unselect All	Use this field to deselect all previously selected performance parameters in the display.	• selected • not selected
Performance Parameters display	This field displays all performance parameters associated with the selected shelf, slot, port and direction. You can select each parameter individually.	Character strings representing applicable performance parameters, each with a selection box.

Table 7-55 (continued)
Optical Metro Performance Monitor window

Data field	Description	Value
Output Options		
Create New List	Select this option to display the specified PM data on a fresh list in the query results display.	• selected • not selected
Append to Current List	Select this option to append the specified PM data to an existing list in the query results display.	• selected • not selected
Retrieve	This button retrieves the PM data for the performance parameters and location specified in the query criteria display and places the results in the query results display.	—
Equipment PM Query Results (select Equipment tab)		
Shelf	This field indicates the name of the selected shelf.	Alphanumeric string
Slot	This field indicates the slot number of the circuit pack for the particular row.	An integer value from 1 to 20

Port	This field indicates the port of the circuit pack that is associated with the performance parameter for the row.	• n optical
		  where n = 1...11
		• m wan
		  where m = 1...10
		• t optical/paths
		  where m = 1...10
		• 1 CS
		• 2 LS
		• aggr/paths
		• all

Direction	This field indicates the direction associated with the performance parameter for the row.	• Rx • Tx
Parameter	This field indicates the equipment performance parameter reported on for a particular row.	• RxPowerHigh • RxPowerLow • TxPowerHigh • TxPowerLow
Current Reading	This field indicates the current value of the performance parameter for the row.	• An integer value • not available dBm

Table 7-55 (continued)
Optical Metro Performance Monitor window

Data field	Description	Value
Degrade Threshold	This field displays the current value of the performance parameter only if it falls within the degrade range. Otherwise, this field displays a not available message. *Note:* The APBE Degrade Threshold is set by the system based on the power target that you set for a facility.	• An integer value • not available
Fail Threshold	This field displays the current value of the performance parameter only if it falls within the fail range. Otherwise, this field displays a not available message. *Note:* The APBE Fail Threshold is set by the system based on the power target that you set for a facility.	• An integer value • not available
User Threshold	This field displays the user-defined thresholds.	• An integer value • not available
User TCA Status	This field displays the status of TCA reporting for user thresholds.	• enabled • disabled
Facility PM Query Results (select Facility tab)		
Shelf	This field indicates the name of the selected shelf.	Alphanumeric string
Slot	This field indicates the slot number of the circuit pack for the particular row.	An integer value from 1 to 20

Port	This field indicates the port of the circuit pack that is associated with the performance parameter for the row.	• *n* optical
		  where *n* = 1...11
		• *m* wan
		  where *m* = 1...10
		• *t* optical/paths
		  where *m* = 1...10
		• 1 CS
		• 2 LS
		• aggr/paths
		• all

Direction	This field indicates the direction associated with the performance parameter for the row.	• Rx • Tx

Table 7-55 (continued)
Optical Metro Performance Monitor window

Data field	Description	Value
Parameter	This field indicates the facility performance parameter reported on for a particular row.	Character strings representing applicable facility performance parameters. See the "Facility performance monitoring" on page 3-25.
Interval	This field indicates the time interval of the PM count for a particular row.	• 15 Min • 1 Day • Untimed
Current Count	This field indicates the current count of the performance parameter for the selected row.	An integer value
IDF (Invalid Data Flag)	This field displays a period (.) to indicate that the current count for a particular row is valid, or it displays a question mark (?) to indicate that the validity of the count is questionable.	• . • ?
Threshold	This field indicates the threshold value that, once crossed, raises an warning or alarm. If the interval is untimed, a not applicable message is displayed.	• An integer value • not applicable
TCA	This field indicates if the count has crossed the threshold value.	• Yes • No • not applicable
TCA Status	This field indicates the status of the TCA.	• enabled • disabled • not applicable
Time Stamp	This field indicates the time and date of the count for a particular row.	e.g. 06:15:00 2001/05/18
Generic OM Query Results (select Generic OMs tab)		
Shelf	This field indicates the name of the selected shelf.	Alphanumeric string.
Slot	This field indicates the slot number of the circuit pack for the particular row.	An integer value from 1 to 8 and 11 to 20.

Table 7-55 (continued)
Optical Metro Performance Monitor window

Data field	Description	Value

Port	This field indicates the port of the circuit pack that is associated with the operational measurement for the row.	• *n* optical
		  where *n* = 1...11
		
		• *m* wan
		  where *m* = 1...10
		
		• *t* optical/paths
		  where *m* = 1...10
		
		• 1 CS
		
		• 2 LS
		
		• aggr/paths
		
		• all

Parameter	This field indicates the facility performance parameter reported on for a particular row.	Character strings representing applicable facility performance parameters. See the "Facility performance monitoring" on page 3-25.
Interval	This field indicates the time interval of the PM count for a particular row.	• 15 Min • 1 Day • Untimed
Current Count	This field indicates the current count of the performance parameter for the selected row.	An integer value
IDF	This field displays a period (.) to indicate that the current count for a particular row is valid, or it displays a question mark (?) to indicate that the validity of the count is questionable.	• . • ?
Timestamp	This field indicates the time and date of the count for a particular row.	e.g. 06:15:00 2001/05/18
Ethernet OM Query Results (select Ethernet OMs tab)		
Shelf	This field indicates the name of the selected shelf.	Alphanumeric string.
Slot	This field indicates the slot number of the circuit pack for the particular row.	An integer value from 1 to 8 and 11 to 20.
Port	This field indicates the port of the circuit pack that is associated with the operational measurement for the row.	—

Table 7-55 (continued)
Optical Metro Performance Monitor window

Data field	Description	Value
Parameter	This field indicates the facility performance parameter reported on for a particular row.	Character strings representing applicable facility performance parameters. See the "Facility performance monitoring" section in this document.
Interval	This field indicates the time interval of the PM count for a particular row.	• 15 Min • 1 Day • Untimed
Current Count	This field indicates the current count of the performance parameter for the selected row.	An integer value
IDF	This field displays a period (.) to indicate that the current count for a particular row is valid, or it displays a question mark (?) to indicate that the validity of the count is questionable.	• . • ?
Timestamp	This field indicates the time and date of the count for a particular row.	e.g. 06:15:00 2001/05/18

When you right-click on a highlighted line in the Equipment PM Query Results or Facility PM Query Results window and select View Details/Modify Attributes, the Details window is displayed. Table 7-56 describes the data fields for equipment PMs.

Table 7-56
Optical Metro Performance Monitor—Details for Equipment PM Query Results

Data field	Description	Value
Details for equipment PMs		
User Threshold/Degrade Threshold/Fail Threshold tab		
Current Threshold	This field displays the current threshold value for the selected performance parameter.	An integer value

Table 7-56
Optical Metro Performance Monitor—Details for Equipment PM Query Results

Data field	Description	Value
Set to default threshold	This field, if selected, sets the threshold value for the selected performance parameter to the factory default. *Note:* This field is greyed out by default for Degrade Threshold and Fail Threshold tabs.	• selected • not selected
TCA enabled for current	This field, if selected, sets the threshold value for the selected performance parameter to the factory default. *Note:* This field is selected and greyed out by default for Degrade Threshold and Fail Threshold tabs.	• selected • not selected
TCA Description	This field provides a description of the TCA. This field is greyed out.	• Character string • not available

When you right-click and select View Details/Modify Attributes on a line in the Facility tab of the Optical Metro Performance Monitor window, the Details dialog appears. Table 7-57 describes the data fields for facility PMs.

Table 7-57
Optical Metro Performance Monitor—Details for Facility PM Query Result

Data field	Description	Value
Details for facility PMs		
Historical counts tab (this tab is only visible if the Current Count or TCA is greater than 0 and the Interval selected is not Untimed)		
Time Stamp	This field displays the time and date of the count for a particular interval.	e.g. 06:15:00 2001/05/18
IDF	This field displays a period (.) to indicate that the count is valid, or it displays a question mark (?) to indicate that the validity of the count is questionable.	• . • ?
Count	This field indicates the count of the performance parameter for the interval.	An integer value.
Current count tab (this tab is only visible if the Current Count or TCA is greater than 0)		
Reset current and historical counts	This field, if selected, resets the current and historical counts for the performance parameter to zero.	• selected • not selected

Table 7-57 (continued)
Optical Metro Performance Monitor—Details for Facility PM Query Result

Data field	Description	Value
Reset current count	This field, if selected, resets the current count of the performance parameter to zero.	• selected • not selected
Threshold tab		
Current threshold	This field displays the current threshold value for the selected performance parameter.	An integer value.
Set to default threshold	This field, if selected, sets the threshold value for the selected performance parameter to the factory default.	• selected • not selected
TCA enabled for current	This field, if selected, raises the appropriate TCA alarm when the value displayed in the Current Threshold field is crossed.	• selected • not selected
TCA Description	A display field that shows the selected performance parameter and interval.	A character string.
TCA port/direction operations	Select an option to enable or disable all TCA reporting on all facility performance parameters associated with a specified interval, port, or direction.	• Enable TCA for all counts • Disable TCA for all counts • not selected
1st drop list	Select an option to define the interval for which you intend enable or disable TCA reporting. You must make a selection from the 1st drop-list to enable the 2nd drop-list.	• for both intervals • for 15 Min • for 1 Day
2nd drop list	Select an option to define the direction for which you intend to enable or disable TCA reporting. You must make a selection from the 1st drop-list to enable the 2nd drop-list.	• at current direction • at current port

When you select Shelf level parameters from the Edit menu, the Shelf Level Parameters dialog appears. Table 7-58 describes the Shelf Level Parameters data fields.

Table 7-58
Optical Metro Performance Monitor—Shelf Level Parameters

Data field	Description	Value
Shelf Level Parameters		
Reset all PP counts	This field, if selected, resets all current and historical facility counts on the shelf to zero.	• selected • not selected
Set all 15 Min thresholds to default	This field, if selected, sets all 15 Min thresholds on the shelf to the factory default values.	• selected • not selected
Set all 1 Day thresholds to default	This field, if selected, sets all 1 Day thresholds on the shelf to the factory default values.	• selected • not selected
Set all User thresholds to default	This field, if selected, sets all user-defined thresholds to the default value.	• selected • not selected
Reset all OM counts	This field, if selected, resets the OM counts for the performance parameter to zero.	• selected • not selected
Facility TCA Type	Select a facility TCA type.	• Alarm (default) • Event • Summary Alarm • Summary Event
TCA for all 15 Min counts	Select the appropriate field to enable, disable or retain the current TCA settings for all 15 Min counts on the shelf.	• Keep current settings • Enable • Disable
TCA for all 1 Day counts	Select the appropriate field to enable, disable or retain the current TCA settings for all 1 Day counts on the shelf.	• Keep current settings • Enable • Disable
TCA for User thresholds	Enable or disable TCA reporting for user thresholds.	• Keep current settings • Enable • Disable
Zero Suppression	This field allows the reporting of the PM Zero Suppression.	• SDH Zero Suppression • No Zero Suppression • All Zero Suppression

When you select Card level parameters from the Edit menu, the Card Level Parameters dialog appears. Table 7-59 describes the Card Level Parameters data fields.

Table 7-59
Performance Monitor—Card Level Parameters

Data field	Description	Value
Card Level Parameters		
Reset all 15 Min counts	This field, if selected, resets all 15 minute counts to zero.	• selected • not selected
Reset all 1 Day PM counts	This field, if selected, resets all 1 day counts to zero.	• selected • not selected
Reset all Untimed PM counts	This field, if selected, resets all untimed counts to zero.	• selected • not selected
Reset all 15 Min OM counts	This field, if selected, resets all 15 minute OM counts to zero.	• selected • not selected
Set all 15 Min thresholds to default	This field, if selected, sets all 15 minute thresholds to the factory default values.	• selected • not selected
Set all 1 Day thresholds to default	This field, if selected, sets all 1 day thresholds to the factory default values.	• selected • not selected
Set all User thresholds to default	This field, if selected, sets all user-defined thresholds to the default value.	• selected • not selected
Reset all 1 Day OM counts	This field, if selected, resets all 1 day OM counts to zero.	• selected • not selected
TCA for all 15 Min counts	Select the appropriate field to enable, disable or retain the current TCA settings for all 15 Min counts.	• Keep current settings • Enable • Disable
TCA for all 1 Day counts	Select the appropriate field to enable, disable or retain the current TCA settings for all 1 Day counts.	• Keep current settings • Enable • Disable
TCA for User thresholds	Enable or disable TCA reporting for user thresholds.	• Keep current settings • Enable • Disable
Reset all Untimed OM counts	This field, if selected, resets all untimed OM counts to zero.	• selected • not selected

Troubleshooting window

Use the Troubleshooting window to obtain additional information during troubleshooting. You can view data from IP routing and interface statistic tables. This feature is only supported in System Manager.

Note: Customer1 and Customer2 user classes do not have the privileges to view the information provided in this window.

Troubleshooting—IP Routing Table window

Table 7-62 describes the data fields in the Troubleshooting— IP Routing Table window. To refresh this window, click the Refresh button.

Table 7-60
Troubleshooting—IP Routing Table window

Data field	Description	Value
Shelf Name	This field indicates the user-assigned name of the shelf.	A character string that can be any combination of letters and numbers, up to 31 characters.
Destination	This field indicates the destination IP address.	Standard dot notation.
Subnet Mask	This field indicates the network mask of the shelf. The shelf mask segments the shelf from other shelves in the network.	IP address mask, e.g., 255.255.0.0
Next Hop	This field indicates the IP address of the next hop to the destination.	Standard dot notation.
Type	This field indicates the routing type to the GNE. direct: route to directly connected network/subnetwork indirect: route to non-local host/network/subnetwork invalid: an invalidated route other: none of the above	• direct • indirect • invalid • other
Protocol	This field indicates the routing mechanism from which the route was learned.	• bgp • local • ospf • other

Troubleshooting—Interface Statistics window

Table 7-62 describes the data fields in the Troubleshooting— IP Routing Table window. To refresh this window, click the **Refresh** button.

Table 7-61
Troubleshooting—Interface Statistics window

Data field	Description	Value
Shelf Name	This field indicates the user-assigned name of the shelf.	A character string that can be any combination of letters and numbers, up to 31 characters.
Description	This field describes the interface as; • cpm: cpm1 and cpm2 are the 1X-Ethernet port and 2X-Ethernet port, respectively. • lo: local interface. lo0 is a standard loopback interface and is always present. In cases where the shelf address mask is set to 32 bits (255.255.255.255), there is an additional loopback interface (lo1) which holds the shelf address. • ppp: ppp0 and ppp1 are Point-to-Point Protocol interfaces corresponding to the Serial-1 and Serial-2 ports, respectively. • tsb0: interface to the SBUS (serial bus) which is used for intra-shelf communications. This bus is modelled as an Ethernet. *Note:* For the tsb0 interface, the interface type field indicates Ethernet since the SBUS is modelled as an Ethernet. • vif: virtual interface (VIF) is a group of one or more PPP-based overhead channels from a given shelf to the same destination shelf. A vif only includes channels of like OSPF cost. For example, if there are four OCLD overhead channels between two shelves of the same band, those four channels are grouped as a single VIF, such as "vif0". If there is also an OSC channel between the same two shelves, this would be a separate VIF, such as "vif1". As they are created, the VIFs are numbered sequentially, starting from zero. VIFs use the SBUS (serial bus) to pass packets to the OCLD/OSC/OTR/Muxponder circuit packs in the shelf which, in turn, forward the packets to the respective remote shelf. The channels in a given VIF are used in a round-robin fashion. *Note:* Since a VIF uses the SBUS, which is modelled as an Ethernet, the interface type for a VIF is Ethernet.	• cpm1 • cpm2 • lo0 • lo1 • ppp0 • ppp1 • tsb0 • vif0...
Internet Address	This field indicates the internet address of the interface in decimal form	IP address, e.g., 10.2.1.3

Table 7-61 (continued)
Troubleshooting—Interface Statistics window

Data field	Description	Value
Ethernet Address	This field indicates the MAC Address in hexadecimal form *Note:* The Ethernet Address is not displayed for tsb0 or vif interfaces. The SBUS is modelled as Ethernet but uses an internal Ethernet address scheme which is not consistent with Ethernet standards.	• 00.10.45.00.19.E9
Type	This field indicates the interface type used. *Note:* For tsb0 and vif interfaces, the interface type field indicates Ethernet since the SBUS is modelled as an Ethernet.	• ethernet • loopback • ppp
MTU	This field indicates the MTU size.	• 256 (ethernet) • 1500 (ppp) • 32768 (loopback)
Admin State	This field indicates the administrative state (user set) of the interface.	• down • up
Operational State	This field indicates the operational state (autonomous) of the interface.	• down • up
InPkts	This field indicates all received packets.	• Integer number
OutPkts	This field indicates all sent packets.	• Integer number
InUcastPkts	This field only displays the unicast packets received.	• Integer number
OutUcastPkts	This field only displays the unicast packets sent.	• Integer number
InNUcastPkts	This field only displays the non-unicast packets received.	• Integer number
OutNUcastPkts	This field only displays the non-unicast packets sent.	• Integer number
InDiscards	This field displays the discarded packets received.	• Integer number
OutDiscards	This field displays the discarded packets sent.	• Integer number
InErrors	This field displays the errored packets received.	• Integer number
OutErrors	This field displays the errored packets sent.	• Integer number
Unknown Protocol	This field indicates the number of packets received via the interface which were discarded because of an unknown or unsupported protocol. This value is a counter.	• 0

Security menu

Use the Security window to manage user accounts and network and shelf security, view a list of users who logged in, and change passwords.

Security—User Profile List window

Table 7-62 describes the data fields in the Security— User Profile List window. To refresh this window, click the **Refresh** button.

Table 7-62
Security—User Profile List window

Data field	Description	Value
Index	A number from 1 through 10 for the ten possible local user accounts. *Note:* Index 1, 2, and 3 are reserved for the three default user accounts: admin, operator, and observer.	1 through 10
User Name	This field indicates the provisioned user ID for the user account. *Note:* You can modify the User ID for the three default users.	A character string (between 5 and 8 characters) that can be any combination of letters and numbers
User Class	This field indicates the provisioned user class for the user account. *Note:* You cannot modify the user class for the three default users.	• ADMIN • OPERATOR • OBSERVER • CUSTOMER1 • CUSTOMER2
Status	This field indicates the status of the user account.	• enabled • disabled
Idle Timeout	This field indicates the period a shelf can remains idle before a timeout occurs. *Note:* If the field is set to zero, the shelf will never timeout.	A number from 0 to 999 Default: 30

Security—Modify User window

When you right-click on an existing line in the Security—User Profile window and select Modify, or double-click on it, the Modify User window is displayed. Table 7-63 describes the data fields.

Note: This window is for managing local users.

Table 7-63
Security—Modify User window

Data field	Description	Value
User Name	This field indicates the provisioned user name for the user account. *Note:* You can modify the User Name for the three default users.	A character string (between 5 and 8 characters) that can be any combination of letters and numbers
User Class	This field indicates the provisioned user class for the user account. *Note:* You cannot modify the user class for the three default users.	• ADMIN • OPERATOR • OBSERVER • CUSTOMER1 • CUSTOMER2
User Password	Enter the new password.	Character string: 1 to 8 characters with no control characters and no commas or double quotations.
Confirm Password	Confirm the new password.	Must be the same as the User Password.
User Status	This field indicates the status of the user account.	• enabled • disabled
Idle Timeout	This field indicates the period a shelf can remains idle before a timeout occurs. *Note:* If the field is set to zero, the shelf will never timeout.	A number from 0 to 999 Default: 0

Security—Add User window

When you right-click on an empty line in the Security—User Profile window and select Add, or double-click on it, the Add User window is displayed. Table 7-64 describes the data fields.

Note: This window is for managing local users.

Table 7-64
Security—Add User window

Data field	Description	Value
User Name	This field indicates the provisioned user ID for the user account. *Note:* You can modify the User ID for the three default users.	A character string (between 5 and 8 characters) that can be any combination of letters and numbers
User Class	This field indicates the provisioned user class for the user account. *Note:* You cannot modify the user class for the three default users.	• ADMIN • OPERATOR • OBSERVER • CUSTOMER1 • CUSTOMER2
User Password	Enter the new password.	Character string: 1 to 8 characters with no control characters and no commas or double quotations.
Confirm Password	Confirm the new password.	Must be the same as the User Password.
User Status	This field indicates the status of the user account.	• enabled • disabled
Idle Timeout	This field indicates the period a shelf can remains idle before a timeout occurs. *Note:* If the field is set to zero, the shelf will never timeout.	A number from 0 to 999 Default: 30

Security—Login User List window

Table 7-65 describes the data fields in the Security—Login User List window. To refresh this window, click the **Refresh** button.

Table 7-65
Security—Login User List window

Data field	Description	Value
Shelf Name	This field indicates the name of the host shelf where the user logged in to System Manager.	A character string that can be any combination of letters and numbers, up to 31 characters.
Shelf IP	This field indicates the IP address of the host shelf.	A valid IP address.
Machine IP	This field indicates the user IP address where SNMP information is sent.	A valid IP address.
Group.User Name	This field indicates the user group and user ID for the session.	e.g. Admin.TedSmith
Trap Port	This field indicates which communication's port at the user shelf is receiving information.	e.g. 1196
Session Type	This field indicates the type of System Manager session.	• SMI session • OMEA • TL1 session

Note: The Group.User Name field will include the emsmetro user. The emsmetro account is used by OMEA to establish a network management session.

Date and time notes

Because the System Manager was developed using the C programming language, the available date range is 1970 and 2038.

The program stores the date and time for the System Manager as a 32-bit number offset in seconds from midnight, January 1, 1970. The field will run out of space on January 19, 2038 at 3:14:07 AM GMT. When the next second ticks by, the number field will overflow.

When the date and time passes January 19, 2038 3:14:07 AM GMT, the System Manager will display the year 1901. No error message is displayed.

If you enter a date and time after January 19, 2038 at 3:17 PM in the System Manager, the System Manager does not accept the date. No error message is displayed.

Time stamp rules

The System Manager observes the following time stamp rules.

- Each shelf in the ring has a Time of Day (TOD) clock. When you perform the system lineup and testing (SLAT) procedure during a shelf installation, the TOD clock is initialized. Each TOD clock

  — uses absolute time, or Greenwich Mean Time (GMT)

  — provides a calendar date and time in the following format:

    YYYY/MM/DD hh:mm:ss

  — survives events, such as power failures

- For every ring, one shelf is designated as the primary shelf. The other shelves in the ring periodically synchronize their TOD clocks with the primary shelf using the Simple Network Time Protocol (SNTP). The SNTP operates on per wavelength overhead channels. The SNTP keeps the shelves in the ring synchronized within one second of the primary shelf and with each other.

- When events occur on a shelf, the event is time stamped using the TOD clock of the shelf. Events can include alarm raise or clear, protection switching, and user login or logout. The shelf uses the time stamp internally and for communications with the System Manager. When the System Manager displays events to the user, the time stamp is converted to local time. The local time is adjusted for daylight saving time (DST) and the time zone. The local time is adjusted using the setup of the users PC or Workstation, such as the date and time control panel in a WinNT environment or the time zone related environment variables on a UNIX station.

As a result of the time stamp rules, multiple shelf events on multiple rings are correlated in time. You do not need to remember which shelf is in which time zone, and you do not need to convert times for different shelves. Optical Metro 5100/5200 monitors a network which spans multiple time zones over many rings. You view your time zone and DST settings. Users that are located in different time zones can view events using their local time. Optical Metro 5100/5200 allows multiple users in multiple time zones, such as remote support roles to monitor the network.

Nortel

Optical Metro 5100/5200
Software and User Interface

NORTEL