



Cisco ONS 15454 DWDM Reference Manual

Product and Software Release 7.2
June 2012

Corporate Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

Text Part Number: 78-17738-03



THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The following information is for FCC compliance of Class A devices: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio-frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case users will be required to correct the interference at their own expense.

The following information is for FCC compliance of Class B devices: The equipment described in this manual generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

Modifying the equipment without Cisco's written authorization may result in the equipment no longer complying with FCC requirements for Class A or Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

Modifications to this product not authorized by Cisco Systems, Inc. could void the FCC approval and negate your authority to operate the product.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Cisco and the Cisco logo are trademarks or registered trademarks of Cisco and/or its affiliates in the U.S. and other countries. To view a list of Cisco trademarks, go to this URL: www.cisco.com/go/trademarks. Third-party trademarks mentioned are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (1110R)

Any Internet Protocol (IP) addresses used in this document are not intended to be actual addresses. Any examples, command display output, and figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses in illustrative content is unintentional and coincidental.

Cisco ONS 15454 DWDM Reference Manual, Release 7.2

©2004–2012 Cisco Systems, Inc. All rights reserved.



About this Manual	xxxvii
Revision History	xxxviii
Document Objectives	xl
Audience	xl
Related Documentation	xl
Document Conventions	xli
Obtaining Optical Networking Information	xlvii
Where to Find Safety and Warning Information	xlvii
Cisco Optical Networking Product Documentation CD-ROM	xlvii
Obtaining Documentation and Submitting a Service Request	xlvii

CHAPTER 1

Shelf Assembly Hardware	1-1
1.1 Overview	1-2
1.1.1 Cisco ONS 15454 ANSI	1-2
1.1.2 Cisco ONS 15454 ETSI	1-2
1.2 ONS 15454 ANSI Rack Installation	1-3
1.2.1 Reversible Mounting Bracket	1-4
1.2.2 Mounting a Single Node	1-5
1.2.3 Mounting Multiple Nodes	1-5
1.2.4 ONS 15454 ANSI Bay Assembly	1-6
1.3 ONS 15454 ETSI Rack Installation	1-6
1.3.1 Mounting a Single Node	1-7
1.3.2 Mounting Multiple Nodes	1-8
1.4 FlexLayer and Y-Cable Protection	1-9
1.4.1 FlexLayer Modules	1-10
1.4.2 Single Y-Cable Protection Module	1-13
1.4.3 Multiple Y-Cable Module Tray	1-17
1.5 Typical DWDM Rack Layouts	1-18
1.6 Front Door	1-20
1.7 ONS 15454 ANSI Backplane Covers	1-27
1.7.1 Lower Backplane Cover	1-28
1.7.2 Rear Cover	1-29
1.7.3 Alarm Interface Panel	1-30

- 1.7.4 Alarm Interface Panel Replacement 1-30
- 1.8 ONS 15454 ETSI Front Mount Electrical Connection 1-31
- 1.9 ONS 15454 ANSI Alarm Expansion Panel 1-31
- 1.10 Ethernet Adapter Panel 1-36
- 1.11 Filler Card 1-38
- 1.12 Cable Routing and Management 1-39
 - 1.12.1 Fiber Management 1-40
 - 1.12.2 Fiber Management Using the Patch-Panel Tray 1-42
 - 1.12.3 Fiber Management Using the Y-Cable Module Tray 1-44
 - 1.12.4 Fiber Management Using the Fiber-Storage Tray 1-44
 - 1.12.5 Fiber Management Using the Optional ANSI Tie-Down Bar 1-45
- 1.13 Fan-Tray Assembly 1-46
 - 1.13.1 Fan Speed and Power Requirements 1-47
 - 1.13.2 Fan Failure 1-48
 - 1.13.3 Air Filter 1-48
- 1.14 Power and Ground Description 1-48
 - 1.14.1 ONS 15454 ANSI Power and Ground 1-48
 - 1.14.2 ONS 15454 ETSI Power and Ground 1-49
- 1.15 ONS 15454 ANSI Alarm, Timing, LAN, and Craft Pin Connections 1-49
 - 1.15.1 Alarm Contact Connections 1-51
 - 1.15.2 Timing Connections 1-52
 - 1.15.3 LAN Connections 1-52
 - 1.15.4 TL1 Craft Interface Installation 1-53
- 1.16 Cards and Slots 1-53
 - 1.16.1 Card Slot Requirements 1-55
 - 1.16.2 Card Replacement 1-56
- 1.17 Ferrites (ANSI Only) 1-56

CHAPTER 2

Card Reference 2-1

- 2.1 Card Overview 2-1
 - 2.1.1 Common Control Cards 2-2
 - 2.1.2 Front Mount Electrical Connections (ETSI only) 2-2
 - 2.1.3 DWDM Cards 2-2
 - 2.1.4 Transponder and Muxponder Cards 2-3
 - 2.1.5 Card Summary 2-3
 - 2.1.6 Card Compatibility 2-6
 - 2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes 2-7
 - 2.1.8 DWDM Card Channel Allocation Plan 2-10

2.2	Safety Labels	2-13
2.2.1	Class 1 Laser Product Cards	2-13
2.2.1.1	Class 1 Laser Product Label	2-13
2.2.1.2	Hazard Level 1 Label	2-13
2.2.1.3	Laser Source Connector Label	2-14
2.2.1.4	FDA Statement Label	2-14
2.2.1.5	Shock Hazard Label	2-14
2.2.2	Class 1M Laser Product Cards	2-15
2.2.2.1	Class 1M Laser Product Label	2-15
2.2.2.2	Hazard Level 1M Label	2-16
2.2.2.3	Laser Source Connector Label	2-16
2.2.2.4	FDA Statement Label	2-16
2.2.2.5	Shock Hazard Label	2-17
2.3	Common Control Cards	2-17
2.3.1	TCC2 Card	2-17
2.3.1.1	TCC2 Functionality	2-18
2.3.1.2	Redundant TCC2 Card Installation	2-19
2.3.1.3	TCC2 Card-Level Indicators	2-19
2.3.1.4	Network-Level Indicators	2-19
2.3.1.5	Power-Level Indicators	2-20
2.3.2	TCC2P Card	2-21
2.3.3	TCC2P Functionality	2-23
2.3.3.1	Redundant TCC2P Card Installation	2-23
2.3.3.2	TCC2P Card-Level Indicators	2-24
2.3.3.3	Network-Level Indicators	2-24
2.3.3.4	Power-Level Indicators	2-25
2.3.4	AIC-I Card	2-25
2.3.4.1	AIC-I Card-Level Indicators	2-26
2.3.4.2	External Alarms and Controls	2-27
2.3.4.3	Orderwire	2-28
2.3.4.4	Power Monitoring	2-29
2.3.4.5	User Data Channel	2-29
2.3.4.6	Data Communications Channel	2-30
2.3.5	MS-ISC-100T Card	2-30
2.3.5.1	MS-ISC-100T Card-Level Indicators	2-32
2.4	Front Mount Electrical Connections	2-33
2.4.1	MIC-A/P FMEC	2-33
2.4.2	MIC-C/T/P FMEC	2-36
2.5	Optical Service Channel Cards	2-37

2.5.1	OSCM Card	2-37
2.5.1.1	Power Monitoring	2-39
2.5.1.2	OSCM Card-Level Indicators	2-39
2.5.1.3	OSCM Port-Level Indicators	2-40
2.5.2	OSC-CSM Card	2-40
2.5.2.1	Power Monitoring	2-43
2.5.2.2	OSC-CSM Card-Level Indicators	2-44
2.5.2.3	OSC-CSM Port-Level Indicators	2-44
2.6	Optical Amplifier Cards	2-44
2.6.1	OPT-PRE Amplifier	2-45
2.6.1.1	Power Monitoring	2-47
2.6.1.2	OPT-PRE Amplifier Card-Level Indicators	2-48
2.6.1.3	OPT-PRE Port-Level Indicators	2-48
2.6.2	OPT-BST Amplifier Card	2-48
2.6.2.1	Power Monitoring	2-50
2.6.2.2	OPT-BST Amplifier Card-Level Indicators	2-51
2.6.2.3	OPT-BST Port-Level Indicators	2-51
2.6.3	OPT-BST-E Amplifier Card	2-51
2.6.3.1	Power Monitoring	2-54
2.6.3.2	OPT-BST-E Amplifier Card-Level Indicators	2-55
2.6.3.3	OPT-BST-E Port-Level Indicators	2-55
2.6.4	OPT-BST-L Amplifier Card	2-55
2.6.4.1	Power Monitoring	2-58
2.6.4.2	OPT-BST-L Amplifier Card-Level Indicators	2-58
2.6.4.3	OPT-BST-L Port-Level Indicators	2-59
2.6.5	OPT-AMP-L Card	2-59
2.6.5.1	Power Monitoring	2-61
2.6.5.2	OPT-AMP-L Amplifier Card-Level Indicators	2-62
2.6.5.3	OPT-AMP-L Port-Level Indicators	2-62
2.7	Multiplexer and Demultiplexer Cards	2-62
2.7.1	32MUX-O Card	2-63
2.7.1.1	Channel Plan	2-65
2.7.1.2	Power Monitoring	2-67
2.7.1.3	32MUX-O Card-Level Indicators	2-67
2.7.1.4	32MUX-O Port-Level Indicators	2-67
2.7.2	32DMX-O Card	2-67
2.7.2.1	Power Monitoring	2-70
2.7.2.2	32DMX-O Card-Level Indicators	2-71
2.7.2.3	32DMX-O Port-Level Indicators	2-71
2.7.3	32DMX Card	2-71

2.7.3.1	ROADM	2-73
2.7.3.2	Power Monitoring	2-74
2.7.3.3	32DMX Card-Level Indicators	2-74
2.7.3.4	32DMX Port-Level Indicators	2-74
2.7.4	32DMX-L Card	2-74
2.7.4.1	ROADM	2-77
2.7.4.2	Power Monitoring	2-78
2.7.4.3	32DMX-L Card-Level Indicators	2-78
2.7.4.4	32DMX-L Port-Level Indicators	2-78
2.7.5	32WSS Card	2-79
2.7.5.1	Power Monitoring	2-83
2.7.5.2	32WSS Card-Level Indicators	2-83
2.7.5.3	32WSS Port-Level Indicators	2-83
2.7.6	32WSS-L Card	2-84
2.7.6.1	Power Monitoring	2-88
2.7.6.2	Channel Plan	2-88
2.7.6.3	32WSS-L Card-Level Indicators	2-90
2.7.6.4	32WSS-L Port-Level Indicators	2-90
2.7.7	4MD-xx.x Card	2-91
2.7.7.1	Wavelength Pairs	2-94
2.7.7.2	Power Monitoring	2-94
2.7.7.3	4MD-xx.x Card-Level Indicators	2-94
2.7.7.4	4MD-xx.x Port-Level Indicators	2-95
2.8	Optical Add/Drop Cards	2-95
2.8.1	AD-1C-xx.x Card	2-95
2.8.1.1	Power Monitoring	2-97
2.8.1.2	AD-1C-xx.x Card-Level Indicators	2-98
2.8.1.3	AD-1C-xx.x Port-Level Indicators	2-98
2.8.2	AD-2C-xx.x Card	2-98
2.8.2.1	Wavelength Pairs	2-100
2.8.2.2	Power Monitoring	2-101
2.8.2.3	AD-2C-xx.x Card-Level Indicators	2-101
2.8.2.4	AD-2C-xx.x Port-Level Indicators	2-102
2.8.3	AD-4C-xx.x Card	2-102
2.8.3.1	Wavelength Sets	2-104
2.8.3.2	Power Monitoring	2-105
2.8.3.3	AD-4C-xx.x Card-Level Indicators	2-105
2.8.3.4	AD-4C-xx.x Port-Level Indicators	2-106
2.8.4	AD-1B-xx.x Card	2-106
2.8.4.1	Power Monitoring	2-108

2.8.4.2	AD-1B-xx.x Card-Level Indicators	2-109
2.8.4.3	AD-1B-xx.x Port-Level Indicators	2-109
2.8.5	AD-4B-xx.x Card	2-109
2.8.5.1	Power Monitoring	2-111
2.8.5.2	AD-4B-xx.x Card-Level Indicators	2-112
2.8.5.3	AD-4B-xx.x Port-Level Indicators	2-112
2.9	Optical Mesh Cards	2-112
2.9.1	MMU Card	2-113
2.9.1.1	Power Monitoring	2-115
2.9.1.2	MMU Card-Level Indicators	2-115
2.9.1.3	MMU Port-Level Indicators	2-116
2.10	Transponder and Muxponder Cards	2-116
2.10.1	TXP_MR_10G Card	2-116
2.10.1.1	Y-Cable Protection	2-118
2.10.1.2	Automatic Laser Shutdown	2-119
2.10.1.3	TXP_MR_10G Card-Level Indicators	2-119
2.10.1.4	TXP_MR_10G Port-Level Indicators	2-119
2.10.2	TXP_MR_10E Card	2-120
2.10.2.1	Key Features	2-120
2.10.2.2	Faceplate and Block Diagram	2-120
2.10.2.3	Client Interface	2-121
2.10.2.4	DWDM Trunk Interface	2-121
2.10.2.5	Y-Cable Protection	2-122
2.10.2.6	Enhanced FEC (E-FEC) Feature	2-122
2.10.2.7	FEC and E-FEC Modes	2-123
2.10.2.8	Client-to-Trunk Mapping	2-123
2.10.2.9	Automatic Laser Shutdown	2-123
2.10.2.10	TXP_MR_10E Card-Level Indicators	2-123
2.10.2.11	TXP_MR_10E Port-Level Indicators	2-124
2.10.3	TXP_MR_10E_C and TXP_MR_10E_L Cards	2-124
2.10.3.1	Key Features	2-125
2.10.3.2	Faceplates and Block Diagram	2-125
2.10.3.3	Client Interface	2-126
2.10.3.4	DWDM Trunk Interface	2-126
2.10.3.5	Y-Cable Protection	2-126
2.10.3.6	Enhanced FEC (E-FEC) Feature	2-127
2.10.3.7	FEC and E-FEC Modes	2-127
2.10.3.8	Client-to-Trunk Mapping	2-127
2.10.3.9	Automatic Laser Shutdown	2-127
2.10.3.10	TXP_MR_10E_C and TXP_MR_10E_L Card-Level Indicators	2-128

2.10.3.11	TXP_MR_10E_C and TXP_MR_10E_L Port-Level Indicators	2-128
2.10.4	TXP_MR_2.5G and TXPP_MR_2.5G Cards	2-128
2.10.4.1	Faceplate	2-130
2.10.4.2	Block Diagram	2-131
2.10.4.3	Y-Cable Protection	2-132
2.10.4.4	Splitter Protection	2-133
2.10.4.5	Automatic Laser Shutdown	2-133
2.10.4.6	TXP_MR_2.5G and TXPP_MR_2.5G Card-Level Indicators	2-133
2.10.4.7	TXP_MR_2.5G and TXPP_MR_2.5G Port-Level Indicators	2-133
2.10.5	MPX_2.5G_10G Card	2-134
2.10.5.1	Y-Cable Protection	2-137
2.10.5.2	Timing Synchronization	2-137
2.10.5.3	Automatic Laser Shutdown	2-137
2.10.5.4	MPX_2.5G_10G Card-Level Indicators	2-138
2.10.5.5	MPX_2.5G_10G Port-Level Indicators	2-138
2.10.6	MPX_2.5G_10E Card	2-138
2.10.6.1	Key Features	2-139
2.10.6.2	Faceplate	2-140
2.10.6.3	Client Interfaces	2-141
2.10.6.4	DWDM Interface	2-141
2.10.6.5	Multiplexing Function	2-141
2.10.6.6	Timing Synchronization	2-142
2.10.6.7	Y-Cable Protection	2-142
2.10.6.8	Enhanced FEC (E-FEC) Capability	2-142
2.10.6.9	FEC and E-FEC Modes	2-143
2.10.6.10	SONET/SDH Overhead Byte Processing	2-143
2.10.6.11	Client Interface Monitoring	2-143
2.10.6.12	Wavelength Identification	2-143
2.10.6.13	Automatic Laser Shutdown	2-144
2.10.6.14	Jitter	2-145
2.10.6.15	Lamp Test	2-145
2.10.6.16	Onboard Traffic Generation	2-145
2.10.6.17	MPX_2.5G_10E Card-Level Indicators	2-145
2.10.6.18	MPX_2.5G_10E Port-Level Indicators	2-145
2.10.7	MPX_2.5G_10E_C and MPX_2.5G_10E_L Cards	2-146
2.10.7.1	Key Features	2-146
2.10.7.2	Faceplate	2-147
2.10.7.3	Client Interfaces	2-148
2.10.7.4	DWDM Interface	2-148
2.10.7.5	Multiplexing Function	2-149

2.10.7.6	Timing Synchronization	2-149
2.10.7.7	Y-Cable Protection	2-149
2.10.7.8	Enhanced FEC (E-FEC) Capability	2-150
2.10.7.9	FEC and E-FEC Modes	2-150
2.10.7.10	SONET/SDH Overhead Byte Processing	2-150
2.10.7.11	Client Interface Monitoring	2-150
2.10.7.12	Wavelength Identification	2-151
2.10.7.13	Automatic Laser Shutdown	2-153
2.10.7.14	Jitter	2-154
2.10.7.15	Lamp Test	2-154
2.10.7.16	Onboard Traffic Generation	2-154
2.10.7.17	MPX_2.5G_10E_C and MPX_2.5G_10E_L Card-Level Indicators	2-154
2.10.7.18	MPX_2.5G_10E and MPX_2.5G_10E_L Port-Level Indicators	2-154
2.10.8	MPX_MR_2.5G and MPXP_MR_2.5G Cards	2-155
2.10.8.1	Card Protection	2-157
2.10.8.2	Performance Monitoring	2-157
2.10.8.3	Distance Extension	2-157
2.10.8.4	Slot Compatibility	2-157
2.10.8.5	Interoperability with Cisco MDS Switches	2-157
2.10.8.6	Client and Trunk Ports	2-157
2.10.8.7	Faceplates	2-158
2.10.8.8	Block Diagram	2-159
2.10.8.9	Automatic Laser Shutdown	2-160
2.10.8.10	MPX_MR_2.5G and MPXP_MR_2.5G Card-Level Indicators	2-160
2.10.8.11	MPX_MR_2.5G and MPXP_MR_2.5G Port-Level Indicators	2-160
2.10.9	MPX_MR_10DME_C and MPX_MR_10DME_L Cards	2-161
2.10.9.1	Key Features	2-163
2.10.9.2	Faceplate	2-164
2.10.9.3	Wavelength Identification	2-165
2.10.9.4	MPX_MR_10DME_C and MPX_MR_10DME_L Card-Level Indicators	2-168
2.10.9.5	MPX_MR_10DME_C and MPX_MR_10DME_L Port-Level Indicators	2-169
2.11	Transponder and Muxponder Protection	2-169
2.11.1	Y-Cable Protection	2-169
2.11.2	Splitter Protection	2-170
2.12	Far-End Laser Control	2-171
2.13	Jitter Considerations	2-172
2.14	Termination Modes	2-172
2.15	SFP and XFP Modules	2-173

CHAPTER 3**Node Reference 3-1**

- 3.1 DWDM Node Configurations 3-1
 - 3.1.1 Hub Node 3-2
 - 3.1.2 Terminal Node 3-3
 - 3.1.3 OADM Node 3-4
 - 3.1.4 ROADM Node 3-8
 - 3.1.5 Anti-ASE Node 3-11
 - 3.1.6 Line Amplifier Node 3-11
 - 3.1.7 OSC Regeneration Node 3-12
 - 3.1.8 Multishelf Node 3-13
 - 3.1.8.1 Multishelf Node Layout 3-15
 - 3.1.8.2 DCC/GCC/OSC Terminations 3-15
- 3.2 DWDM Node Cabling 3-15
 - 3.2.1 OSC Link Termination Fiber-Optic Cabling 3-15
 - 3.2.2 Hub Node Fiber-Optic Cabling 3-18
 - 3.2.3 Terminal Node Fiber-Optic Cabling 3-20
 - 3.2.4 Line Amplifier Node Fiber-Optic Cabling 3-20
 - 3.2.5 OSC Regeneration Node Fiber-Optic Cabling 3-22
 - 3.2.6 Amplified or Passive OADM Node Fiber-Optic Cabling 3-24
 - 3.2.7 ROADM Node Fiber-Optic Cabling 3-28
- 3.3 DWDM and TDM Hybrid Node Types 3-31
 - 3.3.1 1+1 Protected Flexible Terminal Node 3-31
 - 3.3.2 Scalable Terminal Node 3-35
 - 3.3.3 Hybrid Terminal Node 3-38
 - 3.3.4 Hybrid OADM Node 3-40
 - 3.3.5 Hybrid Line Amplifier Node 3-41
 - 3.3.6 Amplified TDM Node 3-43
- 3.4 Automatic Node Setup 3-46
 - 3.4.1 Automatic Node Setup Parameters 3-48
 - 3.4.2 View and Provision ANS Parameters 3-50

CHAPTER 4**Network Reference 4-1**

- 4.1 Network Applications 4-2
- 4.2 Network Topologies 4-2
 - 4.2.1 Hubbed Rings 4-2
 - 4.2.2 Multihubbed Rings 4-3
 - 4.2.3 Any-to-Any Rings 4-4
 - 4.2.4 Meshed Rings 4-5
 - 4.2.5 Linear Configurations 4-6

- 4.2.6 Single-Span Link 4-7
- 4.3 Optical Performance 4-7
- 4.4 Automatic Power Control 4-8
 - 4.4.1 APC at the Amplifier Card Level 4-9
 - 4.4.2 APC at the Node and Network Levels 4-9
 - 4.4.3 Managing APC 4-11
- 4.5 ROADM Power Equalization Monitoring 4-12
- 4.6 Span Loss Verification 4-13
- 4.7 Network Optical Safety—Automatic Laser Shutdown 4-14
 - 4.7.1 Automatic Laser Shutdown on TXP and MXP Cards 4-15
 - 4.7.2 Automatic Power Reduction 4-15
 - 4.7.3 Fiber Cut Scenarios 4-16
 - 4.7.3.1 Scenario 1: Fiber Cut in Nodes Using OPT-BST/OPT-BST-E Cards 4-16
 - 4.7.3.2 Scenario 2: Fiber Cut in Nodes Using OSC-CSM Cards 4-18
 - 4.7.3.3 Scenario 3: Fiber Cut in Nodes Using OPT-BST-L Cards 4-20
 - 4.7.3.4 Scenario 4: Fiber Cut in Nodes Using OPT-AMP-L (OPT-BST mode) Cards 4-21
- 4.8 Network-Level Gain—Tilt Management of Optical Amplifiers 4-23
 - 4.8.1 Gain Tilt Control at the Card Level 4-24
 - 4.8.2 System Level Gain Tilt Control 4-26
 - 4.8.2.1 System Gain Tilt Compensation Without ROADM Nodes 4-26
 - 4.8.2.2 System Gain Tilt Compensation With ROADM Nodes 4-28
- 4.9 Optical Channel Circuits 4-29
 - 4.9.1 OCHNC Circuits 4-29
 - 4.9.2 OCHCC Circuits 4-30
 - 4.9.3 OCH Trail Circuits 4-30

CHAPTER 5

Cisco Transport Controller Operation 5-1

- 5.1 CTC Software Delivery Methods 5-1
 - 5.1.1 CTC Software Installed on the TCC2/TCC2P Card 5-1
 - 5.1.2 CTC Software Installed on the PC or UNIX Workstation 5-3
- 5.2 CTC Installation Overview 5-4
- 5.3 PC and UNIX Workstation Requirements 5-4
- 5.4 ONS 15454 Connections 5-6
- 5.5 CTC Window 5-7
 - 5.5.1 Summary Pane 5-9
 - 5.5.2 Node View (Multishelf Mode), Node View (Single-Shelf Mode), and Shelf View (Multishelf Mode) 5-9
 - 5.5.2.1 CTC Card Colors 5-10

5.5.2.2	Multishelf View Card Shortcuts	5-12
5.5.2.3	Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Card Shortcuts	5-12
5.5.2.4	Multishelf View Tabs	5-12
5.5.2.5	Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Tabs	5-13
5.5.3	Network View	5-14
5.5.3.1	Network View Tabs	5-14
5.5.3.2	CTC Node Colors	5-15
5.5.3.3	DCC Links	5-15
5.5.3.4	Link Consolidation	5-16
5.5.4	Card View	5-16
5.6	TCC2/TCC2P Card Reset	5-18
5.7	TCC2/TCC2P Card Database	5-19
5.8	Software Revert	5-19

CHAPTER 6**Security Reference 6-1**

6.1	User IDs and Security Levels	6-1
6.2	User Privileges and Policies	6-2
6.2.1	User Privileges by CTC Task	6-2
6.2.2	Security Policies	6-5
6.2.2.1	Superuser Privileges for Provisioning Users	6-5
6.2.2.2	Idle User Timeout	6-6
6.2.2.3	User Password, Login, and Access Policies	6-6
6.3	Audit Trail	6-6
6.3.1	Audit Trail Log Entries	6-7
6.3.2	Audit Trail Capacities	6-7
6.4	RADIUS Security	6-7
6.4.1	RADIUS Authentication	6-8
6.4.2	Shared Secrets	6-8

CHAPTER 7**Timing Reference 7-1**

7.1	Node Timing Parameters	7-1
7.2	Network Timing	7-2
7.3	Synchronization Status Messaging	7-3

CHAPTER 8**Management Network Connectivity 8-1**

8.1	IP Networking Overview	8-2
8.2	IP Addressing Scenarios	8-2
8.2.1	Scenario 1: CTC and ONS 15454s on Same Subnet	8-2

- 8.2.2 Scenario 2: CTC and ONS 15454s Connected to a Router 8-3
- 8.2.3 Scenario 3: Using Proxy ARP to Enable an ONS 15454 Gateway 8-4
- 8.2.4 Scenario 4: Default Gateway on CTC Computer 8-7
- 8.2.5 Scenario 5: Using Static Routes to Connect to LANs 8-8
- 8.2.6 Scenario 6: Using OSPF 8-10
- 8.2.7 Scenario 7: Provisioning the ONS 15454 Proxy Server 8-12
- 8.2.8 Scenario 8: Dual GNEs on a Subnet 8-17
- 8.2.9 Scenario 9: IP Addressing with Secure Mode Enabled 8-19
 - 8.2.9.1 Secure Mode Behavior 8-19
 - 8.2.9.2 Secure Node Locked and Unlocked Behavior 8-22
- 8.3 Provisionable Patchcords 8-23
- 8.4 Routing Table 8-24
- 8.5 External Firewalls 8-26
- 8.6 Open GNE 8-28
- 8.7 TCP/IP and OSI Networking 8-30
- 8.8 Link Management Protocol 8-34
 - 8.8.1 Overview 8-34
 - 8.8.1.1 MPLS 8-35
 - 8.8.1.2 GMPLS 8-35
 - 8.8.2 Configuring LMP 8-36
 - 8.8.2.1 Control Channel Management 8-36
 - 8.8.2.2 TE Link Management 8-37
 - 8.8.2.3 Link Connectivity Verification 8-37
 - 8.8.2.4 Fault Management 8-37
 - 8.8.3 LMP WDM 8-38
 - 8.8.4 LMP Network Implementation 8-38

CHAPTER 9

Alarm and TCA Monitoring and Management 9-1

- 9.1 Overview 9-1
- 9.2 Alarm Counts on the LCD for a Node, Slot, or Port 9-2
- 9.3 Alarm Display 9-2
 - 9.3.1 Viewing Alarms by Time Zone 9-3
 - 9.3.2 Controlling Alarm Display 9-3
 - 9.3.3 Filtering Alarms 9-4
 - 9.3.4 Conditions Tab 9-4
 - 9.3.5 Controlling the Conditions Display 9-5
 - 9.3.5.1 Retrieving and Displaying Conditions 9-5
 - 9.3.5.2 Conditions Column Descriptions 9-5
 - 9.3.5.3 Filtering Conditions 9-6

9.3.6	Viewing History	9-6
9.3.6.1	History Column Descriptions	9-7
9.3.6.2	Retrieving and Displaying Alarm and Condition History	9-7
9.3.7	Alarm History and Log Buffer Capacities	9-8
9.4	Alarm Severities	9-8
9.5	Alarm Profiles	9-9
9.5.1	Creating and Modifying Alarm Profiles	9-9
9.5.2	Alarm Profile Buttons	9-10
9.5.3	Alarm Profile Editing	9-11
9.5.4	Alarm Severity Options	9-11
9.5.5	Row Display Options	9-12
9.5.6	Applying Alarm Profiles	9-12
9.6	External Alarms and Controls	9-13
9.6.1	External Alarms	9-13
9.6.2	External Controls	9-13
9.6.3	Virtual Wires	9-14
9.7	Alarm Suppression	9-15
9.7.1	Alarms Suppressed for Maintenance	9-15
9.7.2	Alarms Suppressed by User Command	9-15
9.8	Multishelf Configuration Alarming	9-15
9.8.1	Viewing Multishelf Alarmed Entities	9-16
9.8.2	Multishelf-Specific Alarming	9-16
9.8.2.1	Ethernet Communication Alarms	9-16
9.8.2.2	Multishelf Correlated Alarms	9-17
9.9	Threshold Crossing Alert Suppression	9-17
9.9.1	Overview	9-17
9.9.2	G.709, SONET, and SDH TCA Groups	9-18
CHAPTER 10 Performance Monitoring 10-1		
10.1	Threshold Performance Monitoring	10-2
10.2	Transponder and Muxponder Card Performance Monitoring	10-2
10.2.1	Optics PM Window	10-4
10.2.2	Payload PM Window	10-5
10.2.2.1	Payload PM SONET/SDH Window	10-6
10.2.2.2	Payload PM Statistics Window	10-7
10.2.2.3	MXP_MR_2.5G/MXPP_MR_2.5G Payload Utilization Window	10-10
10.2.2.4	Payload History Window	10-10
10.2.3	OTN PM Window	10-10
10.3	DWDM Card Performance Monitoring	10-13

- 10.3.1 Optical Amplifier Card Performance Monitoring Parameters 10-13
- 10.3.2 Multiplexer and Demultiplexer Card Performance Monitoring Parameters 10-14
- 10.3.3 4MD-xx.x Card Performance Monitoring Parameters 10-14
- 10.3.4 OADM Channel Filter Card Performance Monitoring Parameters 10-14
- 10.3.5 OADM Band Filter Card Performance Monitoring Parameters 10-14
- 10.3.6 Optical Service Channel Card Performance Monitoring Parameters 10-15
- 10.4 Optics and 8b10b PM Parameter Definitions 10-17
- 10.5 ITU G.709 and ITU-T G.8021 Trunk-Side PM Parameter Definitions 10-18
- 10.6 Full RMON Statistics PM Parameter Definitions 10-20
- 10.7 FEC PM Parameter Definitions 10-22
- 10.8 SONET PM Parameter Definitions 10-23
- 10.9 SDH PM Parameter Definitions 10-24
- 10.10 Pointer Justification Count Performance Monitoring 10-26

CHAPTER 11

SNMP 11-1

- 11.1 SNMP Overview 11-1
- 11.2 Basic SNMP Components 11-2
- 11.3 SNMP External Interface Requirement 11-4
- 11.4 SNMP Version Support 11-4
- 11.5 SNMP Message Types 11-4
- 11.6 SNMP Management Information Bases 11-5
 - 11.6.1 IETF-Standard MIBs for the ONS 15454 11-5
 - 11.6.2 Proprietary ONS 15454 MIBs 11-6
 - 11.6.3 Generic Threshold and Performance Monitoring MIBs 11-7
- 11.7 SNMP Trap Content 11-9
 - 11.7.1 Generic and IETF Traps 11-9
 - 11.7.2 Variable Trap Bindings 11-10
- 11.8 SNMP Community Names 11-17
- 11.9 SNMP in Multishelf Management 11-17
- 11.10 Proxy Over Firewalls 11-19
- 11.11 Remote Monitoring 11-20
 - 11.11.1 64-Bit RMON Monitoring over DCC 11-20
 - 11.11.1.1 Row Creation in MediaIndependentTable 11-20
 - 11.11.1.2 Row Creation in cMediaIndependentHistoryControlTable 11-21
 - 11.11.2 HC-RMON-MIB Support 11-21
 - 11.11.3 Ethernet Statistics RMON Group 11-21
 - 11.11.3.1 Row Creation in etherStatsTable 11-21

11.11.3.2	Get Requests and GetNext Requests	11-22
11.11.3.3	Row Deletion in etherStatsTable	11-22
11.11.3.4	64-Bit etherStatsHighCapacity Table	11-22
11.11.4	History Control RMON Group	11-22
11.11.4.1	History Control Table	11-22
11.11.4.2	Row Creation in historyControlTable	11-22
11.11.4.3	Get Requests and GetNext Requests	11-23
11.11.4.4	Row Deletion in historyControl Table	11-23
11.11.5	Ethernet History RMON Group	11-23
11.11.5.1	64-Bit etherHistoryHighCapacityTable	11-23
11.11.6	Alarm RMON Group	11-23
11.11.6.1	Alarm Table	11-24
11.11.6.2	Row Creation in alarmTable	11-24
11.11.6.3	Get Requests and GetNext Requests	11-25
11.11.6.4	Row Deletion in alarmTable	11-25
11.11.7	Event RMON Group	11-26
11.11.7.1	Event Table	11-26
11.11.7.2	Log Table	11-26

APPENDIX A**Hardware Specifications A-1**

A.1	Shelf Specifications	A-1
A.1.1	Bandwidth	A-1
A.1.2	Configurations	A-1
A.1.3	Cisco Transport Controller	A-2
A.1.4	External LAN Interface	A-2
A.1.5	TL1 Craft Interface	A-2
A.1.6	Modem Interface	A-2
A.1.7	Alarm Interface	A-3
A.1.8	EIA Interface (ANSI only)	A-3
A.1.9	BITS Interface (ANSI only)	A-3
A.1.10	System Timing	A-3
A.1.11	System Power	A-4
A.1.12	System Environmental Specifications	A-4
A.1.13	Dimensions	A-4
A.2	General Card Specifications	A-5
A.2.1	Power	A-5
A.2.2	Temperature	A-6
A.3	Common Control Card Specifications	A-6
A.3.1	TCC2 Card Specifications	A-7

A.3.2	TCC2P Card Specifications	A-7
A.3.3	AIC-I Card Specifications	A-8
A.3.4	AEP Specifications (ANSI only)	A-9
A.3.5	MIC-A/P FMEC Specifications (ETSI only)	A-10
A.3.6	MIC-C/T/P FMEC Specifications (ETSI only)	A-10
A.3.7	MS-ISC-100T Card Specifications	A-11
A.4	DWDM Card Specifications	A-11
A.4.1	OSCM Card Specifications	A-12
A.4.2	OSC-CSM Card Specifications	A-12
A.4.3	OPT-PRE Amplifier Card Specifications	A-13
A.4.4	OPT-BST Amplifier Card Specifications	A-14
A.4.5	OPT-BST-E Amplifier Card Specifications	A-14
A.4.6	OPT-BST-L Amplifier Card Specifications	A-15
A.4.7	OPT-AMP-L Preamplifier Card Specifications	A-15
A.4.8	32MUX-O Card Specifications	A-16
A.4.9	32DMX-O Card Specifications	A-17
A.4.10	32DMX Card Specifications	A-18
A.4.11	32DMX-L Card Specifications	A-19
A.4.12	4MD-xx.x Card Specifications	A-21
A.4.13	AD-1C-xx.x Card Specifications	A-22
A.4.14	AD-2C-xx.x Card Specifications	A-23
A.4.15	AD-4C-xx.x Card Specifications	A-24
A.4.16	AD-1B-xx.x Card Specifications	A-26
A.4.17	AD-4B-xx.x Card Specifications	A-29
A.4.18	32WSS Card Specifications	A-33
A.4.19	32WSS-L Card Specifications	A-35
A.4.20	MMU Card Specifications	A-37
A.5	Transponder and Muxponder Card Specifications	A-39
A.5.1	TXP_MR_10G Card Specifications	A-39
A.5.2	MXP_2.5G_10G Card Specifications	A-41
A.5.3	TXP_MR_2.5G and TXPP_MR_2.5G Card Specifications	A-43
A.5.4	MXP_MR_2.5G and MXPP_MR_2.5G Card Specifications	A-45
A.5.5	MXP_2.5G_10E Card Specifications	A-48
A.5.6	MXP_2.5G_10E_C Card Specifications	A-49
A.5.7	MXP_2.5G_10E_L Card Specifications	A-52
A.5.8	MXP_MR_10DME_C Card Specifications	A-55
A.5.9	MXP_MR_10DME_L Card Specifications	A-57
A.5.10	TXP_MR_10E Card Specifications	A-60
A.5.11	TXP_MR_10E_C Card Specifications	A-62
A.5.12	TXP_MR_10E_L Card Specifications	A-65

A.6 SFP and XFP Specifications **A-68**

APPENDIX B

Administrative and Service States B-1

- B.1 Service States **B-1**
- B.2 Administrative States **B-2**
- B.3 Service State Transitions **B-3**
 - B.3.1 DWDM Shelf Service State Transitions **B-3**
 - B.3.2 DWDM Card Service State Transitions **B-4**
 - B.3.3 Optical Payload Port Service State Transitions **B-8**
 - B.3.4 OSC Port Service State Transitions **B-10**
 - B.3.5 OCHNC Service State Transitions **B-12**
 - B.3.6 Transponder/Muxponder Card Service State Transitions **B-13**
 - B.3.7 Transponder/Muxponder Port Service State Transitions **B-18**

APPENDIX C

Network Element Defaults C-1

- C.1 Network Element Defaults Description **C-1**
- C.2 ANSI Platform Defaults **C-2**
 - C.2.1 ANSI Card Defaults **C-2**
 - C.2.1.1 ANSI Configuration Defaults **C-2**
 - C.2.1.2 ANSI Threshold Defaults **C-3**
 - C.2.1.3 ANSI Defaults by Card **C-4**
 - C.2.2 ANSI Node Default Settings **C-60**
 - C.2.2.1 Time Zones **C-73**
- C.3 CTC Default Settings **C-75**
- C.4 ETSI Platform Defaults **C-76**
 - C.4.1 ETSI Card Defaults **C-76**
 - C.4.1.1 ETSI Configuration Defaults **C-77**
 - C.4.1.2 ETSI Threshold Defaults **C-77**
 - C.4.1.3 ETSI Defaults by Card **C-78**
 - C.4.2 ETSI Node Default Settings **C-133**

INDEX



FIGURES

<i>Figure 1-1</i>	Cisco ONS 15454 ANSI Shelf Dimensions	1-4
<i>Figure 1-2</i>	Mounting an ONS 15454 ANSI Shelf in a Rack	1-5
<i>Figure 1-3</i>	ONS 15454 ETSI Shelf Assembly Dimensions	1-7
<i>Figure 1-4</i>	Mounting an ONS 15454 ETSI Shelf in a Rack	1-8
<i>Figure 1-5</i>	Three-Shelf ONS 15454 ETSI Bay Assembly	1-9
<i>Figure 1-6</i>	Two-Channel Add/Drop FlexLayer Module Block Diagram	1-11
<i>Figure 1-7</i>	ONS 15454 Two-Channel Optical Add/Drop FlexLayer Module	1-12
<i>Figure 1-8</i>	Two-Channel Drop Component Connector Mapping and Labeling	1-12
<i>Figure 1-9</i>	Two-Channel Add Component Connector Mapping and Labeling	1-13
<i>Figure 1-10</i>	Typical Y-Cable Protection Module Configuration	1-13
<i>Figure 1-11</i>	1:2 Splitter and 2:1 Coupler (Y-Cable Protection) Module Block Diagram	1-14
<i>Figure 1-12</i>	ONS 15454 Y-Cable Protection FlexLayer Module (Single-Mode)	1-14
<i>Figure 1-13</i>	ONS 15454 Y-Cable Protection FlexLayer Module (Multimode)	1-15
<i>Figure 1-14</i>	Y-Cable Protection Component Connector Mapping and Labeling	1-15
<i>Figure 1-15</i>	Y-Cable Protection Module Tray	1-17
<i>Figure 1-16</i>	Y-Cable Protection Port Label	1-18
<i>Figure 1-17</i>	Typical DWDM Equipment Layout in an ONS 15454 ANSI Rack	1-19
<i>Figure 1-18</i>	The ONS 15454 Front Door	1-20
<i>Figure 1-19</i>	Cisco ONS 15454 ANSI Deep Door	1-21
<i>Figure 1-20</i>	ONS 15454 ANSI Front Door Ground Strap	1-22
<i>Figure 1-21</i>	Removing the ONS 15454 ANSI Front Door	1-23
<i>Figure 1-22</i>	Removing the ONS 15454 ETSI Front Door	1-24
<i>Figure 1-23</i>	ONS 15454 ANSI Front-Door Erasable Label	1-25
<i>Figure 1-24</i>	ONS 15454 ETSI Front-Door Erasable Label	1-26
<i>Figure 1-25</i>	Laser Warning on the ONS 15454 ANSI Front-Door Label	1-26
<i>Figure 1-26</i>	Laser Warning on the ONS 15454 ETSI Front-Door Label	1-27
<i>Figure 1-27</i>	Backplane Covers	1-28
<i>Figure 1-28</i>	Removing the Lower Backplane Cover	1-28
<i>Figure 1-29</i>	Backplane Attachment for Cover	1-29
<i>Figure 1-30</i>	Installing the Plastic Rear Cover with Spacers	1-30
<i>Figure 1-31</i>	AEP Printed Circuit Board Assembly	1-32

Figure 1-32	AEP Block Diagram	1-32
Figure 1-33	AEP Wire-Wrap Connections to Backplane Pins	1-33
Figure 1-34	Alarm Input Circuit Diagram	1-34
Figure 1-35	Alarm Output Circuit Diagram	1-35
Figure 1-36	Connecting the EAP to the Node Controller and Subtending Shelf	1-37
Figure 1-37	EAP Cable	1-38
Figure 1-38	Filler Card Faceplate	1-39
Figure 1-39	Managing Cables on the Front Panel	1-40
Figure 1-40	Fiber Capacity	1-41
Figure 1-41	Standard Patch-Panel Tray	1-42
Figure 1-42	Deep Patch-Panel Tray	1-43
Figure 1-43	Patch-Panel Port Wavelengths	1-43
Figure 1-44	Y-Cable Module Tray	1-44
Figure 1-45	Fiber-Storage Tray	1-45
Figure 1-46	Tie-Down Bar on the Cisco ONS 15454 ANSI Shelf Assembly	1-46
Figure 1-47	Position of the ONS 15454 ETSI Fan-Tray Assembly	1-47
Figure 1-48	Ground Posts on the ONS 15454 ANSI Backplane	1-49
Figure 1-49	Cisco ONS 15454 Backplane Pinouts (Release 3.4 or Later)	1-50
Figure 1-50	ONS 15454 ANSI Backplane Pinouts	1-51
Figure 1-51	Installing Cards in the ONS 15454 ANSI	1-54
Figure 1-52	Installing Cards in the ONS 15454 ETSI Shelf	1-55
Figure 2-1	Class 1 Laser Product Label	2-13
Figure 2-2	Hazard Level Label	2-14
Figure 2-3	Laser Source Connector Label	2-14
Figure 2-4	FDA Statement Label	2-14
Figure 2-5	Shock Hazard Label	2-15
Figure 2-6	Class 1M Laser Product Label	2-15
Figure 2-7	Hazard Level Label	2-16
Figure 2-8	Laser Source Connector Label	2-16
Figure 2-9	FDA Statement Label	2-16
Figure 2-10	Shock Hazard Label	2-17
Figure 2-11	TCC2 Faceplate and Block Diagram	2-18
Figure 2-12	TCC2P Faceplate and Block Diagram	2-22
Figure 2-13	AIC-I Faceplate and Block Diagram	2-26
Figure 2-14	RJ-11 Connector	2-29

Figure 2-15	MS-ISC-100T Faceplate	2-32
Figure 2-16	MIC-A/P Faceplate	2-33
Figure 2-17	MIC-A/P Block Diagram	2-34
Figure 2-18	MIC-C/T/P Faceplate	2-36
Figure 2-19	MIC-C/T/P Block Diagram	2-36
Figure 2-20	OSCM Card Faceplate	2-38
Figure 2-21	OSCM VOA Optical Module Functional Block Diagram	2-39
Figure 2-22	OSC-CSM Faceplate	2-41
Figure 2-23	OSC-CSM Block Diagram	2-42
Figure 2-24	OSC-CSM Optical Module Functional Block Diagram	2-43
Figure 2-25	OPT-PRE Faceplate	2-46
Figure 2-26	OPT-PRE Block Diagram	2-47
Figure 2-27	OPT-PRE Optical Module Functional Block Diagram	2-47
Figure 2-28	OPT-BST Faceplate	2-49
Figure 2-29	OPT-BST Block Diagram	2-50
Figure 2-30	OPT-BST Optical Module Functional Block Diagram	2-50
Figure 2-31	OPT-BST-E Faceplate	2-53
Figure 2-32	OPT-BST-E Block Diagram	2-54
Figure 2-33	OPT-BST-E Optical Module Functional Block Diagram	2-54
Figure 2-34	OPT-BST-L Faceplate	2-57
Figure 2-35	OPT-BST-L Optical Module Functional Block Diagram	2-58
Figure 2-36	OPT-AMP-L Faceplate	2-60
Figure 2-37	OPT-AMP-L Optical Module Functional Block Diagram	2-61
Figure 2-38	32MUX-O Faceplate	2-64
Figure 2-39	32MUX-O Block Diagram	2-65
Figure 2-40	32MUX-O Optical Module Functional Block Diagram	2-65
Figure 2-41	32DMX-O Faceplate	2-69
Figure 2-42	32DMX-O Block Diagram	2-70
Figure 2-43	32DMX-O Optical Module Functional Block Diagram	2-70
Figure 2-44	32DMX Faceplate and Ports	2-72
Figure 2-45	32DMX Block Diagram	2-73
Figure 2-46	32DMX Optical Module Functional Block Diagram	2-73
Figure 2-47	32DMX-L Faceplate and Ports	2-76
Figure 2-48	32DMX-L Block Diagram	2-77
Figure 2-49	32DMX-L Optical Module Functional Block Diagram	2-77

Figure 2-50	32WSS Faceplate and Ports	2-80
Figure 2-51	32WSS Block Diagram	2-81
Figure 2-52	32WSS Optical Block Diagram	2-82
Figure 2-53	32WSS-L Faceplate and Ports	2-85
Figure 2-54	32WSS-L Block Diagram	2-86
Figure 2-55	32WSS-L Optical Block Diagram	2-87
Figure 2-56	4MD-xx.x Faceplate	2-92
Figure 2-57	4MD-xx.x Block Diagram	2-93
Figure 2-58	4MD-xx.x Optical Module Functional Block Diagram	2-93
Figure 2-59	AD-1C-xx.x Faceplate	2-96
Figure 2-60	AD-1C-xx.x Block Diagram	2-97
Figure 2-61	AD-1C-xx.x Optical Module Functional Block Diagram	2-97
Figure 2-62	AD-2C-xx.x Faceplate	2-99
Figure 2-63	AD-2C-xx.x Block Diagram	2-100
Figure 2-64	AD-2C-xx.x Optical Module Functional Block Diagram	2-100
Figure 2-65	AD-4C-xx.x Faceplate	2-103
Figure 2-66	AD-4C-xx.x Block Diagram	2-104
Figure 2-67	AD-4C-xx.x Optical Module Functional Block Diagram	2-104
Figure 2-68	AD-1B-xx.x Faceplate	2-107
Figure 2-69	AD-1B-xx.x Block Diagram	2-108
Figure 2-70	AD-1B-xx.x Optical Module Functional Block Diagram	2-108
Figure 2-71	AD-4B-xx.x Faceplate	2-110
Figure 2-72	AD-4B-xx.x Block Diagram	2-111
Figure 2-73	AD-4B-xx.x Optical Module Functional Block Diagram	2-111
Figure 2-74	MMU Faceplate and Ports	2-114
Figure 2-75	MMU Block Diagram	2-115
Figure 2-76	TXP_MR_10G Faceplate and Block Diagram	2-118
Figure 2-77	TXP_MR_10E Faceplate and Block Diagram	2-121
Figure 2-78	TXP_MR_10E_C and TXP_MR_10E_L Faceplates and Block Diagram	2-125
Figure 2-79	TXP_MR_2.5G and TXPP_MR_2.5G Faceplates	2-131
Figure 2-80	TXP_MR_2.5G and TXPP_MR_2.5G Block Diagram	2-132
Figure 2-81	MXP_2.5G_10G Faceplate	2-136
Figure 2-82	MXP_2.5G_10G Card Block Diagram	2-137
Figure 2-83	MXP_2.5G_10E Faceplate	2-140
Figure 2-84	MXP_2.5G_10E Block Diagram	2-141

Figure 2-85	MXP_2.5G_10E_C and MXP_2.5G_10E_L Faceplates and Block Diagram	2-148
Figure 2-86	MXP_MR_2.5G and MXPP_MR_2.5G Faceplates	2-158
Figure 2-87	MXP_MR_2.5G and MXPP_MR_2.5G Block Diagram	2-159
Figure 2-88	MXP_MR_10DME_C and MXP_MR_10DME_L Faceplates and Block Diagram	2-165
Figure 2-89	Y-Cable Protection	2-170
Figure 2-90	Splitter Protection	2-171
Figure 3-1	Hub Node Configuration Example	3-2
Figure 3-2	Hub Node Channel Flow Example	3-3
Figure 3-3	Terminal Node Configuration Example	3-4
Figure 3-4	Amplified OADM Node Configuration Example	3-5
Figure 3-5	Amplified OADM Node Channel Flow Example	3-6
Figure 3-6	Passive OADM Node Configuration Example	3-7
Figure 3-7	Passive OADM Node Channel Flow Example	3-7
Figure 3-8	ROADM Node with OPT-PRE, OPT-BST, and 32DMX Cards Installed	3-8
Figure 3-9	ROADM Node with BST-PRE, OPT-BST, and 32DMX-O Cards Installed	3-9
Figure 3-10	ROADM Optical Signal Flow Example	3-10
Figure 3-11	Anti-ASE Node Channel Flow Example	3-11
Figure 3-12	Line Amplifier Node Configuration Example	3-12
Figure 3-13	OSC Regeneration Line Node Configuration Example	3-13
Figure 3-14	OSC Regeneration Line Node Flow	3-13
Figure 3-15	Multishelf Node Configuration	3-14
Figure 3-16	Fibering OSC Terminations—Hub Node with OSCM Cards	3-17
Figure 3-17	Fibering a Hub Node	3-19
Figure 3-18	Fibering a Line Amplifier Node	3-21
Figure 3-19	Fibering an OSC Regeneration Node	3-23
Figure 3-20	Fibering an Amplified OADM Node	3-26
Figure 3-21	Fibering a Passive OADM Node	3-28
Figure 3-22	Fibering an ROADM Node	3-30
Figure 3-23	Double Terminal Protection Configuration	3-32
Figure 3-24	1+1 Protected Single-Span Link with Hub Nodes	3-33
Figure 3-25	1+1 Protected Single-Span Link with Active OADM Nodes	3-34
Figure 3-26	1+1 Protected Single-Span Link with Passive OADM Nodes	3-35
Figure 3-27	Scalable Terminal Channel Flow Example	3-37
Figure 3-28	Scalable Terminal Example	3-38
Figure 3-29	Amplified Hybrid Terminal Example	3-39

Figure 3-30	Passive Hybrid Terminal Example	3-40
Figure 3-31	Hybrid Amplified OADM Example	3-41
Figure 3-32	Hybrid Line Amplifier Example	3-42
Figure 3-33	Hybrid Line Amplifier Channel Flow Example	3-43
Figure 3-34	Amplified TDM Example with an OPT-BST Amplifier	3-44
Figure 3-35	Amplified TDM Channel Flow Example With OPT-BST Amplifiers	3-44
Figure 3-36	Amplified TDM Example with FlexLayer Filters	3-45
Figure 3-37	Amplified TDM Channel Flow Example With FlexLayer Filters	3-45
Figure 3-38	Amplified TDM Channel Flow Example With Amplifiers, AD-1C-xx.x Cards, and OSC-CSM Cards	3-46
Figure 3-39	WDM-ANS Provisioning	3-51
Figure 4-1	Hubbed Ring	4-3
Figure 4-2	Multihubbed Ring	4-4
Figure 4-3	Any-to-Any Ring	4-5
Figure 4-4	Meshed Ring	4-6
Figure 4-5	Linear Configuration with an OADM Node	4-6
Figure 4-6	Linear Configuration without an OADM Node	4-7
Figure 4-7	Single-Span Link	4-7
Figure 4-8	Automatic Power Control	4-11
Figure 4-9	Power Monitoring Subtab	4-13
Figure 4-10	Span Loss Verification	4-14
Figure 4-11	Nodes Using OPT-BST/OPT-BST-E Cards	4-17
Figure 4-12	Nodes Using OSC-CSM Cards	4-19
Figure 4-13	Nodes Using OPT-BST-L Cards	4-20
Figure 4-14	Nodes Using OPT-AMP-L Cards	4-22
Figure 4-15	Effect of Gain Ripple and Gain Tilt on Amplifier Output Power	4-24
Figure 4-16	Flat Gain (Gain Tilt = 0 dB)	4-25
Figure 4-17	Effect of VOA Attenuation on Gain Tilt	4-25
Figure 4-18	System Tilt Compensation Without an ROADM Node	4-27
Figure 4-19	Cisco MetroPlanner Installation Parameters	4-28
Figure 4-20	System Tilt Compensation With an ROADM Node	4-29
Figure 4-21	Optical Channel Circuits	4-29
Figure 4-22	Optical Channel Management	4-30
Figure 5-1	CTC Software Versions, Node View (Single-Shelf Mode)	5-2
Figure 5-2	CTC Software Versions, Network View	5-3
Figure 5-3	Node View (Default Login View for Single-Shelf Mode)	5-8

Figure 5-4	Multishelf View (Default Login View for Multishelf Mode)	5-9
Figure 5-5	Terminal Loopback Indicator	5-12
Figure 5-6	Facility Loopback Indicator	5-12
Figure 5-7	Network in CTC Network View	5-14
Figure 5-8	CTC Card View Showing a 32DMX-O Card	5-17
Figure 7-1	ONS 15454 Timing Example	7-3
Figure 8-1	Scenario 1: CTC and ONS 15454s on Same Subnet (ANSI and ETSI)	8-3
Figure 8-2	Scenario 2: CTC and ONS 15454s Connected to Router (ANSI and ETSI)	8-4
Figure 8-3	Scenario 3: Using Proxy ARP (ANSI and ETSI)	8-6
Figure 8-4	Scenario 3: Using Proxy ARP with Static Routing (ANSI and ETSI)	8-7
Figure 8-5	Scenario 4: Default Gateway on a CTC Computer (ANSI and ETSI)	8-8
Figure 8-6	Scenario 5: Static Route With One CTC Computer Used as a Destination (ANSI and ETSI)	8-9
Figure 8-7	Scenario 5: Static Route With Multiple LAN Destinations (ANSI and ETSI)	8-10
Figure 8-8	Scenario 6: OSPF Enabled (ANSI and ETSI)	8-11
Figure 8-9	Scenario 6: OSPF Not Enabled (ANSI and ETSI)	8-12
Figure 8-10	Scenario 7: ONS 15454 Proxy Server with GNE and ENes on the Same Subnet (ANSI and ETSI)	8-14
Figure 8-11	Scenario 7: ONS 15454 Proxy Server with GNE and ENes on Different Subnets (ANSI and ETSI)	8-15
Figure 8-12	Scenario 7: ONS 15454 Proxy Server With ENes on Multiple Rings (ANSI and ETSI)	8-16
Figure 8-13	Scenario 8: Dual GNEs on the Same Subnet (ANSI and ETSI)	8-18
Figure 8-14	Scenario 8: Dual GNEs on Different Subnets (ANSI and ETSI)	8-19
Figure 8-15	Scenario 9: ONS 15454 GNE and ENes on the Same Subnet with Secure Mode Enabled	8-21
Figure 8-16	Scenario 9: ONS 15454 GNE and ENes on Different Subnets with Secure Mode Enabled	8-22
Figure 8-17	Proxy and Firewall Tunnels for Foreign Terminations	8-29
Figure 8-18	Foreign Node Connection to an ENE Ethernet Port	8-30
Figure 8-19	OSI/MSTP Scenario 1	8-31
Figure 8-20	OSI/MSTP Scenario 2	8-32
Figure 8-21	OSI/MSTP Scenario 3	8-33
Figure 8-22	OSI/IP Scenario 4	8-34
Figure 8-23	LMP and LMP-WDM Relationship	8-38
Figure 8-24	LMP System Implementation	8-39
Figure 9-1	Shelf LCD Panel	9-2
Figure 9-2	Network View Alarm Profiles Window	9-9
Figure 9-3	OPT-BST Card Alarm Profiles	9-12
Figure 9-4	External Alarms and Controls Using a Virtual Wire	9-14
Figure 9-5	Navigating to Shelf View from Multishelf View	9-16

<i>Figure 10-1</i>	ONS 15454 ANSI Node PM Read Points for TXP_MR_10G Card	10-3
<i>Figure 10-2</i>	ONS 15454 ETSI Node PM Read Points on TXP_MR_10G Cards	10-4
<i>Figure 10-3</i>	ONS 15454 ANSI Node PM Read Points on OSCM and OSC-CSM Cards	10-15
<i>Figure 10-4</i>	ONS 15454 ETSI Node PM Read Points on OSCM and OSC-CSM Cards	10-16
<i>Figure 11-1</i>	Basic Network Managed by SNMP	11-2
<i>Figure 11-2</i>	Example of the Primary SNMP Components	11-3
<i>Figure 11-3</i>	Agent Gathering Data from a MIB and Sending Traps to the Manager	11-3



TABLES

<i>Table 1-1</i>	ONS 15454 100-GHz Channel Plan	1-10
<i>Table 1-2</i>	Protection A (TXP Cards 1 and 2) Port Mapping: Combiner from DWDM	1-15
<i>Table 1-3</i>	Protection A (TXP Cards 1 and 2) Port Mapping: Splitter to DWDM	1-16
<i>Table 1-4</i>	Protection B (TXP Cards 3 and 4) Port Mapping: Combiner from DWDM	1-16
<i>Table 1-5</i>	Protection B (TXP Cards 3 and 4) Port Mapping: Splitter to DWDM	1-16
<i>Table 1-6</i>	Pin Assignments for the AEP	1-33
<i>Table 1-7</i>	Alarm Input Pin Association	1-34
<i>Table 1-8</i>	Pin Association for Alarm Output Pins	1-35
<i>Table 1-9</i>	ANSI Fiber Channel Capacity (One Side of the Shelf)	1-41
<i>Table 1-10</i>	ETSI Fiber Channel Capacity (One Side of the Shelf)	1-41
<i>Table 1-11</i>	Fiber-Storage Tray Capacity	1-44
<i>Table 1-12</i>	Fan Tray Assembly Power Requirements	1-47
<i>Table 1-13</i>	BITS External Timing Pin Assignments	1-52
<i>Table 1-14</i>	LAN Pin Assignments	1-53
<i>Table 1-15</i>	Craft Interface Pin Assignments	1-53
<i>Table 1-16</i>	Slot and Card Symbols	1-56
<i>Table 2-1</i>	DWDM and Client Cards for the ONS 15454	2-3
<i>Table 2-2</i>	DWDM and Client Card CTC Software Release Compatibility	2-6
<i>Table 2-3</i>	ONS 15454 Card Interfaces Assigned to Input Power Classes	2-8
<i>Table 2-4</i>	10-Gbps Interface Optical Performance	2-8
<i>Table 2-5</i>	2.5-Gbps Interface Optical Performance	2-9
<i>Table 2-6</i>	DWDM Channel Allocation Plan (C Band)	2-10
<i>Table 2-7</i>	DWDM Channel Allocation Plan (L Band)	2-11
<i>Table 2-8</i>	TCC2 Card-Level Indicators	2-19
<i>Table 2-9</i>	TCC2 Network-Level Indicators	2-20
<i>Table 2-10</i>	TCC2 Power-Level Indicators	2-20
<i>Table 2-11</i>	TCC2P Card-Level Indicators	2-24
<i>Table 2-12</i>	TCC2P Network-Level Indicators	2-24
<i>Table 2-13</i>	TCC2P Power-Level Indicators	2-25
<i>Table 2-14</i>	AIC-I Card-Level Indicators	2-26
<i>Table 2-15</i>	Orderwire Pin Assignments	2-29

Table 2-16	UDC Pin Assignments	2-29
Table 2-17	DCC Pin Assignments	2-30
Table 2-18	MS-ISC-100T Card Port Assignments	2-31
Table 2-19	MS-ISC-100T Card-Level Indicators	2-33
Table 2-20	Alarm Interface Pinouts on the MIC-A/P DB-62 Connector	2-34
Table 2-21	OSCM VOA Port Calibration	2-39
Table 2-22	OSCM Card-Level Indicators	2-39
Table 2-23	OSC-CSM Port Calibration	2-44
Table 2-24	OSC-CSM Card-Level Indicators	2-44
Table 2-25	OPT-PRE Port Calibration	2-47
Table 2-26	OPT-PRE Amplifier Card-Level Indicators	2-48
Table 2-27	OPT-BST Port Calibration	2-50
Table 2-28	OPT-BST Card-Level Indicators	2-51
Table 2-29	OPT-BST-E Port Calibration	2-54
Table 2-30	OPT-BST-E Card-Level Indicators	2-55
Table 2-31	OPT-BST-L Port Calibration	2-58
Table 2-32	OPT-BST-L Card-Level Indicators	2-59
Table 2-33	OPT-AMP-L Port Calibration	2-61
Table 2-34	OPT-AMP-L Card-Level Indicators	2-62
Table 2-35	32MUX-O Channel Plan	2-66
Table 2-36	32MUX-O Port Calibration	2-67
Table 2-37	32MUX-O Card-Level Indicators	2-67
Table 2-38	32DMX-O Port Calibration	2-70
Table 2-39	32DMX-O Card-Level Indicators	2-71
Table 2-40	32DMX Port Calibration	2-74
Table 2-41	32DMX Card-Level Indicators	2-74
Table 2-42	32DMX-L Port Calibration	2-78
Table 2-43	32DMX-L Card-Level Indicators	2-78
Table 2-44	32WSS Port Calibration	2-83
Table 2-45	32WSS Card-Level Indicators	2-83
Table 2-46	32WSS-L Port Calibration	2-88
Table 2-47	32WSS-L Channel Plan	2-88
Table 2-48	32WSS-L Card-Level Indicators	2-90
Table 2-49	4MD-xx.x Channel Sets	2-94
Table 2-50	4MD-xx.x Port Calibration	2-94

Table 2-51	4MD-xx.x Card-Level Indicators	2-95
Table 2-52	AD-1C-xx.x Port Calibration	2-97
Table 2-53	AD-1C-xx.x Card-Level Indicators	2-98
Table 2-54	AD-2C-xx.x Channel Pairs	2-101
Table 2-55	AD-2C-xx.x Port Calibration	2-101
Table 2-56	AD-2C-xx.x Card-Level Indicators	2-102
Table 2-57	AD-4C-xx.x Channel Sets	2-105
Table 2-58	AD-4C-xx.x Port Calibration	2-105
Table 2-59	AD-4C-xx.x Card-Level Indicators	2-105
Table 2-60	AD-1B-xx.x Port Calibration	2-108
Table 2-61	AD-1B-xx.x Card-Level Indicators	2-109
Table 2-62	AD-4B-xx.x Port Calibration	2-112
Table 2-63	AD-4B-xx.x Card-Level Indicators	2-112
Table 2-64	MMU Port Calibration	2-115
Table 2-65	MMU Card-Level Indicators	2-116
Table 2-66	TXP_MR_10G Card-Level Indicators	2-119
Table 2-67	TXP_MR_10G Port-Level Indicators	2-119
Table 2-68	TXP_MR_10E Card-Level Indicators	2-123
Table 2-69	TXP_MR_10E Port-Level Indicators	2-124
Table 2-70	TXP_MR_10E_C and TXP_MR_10E_L Card-Level Indicators	2-128
Table 2-71	TXP_MR_10E_C and TXP_MR_10E_L Port-Level Indicators	2-128
Table 2-72	2R and 3R Mode and ITU-T G.709 Compliance by Client Interface	2-129
Table 2-73	Trunk Bit Rates With ITU-T G.709 Enabled	2-129
Table 2-74	TXP_MR_2.5G and TXPP_MR_2.5G Card-Level Indicators	2-133
Table 2-75	TXP_MR_2.5G and TXPP_MR_2.5G Port-Level Indicators	2-134
Table 2-76	MXP_2.5G_10G Card-Level Indicators	2-138
Table 2-77	MXP_2.5G_10G Port-Level Indicators	2-138
Table 2-78	MXP_2.5G_10E Trunk Wavelengths	2-143
Table 2-79	MXP_2.5G_10E Card-Level Indicators	2-145
Table 2-80	MXP_2.5G_10E Port-Level Indicators	2-145
Table 2-81	MXP_2.5G_10E_C Trunk Wavelengths	2-151
Table 2-82	MXP_2.5G_10E_L Trunk Wavelengths	2-152
Table 2-83	MXP_2.5G_10E_C and MXP_2.5G_10E_L Card-Level Indicators	2-154
Table 2-84	MXP_2.5G_10E_C and MXP_2.5G_10E_L Port-Level Indicators	2-154
Table 2-85	Card Versions	2-155

Table 2-86	MXP_MR_2.5G and MXPP_MR_2.5G Client Interface Data Rates and Encapsulation	2-156
Table 2-87	Client Data Rates and Ports	2-156
Table 2-88	MXP_MR_2.5G and MXPP_MR_2.5G Card-Level Indicators	2-160
Table 2-89	MXP_MR_2.5G and MXPP_MR_2.5G Port-Level Indicators	2-160
Table 2-90	MXP_MR_10DME_C and MXP_MR_10DME_L Client Interface Data Rates and Encapsulation	2-162
Table 2-91	Supported Client Data Rates for Ports 1 through 4	2-162
Table 2-92	MXP_MR_10DME_C Trunk Wavelengths	2-166
Table 2-93	MXP_MR_10DME_L Trunk Wavelengths	2-167
Table 2-94	MXP_MR_10DME_C and MXP_MR_10DME_L Card-Level Indicators	2-168
Table 2-95	MXP_MR_10DME_C and MXP_MR_10DME_L Port-Level Indicators	2-169
Table 2-96	Termination Modes	2-172
Table 3-1	Typical Add/Drop Configurations for Scalable Terminal Nodes	3-36
Table 3-2	ANS Parameters	3-49
Table 3-3	ANS-WDM > Provisioning Subtab Parameters	3-51
Table 3-4	ANS Parameters By Node Type	3-53
Table 3-5	ANS Parameters Summary	3-56
Table 4-1	Supported Topologies and Node Types	4-8
Table 4-2	APC-Managed Parameters	4-12
Table 4-3	Flat Output Gain Range Limits	4-26
Table 5-1	JRE Compatibility	5-4
Table 5-2	Computer Requirements for CTC	5-5
Table 5-3	ONS 15454 Connection Methods	5-7
Table 5-4	Multishelf View (Multishelf Mode), Node View (Single-Shelf Mode), and Shelf View (Multishelf Mode) Card Colors	5-10
Table 5-5	Multishelf View (Multishelf Mode) and Node View (Single-Shelf Mode) FMEC Color	5-10
Table 5-6	Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Card Statuses	5-10
Table 5-7	Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Card Port Colors and Service States	5-11
Table 5-8	Multishelf View Tabs and Subtabs	5-12
Table 5-9	Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Tabs and Subtabs	5-13
Table 5-10	Network View Tabs and Subtabs	5-14
Table 5-11	Node Status Shown in Network View	5-15
Table 5-12	DCC Colors Indicating State in Network View	5-15
Table 5-13	Link Icons	5-16
Table 5-14	Card View Tabs and Subtabs	5-17
Table 6-1	ONS 15454 Security Levels—Node View	6-2
Table 6-2	ONS 15454 Security Levels—Network View	6-4

Table 6-3	ONS 15454 Default User Idle Times	6-6
Table 6-4	Audit Trail Window Columns	6-7
Table 6-5	Shared Secret Character Groups	6-9
Table 7-1	SSM Generation 1 Message Set	7-3
Table 7-2	SSM Generation 2 Message Set	7-4
Table 8-1	General ONS 15454 IP Troubleshooting Checklist	8-2
Table 8-2	ONS 15454 Gateway and End NE Settings	8-14
Table 8-3	Proxy Server Firewall Filtering Rules	8-16
Table 8-4	Proxy Server Firewall Filtering Rules When Packet Addressed to ONS 15454	8-17
Table 8-5	Cisco ONS 15454 Client/Trunk Card Combinations for Provisionable Patchcords	8-23
Table 8-6	Cisco ONS 15454 Client/Client Card Combinations for Provisionable Patchcords	8-24
Table 8-7	Cisco ONS 15454 Trunk/Trunk Card Combinations for Provisionable Patchcords	8-24
Table 8-8	Sample Routing Table Entries	8-25
Table 8-9	Ports Used by the TCC2/TCC2P	8-26
Table 9-1	Alarm Column Descriptions	9-2
Table 9-2	Color Codes for Alarms and Condition Severities	9-3
Table 9-3	Alarm Display	9-4
Table 9-4	Conditions Display	9-5
Table 9-5	Conditions Column Description	9-5
Table 9-6	History Column Description	9-7
Table 9-7	Alarm Profile Buttons	9-11
Table 9-8	Alarm Profile Editing Options	9-11
Table 9-9	TCA Suppression Groups	9-18
Table 10-1	Trunk-Side and Client-Side Optics PM Parameters	10-5
Table 10-2	Transponder and Muxponder Port Type PM Provisioning Options	10-6
Table 10-3	ONS 15454 SONET/SDH Layer Far-End and Near-End PMs	10-7
Table 10-4	Full RMON Statistics on TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L cards	10-8
Table 10-5	Gigabit Ethernet (GE) or Fibre Channel (FC) Payload PMs for the TXP_MR_2.5G and TXPP_MR_2.5G Cards	10-8
Table 10-6	ONE_GE or FC1G Payload PMs for the MXP_MR_2.5G and MXPP_MR_2.5G Cards	10-9
Table 10-7	FC1G Payload PMs on the Client Side	10-9
Table 10-8	GFP-T Payload PMs	10-9
Table 10-9	maxBaseRate for STS and VC Circuits	10-10
Table 10-10	History Statistics per Time Interval	10-10
Table 10-11	Transponder and Muxponder PM Provisioning Options	10-11
Table 10-12	ITU G.709 OTN Trunk-Side PMs	10-12

Table 10-13	FEC OTN Trunk-Side PMs	10-13
Table 10-14	ONS 15454 Optics and 8b10b PMs	10-13
Table 10-15	Optical PM Parameters for Optical Amplifier Cards	10-13
Table 10-16	Optical PM Parameters for 2MUX-O, 32WSS, 32WSS-L, 32DMX, 32DMX-L, and 32DMX-O Cards	10-14
Table 10-17	Optical PM Parameters for 4MD-xx.x Cards	10-14
Table 10-18	Optical PM Parameters for AD-1C-xx.x, AD-2C-xx.x, and AD-4C-xx.x Cards	10-14
Table 10-19	Optical PM Parameters for AD-1B-xx.x and AD-4B-xx.x Cards	10-14
Table 10-20	ANSI OSCM/OSC-CSM (OC3) Card PMs	10-16
Table 10-21	ETSI OSCM and OSC-CSM Card PMs	10-16
Table 10-22	ONS 15454 Optics and 8b10b PM Definitions	10-17
Table 10-23	ITU G.709 and ITU-T G.8021 Section Monitoring PM Definitions	10-19
Table 10-24	ITU G.709 Path Monitoring PM Definitions	10-19
Table 10-25	Full RMON Statistics PM Definitions	10-20
Table 10-26	FEC PM Definitions	10-23
Table 10-27	SONET PM Parameters	10-23
Table 10-28	SDH PM Parameters	10-24
Table 11-1	ONS 15454 SNMP Message Types	11-4
Table 11-2	IETF Standard MIBs Implemented in the ONS 15454 System	11-5
Table 11-3	ONS 15454 Proprietary MIBs	11-6
Table 11-4	cerentGenericPmThresholdTable	11-7
Table 11-5	cerentGenericPmStatsCurrentTable	11-8
Table 11-6	cerentGenericPmStatsIntervalTable	11-9
Table 11-7	Generic IETF Traps	11-9
Table 11-8	ONS 15454 SNMPv2 Trap Variable Bindings	11-10
Table 11-9	RMON History Control Periods and History Categories	11-22
Table 11-10	OIDs Supported in the AlarmTable	11-24
Table A-1	Individual Card Power Requirements (Typical Values at 25 degrees C)	A-5
Table A-2	32MUX-O Optical Specifications	A-16
Table A-3	32DMX-O Optical Specifications	A-17
Table A-4	32DMX Optical Specifications	A-18
Table A-5	32DMX Channel Plan	A-18
Table A-6	32DMX -L Optical Specifications	A-20
Table A-7	32DMX-L Channel Plan	A-20
Table A-8	4MD-xx.x Optical Specifications	A-22
Table A-9	AD-1C-xx.x Card Optical Specifications	A-23

Table A-10	AD-2C-xx.x Card Optical Specifications	A-23
Table A-11	AD-4C-xx.x Optical Specifications	A-25
Table A-12	AD-1B-xx.x Channel Allocation Plan by Band	A-26
Table A-13	AD-1B-xx.x Optical Specifications	A-28
Table A-14	AD-1B-xx.x Transmit and Receive Dropped Band Wavelength Ranges	A-28
Table A-15	AD-4B-xx.x Channel Allocation Plan by Band	A-30
Table A-16	AD-4B-xx.x Optical Specifications	A-32
Table A-17	AD-4B-xx.x Transmit and Receive Dropped Band Wavelength Ranges	A-32
Table A-18	32WSS Optical Specifications	A-33
Table A-19	32WSS Channel Plan	A-34
Table A-20	32WSS-L Optical Specifications	A-36
Table A-21	32WSS-L Channel Plan	A-36
Table A-22	MMU Optical Specifications	A-38
Table A-23	TXP_MR_2.5G/TXPP_MR_2.5G Card Receiver Trunk Side Specifications	A-44
Table A-24	MXP_MR_2.5G/MXPP_MR_2.5G Card Receiver Trunk Side Specifications	A-46
Table A-25	MXP_2.5G_10E Card Receiver Trunk Side Specifications	A-49
Table A-26	MXP_2.5G_10E_C Card Trunk Wavelengths	A-50
Table A-27	MXP_2.5G_10E_C Card Receiver Trunk Side Specifications	A-51
Table A-28	MXP_2.5G_10E_L Card Trunk Wavelengths	A-53
Table A-29	MXP_2.5G_10E_L Card Receiver Trunk Side Specifications	A-54
Table A-30	MXP_MR_10DME_C Card Receiver Trunk Side Specifications	A-56
Table A-31	MXP_MR_10DME_L Card Receiver Trunk Side Specifications	A-58
Table A-32	TXP_MR_10E Card Receiver Trunk Side Specifications	A-61
Table A-33	TXP_MR_10E_C Card Trunk Wavelengths	A-63
Table A-34	TXP_MR_10E_C Card Receiver Trunk Side Specifications	A-64
Table A-35	TXP_MR_10E_L Card Trunk Wavelengths	A-66
Table A-36	TXP_MR_10E Card Receiver Trunk Side Specifications	A-67
Table B-1	ONS 15454 Service State Primary States and Primary State Qualifiers	B-1
Table B-2	ONS 15454 Secondary States	B-2
Table B-3	ONS 15454 Administrative States	B-2
Table B-4	ONS 15454 Shelf Service State Transitions	B-3
Table B-5	ONS 15454 Optical Unit Service State Transitions	B-5
Table B-6	ONS 15454 Optical Payload Port Service State Transitions	B-8
Table B-7	ONS 15454 OSC Port Service State Transitions	B-10
Table B-8	ONS 15454 OCHNC Service State Transitions	B-12

<i>Table B-9</i>	ONS 15454 Transponder/Muxponder Card Service State Transitions	B-14
<i>Table B-10</i>	ONS 15454 Transponder/Muxponder Port Service State Transitions	B-19
<i>Table C-1</i>	ANSI MXP_2.5G_10E Card Default Settings	C-4
<i>Table C-2</i>	ANSI MXP_2.5G_10G Card Default Settings	C-9
<i>Table C-3</i>	ANSI MXP_MR_2.5G Card Default Settings	C-15
<i>Table C-4</i>	ANSI MXPP_MR_2.5G Card Default Settings	C-19
<i>Table C-5</i>	ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings	C-23
<i>Table C-6</i>	ANSI TXP_MR_10E Card Default Settings	C-29
<i>Table C-7</i>	ANSI TXP_MR_10G Card Default Settings	C-35
<i>Table C-8</i>	ANSI TXP_MR_2.5G Card Default Settings	C-40
<i>Table C-9</i>	ANSI TXPP_MR_2.5G Card Default Settings	C-49
<i>Table C-10</i>	ANSI OSCM Card Default Settings	C-58
<i>Table C-11</i>	ANSI OSC-CSM Card Default Settings	C-59
<i>Table C-12</i>	ANSI Amplifier Card Default Settings	C-60
<i>Table C-13</i>	Node Default Settings	C-62
<i>Table C-14</i>	Time Zones	C-73
<i>Table C-15</i>	CTC Default Settings	C-76
<i>Table C-16</i>	ETSI MXP_2.5G_10E Card Default Settings	C-78
<i>Table C-17</i>	ETSI MXP_2.5G_10G Card Default Settings	C-82
<i>Table C-18</i>	ETSI MXP_MR_2.5G Card Default Settings	C-88
<i>Table C-19</i>	ETSI MXPP_MR_2.5G Card Default Settings	C-92
<i>Table C-20</i>	ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings	C-96
<i>Table C-21</i>	ETSI TXP_MR_10E Card Default Settings	C-102
<i>Table C-22</i>	ETSI TXP_MR_10G Card Default Settings	C-108
<i>Table C-23</i>	ETSI TXP_MR_2.5G Card Default Settings	C-113
<i>Table C-24</i>	ETSI TXPP_MR_2.5G Card Default Settings	C-122
<i>Table C-25</i>	ETSI OSCM Card Default Settings	C-131
<i>Table C-26</i>	ETSI OSC-CSM Card Default Settings	C-132
<i>Table C-27</i>	ETSI Amplifier Card Default Settings	C-133
<i>Table C-28</i>	Node Default Settings	C-134



About this Manual



Note

The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This section explains the objectives, intended audience, and organization of this publication and describes the conventions that convey instructions and other information.

This section provides the following information:

- [Revision History](#)
- [Document Objectives](#)
- [Audience](#)
- [Related Documentation](#)
- [Document Conventions](#)
- [Obtaining Optical Networking Information](#)
- [Obtaining Documentation and Submitting a Service Request](#)

Revision History

Date	Notes
March 2007	Revision History Table added for the first time. Changed fuse rating and power consumption specifications in Appendix A.
August 2007	Updated About this Guide chapter.
September 2007	Updated transmitter and receiver power range for SFP, ONS-SE-4G-SM, in Appendix A.
October 2007	Updated the trunk and client side specifications in Appendix A, Hardware Specifications. Updated receiver power range for SFP, ONS-SE-4G-SM, in Appendix A, Hardware Specifications.
November 2007	Added replacement SFPs for the EOL/EOS SFPs in Chapter 2, Card Reference and Appendix A, Hardware Specification.
April 2008	Corrected applicable slot number for the TXP_MR_10E Card in Section 2.10.2 TXP_MR_10E Card.
June 2008	Added a note in the Key Features section of MXP_MR_10DME_C and MXP_MR_10DME_L Cards in Chapter 2, Card Reference.
July 2008	Updated Table B-8 in Appendix B, Administrative and Service States. Deleted the note in the ONS 15454 ANSI Power and Ground section in Chapter 1, Shelf Assembly Hardware.
September 2008	Added a note in Card Default Settings and Node Default Settings section of Appendix C, Network Element Defaults. Updated the Hub Node section in Chapter 3, Node Reference.
October 2008	Added a reference to “CTC Port Numbers and TL1 Aids” section of TL1 Command Guide, in the Power Monitoring sections of the Chapter, Card Reference.
December 2008	Added a note in the “Y-Cable Protection” section of Chapter 2, Card Reference.
April 2009	Added a note in the section “Automatic Power Reduction” of chapter 4, “Network Reference”.
August 2009	Added details on how the throughput of the MXP_MR_10DME_C and MXP_MR_10DME_L cards is affected in Chapter 2, Card Reference.
November 2009	Updated the table “2R and 3R Mode and ITU-T G.709 Compliance by Client Interface” in Chapter, Card Reference. Updated the table “Card View Tabs and Subtabs” in Chapter, Cisco Transport Controller Operation.
February 2010	Changed the BIEC parameter to BIT-EC in Chapter , “Performance Monitoring”.
March 2010	Updated the table “Multimode Fiber SFP Port Cabling Specifications” in the appendix “Hardware Specifications”.
April 2010	Updated the section “SNMP Overview” in the chapter “SNMP”.
June 2010	Updated the table “ONS 15454 Security Levels—Node View” in the chapter “Security Reference”.

Date	Notes
November 2010	<ul style="list-style-type: none"> • Updated the section, “SNMP in Multishelf Management” in the chapter, SNMP. • Updated the width of the single slot cards for Control cards and Transponder and Muxponder Cards in the appendix, "Hardware Specifications". • Updated the tables “SFP Specifications” and “Single-Mode Fiber SFP Port Cabling Specifications” in the appendix, “Hardware Specifications”.
January 2011	<ul style="list-style-type: none"> • Updated the width of all the cards in the appendix, "Hardware Specifications".
April 2011	<ul style="list-style-type: none"> • Updated the power values in the “Individual Card Power Requirements” table in the appendix, “Hardware Specifications”.
May 2011	<ul style="list-style-type: none"> • Updated the section “SFP and XFP Modules” in the chapter “Card Reference”. • Removed the sections “SFP Specifications” and “XFP Specifications” and added the section “SFP and XFP Specifications” in the appendix “Hardware Specifications”.
June 2011	Updated the section “AIC-I Card” in the chapter “Card Reference”.
July 2011	<ul style="list-style-type: none"> • Added a note in the “PC and UNIX Workstation Requirements” section of Chapter, “Cisco Transport Controller Operation”.
September 2011	<ul style="list-style-type: none"> • Replaced G.975.1 with G.975.1 I.7 and added a note in the chapter, “Card Reference”. • Created a “Summary Pane” section in the chapter, “Cisco Transport Controller Operation”.
October 2011	<ul style="list-style-type: none"> • Removed the Temperature table and updated the Temperature section with standard operating values. Removed the temperature and humidity values from all the 15454 card specifications. • Updated the figure “Scenario 3: Using Proxy ARP with Static Routing (ANSI and ETSI)” in the chapter “Management Network Connectivity”.
December 2011	<ul style="list-style-type: none"> • Updated the power values in the table “Individual Card Power Requirements” in the appendix “Hardware Specifications”. • Updated the section “Termination Modes” in the chapter “Card Reference”.
April 2012	Updated the section “SNMP in Multishelf Management” in the chapter “SNMP”.
May 2012	Updated the section “Optical Channel Circuits” in the chapter “Network Reference”.
June 2012	<ul style="list-style-type: none"> • Updated the section “Generic Threshold and Performance Monitoring MIBs” in the chapter “SNMP”. • Document Part Number revisioned to 78-17738-03 and a full length book-PDF was generated.

Document Objectives

This document explains installation, turn up, provisioning, and maintenance for Cisco ONS 15454 dense wavelength division (DWDM) systems. Use this document in conjunction with the appropriate publications listed in the [Related Documentation](#) section.

Audience

To use this publication, you should be familiar with Cisco or equivalent optical transmission hardware and cabling, telecommunications hardware and cabling, electronic circuitry and wiring practices, and preferably have experience as a telecommunications technician.

Related Documentation

Use the *Cisco ONS 15454 DWDM Reference Manual* in conjunction with the following referenced publications:

- *Cisco ONS 15454 DWDM Procedure Guide, Release 7.2*
Provides installation, turn-up, and maintenance procedures for ONS 15454 DWDM nodes and networks.
- *Cisco ONS 15454 DWDM Troubleshooting Guide, Release 7.0.1*
Provides alarm descriptions, alarm and general troubleshooting procedures, error messages, and transient conditions.
- *Cisco ONS SONET TL1 Command Guide, Release 7.2*
Provides a full TL1 command and autonomous message set including parameters, AIDs, conditions and modifiers for the Cisco ONS 15454, ONS 15327, ONS 15600, ONS 15310-CL, and ONS 15310-MA systems.
- Cisco ONS SONET TL1 Reference Guide, Release 7.0
Provides general information, procedures, and errors for TL1 in the Cisco ONS 15454 SONET, ONS 15327, ONS 15600, ONS 15310-CL, and ONS 15310-MA systems.
- *Cisco ONS SONET TL1 Command Quick Reference Guide, Release 7.2*
Lists all TL1 commands for the Cisco ONS 15454, ONS 15327, ONS 15600, ONS 15310-CL, and ONS 15310-MA systems.
- Cisco ONS 15454 SDH TL1 Command Guide, Release 7.2
Provides a full TL1 command and autonomous message set including parameters, AIDs, conditions and modifiers for the Cisco ONS 15454 SDH.
- *Cisco ONS 15454 SDH TL1 Reference Guide, Release 7.0*
Provides general information, procedures, and errors for TL1 in the Cisco ONS 15454 SDH.
- Cisco ONS 15454 SDH TL1 Command Quick Reference Guide, Release 7.2
Lists all TL1 commands for the Cisco ONS 15454, ONS 15327, ONS 15600, ONS 15310-CL, and ONS 15310-MA systems.
- *Release Notes for Cisco ONS 15454 Release 7.2*
Provides caveats, closed issues, and new feature and functionality information.
- Release Notes for Cisco ONS 15454 SDH Release 7.2
Provides caveats, closed issues, and new feature and functionality information.

- *Cisco Metroplanner DWDM Operations Guide, Release 7.0*
Provides configuration and operations information for Cisco Metroplanner.

For an update on End-of-Life and End-of-Sale notices, refer to http://cisco.com/en/US/products/hw/optical/ps2006/prod_eol_notices_list.html.

Document Conventions

This publication uses the following conventions:

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



Note

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



Caution

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



Warning

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS

Waarschuwing

BELANGRIJKE VEILIGHEIDSINSTRUCTIES

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.

BEWAAR DEZE INSTRUCTIES

Varoitus

TÄRKEITÄ TURVALLISUUSOHJEITA

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

SÄILYTÄ NÄMÄ OHJEET

Attention

IMPORTANTES INFORMATIONS DE SÉCURITÉ

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS

Warnung

WICHTIGE SICHERHEITSHINWEISE

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

CONSERVARE QUESTE ISTRUZIONI**Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

TA VARE PÅ DISSE INSTRUKSJONENE**Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

GUARDE ESTAS INSTRUÇÕES**¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES**Varning! VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

SPARA DESSA ANVISNINGAR

FONTOS BIZTONSÁGI ELOÍRÁSOK

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejtő helyzetben van. Mielott bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelte biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján kereshető meg.

ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!

Предупреждение

ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ

警告

重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

警告

安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

주의

중요 안전 지침

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

이 지시 사항을 보관하십시오.

Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA

Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.

GUARDE ESTAS INSTRUÇÕES**Advarsel VIGTIGE SIKKERHEDSANVISNINGER**

Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemesbeskadigelse. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.

GEM DISSE ANVISNINGER**تحذير****إرشادات الأمان الهامة**

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض للإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز. قم بحفظ هذه الإرشادات

Upozorenje VAŽNE SIGURNOSNE NAPOMENE

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

SAČUVAJTE OVE UPUTE**Upozornění DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY**

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

USCHOVEJTE TYTO POKYNY

Προειδοποίηση ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνήθεις πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

הרהר

הוראות בטיחות חשובות

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במעגלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כדי לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

שמור הוראות אלה

Opomena

ВАЖНИ БЕЗБЕДНОСНИ НАПАТСТВИЈА

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во преведените безбедносни предупредувања што се испорачани со уредот.

ЧУВАЈТЕ ГИ ОБИЕ НАПАТСТВИЈА

Ostrzeżenie

WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ

Upozornenie

DÔLEŽITÉ BEZPEČNOSTNÉ POKYNY

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

USCHOVAJTE SI TENTO NÁVOD

Obtaining Optical Networking Information

This section contains information that is specific to optical networking products. For information that pertains to all of Cisco, refer to the [Obtaining Documentation and Submitting a Service Request](#) section.

Where to Find Safety and Warning Information

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

Cisco Optical Networking Product Documentation CD-ROM

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

Obtaining Documentation and Submitting a Service Request

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

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

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



Shelf Assembly Hardware

This chapter provides a description of Cisco ONS 15454 hardware for the ANSI and ETSI shelf assemblies. For card descriptions, see [Chapter 2, “Card Reference.”](#) To install equipment, see the “Install the Shelf and Common Control Cards” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- [1.1 Overview, page 1-2](#)
- [1.2 ONS 15454 ANSI Rack Installation, page 1-3](#)
- [1.3 ONS 15454 ETSI Rack Installation, page 1-6](#)
- [1.4 FlexLayer and Y-Cable Protection, page 1-9](#)
- [1.5 Typical DWDM Rack Layouts, page 1-18](#)
- [1.6 Front Door, page 1-20](#)
- [1.7 ONS 15454 ANSI Backplane Covers, page 1-27](#)
- [1.8 ONS 15454 ETSI Front Mount Electrical Connection, page 1-31](#)
- [1.9 ONS 15454 ANSI Alarm Expansion Panel, page 1-31](#)
- [1.10 Ethernet Adapter Panel, page 1-36](#)
- [1.11 Filler Card, page 1-38](#)
- [1.12 Cable Routing and Management, page 1-39](#)
- [1.13 Fan-Tray Assembly, page 1-46](#)
- [1.14 Power and Ground Description, page 1-48](#)
- [1.15 ONS 15454 ANSI Alarm, Timing, LAN, and Craft Pin Connections, page 1-49](#)
- [1.16 Cards and Slots, page 1-53](#)
- [1.17 Ferrites \(ANSI Only\), page 1-56](#)



Note

The Cisco ONS 15454 shelf assemblies are intended for use with telecommunications equipment only.

**Caution**

Unused card slots should be filled with a blank faceplate (Cisco P/N 15454-BLANK for ANSI shelves and 15454E-BLANK for ETSI shelves). The blank faceplate ensures proper airflow when operating the ONS 15454 without the front door attached, although Cisco recommends that the front door remain attached.

1.1 Overview

This section provides an introduction to the Cisco ONS 15454 ANSI and the Cisco ONS 15454 ETSI.

Install the ONS 15454 in compliance with your local and national electrical codes:

- United States: National Fire Protection Association (NFPA) 70; United States National Electrical Code.
- Canada: Canadian Electrical Code, Part I, CSA C22.1.
- Other countries: If local and national electrical codes, are not available, refer to IEC 364, Part 1 through Part 7.

1.1.1 Cisco ONS 15454 ANSI

When installed in an equipment rack, the ONS 15454 ANSI assembly is typically connected to a fuse and alarm panel to provide centralized alarm connection points and distributed power for the ONS 15454 ANSI. Fuse and alarm panels are third-party equipment and are not described in this documentation. If you are unsure about the requirements or specifications for a fuse and alarm panel, consult the user documentation for the related equipment. The front door of the ONS 15454 ANSI allows access to the shelf assembly, fan-tray assembly, and fiber-storage area. The backplanes provide access to alarm contacts, external interface contacts, power terminals, and BNC/SMB connectors.

You can mount the ONS 15454 ANSI in a 19- or 23-inch rack (482.6 or 584.2 mm). The shelf assembly weighs approximately 55 pounds (24.94 kg) with no cards installed.

The ONS 15454 ANSI is powered using -48 VDC power. Negative, return, and ground power terminals are accessible on the backplane.

**Note**

The ONS 15454 ANSI is designed to comply with Telcordia GR-1089-CORE Type 2 and Type 4. Install and operate the ONS 15454 ANSI only in environments that do not expose wiring or cabling to the outside plant. Acceptable applications include Central Office Environments (COEs), Electronic Equipment Enclosures (EEEs), Controlled Environment Vaults (CEVs), huts, and Customer Premise Environments (CPEs).

1.1.2 Cisco ONS 15454 ETSI

When installed in an equipment rack, the ONS 15454 ETSI assembly is typically connected to a fuse and alarm panel to provide centralized alarm connection points and distributed power for the ONS 15454 ETSI. Fuse and alarm panels are third-party equipment and are not described in this documentation. If you are unsure about the requirements or specifications for a fuse and alarm panel, consult the user documentation for the related equipment. The front door of the ONS 15454 ETSI allows

access to the shelf assembly, fan-tray assembly, and fiber-storage area. The FMEC cover at the top of the shelf allows access to power connectors, external alarms and controls, timing input and output, and craft interface terminals.

You can mount the ONS 15454 ETSI in an ETSI rack. The shelf assembly weighs approximately 26 kg (57 pounds) with no cards installed. The shelf assembly includes a front door and a Front Mount Electrical Connection (FMEC) cover for added security, a fan tray module for cooling, and extensive fiber-storage space.

The ONS 15454 ETSI is powered using -48 VDC power. Negative and return power terminals are connected via the MIC-A/P and the MIC-C/T/P FMECs. The ground terminal is connected via the 2-hole grounding lug.

1.2 ONS 15454 ANSI Rack Installation

The ONS 15454 ANSI shelf is mounted in a 19- or 23-in. (482.6- or 584.2-mm) equipment rack. The shelf assembly projects five inches (127 mm) from the front of the rack. It mounts in both Electronic Industries Alliance (EIA) standard and Telcordia-standard racks. The shelf assembly is a total of 17 inches (431.8 mm) wide with no mounting ears attached. Ring runs are not provided by Cisco and might hinder side-by-side installation of shelves where space is limited.

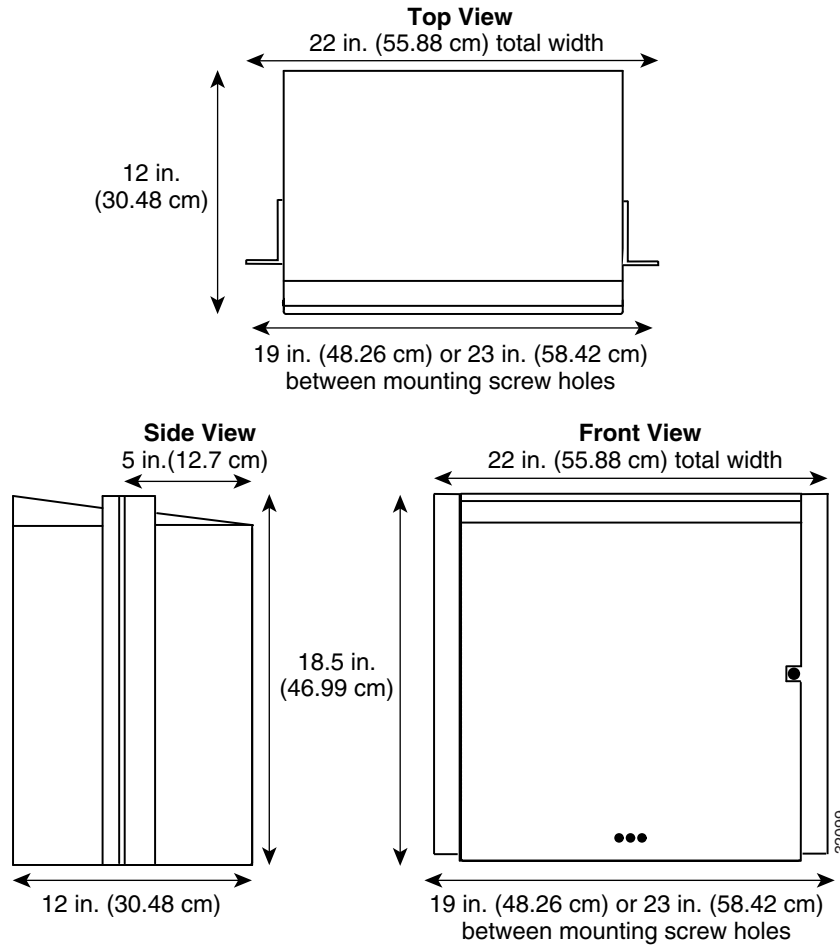
The ONS 15454 ANSI assembly measures 18.5 inches (469.9 mm) high, 19 or 23 inches (482.6 or 584.2 mm) wide (depending on which way the mounting ears are attached), and 12 inches (304.8 mm) deep. You can install up to four ONS 15454 ANSIs in a seven-foot (2133.6 mm) equipment rack. The ONS 15454 ANSI must have one inch (25.4 mm) of airspace below the installed shelf assembly to allow air flow to the fan intake. If a second ONS 15454 ANSI is installed underneath the shelf assembly, the air ramp on top of the lower shelf assembly provides the air spacing needed and should not be modified in any way. [Figure 1-1](#) shows the dimensions of the ONS 15454 ANSI.



Note

A 10-Gbps-compatible shelf assembly (15454-SA-ANSI or 15454-SA-HD) and fan-tray assembly (15454-FTA3 or 15454-FTA3-T) are required if ONS 15454 ANSI 10-Gbps Cross-Connect (XC10G) cards are installed in the shelf.

Figure 1-1 Cisco ONS 15454 ANSI Shelf Dimensions



1.2.1 Reversible Mounting Bracket



Caution

Use only the fastening hardware provided with the ONS 15454 ANSI shelf to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.



Caution

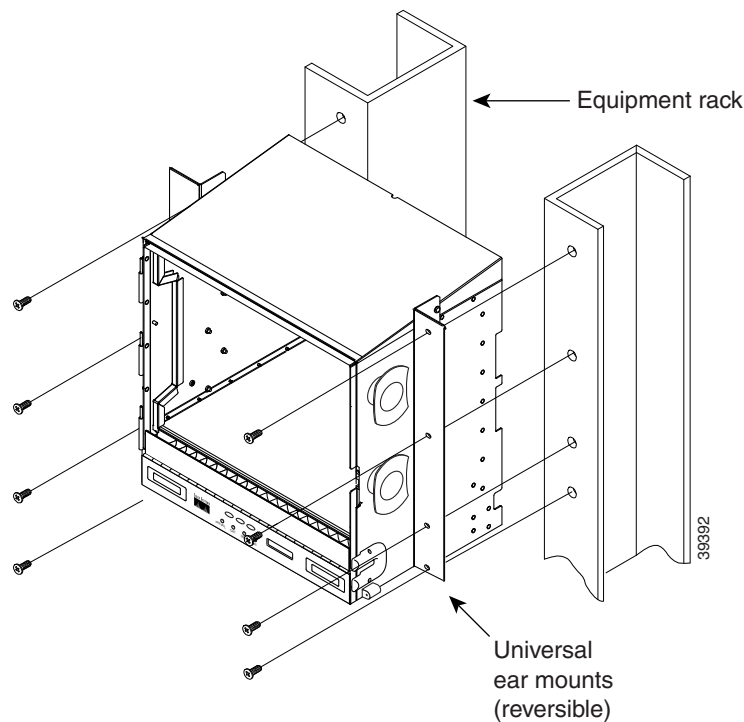
When mounting the ONS 15454 ANSI shelf in a frame with a nonconductive coating (such as paint, lacquer, or enamel) either use the thread-forming screws provided with the ONS 15454 ANSI shipping kit, or remove the coating from the threads to ensure electrical continuity.

The shelf assembly comes preset for installation in a 23-inch (584.2 mm) rack, but you can reverse the mounting bracket to fit the smaller 19-inch (482.6 mm) rack.

1.2.2 Mounting a Single Node

Mounting the ONS 15454 ANSI shelf in a rack requires a minimum of 18.5 inches (469.9 mm) of vertical rack space and one additional inch (25.4 mm) for air flow. To ensure the mounting is secure, use two to four #12-24 mounting screws for each side of the shelf assembly. [Figure 1-2](#) shows the rack mounting position for the ONS 15454 ANSI shelf.

Figure 1-2 Mounting an ONS 15454 ANSI Shelf in a Rack



Two people should install the shelf assembly; however, one person can install it using the temporary set screws included. The shelf assembly should be empty for easier lifting. The front door can also be removed to lighten the shelf assembly.

1.2.3 Mounting Multiple Nodes

Most standard (Telcordia GR-63-CORE, 19-inch [482.6-mm] or 23-inch [584.2-mm]) seven-foot (2.133-m) racks can hold four ONS 15454 ANSI shelves and a fuse and alarm panel. However, unequal flange racks are limited to three ONS 15454 ANSI shelves and a fuse and alarm panel, or four ONS 15454 ANSI shelves using a fuse and alarm panel from an adjacent rack.

If you are using the external (bottom) brackets to install the fan-tray air filter, you can install three shelf assemblies in a standard seven-foot (2.133-m) rack. If you are not using the external (bottom) brackets, you can install four shelf assemblies in a rack. The advantage of using the bottom brackets is that you can replace the filter without removing the fan tray.

1.2.4 ONS 15454 ANSI Bay Assembly

The Cisco ONS 15454 ANSI bay assembly simplifies ordering and installing the ONS 15454 ANSI shelf because it allows you to order shelf assemblies preinstalled in a seven-foot (2,133 mm) rack. The bay assembly is available in a three- or four-shelf configuration. The three-shelf configuration includes three ONS 15454 ANSI shelf assemblies, a prewired fuse and alarm panel, and two fiber-storage trays. The four-shelf configuration includes four ONS 15454 ANSI shelf assemblies and a prewired fuse and alarm panel. You can order optional fiber channels with either configuration. Installation procedures are included in the *Unpacking and Installing the Cisco ONS 15454 Four-Shelf and Zero-Shelf Bay Assembly* document that ships with the bay assembly.

1.3 ONS 15454 ETSI Rack Installation

The ONS 15454 ETSI shelf assembly (15454-SA-ETSI) is mounted in a 600 x 600-mm (23-inch) or 600 x 300-mm (11.8-inch) equipment cabinet/rack. The shelf assembly projects 240 mm (9.45 inches) from the front of the rack. It mounts in ETSI-standard racks. The shelf assembly is a total of 435 mm (17.35 inches) wide with no mounting ears attached. Ring runs are not provided by Cisco and might hinder side-by-side installation of shelves where space is limited.

The ONS 15454 ETSI shelf assembly measures 616.5 mm (24.27 inches) high, 535 mm (21.06 inches) wide, and 280 mm (11.02 inches) deep. You can install up to three ONS 15454 ETSI shelves in a seven-foot (2133.6 mm) equipment rack. The ONS 15454 ETSI must have one inch (25.4 mm) of airspace below the installed shelf assembly to allow air flow to the fan intake. If a second ONS 15454 ETSI is installed below the first shelf assembly, an ETSI air ramp unit must be assembled between the two shelves to ensure adequate air flow.

Figure 1-3 provides the dimensions of the ONS 15454 ETSI shelf assembly.



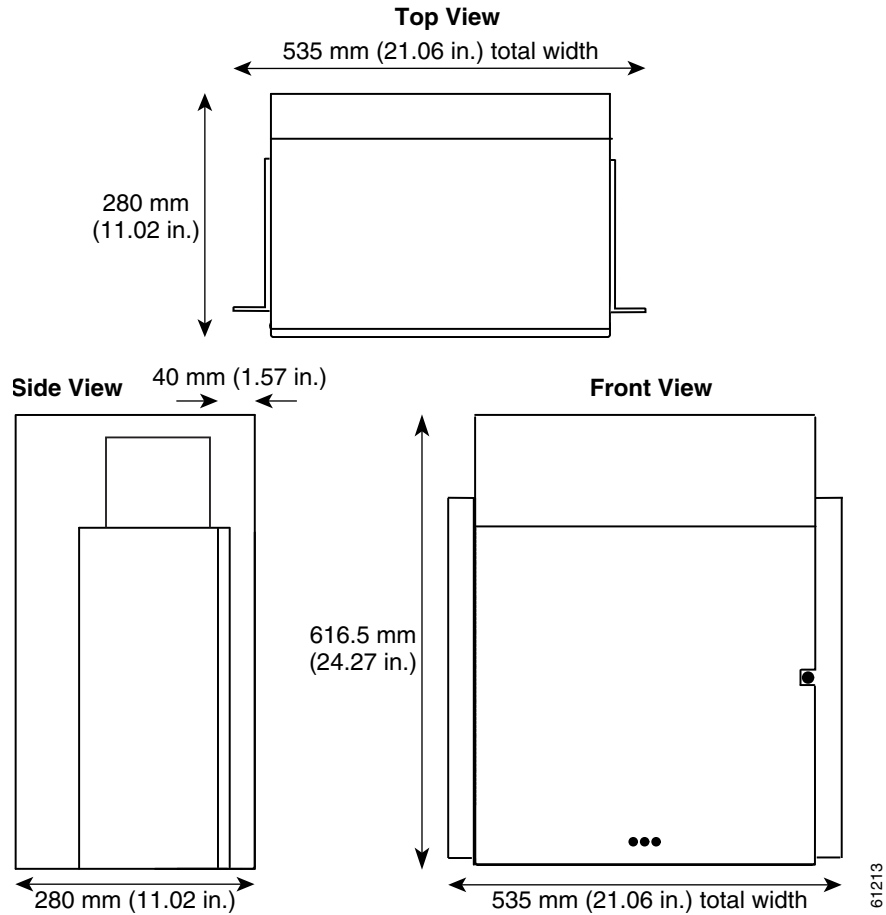
Caution

The standard ETSI racks can hold three ONS 15454 ETSI shelf assemblies and two air ramps. When mounting a shelf assembly in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack. If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.



Caution

The ONS 15454 ETSI must have 1 inch (25.4 mm) of airspace below the installed shelf assembly to allow air flow to the fan intake. The air ramp (the angled piece of sheet metal on top of the shelf assembly) provides this spacing and should not be modified in any way.

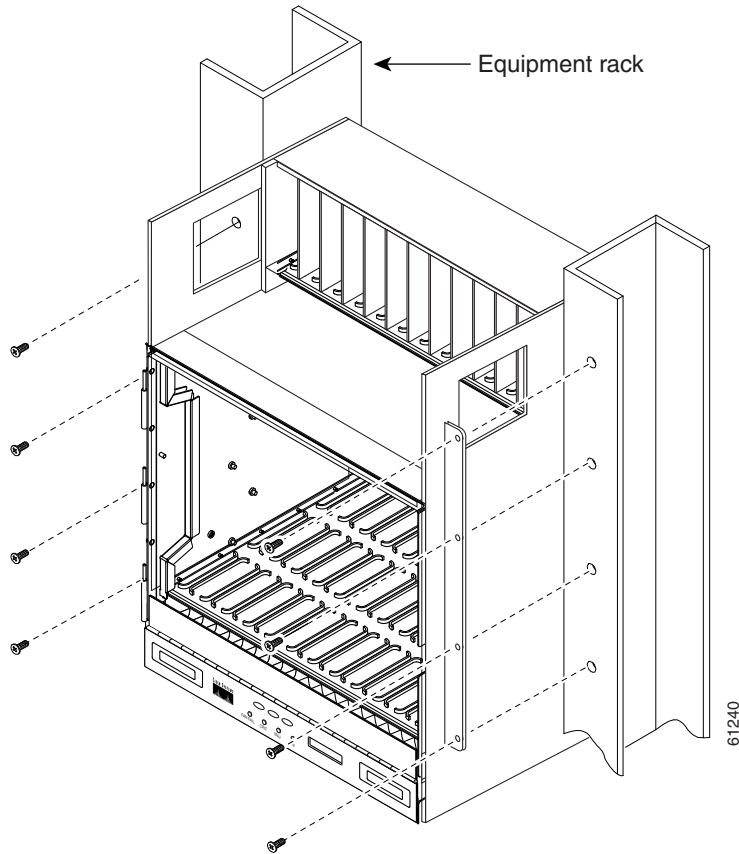
Figure 1-3 ONS 15454 ETSI Shelf Assembly Dimensions

1.3.1 Mounting a Single Node

The ONS 15454 ETSI requires 616.5 mm (24.24 inch) minimum of vertical rack space and 25 mm (1 inch) below the installed shelf assembly to allow air flow to the fan intake. If a second ONS 15454 ETSI is installed above a shelf assembly, the air ramp between the shelves provides space for air flow. To ensure the mounting is secure, use two to four M6 mounting screws for each side of the shelf assembly. A shelf assembly should be mounted at the bottom of the rack if it is the only unit in the rack.

Figure 1-4 shows the rack mounting position for the ONS 15454 ETSI shelf.

Figure 1-4 Mounting an ONS 15454 ETSI Shelf in a Rack

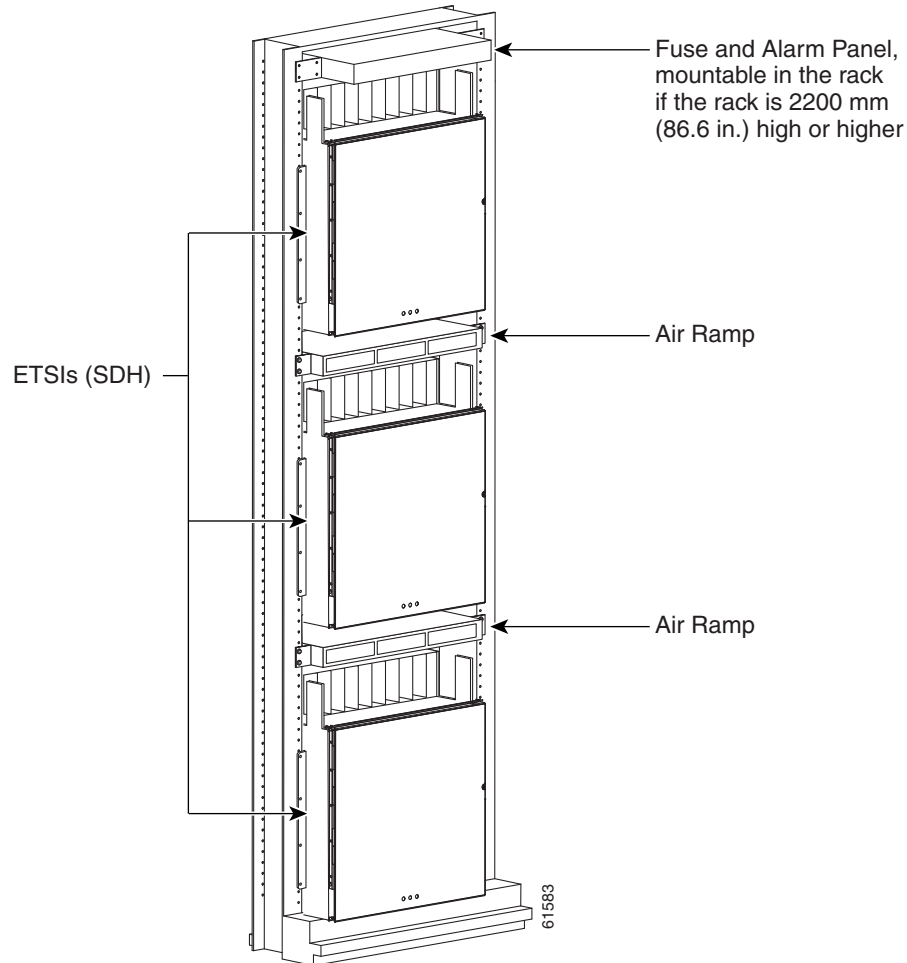


Two people should install the shelf assembly; however, one person can install it using the temporary set screws included. The shelf assembly should be empty for easier lifting. The front door can also be removed to lighten the shelf assembly.

1.3.2 Mounting Multiple Nodes

Most standard (Telcordia GR-63-CORE, 23-inch [584.2 mm]) seven-foot (2,133 mm) racks can hold three ONS 15454 ETSI shelves, two air ramps, and a fuse and alarm panel. [Figure 1-5](#) shows a three-shelf ONS 15454 ETSI bay assembly.

Figure 1-5 *Three-Shelf ONS 15454 ETSI Bay Assembly*



1.4 FlexLayer and Y-Cable Protection

The Cisco ONS 15454 FlexLayer DWDM system includes the following components:

- Two-channel add or drop flex module
- FlexLayer shelf assembly
- Y-cable FlexLayer module
- Y-cable module tray

The FlexLayer shelf assembly is 1 rack unit (RU) high and can be mounted in a 19-inch (482.6-mm) or 23-inch (584.2-mm) rack (two-way mounting brackets). The FlexLayer shelf assembly is used to house the FlexLayer and Y-cable modules.

1.4.1 FlexLayer Modules

The two-channel add/drop FlexLayer module is a completely passive unidirectional component that allows the insertion or the extraction of two channels within the ONS 15454 channel plan. This module is used only in point-to-point, one-channel, amplified system configurations.

Sixteen specific modules are available to cover the whole 32-channel bandwidth. [Table 1-1](#) shows how the FlexLayer add/drop modules are grouped in relation to the supported channels.

Table 1-1 ONS 15454 100-GHz Channel Plan

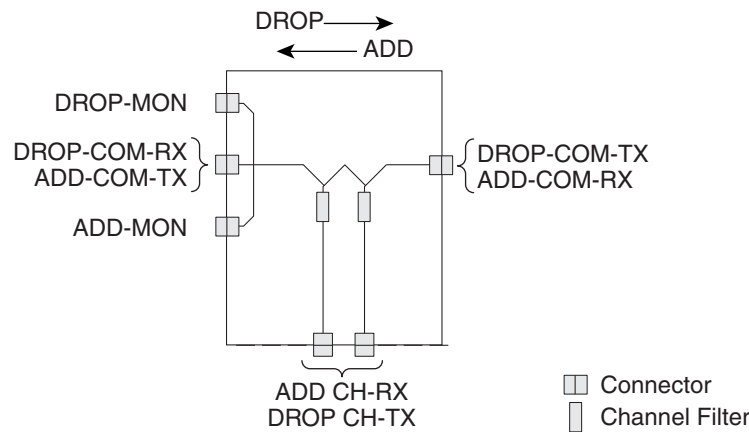
ITU	Channel ID	Frequency (THz)	Wavelength (nm)	Two-Channel A/D Flex Module
59	30.3	195.9	1530.33	15216-FLB-2-31.1=
58	31.1	195.8	1531.12	
57	31.9	195.7	1531.90	15216-FLB-2-32.6=
56	32.6	195.6	1532.68	
54	34.2	195.4	1534.25	15216-FLB-2-35.0=
53	35.0	195.3	1535.04	
52	35.8	195.2	1535.82	15216-FLB-2-36.6=
51	36.6	195.1	1536.61	
49	38.1	194.9	1538.19	15216-FLB-2-38.9=
48	38.9	194.8	1538.98	
47	39.7	194.7	1539.77	15216-FLB-2-40.5=
46	40.5	194.6	1540.56	
44	42.1	194.4	1542.14	15216-FLB-2-42.9=
43	42.9	194.3	1542.94	
42	43.7	194.2	1543.73	15216-FLB-2-44.5=
41	44.5	194.1	1544.53	
39	46.1	193.9	1546.12	15216-FLB-2-46.9=
38	46.9	193.8	1546.92	
37	47.7	193.7	1547.72	15216-FLB-2-48.5=
36	48.5	193.6	1548.51	
34	50.1	193.4	1550.12	15216-FLB-2-50.9=
33	50.9	193.3	1550.92	
32	51.7	193.2	1551.72	15216-FLB-2-52.5=
31	52.5	193.1	1552.52	
29	54.1	192.9	1554.13	15216-FLB-2-54.9=
28	54.9	192.8	1554.94	
27	55.7	192.7	1555.75	15216-FLB-2-56.5=
26	56.5	192.6	1556.55	

Table 1-1 ONS 15454 100-GHz Channel Plan (continued)

ITU	Channel ID	Frequency (THz)	Wavelength (nm)	Two-Channel A/D Flex Module
24	58.1	192.4	1558.17	15216-FLB-2-58.9=
23	58.9	192.3	1558.98	
22	59.7	192.2	1559.79	15216-FLB-2-60.6=
21	60.6	192.1	1560.61	

Figure 1-6 shows the module functional block diagram. In Figure 1-6, the signal flows from left to right when the card is used as a drop component and from right to left when the module is used as an add component.

Figure 1-6 Two-Channel Add/Drop FlexLayer Module Block Diagram

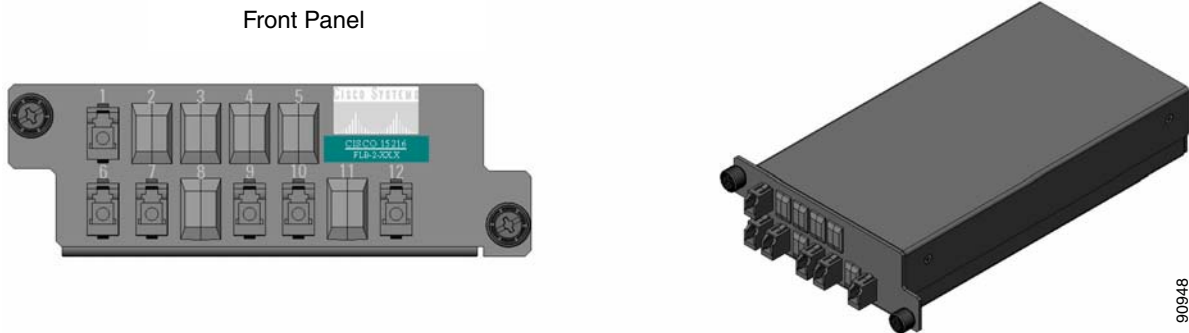


When the module is used as a drop component, the wave-division multiplexing (WDM) composite signal coming from the DROP-COM-RX port is filtered sequentially by two filters and the filtered channels are dropped at the two DROP-CH-TX ports. The rest of the WDM composite signal is sent to the DROP-COM-TX port. A two-percent tap coupler, DROP-MON, is used to monitor the input WDM composite signal.

When the module is used as an add component, the added channels coming from the two ADD-CH-RX ports are combined with the WDM composite signal coming from the ADD-COM-RX port. The multiplexed WDM composite signal is sent to the ADD-COM-TX port. A two-percent tap coupler, ADD-MON, is used to monitor the multiplexed WDM composite signal.

Figure 1-7 shows the physical appearance of the ONS 15454 two-channel add/drop FlexLayer module.

Figure 1-7 ONS 15454 Two-Channel Optical Add/Drop FlexLayer Module



Labels are provided to show how the module ports are mapped. It is the end user's responsibility to label the module for its intended use (drop or add component).

Figure 1-8 shows how the connectors are mapped and labeled on the front panel when the component is used as a drop component. The COM-RX is mapped to Port 1, the COM-TX is mapped to Port 12, and the two dropped channel TX ports are mapped to Ports 9 and 10. The two-percent tap MON port is mapped to Port 6. Port 7 is not active.

Figure 1-8 Two-Channel Drop Component Connector Mapping and Labeling

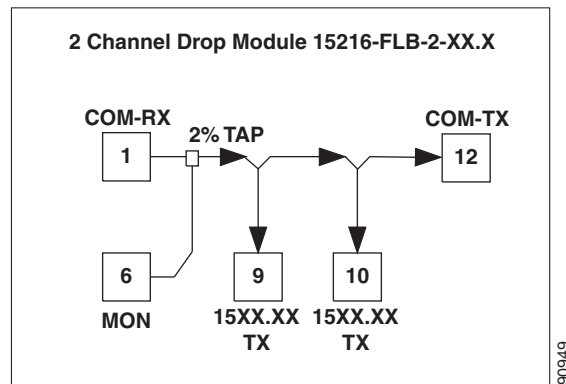
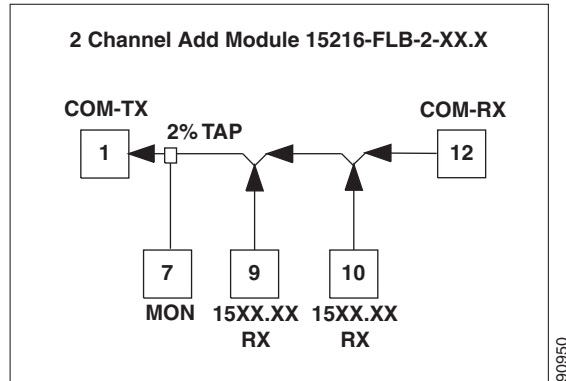


Figure 1-9 shows how the connectors are mapped and labeled in the front panel when the component is used as an add component. The COM-TX is mapped to Port 1, the COM-RX is mapped to Port 12, and the added channels are mapped to the two RX Ports 9 and 10. The two-percent tap MON port is mapped to Port 7. Port 6 is not active.

Figure 1-9 Two-Channel Add Component Connector Mapping and Labeling



1.4.2 Single Y-Cable Protection Module

The Y-cable protection module is a bidirectional module. It is equipped with two passive star couplers: one that is used as a splitter and one that is used as a coupler.



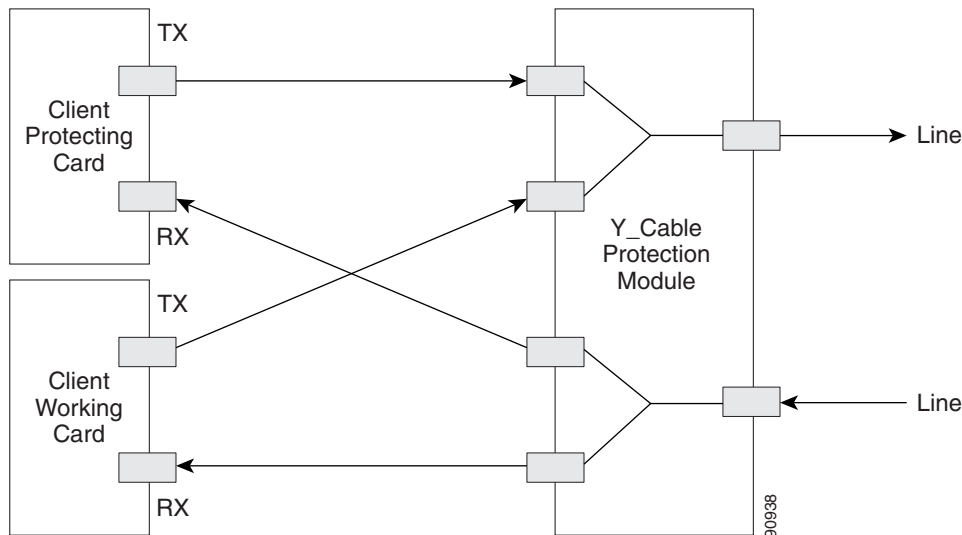
Note

None of the modules in this equipment release can be used for video on demand (VoD) applications.

The purpose of this module is to provide Y-cable protection on the CLIENT side of transponder (TXP) cards such as the TXP_MR_10G, XP_MR_10E, or TXP_MR_2.5G (Figure 1-10). There are two versions of this module, one for multimode applications (CS-MM-Y) and one for single-mode applications (CS-SM-Y).

Using one Y-cable protection module, you can protect one client signal with two TXP cards, and two client signals with four TXP cards.

Figure 1-10 Typical Y-Cable Protection Module Configuration



When the module is used in the coupler direction, the individual signals enter the module from the CPL-RX n ports and pass through a passive star coupler to the CPL-TX port. The coupler is not meant to combine both the protect and working client card signals. The module allows a path for the working client transmit interface to connect to the network in the event the opposite interface in the protection pair should fail (the protect interface switches to the working interface).

When the module is used in the splitter direction, the signal enters the module from the SPL-RX port and is split through a passive star coupler to the SPL-TX n ports. This module, although designed to pass wavelengths associated with the ONS 15454 32-channel plan, is not selective to specific wavelengths (modules do not filter wavelengths).

Figure 1-11 shows the block diagram of the Y-cable protection module.

Figure 1-11 1:2 Splitter and 2:1 Coupler (Y-Cable Protection) Module Block Diagram

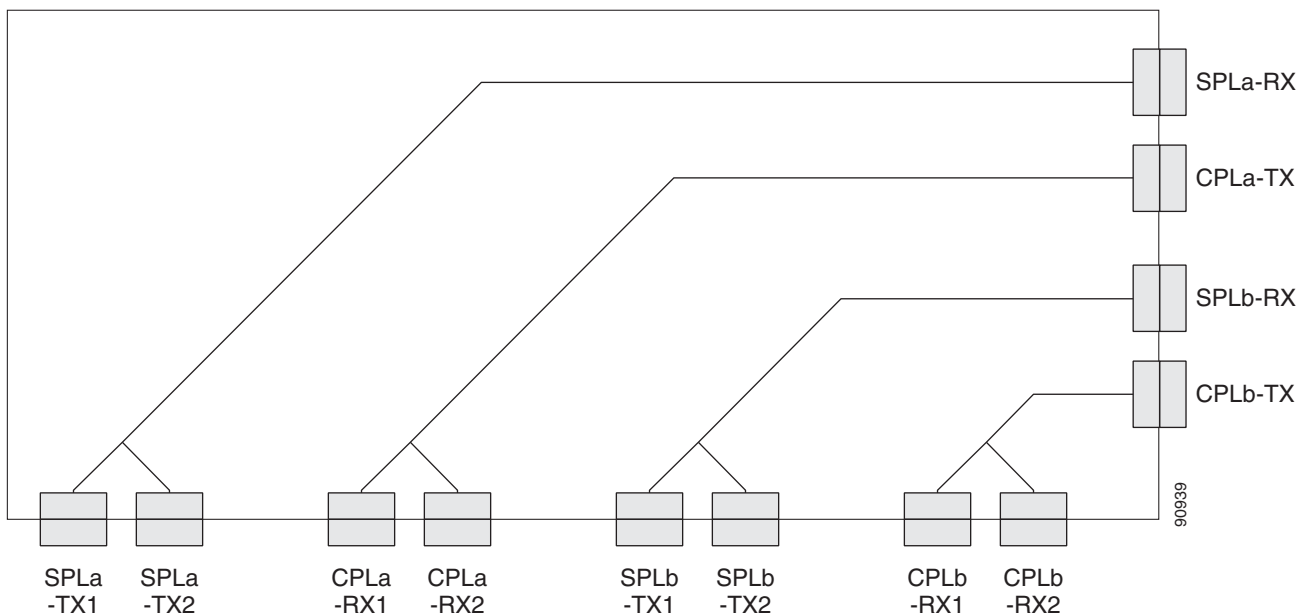


Figure 1-12 and Figure 1-13 show the physical appearance of the ONS 15454 Y-Cable Protection FlexLayer Module. This module has two versions, one for single-mode applications and the other for multimode applications.

Figure 1-12 ONS 15454 Y-Cable Protection FlexLayer Module (Single-Mode)

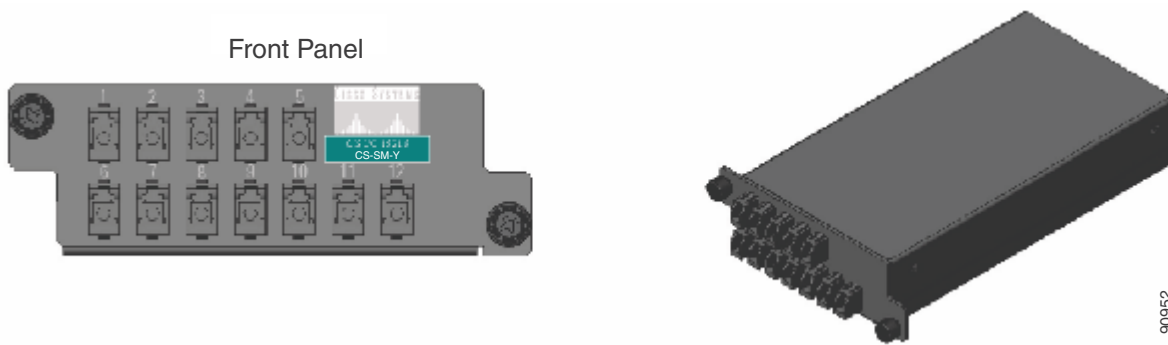


Figure 1-13 ONS 15454 Y-Cable Protection FlexLayer Module (Multimode)

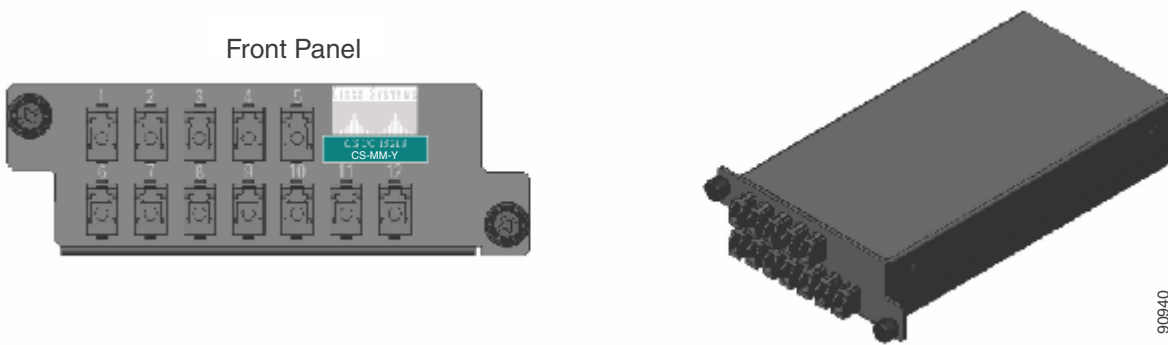


Figure 1-14 shows how the module front panel ports are mapped and labeled. The multimode module is mapped and labeled the same as the single-mode module.

Figure 1-14 Y-Cable Protection Component Connector Mapping and Labeling

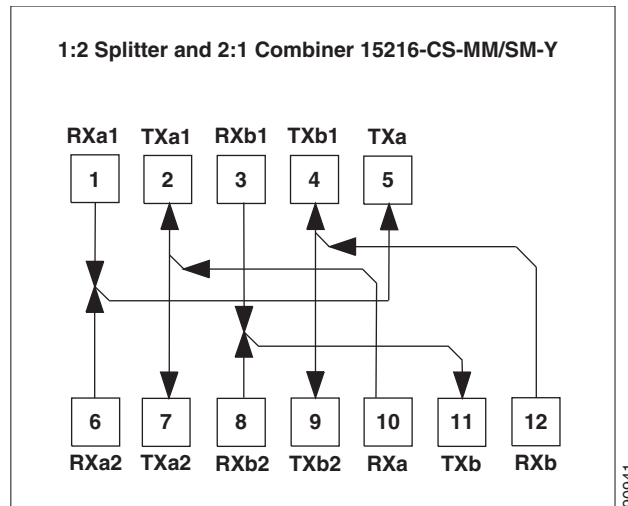


Table 1-2 details the single-mode and multimode front panel Protection A mapping. It shows how two DWDM receive inputs (client working and protect) provide one output signal to the customer client equipment, using the module combiner function.

Table 1-2 Protection A (TXP Cards 1 and 2) Port Mapping: Combiner from DWDM

Receive Port on the Y-Cable Module	Signal Sources
1 (RXa1)	Client TX port on the TXP 1 card
6 (RXa2)	Client TX port on the TXP 2 card
Transmit Port on the Y-Cable Module	Signal Destination
5 (TXa)	RX port on customer client equipment A

Table 1-3 details the single-mode and multimode front panel Protection A mapping. It shows how the module splits a single receive input from the equipment into two DWDM output signals (working and protect) to the TXP client port.

Table 1-3 Protection A (TXP Cards 1 and 2) Port Mapping: Splitter to DWDM

Receive Port	Signal Source
10 (RXa)	TX port on customer client equipment A
Transmit Port	Signal Destinations
2 (TXa1)	Client RX port on the TXP 1 card
7 (TXa2)	Client RX on the TXP 2 card

Table 1-4 details the single-mode and multimode front panel Protection B mapping. It shows how two DWDM receive inputs (client working and protect) provide one output signal to the equipment, using the module combiner function.

Table 1-4 Protection B (TXP Cards 3 and 4) Port Mapping: Combiner from DWDM

Receive Port	Signal Sources
3 (RXb1)	Client TX port on the TXP 3 card
8 (RXb2)	Client TX port on the TXP 4 card
Transmit Port	Signal Destination
11 (TXb)	RX port on customer client equipment B

Table 1-5 details the single-mode and multimode front panel Protection B mapping. It shows how the module splits a single receive input from the equipment into two DWDM output signals (working and protect) to the client.

Table 1-5 Protection B (TXP Cards 3 and 4) Port Mapping: Splitter to DWDM

Receive Port Number	Signal Source
12 (RXb)	TX port on customer client equipment B
Transmit Port Number	Signal Destinations
4 (TXb1)	Client RX on the TXP 3 port
9 (TXb2)	Client RX on the TXP 4 port

The following muxponder (MXP) and transponder (TXP) cards can use Y-cable protection:

- MXP_2.5_10G
- MXP_2.5_10E
- MXP_MR_2.5G
- TXP_MR_10G
- TXP_MR_10E
- TXP_MR_2.5G
- MXP_MR_10DME_C
- MXP_MR_10DME_L

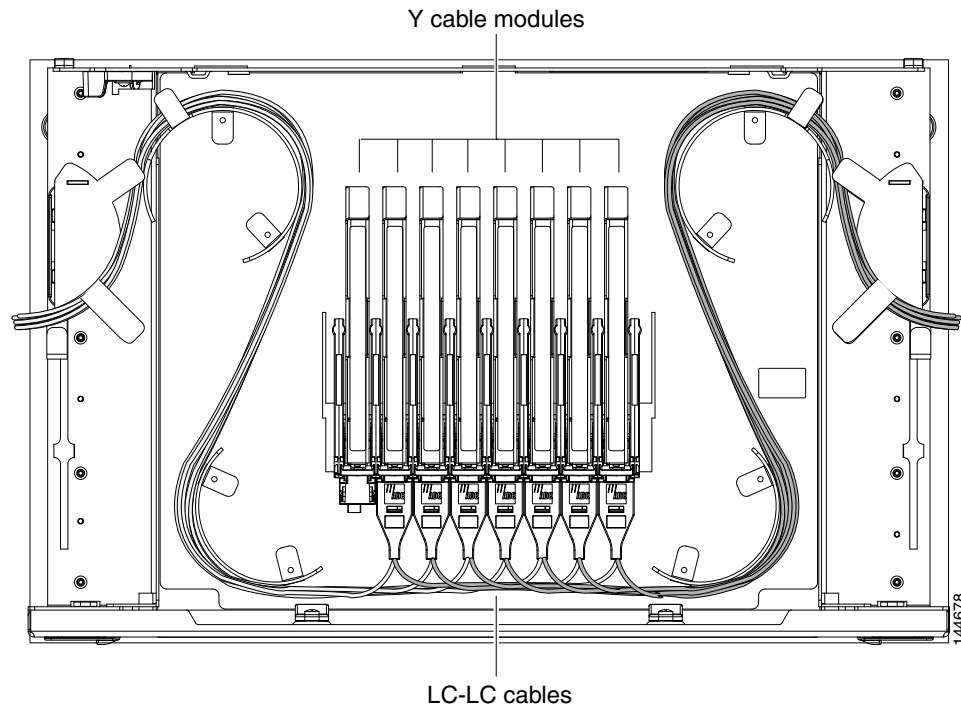
**Note**

The MXP_MR_10DME_C card is labeled 10DME-C on the card faceplate. The MXP_MR_10DME_L card is labeled 10DME-L on the card faceplate.

1.4.3 Multiple Y-Cable Module Tray

Another option for Y-cable protection is the Y-cable module tray. Each tray holds up to 8 individual Y-cable modules (Figure 1-15).

Figure 1-15 Y-Cable Protection Module Tray



The ports on these Y-cable modules are labelled according to their intended signal type (Client TX/RX, TXP Working TX/RX, TXP Protect TX/RX). You can use the port label on the front of the tray to identify the ports on each module (Figure 1-16).

Figure 1-16 Y-Cable Protection Port Label

Client TX	Client TX	Client TX	Client TX	Client TX	Client TX	Client TX	Client TX
Client RX	Client RX	Client RX	Client RX	Client RX	Client RX	Client RX	Client RX
TXP W TX	TXP W TX	TXP W TX	TXP W TX	TXP W TX	TXP W TX	TXP W TX	TXP W TX
TXP W RX	TXP W RX	TXP W RX	TXP W RX	TXP W RX	TXP W RX	TXP W RX	TXP W RX
TXP P TX	TXP P TX	TXP P TX	TXP P TX	TXP P TX	TXP P TX	TXP P TX	TXP P TX
TXP P RX	TXP P RX	TXP P RX	TXP P RX	TXP P RX	TXP P RX	TXP P RX	TXP P RX
#1	#2	#3	#4	#5	#6	#7	#8

144677

1.5 Typical DWDM Rack Layouts

Typical dense wavelength division multiplexing (DWDM) applications might include:

- 3 ONS 15454 shelves
- 1 Dispersion Compensating Unit (DCU)
- 7 patch panels (or fiber-storage trays)

Or, alternatively:

- 3 ONS 15454 shelves
- 2 DCUs
- 6 standard patch-panel trays (or fiber-storage trays), or 3 deep patch-panel trays

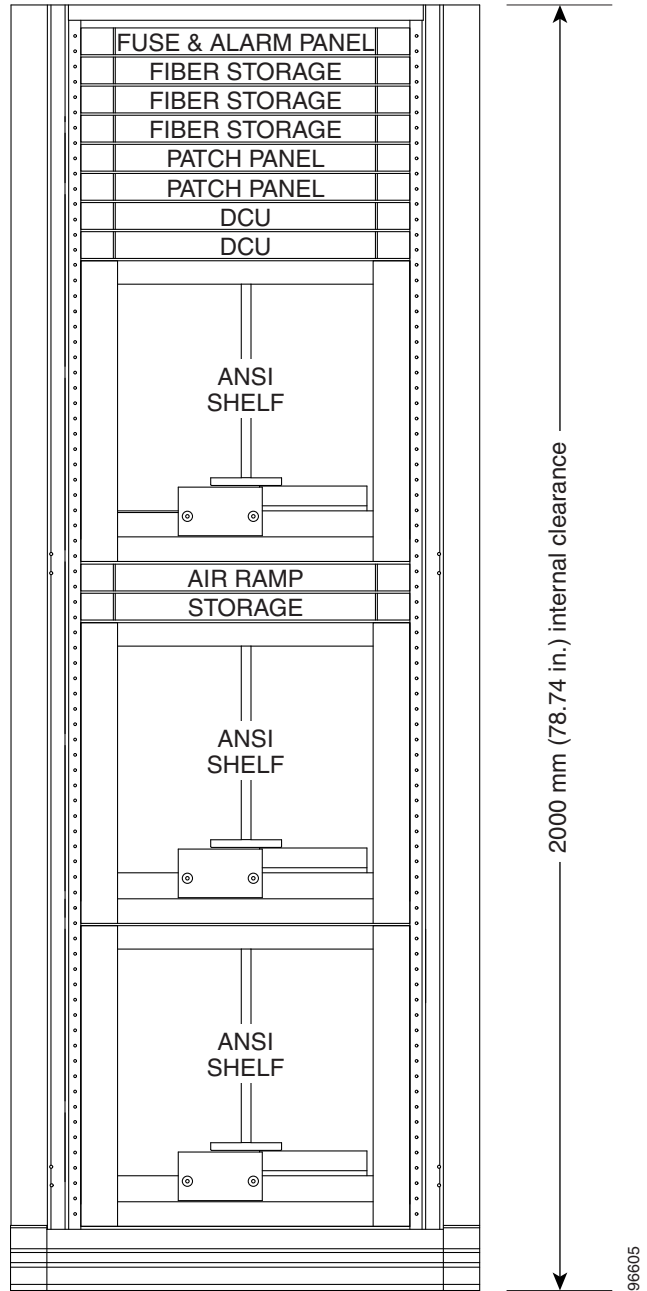
See [Figure 1-17](#) for a typical rack layout.



Note

Use the rack layout generated by Cisco MetroPlanner to determine your exact shelf layout.

Figure 1-17 Typical DWDM Equipment Layout in an ONS 15454 ANSI Rack



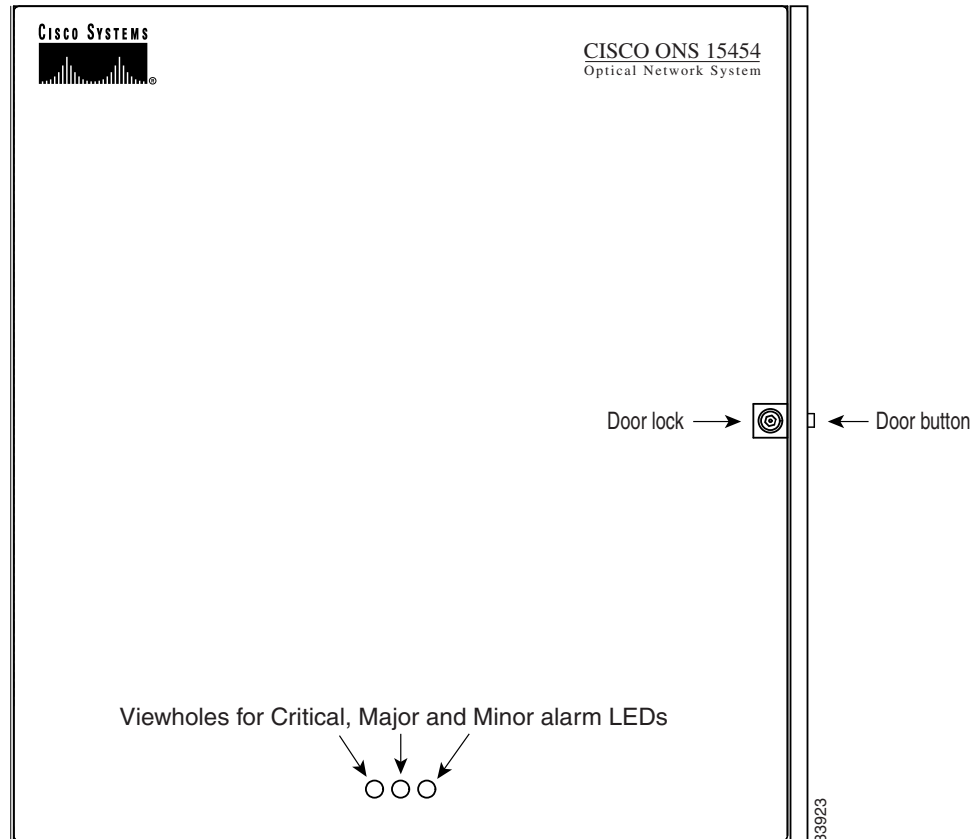
ANSI 23 in. (584.2 mm) or 19 in. (482.6 mm)

If you are installing a patch-panel or fiber-storage tray below the ONS 15454 shelf, you must install the air ramp between the shelf and patch-panel tray/fiber-management tray, or leave one rack unit (RU) space open.

1.6 Front Door

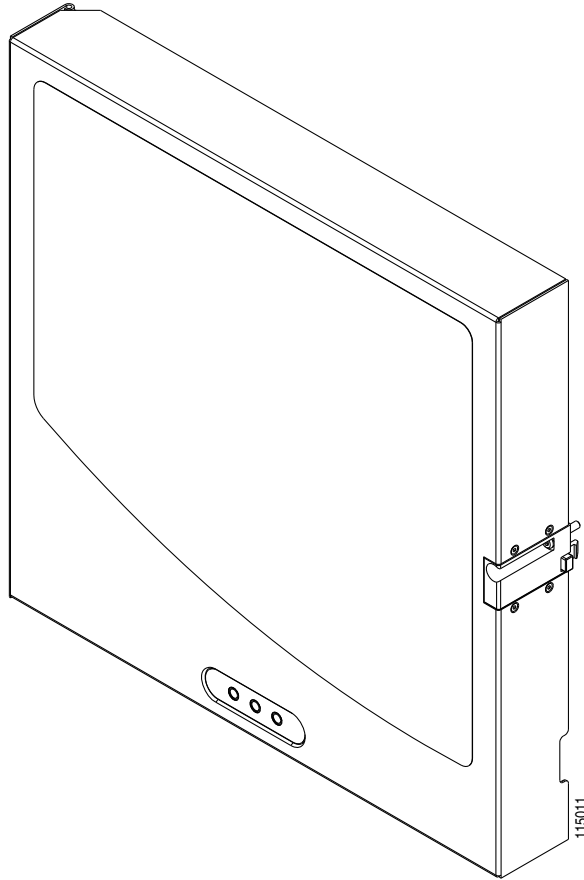
The Critical, Major, and Minor alarm LEDs visible through the front door indicate whether a critical, major, or minor alarm is present anywhere on the ONS 15454 shelf. These LEDs must be visible so that technicians can quickly determine if any alarms are present on the ONS 15454 shelf or the network. You can use the LCD to further isolate alarms. The front door (Figure 1-18) provides access to the shelf assembly, fiber-storage tray, fan-tray assembly, and LCD screen.

Figure 1-18 The ONS 15454 Front Door



The ONS 15454 ANSI ships with a standard door but can also accommodate a deep door and extended fiber clips (15454-DOOR-KIT) to provide additional room for cabling (Figure 1-19). The ONS 15454 ETSI does not support the deep door.

Figure 1-19 Cisco ONS 15454 ANSI Deep Door



The ONS 15454 door locks with a pinned hex key that ships with the shelf assembly. A button on the right side of the shelf assembly releases the door. You can remove the front door to provide unrestricted access to the front of the shelf assembly.

Before you remove the ONS 15454 front door, you must remove the ground strap of the front door (Figure 1-20).

Figure 1-20 ONS 15454 ANSI Front Door Ground Strap

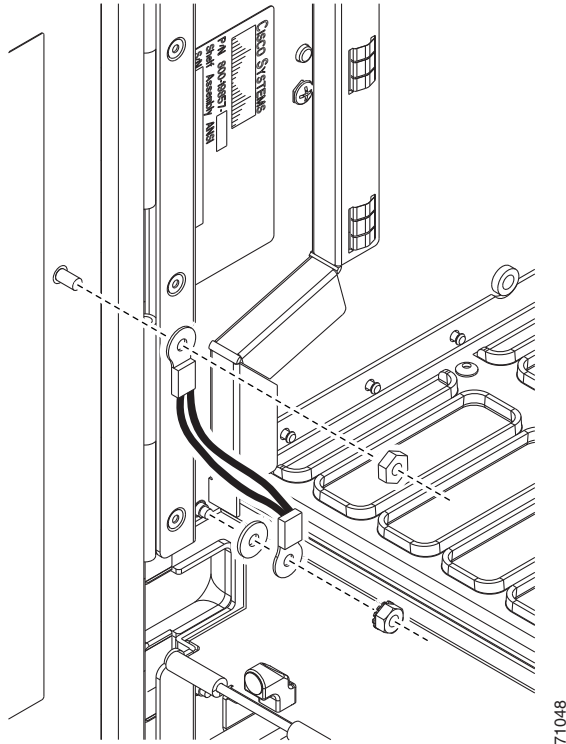


Figure 1-21 shows how to remove the ONS 15454 ANSI front door.

Figure 1-21 Removing the ONS 15454 ANSI Front Door

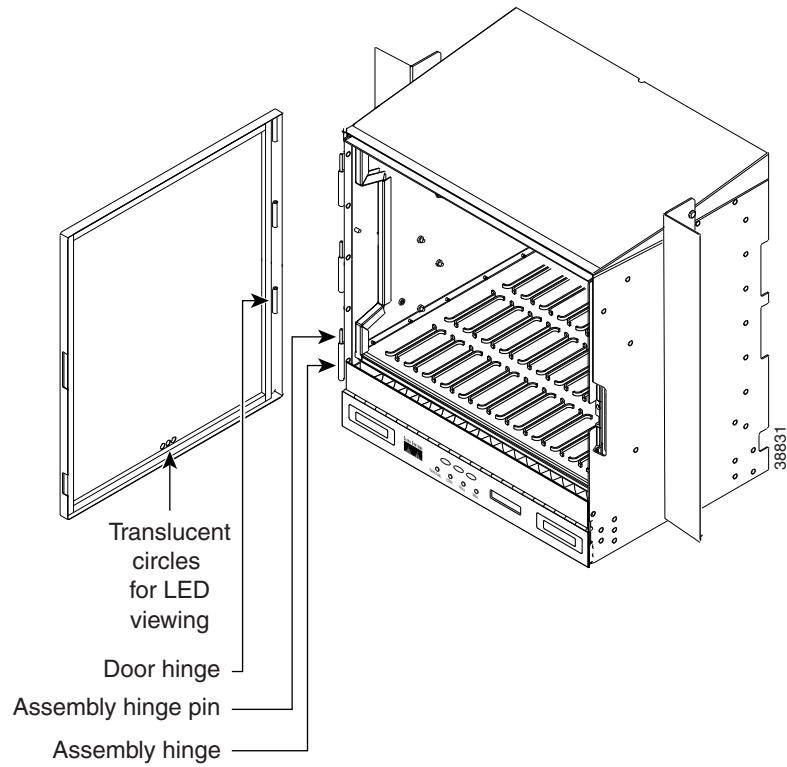
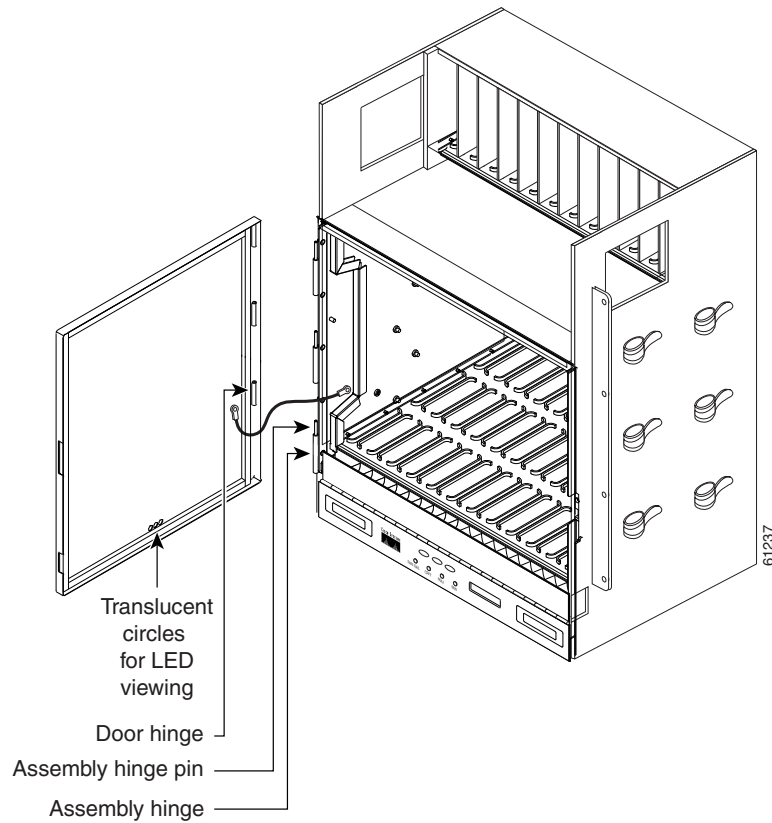


Figure 1-22 shows how to remove the ONS 15454 ETSI front door.



Figure 1-22 Removing the ONS 15454 ETSI Front Door



An erasable label is pasted on the inside of the front door. You can use the label to record slot assignments, port assignments, card types, node ID, rack ID, and serial number for the ONS 15454.

Figure 1-23 shows the erasable label on the ONS 15454 ANSI shelf.

Figure 1-23 ONS 15454 ANSI Front-Door Erasable Label

		SLOT ASSIGNMENTS																
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
PORT ASSIGNMENTS	CARD NAME							TCC ___	XC ___	---	XC ___	TCC ___						
	1																	
	2																	
	3																	
	4																	
	5																	
	6																	
	7																	
	8																	
	9																	
	10																	
	11																	
	12																	
	13																	
	14																	
	15																	
	16																	
SHELF ID:		 DANGER INVISIBLE RADIATION MAY BE EMITTED FROM OPTICAL CARDS AT THE END OF UNTERMINATED FIBER CABLES OR CONNECTORS. DO NOT STARE INTO THE BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. CLASS I - LASER PRODUCT (CDRH) CLASS 1M LASER PRODUCT (IEC)										ATTN: TO MAINTAIN FCC EMI COMPLIANCE REPLACE FRONT COVER AFTER SERVICING.		IP ADDRESS:				
RACK ID:												CAUTION: ELECTROSTATIC SENSITIVE DEVICES 		MAC ADDRESS:				
SERIAL #:												PRODUCT COMPLIES WITH RADIATION PERFORMANCE STANDARDS 21CFR 1040.10 AND 1040.11, IEC 60825-1 AND IEC 60825-2.						

61840

Figure 1-24 shows the erasable label on the ONS 15454 ETSI shelf.

Figure 1-24 ONS 15454 ETSI Front-Door Erasable Label

SHELF ID:			RACK ID:			SERIAL #:			IP ADDRESS:			MAC ADDRESS:					
SLOT NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CARD NAME							TCC	XC	—	XC	TCC						
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
11																	
12																	
13																	
14																	
15																	
16																	
17																	
18																	
19																	
20																	
21																	
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
31																	
32																	
33																	
34																	
35																	
36																	
37																	
38																	
39																	
40																	
41																	
42																	

**P
O
R
T
A
S
S
I
G
N
M
E
N
T
S**

⚠ DANGER
GEFAHR
PELIGRO
DANGER
危險

INVISIBLE LASER RADIATION MAY BE EMITTED FROM THE OPTICAL CARDS AT THE END OF UNTERMINATED FIBER CABLES OR CONNECTORS. DO NOT STARE INTO THE BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. THIS EQUIPMENT IS A CLASS I (CDRH)/CLASS 1M (IEC) LASER PRODUCT. THIS PRODUCT COMPLIES WITH THE RADIATION PERFORMANCE STANDARDS OF 21 CFR 1040.10 AND 1040.11, IEC 60825-1 AND IEC 60825-2.

Die optischen Karten können möglicherweise am Ende nicht angeschlossener Faserkabel oder -steckverbinder unsichtbare Laserstrahlen emittieren. Nicht in den Strahl blicken, auch nicht direkt mit optischen Instrumenten. Diese Ausrüstung ist ein Laserprodukt der Klasse I (CDRH)/Klasse 1M (IEC). Dieses Produkt erfüllt die Standards für Strahlungsleistung 21 CFR 1040.10 und 1040.11, IEC 60825-1 und IEC 60825-2.

Podría emitirse radiación láser invisible de las tarjetas ópticas en el extremo de los cables o conectores de fibra óptica no terminados. No mirar directamente al haz ni ver directamente con instrumentos ópticos. Este equipo es un producto de láser de clase I (CDRH)/clase 1M (IEC) este producto, cumple con los estándares de desempeño de radiación de 21 CFR 1040.10 y 1040.11, IEC 60825-1 y IEC 60825-2.

ÉMISSION POSSIBLE DE RAYONS LASER À PARTIR DES CARTES OPTIQUES SE TROUVANT À L'EXTREMITÉ DES CONNECTEURS OU DES CÂBLES OPTIQUES NON ABOUTÉS. NE PAS REGARDER LE FASCEAU DIRECTEMENT NI L'EXAMINER À L'AIDE D'INSTRUMENTS OPTIQUES. CET APPAREIL EST UN PRODUIT LASER DE CLASSE I (CDRH)/CLASSE 1M (IEC) CE PRODUIT EST CONFORME AUX NORMES DE PERFORMANCE DE RAYONNEMENT DE 21 CFR 1040.10 ET 1040.11, IEC 60825-1 ET IEC 60825-2.

未收束的光纖電纜或線頭未端的光學卡可能會放射肉眼看不見的雷射線。
 請勿直接目視光束或以光學儀器直接查看。
 本設備為CLASS I (CDRH) / 第1M類 (IEC) 雷射製品。
 本產品符合輻射性能標準 (RADIATION PERFORMANCE STANDARDS) 或 21 CFR 1040.10 以及 1040.11、IEC 60825-1 和 IEC 60825-2 之規定。

⚠ CAUTION
 THIS UNIT MAY HAVE MORE THAN ONE POWER CONNECTION. REMOVE ALL CABLES FIRST TO DEENERGIZE THE SYSTEM BEFORE SERVICING TO AVOID ELECTRIC SHOCK.
 NO OPERATOR SERVICEABLE PARTS INDICATED. SERVICING TO QUALIFIED PERSONNEL.
 TO MAINTAIN THE COMPLIANCE, REPLACE FRONT COVER AFTER SERVICING.
⚠ ELECTROSTATIC SENSITIVE DEVICES.

VORSICHT
 DIESE EINHEIT HAT MÖGLICHERWEISE MEHR ALS EINEN STROMANSCHLUSS. ENTFERNEN SIE ZUERST ALLE KABELN, UM DAS SYSTEM VOM NETZ ZU TRENNEN, UM ELEKTROSCHLAG ZU VERMEIDEN.
 TEILE DER EINHEIT KÖNNEN NICHT VON BENUTZERN GEWARTET WERDEN. WARTUNGSGÄRBER MÜSSEN VON QUALIFIZIERTEM PERSONAL DURCHFÜHRT WERDEN.
 UM DIE ÜbereINFAHRT ERHALTEN, NACH DER WARTUNG VORNE ABDECKUNG ERNEUT ANBRINGEN.
⚠ ELEKTROSTATISCH EMPFINDLICHE GERÄTE.

PRECAUCIÓN
 ES POSIBLE QUE ESTA UNIDAD TENGA MÁS DE UNA CONEXIÓN ELÉCTRICA. PARA DESENERGIZAR EL SISTEMA ANTES DE HACER REPARACIONES, LAS REMOVAN LAS CABLES ANTES DE HACER REPARACIONES.
 ESTA UNIDAD NO TIENE PARTES QUE PUEDAN SER REPARADAS POR EL USUARIO. LAS REPARACIONES DEBEN SER HECHAS POR PERSONAL CUALIFICADO.
 PARA MANTENER EL CONFORME, REEMPLAZAR LA CUBIERTA ANTES DE SERVICIOS.
⚠ DISPOSITIVOS SENSIBLES A LA ENERGÍA ESTÁTICA.

ATTENTION
 CETTE UNITE PEUT AVOIR PLUSIEURS RACCORDEMENTS A UNE SOURCE D'ENERGIE ELECTRIQUE. DECONNECTER LE CORDON D'ALIMENTATION DU SYSTEME ET ENLEVER TOUS LES CABLES ELECTRIQUES.
 L'APPAREIL NE PEUT PAS ETRE REPARÉ PAR DES TECHNICIENS. SEULEMENT LE PERSONNEL QUALIFIE PEUT FAIRE ENTRETIEN DE L'APPAREIL.
 POUR MAINTENIR LA CONFORMITE, REMPLACER LA COUVERCLE AVANT APRES AVER REPARÉ L'APPAREIL.
⚠ APPAREILS SENSIBLES A L'ELECTRICITE STATIQUE.

注意
 本設備可能有一般以上之電源接線。
 請先拔掉所有電源線，再進行系統之維護，以避免發生電擊的危險。
 內部零件係由合格專業技師進行維修，非專業人員請勿自行維修。
 為了保持符合 EMI/CE 規定，請在維修後重新蓋蓋板。
⚠ 本設備有靜電敏感。

The front door label also includes the Class I and Class 1M laser warning. Figure 1-25 shows the ONS 15454 ANSI laser warning.

Figure 1-25 Laser Warning on the ONS 15454 ANSI Front-Door Label

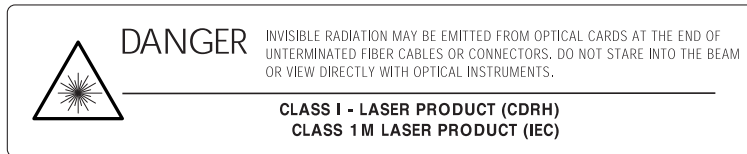



Figure 1-26 shows the ONS 15454 ETSI laser warning.

Figure 1-26 Laser Warning on the ONS 15454 ETSI Front-Door Label

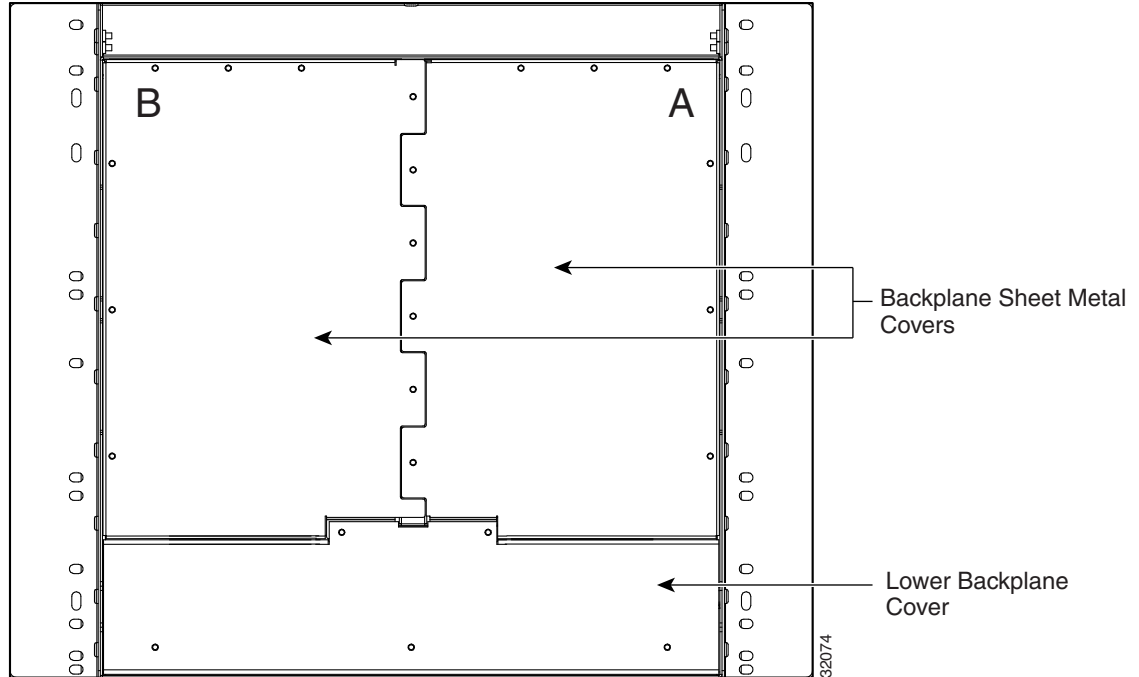
 <p>DANGER</p> <p>GEFAHR</p> <p>PELIGRO</p> <p>DANGER</p> <p>危險</p>	<p>INVISIBLE LASER RADIATION MAY BE EMITTED FROM THE OPTICAL CARDS AT THE END OF UNTERMINATED FIBER CABLES OR CONNECTORS. DO NOT STARE INTO THE BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. THIS EQUIPMENT IS A CLASS I (CDRH)/Class 1M (IEC) LASER PRODUCT. THIS PRODUCT COMPLIES WITH THE RADIATION PERFORMANCE STANDARDS OF 21 CFR 1040.10 AND 1040.11, IEC 60825-1 AND IEC 60825-2.</p> <p>DIE OPTISCHEN KARTEN KÖNNEN MÖGLICHERWEISE AM ENDE NICHT ANGESCHLOSSENER FASERKABEL ODER –STECKVERBINDER UNSICHTBARE LASERSTRAHLEN EMITTIEREN. NICHT IN DEN STRAHL BLICKEN, AUCH NICHT DIREKT MIT OPTISCHEN INSTRUMENTEN. DIESE AUSRÜSTUNG IST EIN LASERPRODUKT DER KLASSE I (CDRH)/Klasse 1M (IEC) DIESES PRODUKT. ERFÜLLT DIE STANDARDS FÜR STRAHLUNGSLEISTUNG 21 CFR 1040.10 UND 1040.11, IEC 60825-1 UND IEC 60825-2.</p> <p>PODRÍA EMITIRSE RADIACIÓN LÁSER INVISIBLE DE LAS TARJETAS ÓPTICAS EN EL EXTREMO DE LOS CABLES O CONECTORES DE FIBRA ÓPTICA NO TERMINADOS. NO MIRAR DIRECTAMENTE AL HAZ NI VER DIRECTAMENTE CON INSTRUMENTOS ÓPTICOS. ESTE EQUIPO ES UN PRODUCTO DE LÁSER DE CLASE I (CDRH)/Clase 1M (CEI) ESTE PRODUCTO. CUMPLE CON LOS ESTÁNDARES DE DESEMPEÑO DE RADIACIÓN DE 21 CFR 1040.10 Y 1040.11, CEI 60825-1 Y CEI 60825-2.</p> <p>ÉMISSION POSSIBLE DE RAYONS LASER À PARTIR DES CARTES OPTIQUES SE TROUVANT À L'EXTRÉMITÉ DES CONNECTEURS OU DES CÂBLES OPTIQUES NON ABOUTIS. NE PAS REGARDER LE FAISCEAU DIRECTEMENT NI L'EXAMINER À L'AIDE D'INSTRUMENTS OPTIQUES. CET APPAREIL EST UN PRODUIT LASER DE CLASSE I (CDRH)/CLASSE 1M (IEC) CE PRODUIT. EST CONFORME AUX NORMES DE PERFORMANCE DE RAYONNEMENT DE 21 CFR 1040.10 ET 1040.11, IEC 60825-1 ET IEC 60825-2.</p> <p>未收尾的光纖電纜或接頭末端的光學卡可能會放射肉眼看不見的輻射線。 請勿直接目視光束或以光學儀器直接查看。 本設備為CLASS I (CDRH) / 第1M類(IEC)雷射製品。 本產品符合輻射性能標準 (RADIATION PERFORMANCE STANDARDS) 或21CFR1040.10以及1040.11、IEC60825-1和IEC60825-2之規定。</p>
---	---

780099

1.7 ONS 15454 ANSI Backplane Covers

If a backplane does not have an electrical interface assembly (EIA) panel installed, it should have two sheet metal backplane covers (one on each side of the backplane). See [Figure 1-27](#). Each cover is held in place with nine 6-32 x 3/8 inch Phillips screws.

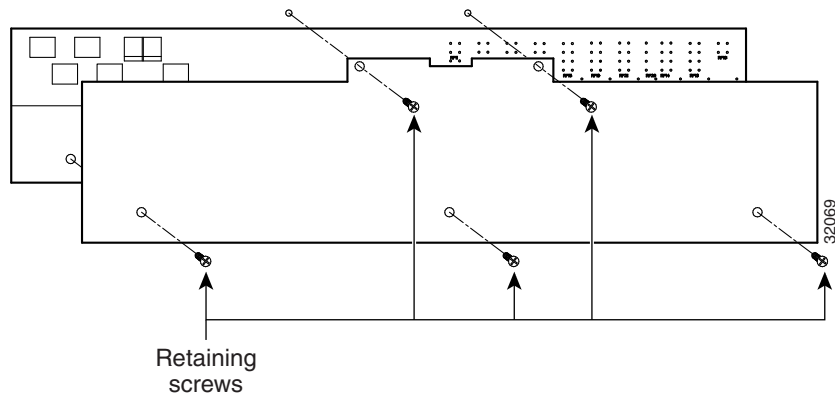
Figure 1-27 Backplane Covers



1.7.1 Lower Backplane Cover

The lower section of the ONS 15454 ANSI backplane is covered by either a clear plastic protector (15454-SA-ANSI) or a sheet metal cover (15454-SA-HD), which is held in place by five 6-32 x 1/2 inch screws. Remove the lower backplane cover to access the alarm interface panel (AIP), alarm pin fields, frame ground, and power terminals (Figure 1-28).

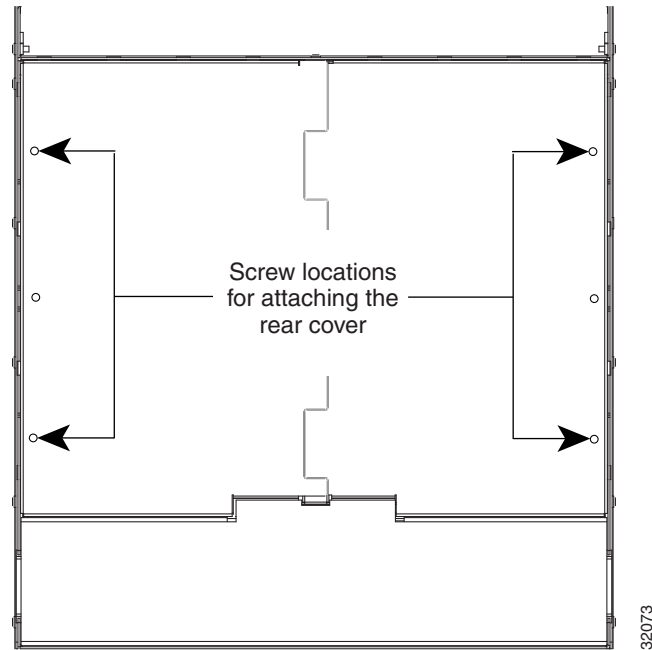
Figure 1-28 Removing the Lower Backplane Cover



1.7.2 Rear Cover

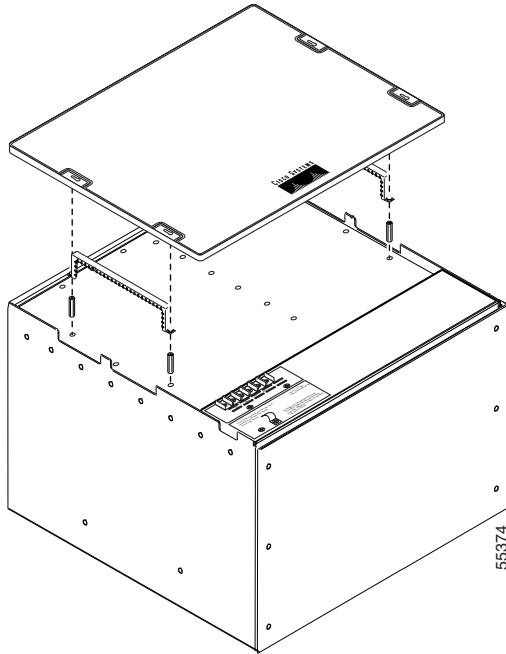
The ONS 15454 ANSI has an optional clear plastic rear cover. This clear plastic cover provides additional protection for the cables and connectors on the backplane. [Figure 1-29](#) shows the rear cover screw locations.

Figure 1-29 Backplane Attachment for Cover



You can also install the optional spacers if more space is needed between the cables and rear cover ([Figure 1-30](#)).

Figure 1-30 Installing the Plastic Rear Cover with Spacers



1.7.3 Alarm Interface Panel

The AIP is located above the alarm contacts on the lower section of the backplane. The AIP provides surge protection for the ONS 15454 ANSI. It also provides an interface from the backplane to the fan-tray assembly and LCD. The AIP plugs into the backplane using a 96-pin DIN connector and is held in place with two retaining screws. The panel has a nonvolatile memory chip that stores the unique node address (MAC address). The MAC address identifies the nodes that support circuits. It allows Cisco Transport Controller (CTC) to determine circuit sources, destinations, and spans. The TCC2/TCC2P cards in the ONS 15454 ANSI also use the MAC address to store the node database.



Note

The 5-A AIP (73-7665-XX) is required when installing the new fan-tray assembly (15454-FTA3), which comes preinstalled on the shelf assembly (15454-SA-ANSI or 15454-SA-HD).



Note

A blown fuse on the AIP board can cause the LCD display to go blank.

1.7.4 Alarm Interface Panel Replacement

If the AIP fails, a MAC Fail alarm appears on the CTC Alarms menu and/or the LCD display on the fan-tray assembly goes blank. To perform an in-service replacement of the AIP, you must contact the Cisco Technical Assistance Center (Cisco TAC). For contact information, see the [“Obtaining Documentation and Submitting a Service Request”](#) section on page [xlvii](#).

You can replace the AIP on an in-service system without affecting traffic (except Ethernet traffic on nodes running a release earlier than Software Release 4.0). The circuit repair feature allows you to repair circuits affected by MAC address changes on one node at a time. Circuit repair works when all nodes are running the same software version. Each individual AIP upgrade requires an individual circuit repair; if AIPs are replaced on two nodes, the circuit repair must be performed twice. Always replace an AIP during a maintenance window.

**Caution**

Do not use a 2-A AIP with a 5-A fan-tray assembly; doing so causes a blown fuse on the AIP.

**Note**

Ensure that all nodes in the affected network are running the same software version before replacing the AIP and repairing circuits. If you need to upgrade nodes to the same software version, no hardware should be changed or circuit repair performed until after the software upgrade is complete.

1.8 ONS 15454 ETSI Front Mount Electrical Connection

The ONS 15454 ETSI positive and negative power terminals are located on FMEC cards in the Electrical Facility Connection Assembly (EFCA). The ground connection is the grounding receptacle on the side panel of the shelf.

The ONS 15454 ETSI EFCA at the top of the shelf has 12 FMEC slots numbered sequentially from left to right (18 to 29). Slots 18 to 22 and 25 to 29 provide electrical connections. Slots 23 and 24 host the MIC-A/P and MIC-C/T/P cards, respectively. The MIC-A/P and the MIC-C/T/P cards also connect alarm, timing, LAN, and craft connections to the ONS 15454 ETSI.

For more information about the MIC-A/P and MIC-C/T/P cards, see [Chapter 2, “Card Reference.”](#)

1.9 ONS 15454 ANSI Alarm Expansion Panel

The optional ONS 15454 ANSI alarm expansion panel (AEP) can be used with the AIC-I card to provide an additional 48 dry alarm contacts for the ONS 15454 ANSI: 32 inputs and 16 outputs. The AEP is a printed circuit board assembly that is installed on the backplane. [Figure 1-31](#) shows the AEP board; the left connector is the input connector and the right connector is the output connector.

The AIC-I without an AEP already contains direct alarm contacts. These direct AIC-I alarm contacts are routed through the backplane to wire-wrap pins accessible from the back of the shelf. If you install an AEP, you cannot use the alarm contacts on the wire-wrap pins. For more information about the AIC-I, see [Chapter 2, “Card Reference.”](#)

Figure 1-31 AEP Printed Circuit Board Assembly

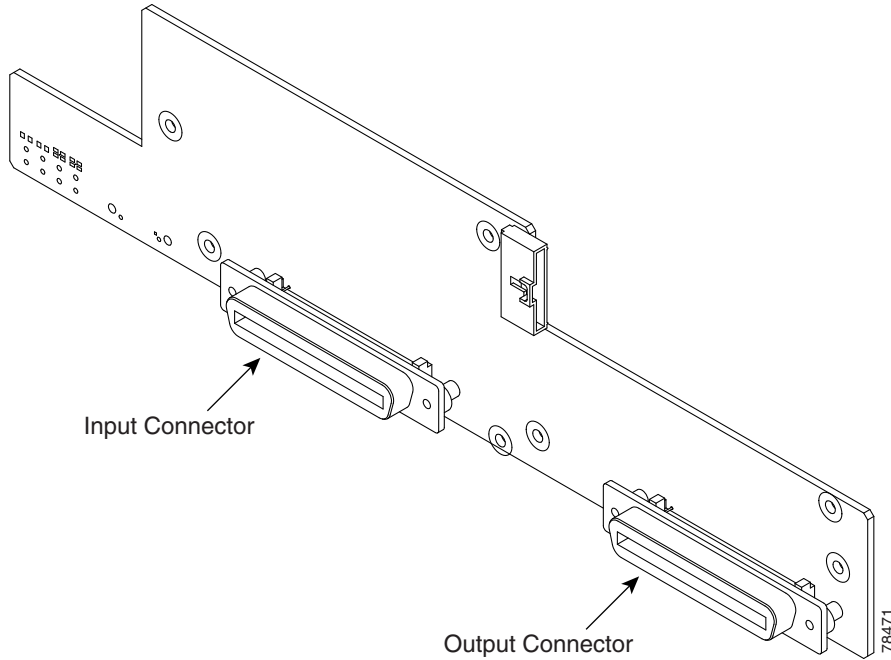
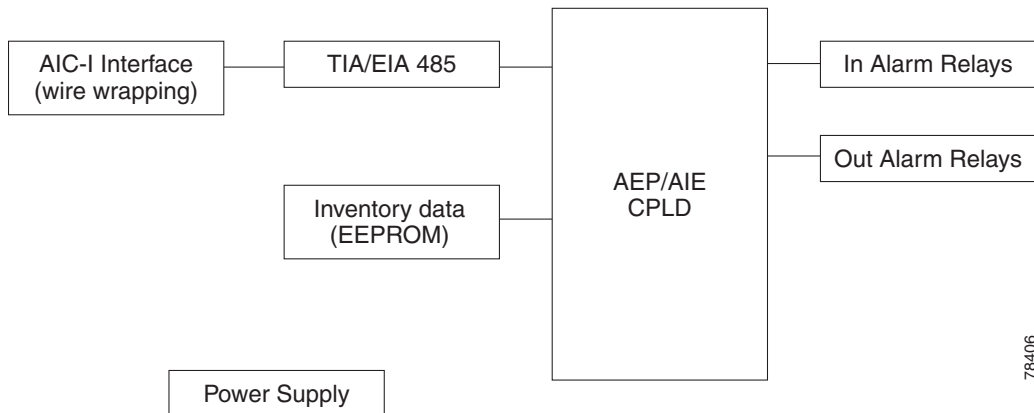


Figure 1-32 shows the AEP block diagram.

Figure 1-32 AEP Block Diagram



Each AEP alarm input port has a provisionable label and severity. The alarm inputs have optocoupler isolation. They have one common 32-VDC output and a maximum of 2 mA per input. Each opto-metal oxide semiconductor (MOS) alarm output can operate by definable alarm condition, a maximum open circuit voltage of 60 VDC, and a maximum current of 100 mA. See the “[9.6 External Alarms and Controls](#)” section on [page 9-13](#) for further information.

Figure 1-33 shows the wire-wrapping connections on the shelf backplane used to connect to the AEP.

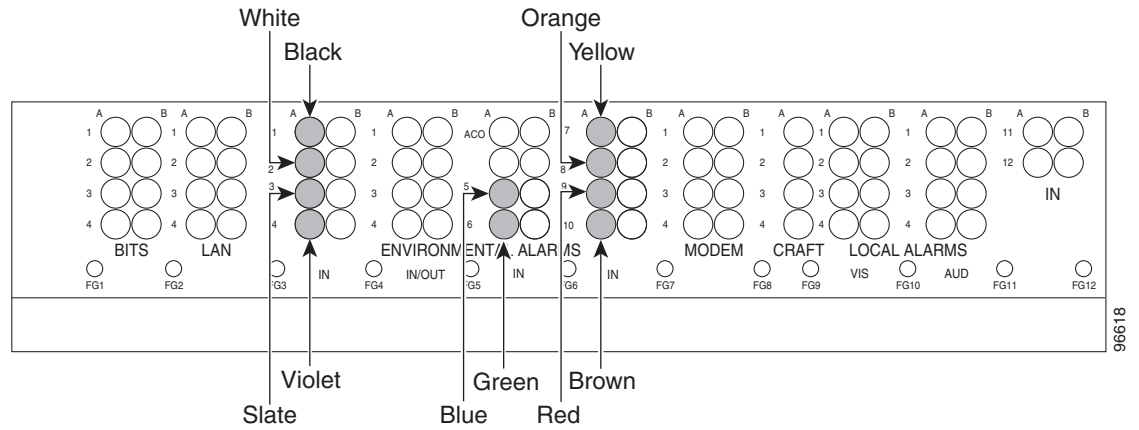
Figure 1-33 AEP Wire-Wrap Connections to Backplane Pins

Table 1-6 shows the backplane pin assignments and corresponding signals on the AIC-I and AEP.

Table 1-6 Pin Assignments for the AEP

AEP Cable Wire	Backplane Pin	AIC-I Signal	AEP Signal
Black	A1	GND	AEP_GND
White	A2	AE_+5	AEP_+5
Slate	A3	VBAT-	VBAT-
Violet	A4	VB+	VB+
Blue	A5	AE_CLK_P	AE_CLK_P
Green	A6	AE_CLK_N	AE_CLK_N
Yellow	A7	AE_DIN_P	AE_DOUT_P
Orange	A8	AE_DIN_N	AE_DOUT_N
Red	A9	AE_DOUT_P	AE_DIN_P
Brown	A10	AE_DOUT_N	AE_DIN_N

Figure 1-34 is a circuit diagram of the alarm inputs. (Inputs 1 and 32 are shown in the example.)

Figure 1-34 Alarm Input Circuit Diagram

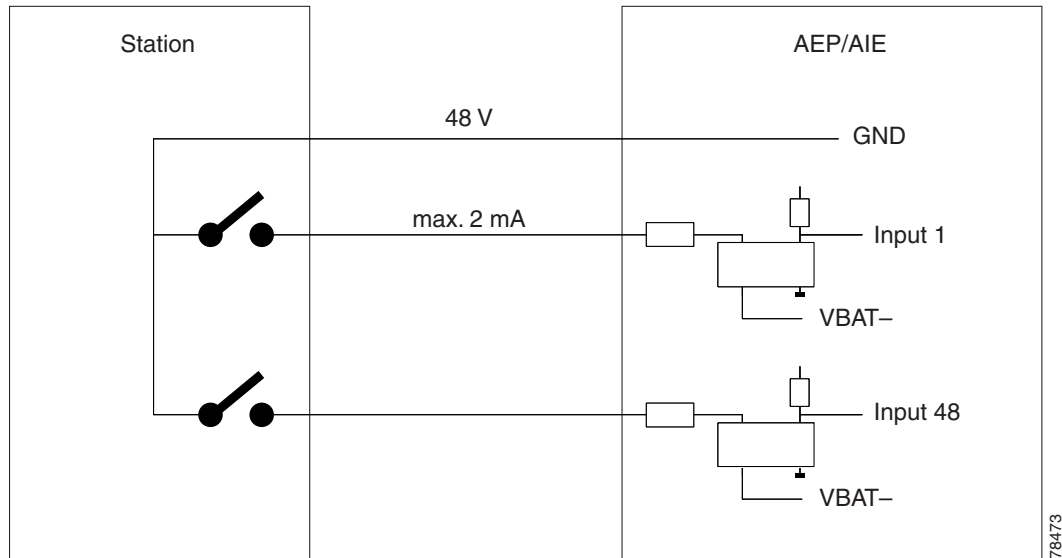


Table 1-7 lists the connections to the external alarm sources.

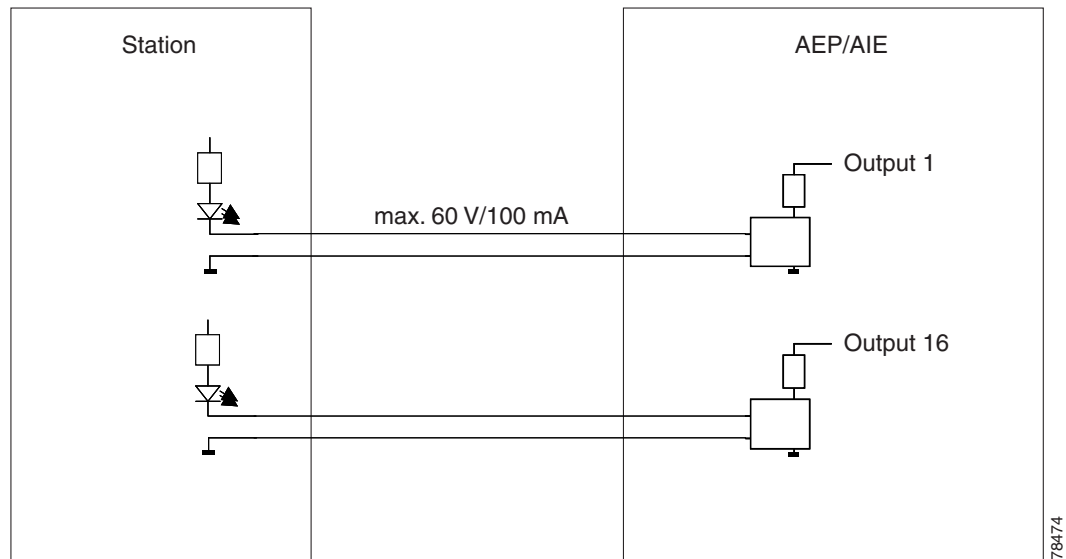
Table 1-7 Alarm Input Pin Association

AMP Champ Pin Number	Signal Name	AMP Champ Pin Number	Signal Name
1	ALARM_IN_1-	27	GND
2	GND	28	ALARM_IN_2-
3	ALARM_IN_3-	29	ALARM_IN_4-
4	ALARM_IN_5-	30	GND
5	GND	31	ALARM_IN_6-
6	ALARM_IN_7-	32	ALARM_IN_8-
7	ALARM_IN_9-	33	GND
8	GND	34	ALARM_IN_10-
9	ALARM_IN_11-	35	ALARM_IN_12-
10	ALARM_IN_13-	36	GND
11	GND	37	ALARM_IN_14-
12	ALARM_IN_15-	38	ALARM_IN_16-
13	ALARM_IN_17-	39	GND
14	GND	40	ALARM_IN_18-
15	ALARM_IN_19-	41	ALARM_IN_20-
16	ALARM_IN_21-	42	GND
17	GND	43	ALARM_IN_22-

Table 1-7 Alarm Input Pin Association (continued)

AMP Champ Pin Number	Signal Name	AMP Champ Pin Number	Signal Name
18	ALARM_IN_23-	44	ALARM_IN_24-
19	ALARM_IN_25-	45	GND
20	GND	46	ALARM_IN_26-
21	ALARM_IN_27-	47	ALARM_IN_28-
22	ALARM_IN_29-	48	GND
23	GND	49	ALARM_IN_30-
24	ALARM_IN_31-	50	—
25	ALARM_IN_+	51	GND1
26	ALARM_IN_0-	52	GND2

Figure 1-35 is a circuit diagram of the alarm outputs. (Outputs 1 and 16 are shown in the example.)

Figure 1-35 Alarm Output Circuit Diagram

Use the pin numbers in Table 1-8 to connect to the external elements being switched by external controls.

Table 1-8 Pin Association for Alarm Output Pins

AMP Champ Pin Number	Signal Name	AMP Champ Pin Number	Signal Name
1	—	27	COM_0
2	COM_1	28	—
3	NO_1	29	NO_2
4	—	30	COM_2

Table 1-8 Pin Association for Alarm Output Pins (continued)

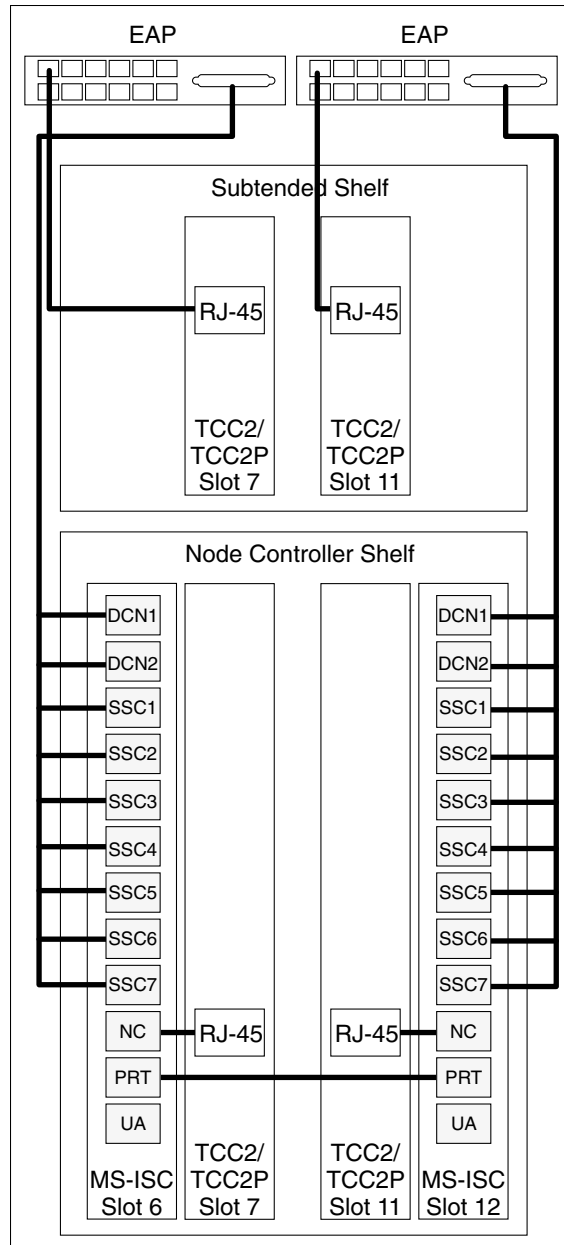
AMP Champ Pin Number	Signal Name	AMP Champ Pin Number	Signal Name
5	COM_3	31	—
6	NO_3	32	NO_4
7	—	33	COM_4
8	COM_5	34	—
9	NO_5	35	NO_6
10	—	36	COM_6
11	COM_7	37	—
12	NO_7	38	NO_8
13	—	39	COM_8
14	COM_9	40	—
15	NO_9	41	NO_10
16	—	42	COM_10
17	COM_11	43	—
18	NO_11	44	NO_12
19	—	45	COM_12
20	COM_13	46	—
21	NO_13	47	NO_14
22	—	48	COM_14
23	COM_15	49	—
24	NO_15	50	—
25	—	51	GND1
26	NO_0	52	GND2

1.10 Ethernet Adapter Panel

An ethernet adapter panel (EAP) is required in an ANSI or ETSI equipment rack for multishelf configurations. Two EAPs are required in a multishelf configuration, one for each MS-ISC-100T card. [Figure 1-36](#) shows an example of two installed EAPs and the connection between each EAP and a node controller shelf and a subtending shelf.

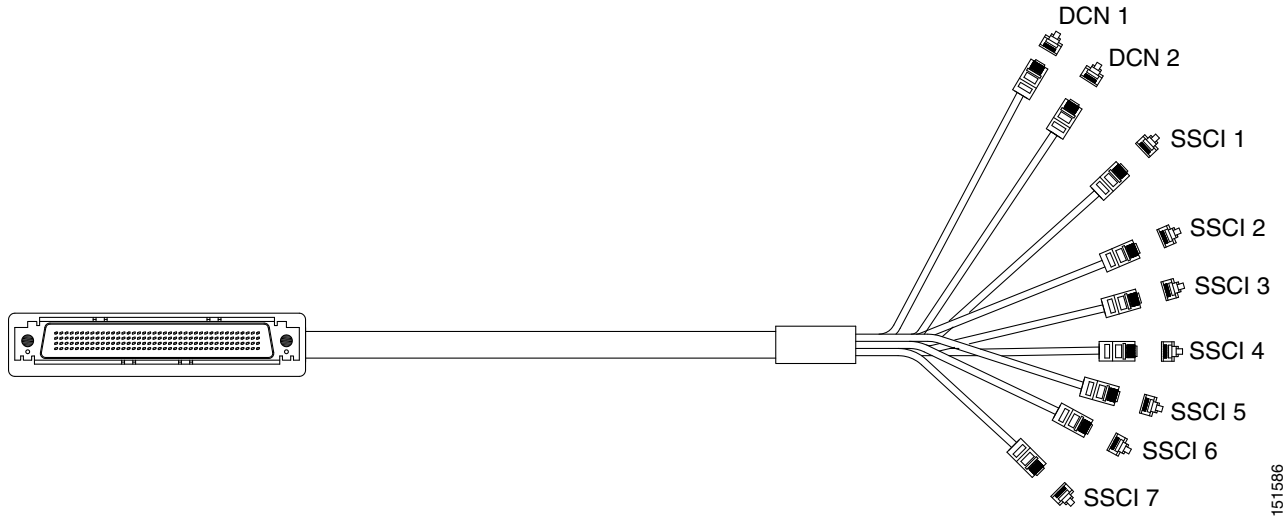
An EAP cable is used to connect the MS-ISC-100T card ports to the EAP ([Figure 1-37](#)). The nine connector ends plug into Ports 0 through 8 of the MS-ISC-100T card, and the multiport connector plugs into the EAP. Ports 0 and 1 on the MS-ISC-100T card are the DCN ports; Ports 2 through 7 are the SSC ports. A cross-over (CAT-5) LAN cable is used to connect the DCN port on the EAP to the front panel of the TCC2/TCC2P cards in the subtending shelves.

Figure 1-36 Connecting the EAP to the Node Controller and Subtending Shelf



151985

Figure 1-37 EAP Cable



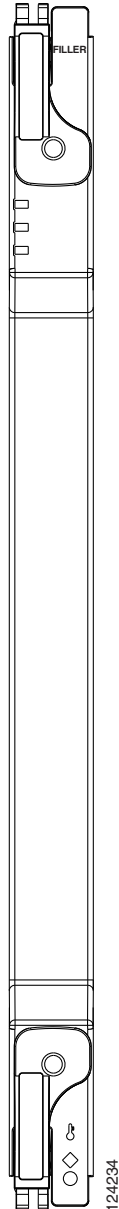
1.11 Filler Card

The filler card is designed to occupy empty multiservice and AIC-I slots in the Cisco ONS 15454 (Slots 1 to 6, 9, and 12 to 17). The filler card cannot operate in the cross-connect (XC) slots (Slots 8 and 10) or TCC2/TCC2P slots (Slots 7 and 11). The filler card is detected by CTC.

When installed, the filler card aids in maintaining proper air flow and EMI requirements.

Figure 1-38 shows the card faceplate. The filler card has no card-level LED indicators.

Figure 1-38 Filler Card Faceplate



1.12 Cable Routing and Management

The ONS 15454 cable management facilities include the following:

- Fiber patch panels
- A cable-routing channel (behind the fold-down door) that runs the width of the shelf assembly ([Figure 1-39 on page 1-40](#))
- Plastic horseshoe-shaped fiber guides at each side opening of the cable-routing channel that ensure that the proper bend radius is maintained in the fibers ([Figure 1-40 on page 1-41](#))



Note You can remove the fiber guide, if necessary, to create a larger opening (if you need to route CAT-5 Ethernet cables out the side, for example). To remove the fiber guide, take out the three screws that anchor it to the side of the shelf assembly.

- Cable tie-wrap facilities on EIAs that secure cables to the cover panel (ANSI only)
- Reversible jumper routing fins that enable you to route cables out either side by positioning the fins as desired
- Jumper slack storage reels (2) on each side panel that reduce the amount of slack in cables that are connected to other devices

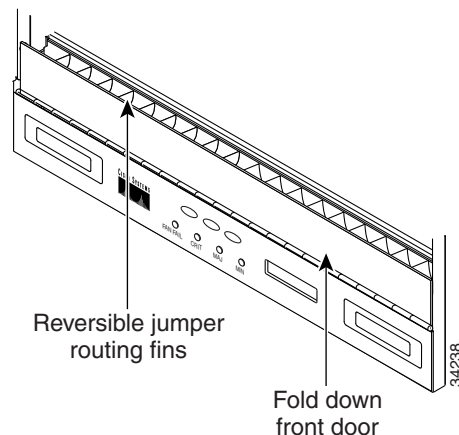


Note To remove the jumper slack storage reels, take out the screw in the center of each reel.

- Optional fiber-storage tray (recommended for DWDM nodes)
- Optional tie-down bar (ANSI only)

Figure 1-39 shows the cable management facilities that you can access through the fold-down front door, including the cable-routing channel and the jumper routing fins.

Figure 1-39 Managing Cables on the Front Panel



1.12.1 Fiber Management

The jumper routing fins are designed to route fiber jumpers out of both sides of the shelf. Slots 1 to 6 exit to the left, and Slots 12 to 17 exit to the right. Figure 1-40 shows fibers routed from cards in the left slots, down through the fins, then exiting out the fiber channel to the left. The maximum capacity of the fiber routing channel depends on the size of the fiber jumpers.

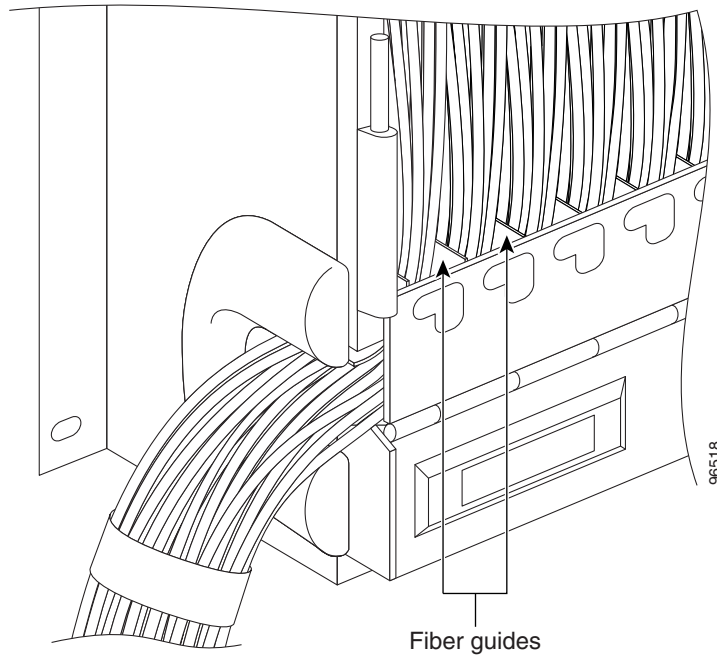
Figure 1-40 Fiber Capacity

Table 1-9 provides the maximum capacity of the fiber channel for one side of an ANSI shelf, depending on fiber size and number of Ethernet cables running through that fiber channel.

Table 1-9 ANSI Fiber Channel Capacity (One Side of the Shelf)

Fiber Diameter	Maximum Number of Fibers Exiting Each Side		
	No Ethernet Cables	One Ethernet Cable	Two Ethernet Cables
0.6 inch (1.6 mm)	144	127	110
0.7 inch (2 mm)	90	80	70
0.11 inch (3 mm)	40	36	32

Table 1-10 provides the maximum capacity of the fiber channel for one side of an ETSI shelf, depending on fiber size and number of Ethernet cables running through that fiber channel.

Table 1-10 ETSI Fiber Channel Capacity (One Side of the Shelf)

Fiber Diameter	Maximum Number of Fibers Exiting Each Side		
	No Ethernet Cables	One Ethernet Cable	Two Ethernet Cables
0.6 inch (1.6 mm)	126	110	94
0.7 inch (2 mm)	80	70	60
0.11 inch (3 mm)	36	31	26

Determine your fiber size according to the number of cards/ports installed in each side of the shelf. For example, if your port combination requires 36 fibers, 3-mm (0.11-inch) fiber is adequate. If your port combination requires 68 fibers, you must use 2-mm (0.7-inch) or smaller fibers.

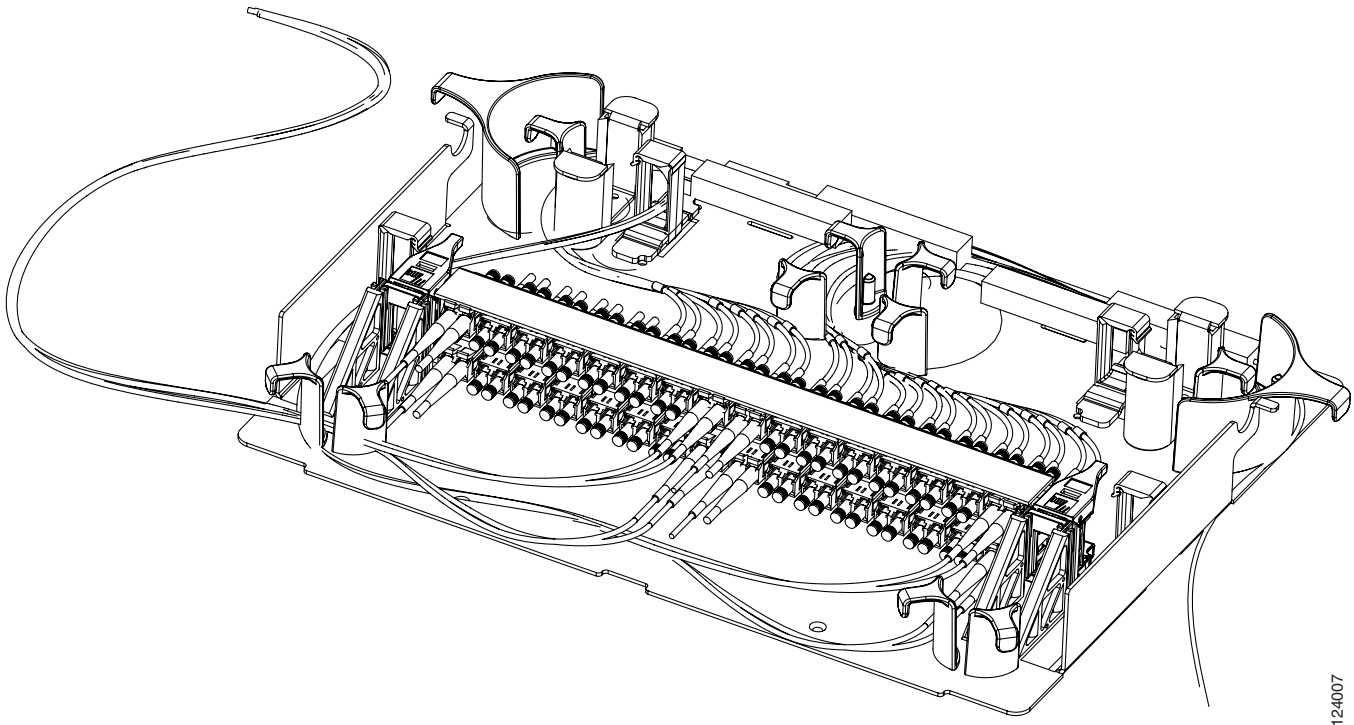
1.12.2 Fiber Management Using the Patch-Panel Tray

The optional patch-panel tray manages the connections between multiplexer/demultiplexer and TXP cards by splitting patchcords into single connections. There are two patch-panel trays, the regular tray (1 RU deep) and the deep tray (2 RUs deep). The patch-panel tray consists of a metal shelf, a pull-out drawer, and a drop-in patch-panel module. The standard patch-panel tray can host up to eight ribbon cables (with eight fibers each) entering the drawer, or 64 cables (with a maximum outer diameter of 2 mm [0.079 in.]). The deep patch-panel tray can host up to 16 ribbon cables (with eight fibers each) entering the drawer, or 128 cables (with a maximum outer diameter of 2 mm [0.079 in.]).

Because the standard patch-panel tray can host 64 connections, hub and ROADM nodes will typically require two standard patch-panel modules each, and other DWDM nodes typically require one. (Only one deep patch-panel tray is necessary for hub and ROADM nodes.) The module fits 19- and 23-inch (482.6-mm and 584.2-mm) ANSI racks and 600 mm (23.6 inch) x 300 mm (11.8 inch) ETSI racks, using reversible brackets.

Figure 1-41 shows a partially fibered standard patch-panel tray.

Figure 1-41 Standard Patch-Panel Tray



12-4007

Figure 1-42 shows a partially fibered deep patch-panel tray.

Figure 1-42 Deep Patch-Panel Tray

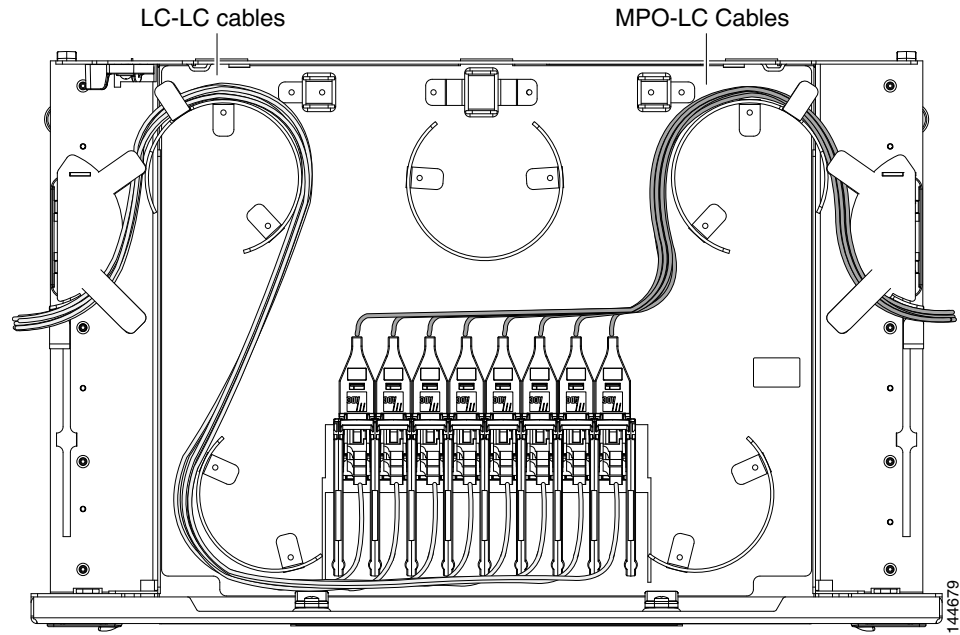


Figure 1-43 shows the label on the patch panel that identifies the wavelength for each port.

Figure 1-43 Patch-Panel Port Wavelengths

1	1532.6nm	FX	TX	2	1536.6nm	FX	TX	3	1540.5nm	FX	TX	4	1544.5nm	FX	TX	5	1548.5nm	FX	TX	6	1552.5nm	FX	TX	7	1556.5nm	FX	TX	8	1560.6nm	FX	TX
	1531.8nm	FX	TX		1535.8nm	FX	TX		1539.7nm	FX	TX		1543.7nm	FX	TX		1547.7nm	FX	TX		1551.7nm	FX	TX		1555.7nm	FX	TX		1559.7nm	FX	TX
	1531.1nm	FX	TX		1535.0nm	FX	TX		1538.9nm	FX	TX		1542.9nm	FX	TX		1546.9nm	FX	TX		1550.9nm	FX	TX		1554.9nm	FX	TX		1558.9nm	FX	TX
	1530.3nm	FX	TX		1534.2nm	FX	TX		1538.1nm	FX	TX		1542.1nm	FX	TX		1546.1nm	FX	TX		1550.1nm	FX	TX		1554.1nm	FX	TX		1558.1nm	FX	TX

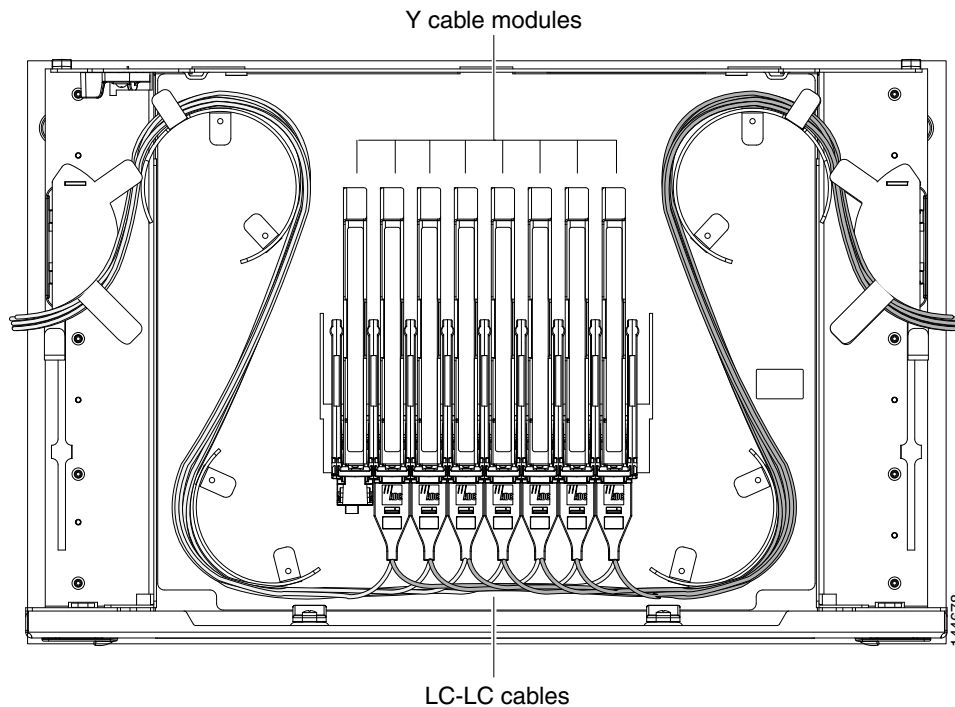
14676

1.12.3 Fiber Management Using the Y-Cable Module Tray

The optional Y-cable module tray manages the connections between TXP cards by splitting patchcords into single connections. The patch-panel tray consists of a metal shelf, a pull-out drawer, and up to eight Y-cable modules.

Figure 1-44 shows a fibered Y-cable module tray.

Figure 1-44 Y-Cable Module Tray



To ensure diversity of the fiber coming from different cards in the Y-cable scheme, one pair of fibers (e.g. from the active transponder) should come out on the opposite side from the second pair of fibers (e.g. standby transponder), according to local site practice.

1.12.4 Fiber Management Using the Fiber-Storage Tray

Cisco recommends installing at least one fiber-storage tray in multinode racks to facilitate fiber-optic cable management for DWDM applications. This tray is usually used to store slack cable from cables installed between cards within a single node. Refer to Figure 1-17 on page 1-19 for typical mounting locations.

Table 1-11 provides the fiber capacity for each tray.

Table 1-11 Fiber-Storage Tray Capacity

Fiber Diameter	Maximum Number of Fibers Exiting Each Side
0.6 inch (1.6 mm)	62

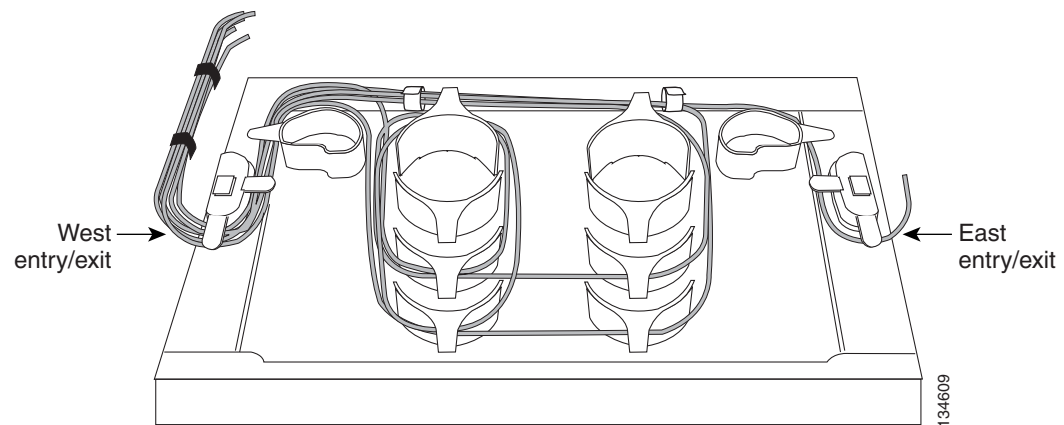
Table 1-11 Fiber-Storage Tray Capacity

Fiber Diameter	Maximum Number of Fibers Exiting Each Side
0.7 inch (2 mm)	48
0.11 inch (3 mm)	32

Figure 1-45 shows a fiber-management tray with fiber-optic cables routed through it. You can route cables around the cable rounders, entering and exiting from either side, as necessary.

**Note**

Figure 1-45 shows one example of how to route fibers through the fiber-storage tray. Route fibers as necessary for your site configuration.

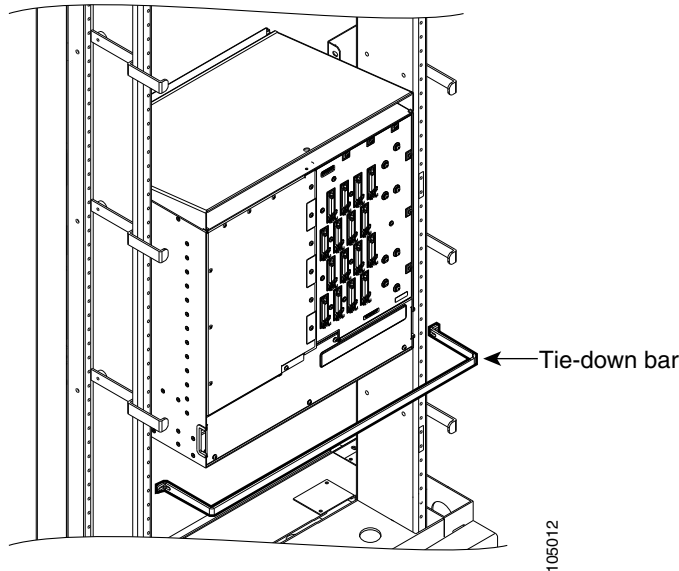
Figure 1-45 Fiber-Storage Tray

1.12.5 Fiber Management Using the Optional ANSI Tie-Down Bar

You can install a 5-inch (127-mm) tie-down bar on the rear of the ANSI chassis. You can use tie-wraps or other site-specific material to bundle the cabling and attach it to the bar so that you can more easily route the cable away from the rack.

Figure 1-46 shows the tie-down bar, the ONS 15454 ANSI, and the rack.

Figure 1-46 Tie-Down Bar on the Cisco ONS 15454 ANSI Shelf Assembly



1.13 Fan-Tray Assembly

The fan-tray assembly is located at the bottom of the ONS 15454 shelf assembly. The fan tray is a removable drawer that holds fans and fan-control circuitry for the ONS 15454. The front door can be left in place or removed before installing the fan-tray assembly. After you install the fan tray, you should only need to access it if a fan failure occurs or if you need to replace or clean the fan-tray air filter. Refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide* to clean and replace the fan-tray assembly.

The front of the fan-tray assembly has an LCD screen that provides slot- and port-level information for all card slots, including the number of Critical, Major, and Minor alarms.

The fan-tray assembly features an air filter at the bottom of the tray that you can install and remove by hand. Remove and visually inspect this filter every 30 days and keep spare filters in stock. Refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide* for information about cleaning and maintaining the fan-tray air filter.



Caution

Do not operate an ONS 15454 without the mandatory fan-tray air filter.

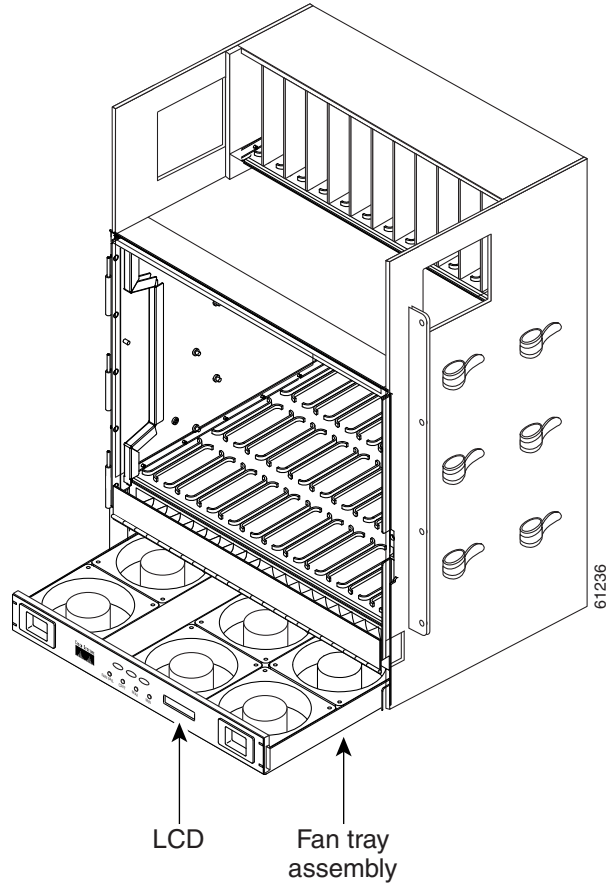


Caution

The 15454-FTA3-T fan-tray assembly can only be installed in ONS 15454 Release 3.1 and later shelf assemblies (15454-SA-ANSI, P/N: 800-19857; 15454-SA-HD, P/N: 800-24848). The fan-tray assembly includes a pin that prevents it from being installed in ONS 15454 shelf assemblies released before ONS 15454 Release 3.1 (15454-SA-NEBS3E, 15454-SA-NEBS3, and 15454-SA-R1). Equipment damage can result from attempting to install the 15454-FTA3 in an incompatible shelf assembly.

See [Figure 1-47](#) for the position of the ONS 15454 ETSI fan-tray assembly.

Figure 1-47 Position of the ONS 15454 ETSI Fan-Tray Assembly



1.13.1 Fan Speed and Power Requirements

Fan speed is controlled by the TCC2/TCC2P card's temperature sensors. The sensors measure the input air temperature at the fan-tray assembly. Fan speed options are low, medium, and high. If the TCC2/TCC2P card fails, the fans automatically shift to high speed. The temperature measured by the TCC2/TCC2P sensors appears on the LCD screen.

Table 1-12 lists power requirements for the fan-tray assembly.

Table 1-12 Fan Tray Assembly Power Requirements

Fan Tray Assembly	Watts	Amps	BTU/Hr
FTA2	53	1.21	198
FTA3 -T	86.4	1.8	295

1.13.2 Fan Failure

If one or more fans fail on the fan-tray assembly, replace the entire assembly. You cannot replace individual fans. The red Fan Fail LED on the front of the fan tray illuminates when one or more fans fail. The red Fan Fail LED clears after you install a working fan tray.

1.13.3 Air Filter

The ONS 15454 contains a reusable air filter (for ANSI: 15454-FTF2; for ETSI: 15454E-ETSI-FTF) that is installed either below the fan-tray assembly or, for the ONS 15454 ANSI, in the optional external filter brackets.

The reusable filter is made of a gray, open-cell, polyurethane foam that is specially coated to provide fire and fungi resistance. All versions of the ONS 15454 can use the reusable air filter. Spare filters should be kept in stock. Inspect the air filter every 30 days, and clean the filter every three to six months. Replace the air filter every two to three years. Avoid cleaning the air filter with harsh cleaning agents or solvents.

Earlier versions of the ONS 15454 ANSI shelf used a disposable air filter that is installed beneath the fan-tray assembly only. However, the reusable air filter is backward compatible.

1.14 Power and Ground Description

Ground the equipment according to Telcordia standards or local practices. The following sections describe power and ground for the ONS 15454 shelves.

1.14.1 ONS 15454 ANSI Power and Ground

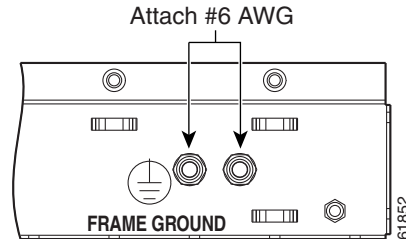
Cisco recommends the following wiring conventions, but customer conventions prevail:

- Red wire for battery connections (–48 VDC).
- Black wire for battery return connections (0 VDC).
- The battery return connection is treated as DC-I, as defined in Telcordia GR-1089-CORE, Issue 3.

The ONS 15454 ANSI has redundant –48 VDC #8 power terminals on the shelf-assembly backplane. The terminals are labeled BAT1, RET1, BAT2, and RET2 and are located on the lower section of the backplane behind a clear plastic cover.

To install redundant power feeds, use four power cables and one ground cable. For a single power feed, only two power cables (#10 AWG, copper conductor, 194 degrees F [90 degrees C]) and one ground cable (#6 AWG) are required. Use a conductor with low impedance to ensure circuit overcurrent protection. However, the conductor must have the capability to safely conduct any faulty current that might be imposed.

The existing ground post is a #10-32 bolt. The nut provided for a field connection is also a #10 AWG, with an integral lock washer. The lug must be a dual-hole type and rated to accept the #6 AWG cable. Two posts are provided on the ONS 15454 ANSI to accommodate the dual-hole lug. [Figure 1-48](#) shows the location of the ground posts.

Figure 1-48 Ground Posts on the ONS 15454 ANSI Backplane

1.14.2 ONS 15454 ETSI Power and Ground

The ONS 15454 ETSI has redundant –48 VDC power connectors on the MIC-A/P and MIC-C/T/P faceplates. To install redundant power feeds, use the two power cables shipped with the ONS 15454 ETSI and one ground cable. For details, see the “2.4.1 MIC-A/P FMEC” section on page 2-33 and the “2.4.2 MIC-C/T/P FMEC” section on page 2-36.



Caution

Only use the power cables shipped with the ONS 15454 ETSI.

1.15 ONS 15454 ANSI Alarm, Timing, LAN, and Craft Pin Connections

Pin connections are provided on the ONS 15454 ANSI backplane. For information about ONS 15454 ETSI connections, see the “1.8 ONS 15454 ETSI Front Mount Electrical Connection” section on page 1-31.

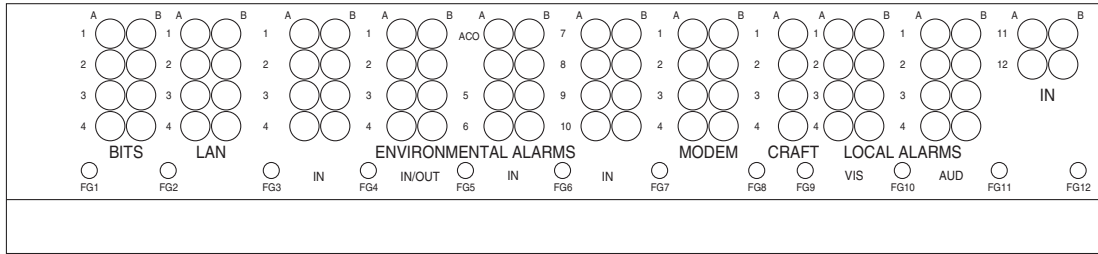
The ONS 15454 ANSI has a backplane pin field located at the bottom of the backplane. The backplane pin field provides 0.045 inch² (29 mm²) wire-wrap pins for enabling external alarms, timing input and output, and craft interface terminals. This section describes the backplane pin field and the pin assignments for the field. [Figure 1-50 on page 1-51](#) shows the wire-wrap pins on the backplane pin field. Beneath each wire-wrap pin is a frame ground pin. Frame ground pins are labeled FG1, FG2, FG3, etc. Install the ground shield of the cables connected to the backplane to the ground pin that corresponds to the pin field used.



Note

The AIC-I requires a shelf assembly running Software R3.4.0 or later. The backplane of the ANSI shelf contains a wire-wrap field with pin assignment according to the layout in [Figure 1-49 on page 1-50](#). The shelf assembly might be an existing shelf that has been upgraded to Software R3.4 or later. In this case, the backplane pin labeling appears as indicated in [Figure 1-50 on page 1-51](#), but you must use the pin assignments provided by the AIC-I card as shown in [Figure 1-49 on page 1-50](#).

Figure 1-49 Cisco ONS 15454 Backplane Pinouts (Release 3.4 or Later)

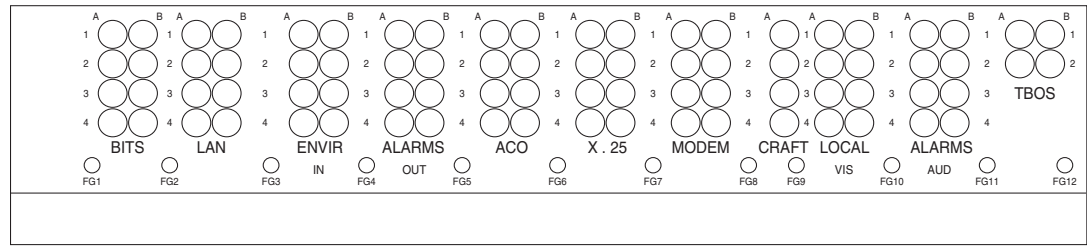


Field	Pin	Function	Field	Pin	Function	
BITS	A1	BITS Output 2 negative (-)	ENVIR ALARMS IN/OUT	A1/A13	Normally open output pair number 1	
	B1	BITS Output 2 positive (+)		B1/B13		
	A2	BITS Input 2 negative (-)		A2/A14	Normally open output pair number 2	
	B2	BITS Input 2 positive (+)		B2/B14		
	A3	BITS Output 1 negative (-)	N/O	A3/A15	Normally open output pair number 3	
	B3	BITS Output 1 positive (+)		B3/B15		
	A4	BITS Input 1 negative (-)		A4/A16	Normally open output pair number 4	
	B4	BITS Input 1 positive (+)		B4/B16		
LAN	Connecting to a hub, or switch		ACO	A1	Normally open ACO pair	
	A1	RJ-45 pin 6 RX-		B1		
	B1	RJ-45 pin 3 RX+	CRAFT	A1	Receive (PC pin #2)	
	A2	RJ-45 pin 2 TX-		A2	Transmit (PC pin #3)	
	B2	RJ-45 pin 1 TX+		A3	Ground (PC pin #5)	
	A1			RJ-45 pin 2 RX-	A4	DTR (PC pin #4)
	Connecting to a PC/Workstation or router		LOCAL ALARMS AUD (Audible)	A1	Alarm output pair number 1: Remote audible alarm.	
	B1	RJ-45 pin 1 RX+		B1		
A2	RJ-45 pin 6 TX-	A2		Alarm output pair number 2: Critical audible alarm.		
B2	RJ-45 pin 3 TX+	B2				
ENVIR ALARMS IN	A1	Alarm input pair number 1: Reports closure on connected wires.	N/O	A3	Alarm output pair number 3: Major audible alarm.	
	B1			B3		
	A2	Alarm input pair number 2: Reports closure on connected wires.		A4		Alarm output pair number 4: Minor audible alarm.
	B2			B4		
	A3	Alarm input pair number 3: Reports closure on connected wires.	LOCAL ALARMS VIS (Visual)	A1	Alarm output pair number 1: Remote visual alarm.	
	B3			B1		
	A4	Alarm input pair number 4: Reports closure on connected wires.		A2		Alarm output pair number 2: Critical visual alarm.
	B4			B2		
	A5	Alarm input pair number 5: Reports closure on connected wires.	N/O	A3	Alarm output pair number 3: Major visual alarm.	
	B5			B3		
	A6	Alarm input pair number 6: Reports closure on connected wires.		A4		Alarm output pair number 4: Minor visual alarm.
	B6			B4		
A7	Alarm input pair number 7: Reports closure on connected wires.					
B7						
A8	Alarm input pair number 8: Reports closure on connected wires.					
B8						
A9	Alarm input pair number 9: Reports closure on connected wires.					
B9						
A10	Alarm input pair number 10: Reports closure on connected wires.					
B10						
A11	Alarm input pair number 11: Reports closure on connected wires.					
B11						
A12	Alarm input pair number 12: Reports closure on connected wires.					
B12						

If you are using an AIC-I card, contacts provisioned as OUT are 1-4. Contacts provisioned as IN are 13-16.

83020

Figure 1-50 ONS 15454 ANSI Backplane Pinouts



Field	Pin	Function	Field	Pin	Function	
BITS	A1	BITS Output 2 negative (-)	ENVIR ALARMS OUT	A1	Normally open output pair number 1	
	B1	BITS Output 2 positive (+)		B1		
	A2	BITS Input 2 negative (-)		A2	Normally open output pair number 2	
	B2	BITS Input 2 positive (+)		B2		
	A3	BITS Output 1 negative (-)		A3	Normally open output pair number 3	
	B3	BITS Output 1 positive (+)		B3		
	A4	BITS Input 1 negative (-)		A4	Normally open output pair number 4	
	B4	BITS Input 1 positive (+)		B4		
LAN	Connecting to a hub, or switch		ACO	A1	Normally open ACO pair	
	A1	RJ-45 pin 6 RX-		B1		
	B1	RJ-45 pin 3 RX+		CRAFT	A1	Receive (PC pin #2)
	A2	RJ-45 pin 2 TX-			A2	Transmit (PC pin #3)
	B2	RJ-45 pin 1 TX+	A3		Ground (PC pin #5)	
	Connecting to a PC/Workstation or router		A4		DTR (PC pin #4)	
	A1	RJ-45 pin 2 RX-	LOCAL ALARMS AUD (Audible)	A1	Alarm output pair number 1: Remote audible alarm.	
	B1	RJ-45 pin 1 RX+		B1		
A2	RJ-45 pin 6 TX-	A2		Alarm output pair number 2: Critical audible alarm.		
B2	RJ-45 pin 3 TX+	B2				
ENVIR ALARMS IN	A1	Alarm input pair number 1: Reports closure on connected wires.		N/O	A3	Alarm output pair number 3: Major audible alarm.
	B1	Alarm input pair number 2: Reports closure on connected wires.			B3	
	A2	Alarm input pair number 2: Reports closure on connected wires.			A4	Alarm output pair number 4: Minor audible alarm.
	B2	Alarm input pair number 2: Reports closure on connected wires.			B4	
	A3	Alarm input pair number 3: Reports closure on connected wires.	LOCAL ALARMS VIS (Visual)	A1	Alarm output pair number 1: Remote visual alarm.	
	B3	Alarm input pair number 3: Reports closure on connected wires.		B1		
	A4	Alarm input pair number 4: Reports closure on connected wires.		A2	Alarm output pair number 2: Critical visual alarm.	
	B4	Alarm input pair number 4: Reports closure on connected wires.		B2		
		N/O	A3	Alarm output pair number 3: Major visual alarm.		
			B3			
			A4	Alarm output pair number 4: Minor visual alarm.		
			B4			

38533

1.15.1 Alarm Contact Connections

The alarm pin field supports up to 17 alarm contacts, including four audible alarms, four visual alarms, one alarm cutoff (ACO), and four user-definable alarm input and output contacts.

Audible alarm contacts are in the LOCAL ALARM AUD pin field and visual contacts are in the LOCAL ALARM VIS pin field. Both of these alarms are in the LOCAL ALARMS category. User-definable contacts are in the ENVIR ALARM IN (external alarm) and ENVIR ALARM OUT (external control) pin fields. These alarms are in the ENVIR ALARMS category; you must have the AIC-I card installed to use the ENVIR ALARMS. Alarm contacts are Normally Open (N/O), meaning that the system closes the alarm contacts when the corresponding alarm conditions are present. Each alarm contact consists of two wire-wrap pins on the shelf assembly backplane. Visual and audible alarm contacts are classified as Critical, Major, Minor, and Remote. [Figure 1-50 on page 1-51](#) shows alarm pin assignments.

Visual and audible alarms are typically wired to trigger an alarm light or bell at a central alarm collection point when the corresponding contacts are closed. You can use the ACO pins to activate a remote ACO for audible alarms. You can also activate the ACO function by pressing the ACO button on the TCC2/TCC2P card faceplate. The ACO function clears all audible alarm indications. After clearing the audible alarm indication, the alarm is still present and viewable in the Alarms tab in CTC.

1.15.2 Timing Connections

The ONS 15454 ANSI backplane supports two building integrated timing supply (BITS) clock pin fields. The first four BITS pins, rows 3 and 4, support output and input from the first external timing device. The last four BITS pins, rows 1 and 2, perform the identical functions for the second external timing device. [Table 1-13](#) lists the pin assignments for the BITS timing pin fields.


Note

For timing connection, use 100-ohm shielded BITS clock cable pair #22 or #24 AWG (0.51 mm² [0.020 inch] or 0.64 mm² [0.0252 inch]), twisted-pair T1-type.

Table 1-13 BITS External Timing Pin Assignments

External Device	Contact	Tip and Ring	Function
First external device	A3 (BITS 1 Out)	Primary ring (-)	Output to external device
	B3 (BITS 1 Out)	Primary tip (+)	Output to external device
	A4 (BITS 1 In)	Secondary ring (-)	Input from external device
	B4 (BITS 1 In)	Secondary tip (+)	Input from external device
Second external device	A1 (BITS 2 Out)	Primary ring (-)	Output to external device
	B1 (BITS 2 Out)	Primary tip (+)	Output to external device
	A2 (BITS 2 In)	Secondary ring (-)	Input from external device
	B2 (BITS 2 In)	Secondary tip (+)	Input from external device


Note

Refer to Telcordia SR-NWT-002224 for rules about provisioning timing references.

1.15.3 LAN Connections

Use the LAN pins on the ONS 15454 ANSI backplane to connect the ONS 15454 ANSI to a workstation or Ethernet LAN, or to a LAN modem for remote access to the node. You can also use the LAN port on the TCC2/TCC2P faceplate to connect a workstation or to connect the ONS 15454 ANSI to the network. [Table 1-14](#) shows the LAN pin assignments.

Before you can connect an ONS 15454 ANSI to other ONS 15454 ANSI shelves or to a LAN, you must change the default IP address that is shipped with each ONS 15454 ANSI (192.1.0.2).

Table 1-14 LAN Pin Assignments

Pin Field	Backplane Pins	RJ-45 Pins
LAN 1 Connecting to data circuit-terminating equipment (DCE ¹ , a hub or switch)	B2	1
	A2	2
	B1	3
	A1	6
LAN 1 Connecting to data terminal equipment (DTE) (a PC/workstation or router)	B1	1
	A1	2
	B2	3
	A2	6

1. The Cisco ONS 15454 ANSI is DCE.

1.15.4 TL1 Craft Interface Installation

You can use the craft pins on the ONS 15454 ANSI backplane or the EIA/TIA-232 port on the TCC2/TCC2P faceplate to create a VT100 emulation window to serve as a TL1 craft interface to the ONS 15454 ANSI. Use a straight-through cable to connect to the EIA/TIA-232 port. [Table 1-15](#) shows the pin assignments for the CRAFT pin field.


Note

You cannot use the craft backplane pins and the EIA/TIA-232 port on the TCC2/TCC2P card simultaneously.


Note

To use the serial port craft interface wire-wrap pins on the backplane, the DTR signal line on the backplane port wire-wrap pin must be connected and active.

Table 1-15 Craft Interface Pin Assignments

Pin Field	Contact	Function
Craft	A1	Receive
	A2	Transmit
	A3	Ground
	A4	DTR

1.16 Cards and Slots

ONS 15454 cards have electrical plugs at the back that plug into electrical connectors on the shelf assembly backplane. When the ejectors are fully closed, the card plugs into the assembly backplane. [Figure 1-51](#) shows card installation for an ONS 15454 ANSI shelf.

Figure 1-51 *Installing Cards in the ONS 15454 ANSI*

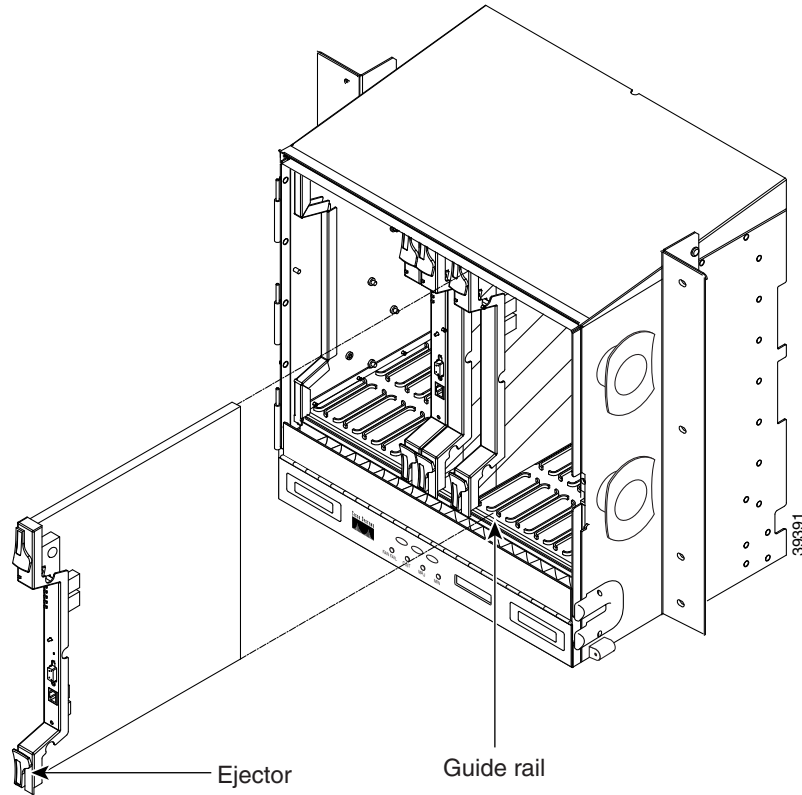
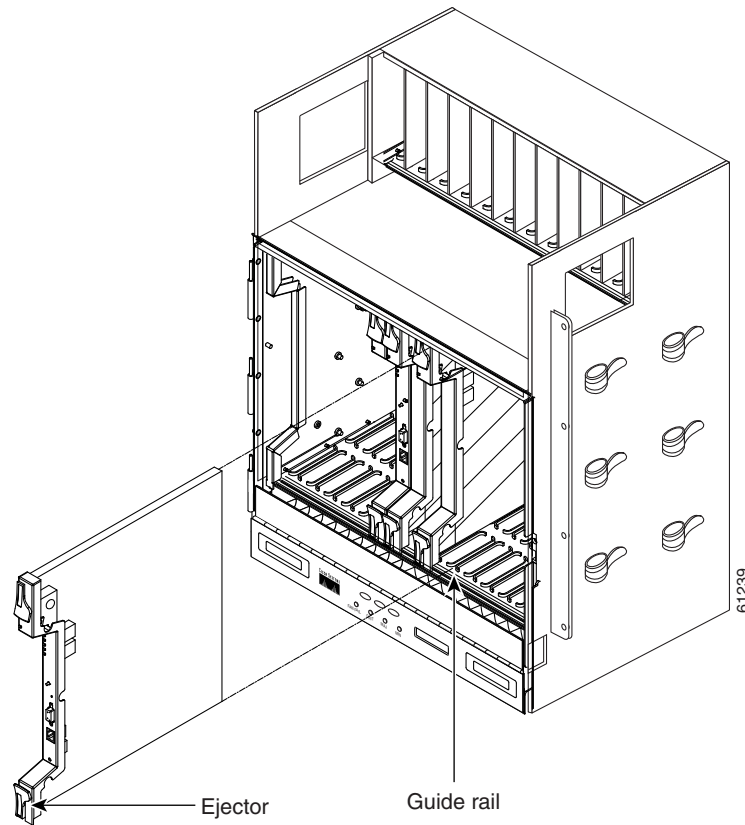


Figure 1-52 shows card installation in the ONS 15454 ETSI shelf.

Figure 1-52 *Installing Cards in the ONS 15454 ETSI Shelf*



1.16.1 Card Slot Requirements

The ONS 15454 shelf assemblies have 17 card slots numbered sequentially from left to right. Slots 7 and 11 are dedicated to TCC2/TCC2P cards. Slot 9 is reserved for the optional AIC-I card.



Caution

Do not operate the ONS 15454 with a single TCC2/TCC2P card. Always operate the shelf assembly with one working and one protect card of the same type.

Shelf assembly slots have symbols indicating the type of cards that you can install in them. Each ONS 15454 card has a corresponding symbol. The symbol on the card must match the symbol on the slot.

Table 1-16 shows the slot and card symbol definitions.

Table 1-16 Slot and Card Symbols

Symbol Color/Shape	Definition
Orange/Circle	Slots 1 to 6 and 12 to 17. Only install cards with a circle symbol on the faceplate.
Blue/Triangle	Slots 5, 6, 12, and 13. Only install cards with circle or a triangle symbol on the faceplate.
Purple/Square	TCC2/TCC2P slot, Slots 7 and 11. Only install cards with a square symbol on the faceplate.
Green/Cross	Cross-connect (XC/XCVT/XC10G) slot, Slots 8 and 10. Only install ONS 15454 cards with a cross symbol on the faceplate. Note Cross-connect cards are not required in DWDM applications. Install a FILLER card or blank card if not using Slots 8 and 10.
Red/P	Protection slot in 1:N protection schemes.
Red/Diamond	AIC/AIC-I slot, Slot 9. Only install cards with a diamond symbol on the faceplate.
Gold/Star	Slots 1 to 4 and 14 to 17. Only install cards with a star symbol on the faceplate.
Blue/Hexagon	(Only used with the 15454-SA-HD shelf assembly.) Slots 3 and 15. Only install ONS 15454 ANSI cards with a blue hexagon symbol on the faceplate.

1.16.2 Card Replacement

To replace an ONS 15454 card with another card of the same type, you do not need to make any changes to the database; remove the old card and replace it with a new card. To replace a card with a card of a different type, physically remove the card and replace it with the new card, then delete the original card from CTC. For specifics, refer to the “Maintain the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.



Caution

Removing any active card from the ONS 15454 can result in traffic interruption. Use caution when replacing cards and verify that only inactive or standby cards are being replaced. If the active card needs to be replaced, switch it to standby prior to removing the card from the node. For traffic switching procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.



Note

An improper removal (IMPROPRMVL) alarm is raised whenever a card pull (reseat) is performed, unless the card is deleted in CTC first. The alarm clears after the card replacement is complete.

1.17 Ferrites (ANSI Only)

Place third-party ferrites on certain cables to dampen electromagnetic interference (EMI) from the ONS 15454 ANSI. Ferrites must be added to meet the requirements of Telcordia GR-1089-CORE. Refer to the ferrite manufacturer documentation for proper use and installation of the ferrites. Ferrite placements on the ONS 15454 ANSI can include power cables, AMP Champ connectors, baluns, BNC/SMB connectors, and the wire-wrap pin field.



Card Reference

This chapter describes Cisco ONS 15454 dense wavelength division multiplexing (DWDM) card and client card features and functions. It also describes the common control cards needed to support them as well as the optical plug-in modules (Small Form-factor Pluggables [SFPs]). For installation and card turn-up procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. For card safety and compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- [2.1 Card Overview, page 2-1](#)
- [2.2 Safety Labels, page 2-13](#)
- [2.3 Common Control Cards, page 2-17](#)
- [2.4 Front Mount Electrical Connections, page 2-33](#)
- [2.5 Optical Service Channel Cards, page 2-37](#)
- [2.6 Optical Amplifier Cards, page 2-44](#)
- [2.7 Multiplexer and Demultiplexer Cards, page 2-62](#)
- [2.8 Optical Add/Drop Cards, page 2-95](#)
- [2.9 Optical Mesh Cards, page 2-112](#)
- [2.10 Transponder and Muxponder Cards, page 2-116](#)
- [2.11 Transponder and Muxponder Protection, page 2-169](#)
- [2.12 Far-End Laser Control, page 2-171](#)
- [2.13 Jitter Considerations, page 2-172](#)
- [2.14 Termination Modes, page 2-172](#)
- [2.15 SFP and XFP Modules, page 2-173](#)

2.1 Card Overview

The card overview section lists the cards described in this chapter and summarizes card functions, power consumption, and temperature ranges of the optical cards covered in this reference section.

**Note**

Each card is marked with a symbol that corresponds to a slot (or slots) on the ONS 15454 shelf assembly. The cards are then installed into slots displaying the same symbols. See the “[1.16.1 Card Slot Requirements](#)” section on page 1-55 for a list of slots and symbols.

2.1.1 Common Control Cards

The following common control cards are needed to support the functions of the DWDM, transponder, and muxponder cards:

- TCC2 or TCC2P
- AIC-I (optional)
- MS-ISC-100T (multishelf configurations only)

2.1.2 Front Mount Electrical Connections (ETSI only)

The following Front Mount Electrical Connections (FMECs) are needed to support the functions of the DWDM, transponder, and muxponder cards:

- MIC-A/P
- MIC-C/T/P

2.1.3 DWDM Cards

ONS 15454 DWDM cards are grouped into the following categories:

- **Optical service channel cards**—These cards provide channels that connect ONS 15454 DWDM nodes and transport general-purpose information (including Cisco Transport Controller [CTC] management) without affecting the client traffic. ONS 15454 optical service channel cards include the Optical Service Channel Module (OSCM) and the Optical Service Channel and Combiner/Separator Module (OSC-CSM).
- **Optical amplifier cards**—These cards are used in amplified DWDM nodes, including hub nodes, amplified OADM nodes, and line amplified nodes. Optical amplifier cards include the Optical Pre-amplifier (OPT-PRE), Optical Booster (OPT-BST), Optical Booster Enhanced (OPT-BST-E), Optical Booster L-Band (OPT-BST-L), and Optical Pre-amplifier L-Band (OPT-AMP-L).
- **Dispersion compensation units**—These cards are installed in the ONS 15454 dispersion compensation shelf when optical pre-amplifier cards are installed in the DWDM node. Each dispersion compensation unit (DCU) module is designed to compensate a specific fiber length, up to a maximum (per-module) of 65 km of standard single-mode fiber (SMF-28). DCUs can be cascaded to extend the compensation to 130 km.
- **Multiplexer and demultiplexer cards**—These cards multiplex and demultiplex DWDM optical channels. ONS 15454 multiplexer and demultiplexer cards include the 32-Channel Multiplexer (32MUX-O), the 32-Channel Demultiplexer (32DMX-O), the single-slot 32-Channel Demultiplexer (32DMX), the single-slot 32-Channel L-Band Demultiplexer (32DMX-L), and the 4-Channel Multiplexer/Demultiplexer (4MD-xx.x). This section also covers the 32-Channel Wavelength Selective Switch (32WSS and 32WSS-L) cards used to implement reconfigurable OADM (ROADM) functionality.

- Optical Add/Drop cards—These cards are mainly divided into two groups: band optical add/drop multiplexer (OADM) and channel OADM cards. Band OADM cards add and drop one or four bands of adjacent channels; they include the 4-Band OADM (AD-4B-xx.x) and the 1-Band OADM (AD-1B-xx.x). Channel OADM cards add and drop one, two, or four adjacent channels; they include the 4-Channel OADM (AD-4C-xx.x), the 2-Channel OADM (AD-2C-xx.x), and the 1-Channel OADM (AD-1C-xx.x).
- Optical Mesh cards—The Mesh/Multiring Upgrade (MMU) card is used to optically bypass a given wavelength from one section of the network or ring to another one without requiring 3R regeneration.

2.1.4 Transponder and Muxponder Cards

The purpose of a transponder (TXP) or muxponder (MXP) card is to convert the “gray” optical client interface signals into trunk signals that operate in the “colored” DWDM wavelength range¹. Transponding or muxponding is the process of converting the signals between the client and trunk wavelengths.

A muxponder generally handles several client signals. It aggregates, or multiplexes, lower rate client signals together and sends them out over a higher rate trunk port. Likewise, it demultiplexes optical signals coming in on a trunk and sends them out to individual client ports. A transponder converts a single client signal to a single trunk signal and converts a single incoming trunk signal to a single client signal.

All of the TXP and MXP cards perform optical to electrical to optical (OEO) conversion. As a result, they are not optically transparent cards. The reason for this is that the cards must operate on the signals passing through them, so it is necessary to do an OEO conversion.

On the other hand, the termination mode for all of the TXPs and MXPs, which is done at the electrical level, can be configured to be transparent. In this case, neither the Line nor the Section overhead is terminated. The cards can also be configured so that either Line or Section overhead can be terminated, or both can be terminated.



Note

The MXP_2.5G_10G card, by design, when configured in the transparent termination mode, actually does terminate some of the bytes. See [Table 2-96 on page 2-172](#) for details.

2.1.5 Card Summary

[Table 2-1](#) lists and summarizes the functions of each Cisco ONS 15454 DWDM and client card.

Table 2-1 DWDM and Client Cards for the ONS 15454

Card	Port Description	For Additional Information
Optical Service Channel Cards		
OSCM	The OSCM has one set of optical ports and one Ethernet port located on the faceplate. It operates in Slots 8 and 10.	See the “ 2.5.1 OSCM Card ” section on page 2-37.

1. Client-facing gray optical signals generally operate at shorter wavelengths, whereas DWDM colored optical signals are in the longer wavelength range (for example, 1490 nm = violet; 1510 nm = blue; 1530 nm = green; 1550 nm = yellow; 1570 nm = orange; 1590 nm = red; 1610 nm = brown). Some of the newer client-facing SFPs, however, operate in the colored region.

Table 2-1 DWDM and Client Cards for the ONS 15454 (continued)

Card	Port Description	For Additional Information
OSC-CSM	The OSC-CSM has three sets of optical ports and one Ethernet port located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “2.5.2 OSC-CSM Card” section on page 2-40.
Optical Amplifier Cards		
OPT-PRE	The OPT-PRE amplifier has five optical ports (three sets) located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “2.6.1 OPT-PRE Amplifier” section on page 2-45.
OPT-BST	The OPT-BST amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “2.6.2 OPT-BST Amplifier Card” section on page 2-48.
OPT-BST-E	The OPT-BST-E amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “2.6.3 OPT-BST-E Amplifier Card” section on page 2-51.
OPT-BST-L	The OPT-BST-L L-band amplifier has four sets of optical ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “2.6.4 OPT-BST-L Amplifier Card” section on page 2-55.
OPT-AMP-L	The OPT-AMP-L L-band preamplifier have five sets of optical ports located on the faceplate. It is a two-slot card that operates in Slots 1 to 6 and 12 to 17.	See the “2.6.5 OPT-AMP-L Card” section on page 2-59.
Multiplexer and Demultiplexer Cards		
32MUX-O	The 32MUX-O has five sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the “2.7.1 32MUX-O Card” section on page 2-63.
32DMX-O	The 32DMX-O has five sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the “2.7.2 32DMX-O Card” section on page 2-67.
32DMX	The 32DMX has five sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “2.7.3 32DMX Card” section on page 2-71
32DMX-L	The 32DMX-L has five sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “2.7.4 32DMX-L Card” section on page 2-74
32WSS	The 32WSS card has seven sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the “2.7.5 32WSS Card” section on page 2-79
32WSS-L	The 32WSS-L card has seven sets of ports located on the faceplate. It operates in Slots 1 to 5 and 12 to 16.	See the “2.7.6 32WSS-L Card” section on page 2-84
4MD-xx.x	The 4MD-xx.x card has five sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “2.7.7 4MD-xx.x Card” section on page 2-91.
Optical Add/Drop Cards		

Table 2-1 DWDM and Client Cards for the ONS 15454 (continued)

Card	Port Description	For Additional Information
AD-1C-xx.x	The AD-1C-xx.x card has three sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “ 2.8.1 AD-1C-xx.x Card ” section on page 2-95.
AD-2C-xx.x	The AD-2C-xx.x card has four sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “ 2.8.2 AD-2C-xx.x Card ” section on page 2-98.
AD-4C-xx.x	The AD-4C-xx.x card has six sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “ 2.8.3 AD-4C-xx.x Card ” section on page 2-102.
AD-1B-xx.x	The AD-1B-xx.x card has three sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “ 2.8.4 AD-1B-xx.x Card ” section on page 2-106.
AD-4B-xx.x	The AD-4B-xx.x card has six sets of ports located on the faceplate. It operates in Slots 1 to 6 and 12 to 17.	See the “ 2.8.5 AD-4B-xx.x Card ” section on page 2-109.
Optical Mesh Cards		
MMU	The MMU card has six sets of ports located on the faceplate, It operates in slots 1 to 6 and 12 to 17.	See the “ 2.9 Optical Mesh Cards ” section on page 2-112
Transponder and Muxponder Cards		
TXP_MR_10G	The TXP_MR_10G card has two sets of ports located on the faceplate.	See the “ 2.10.1 TXP_MR_10G Card ” section on page 2-116
TXP_MR_10E	The TXP_MR_10E card has two sets of ports located on the faceplate.	See the “ 2.10.2 TXP_MR_10E Card ” section on page 2-120
TXP_MR_10E_C and TXP_MR_10E_L	The TXP_MR_10E_C and TXP_MR_10E_L cards have two sets of ports located on the faceplate.	See the “ 2.10.3 TXP_MR_10E_C and TXP_MR_10E_L Cards ” section on page 2-124
TXP_MR_2.5G	The TXP_MR_2.5G card has two sets of ports located on the faceplate.	See the “ 2.10.4 TXP_MR_2.5G and TXPP_MR_2.5G Cards ” section on page 2-128
TXPP_MR_2.5G	The TXPP_MR_2.5G card has three sets of ports located on the faceplate.	See the “ 2.10.4 TXP_MR_2.5G and TXPP_MR_2.5G Cards ” section on page 2-128
MXP_2.5G_10G	The MXP_2.5G_10G card has nine sets of ports located on the faceplate.	See the “ 2.10.5 MXP_2.5G_10G Card ” section on page 2-134.
MXP_2.5G_10E	The MXP_2.5G_10E card has nine sets of ports located on the faceplate.	See the “ 2.10.6 MXP_2.5G_10E Card ” section on page 2-138
MXP_2.5G_10E_C and MXP_2.5G_10E_L	The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards have nine sets of ports located on the faceplate.	See the “ 2.10.3 TXP_MR_10E_C and TXP_MR_10E_L Cards ” section on page 2-124

Table 2-1 DWDM and Client Cards for the ONS 15454 (continued)

Card	Port Description	For Additional Information
MXP_MR_2.5G	The MXP_MR_2.5G card has nine sets of ports located on the faceplate.	See the “2.10.8 MXP_MR_2.5G and MXPP_MR_2.5G Cards” section on page 2-155
MXPP_MR_2.5G	The MXPP_MR_2.5G card has ten sets of ports located on the faceplate.	See the “2.10.8 MXP_MR_2.5G and MXPP_MR_2.5G Cards” section on page 2-155
MXP_MR_10DME_C and MXP_MR_10DME_L	The MXP_MR_10DME_C and MXP_MR_10DME_L cards have eight sets of ports located on the faceplate.	See the “2.10.9 MXP_MR_10DME_C and MXP_MR_10DME_L Cards” section on page 2-161

2.1.6 Card Compatibility

Table 2-2 lists the CTC software compatibility for each DWDM and client card.

Table 2-2 DWDM and Client Card CTC Software Release Compatibility

Card Type	Compatibility						R7.2
	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	
Optical Service Channel Cards							
OSCM	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OSC-CSM	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Optical Amplifier Cards							
OPT-PRE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OPT-BST	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OPT-BST-E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OPT-BST-L	No	No	No	No	No	Yes	Yes
OPT-AMP-L	No	No	No	No	No	Yes	Yes
Multiplexer and Demultiplexer Cards							
32MUX-O	Yes	Yes	Yes	Yes	Yes	Yes	Yes
32DMX-O	Yes	Yes	Yes	Yes	Yes	Yes	Yes
32DMX	No	No	Yes	Yes	Yes	Yes	Yes
32DMX-L	No	No	No	No	No	Yes	Yes
32WSS	No	No	Yes	Yes	Yes	Yes	Yes
32WSS-L	No	No	No	No	No	Yes	Yes
4MD-xx.x	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Optical Add/Drop Cards							
AD-1C-xx.x	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2-2 DWDM and Client Card CTC Software Release Compatibility (continued)

Card Type	Compatibility						
	R4.5	R4.6	R4.7	R5.0	R6.0	R7.0	R7.2
AD-2C-xx.x	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AD-4C-xx.x	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AD-1B-xx.x	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AD-4B-xx.x	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Optical Mesh Cards							
MMU	No	No	No	No	No	Yes	Yes
Transponder and Muxponder Cards							
TXP_MR_10G	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TXP_MR_10E	No	No	Yes	Yes	Yes	Yes	Yes
TXP_MR_10E_C	No	No	No	No	No	Yes	Yes
TXP_MR_10E_L	No	No	No	No	No	Yes	Yes
TXP_MR_2.5G	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TXPP_MR_2.5G	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MPX_2.5G_10G	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MPX_2.5G_10E	No	No	Yes	Yes	Yes	Yes	Yes
MPX_2.5G_10E_C	No	No	No	No	No	Yes	Yes
MPX_2.5G_10E_L	No	No	No	No	No	Yes	Yes
MPX_MR_2.5G	No	No	Yes	Yes	Yes	Yes	Yes
MPXP_MR_2.5G	No	No	Yes	Yes	Yes	Yes	Yes
MPX_MR_10DME_C	No	No	No	No	No	Yes	Yes
MPX_MR_10DME_L	No	No	No	No	No	Yes	Yes

2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes

The multiplexer and demultiplexer cards (32MUX-O, 32WSS, 32WSS-L, 32DMX, 32DMX-L, 32DMX-O, and 4MD-xx.x) and the optical add/drop cards (AD-1C-xx.x AD-4B-xx.x, AD-1B-xx.x, AD-4C-xx.x and AD-2C-xx.x) have different input and output optical channel signals depending upon the interface card where the input signal originates. The input interface cards have been grouped in classes listed in Table 2-3. The subsequent tables list the optical performances and output power of each interface class.

Table 2-3 ONS 15454 Card Interfaces Assigned to Input Power Classes

Input Power Class	Card
A	10-Gbps multirate transponder (TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L) with forward error correction (FEC) enabled and 10-Gbps muxponder (MXP_2.5G_10G, MXP_2.5G_10E, MXP_MR_10DME_C, MXP_MR_10DME_L, MXP_2.5G_10E_C, and MXP_2.5G_10E_L) with FEC enabled
B	10-Gbps multirate transponder (TXP_MR_10G) without FEC and 10-Gbps muxponder (MXP_2.5G_10G, MXP_MR_10DME_C, MXP_MR_10DME_L) with FEC disabled
C	OC-192 LR ITU (TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L) without FEC
D	2.5-Gbps multirate transponder (TXP_MR_2.5G), both protected and unprotected, with FEC enabled
E	2.5-Gbps multirate transponder (TXP_MR_2.5G), both protected and unprotected, with FEC disabled and retime, reshape, and regenerate (3R) mode enabled, and OC-48 100-GHz DWDM muxponder (MXP_MR_2.5G)
F	2.5-Gbps multirate transponder (TXP_MR_2.5G), both protected and unprotected, in regenerate and reshape (2R) mode
G	OC-48 ELR 100 GHz
H	2/4 port GbE transponder (GBIC WDM 100GHz)
I	TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L with enhanced FEC (E-FEC) and MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_MR_10DME_C, and MXP_MR_10DME_L with E-FEC enabled

10-Gbps cards that provide signal input to OADM cards have the optical performance parameters listed in [Table 2-4](#). 2.5-Gbps card interface performance parameters are listed in [Table 2-5 on page 2-9](#).

Table 2-4 10-Gbps Interface Optical Performance

Parameter	Class A		Class B		Class C	Class I	
	Power Limited	OSNR ¹ Limited	Power Limited	OSNR Limited	OSNR Limited	Power Limited	OSNR Limited
Maximum bit rate	10 Gbps		10 Gbps		10 Gbps	10 Gbps	
Regeneration	3R		3R		3R	3R	
FEC	Yes		No		No	Yes (E-FEC)	
Threshold	Optimum		Average		Average	Optimum	
Maximum BER ²	10 ⁻¹⁵		10 ⁻¹²		10 ⁻¹²	10 ⁻¹⁵	
OSNR ¹ sensitivity	23 dB	9 dB	23 dB	19 dB	19 dB	20 dB	8 dB
Power sensitivity	-24 dBm	-18 dBm	-21 dBm	-20 dBm	-22 dBm	-26 dBm	-18 dBm
Power overload	-8 dBm		-8 dBm		-9 dBm	-8 dBm	

Table 2-4 10-Gbps Interface Optical Performance (continued)

Parameter	Class A		Class B		Class C	Class I	
	Power Limited	OSNR ¹ Limited	Power Limited	OSNR Limited	OSNR Limited	Power Limited	OSNR Limited
Transmitted Power Range ³							
10-Gbps multirate transponder/10-Gbps FEC transponder (TXP_MR_10G)	+2.5 to 3.5 dBm		+2.5 to 3.5 dBm		—	—	
OC-192 LR ITU	—		—		+3.0 to 6.0 dBm	—	
10-Gbps multirate transponder/10-Gbps FEC transponder (TXP_MR_10E)	+3.0 to 6.0 dBm		+3.0 to 6.0 dBm		—	+3.0 to 6.0 dBm	
Dispersion compensation tolerance	+/-800 ps/nm		+/-1,000 ps/nm		+/-1,000 ps/nm	+/-800 ps/nm	

1. OSNR = optical signal-to-noise ratio

2. BER = bit error rate

3. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

Table 2-5 2.5-Gbps Interface Optical Performance

Parameter	Class D		Class E		Class F	Class G		Class H		Class J
	Power Limited	OSNR Limited	Power Limited	OSNR Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited
Maximum bit rate	2.5 Gbps		2.5 Gbps		2.5 Gbps	2.5 Gbps		1.25 Gbps		2.5 Gbps
Regeneration	3R		3R		2R	3R		3R		3R
FEC	Yes		No		No	No		No		No
Threshold	Average		Average		Average	Average		Average		Average
Maximum BER	10 ⁻¹⁵		10 ⁻¹²		10 ⁻¹²	10 ⁻¹²		10 ⁻¹²		10 ⁻¹²
OSNR sensitivity	14 dB	6 dB	14 dB	10 dB	15 dB	14 dB	11 dB	13 dB	8 dB	12 dB
Power sensitivity	-31 dBm	-25 dBm	-30 dBm	-23 dBm	-24 dBm	-27 dBm	-33 dBm	-28 dBm	-18 dBm	-26 dBm
Power overload	-9 dBm		-9 dBm		-9 dBm	-9 dBm		-7 dBm		-17dBm
Transmitted Power Range ¹										
TXP_MR_2.5G	-1.0 to 1.0 dBm		-1.0 to 1.0 dBm		-1.0 to 1.0 dBm	-2.0 to 0 dBm				
TXPP_MR_2.5G	-4.5 to -2.5 dBm		-4.5 to -2.5 dBm		-4.5 to -2.5 dBm					
MXP_MR_2.5G	—		+2.0 to +4.0 dBm		—					
MXPP_MR_2.5G	—		-1.5 to +0.5 dBm		—					

Table 2-5 2.5-Gbps Interface Optical Performance (continued)

Parameter	Class D		Class E		Class F	Class G		Class H		Class J
	Power Limited	OSNR Limited	Power Limited	OSNR Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited	OSNR Limited	Power Limited
2/4 port GbE Transponder (GBIC WDM 100GHz)								+2.5 to 3.5 dBm		—
Dispersion compensation tolerance	-1200 to +5400 ps/nm		-1200 to +5400 ps/nm		-1200 to +3300 ps/nm	-1200 to +3300 ps/nm		-1000 to +3600 ps/nm		-1000 to +3200 ps/nm

1. These values, decreased by patchcord and connector losses, are also the input power values for the OADM cards.

2.1.8 DWDM Card Channel Allocation Plan

ONS 15454 DWDM multiplexers, demultiplexers, channel OADM, and band OADM cards are designed for use with specific channels in the C band and L band. In most cases, the channels for these cards are either numbered (for example, 1 to 32) or delimited (odd or even). Client interfaces must comply with these channel assignments to be compatible with the ONS 15454 system.

Table 2-6 lists the channel IDs and wavelengths assigned to the C-band DWDM channels and Table 2-7 lists the channel IDs and wavelengths assigned to the L-band channels.



Note

In some cases, a card uses only one of the bands (C band or L band) and might or might not use all of the channels listed in a band. Also, some cards use channels on the 100-GHz ITU grid while others use channels on the 50-GHz ITU grid. See the specific card description or [Appendix A, “Hardware Specifications”](#) for more details.

Table 2-6 DWDM Channel Allocation Plan (C Band)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517

Table 2-6 DWDM Channel Allocation Plan (C Band) (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

Table 2-7 DWDM Channel Allocation Plan (L Band)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88

Table 2-7 DWDM Channel Allocation Plan (L Band) (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74

Table 2-7 DWDM Channel Allocation Plan (L Band) (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

2.2 Safety Labels

This section explains the significance of the safety labels attached to some of the cards. The faceplates of the cards are clearly labeled with warnings about the laser radiation levels. You must understand all warning labels before working on these cards.

2.2.1 Class 1 Laser Product Cards

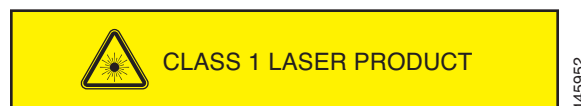
The cards that contains Class 1 Laser Products are:

- OSCM and OSC-CSM
- 32MUX-O
- MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, and MXP_2.5G_10E_L

The labels that appear on these cards are described in the following subsections.

2.2.1.1 Class 1 Laser Product Label

The Class 1 Laser Product label is shown in [Figure 2-1](#).

Figure 2-1 Class 1 Laser Product Label

Class 1 lasers are products whose irradiance does not exceed the Maximum Permissible Exposure (MPE) value. Therefore, for Class 1 laser products the output power is below the level at which it is believed eye damage will occur. Exposure to the beam of a Class 1 laser will not result in eye injury and may therefore be considered safe. However, some Class 1 laser products may contain laser systems of a higher Class but there are adequate engineering control measures to ensure that access to the beam is not reasonably likely. Anyone who dismantles a Class 1 laser product that contains a higher Class laser system is potentially at risk of exposure to a hazardous laser beam.

2.2.1.2 Hazard Level 1 Label

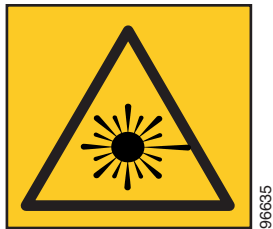
The Hazard Level 1 label is shown in [Figure 2-2](#).

Figure 2-2 *Hazard Level Label*

The Hazard Level label warns users against exposure to laser radiation of Class 1 limits calculated in accordance with IEC60825-1 Ed.1.2.

2.2.1.3 Laser Source Connector Label

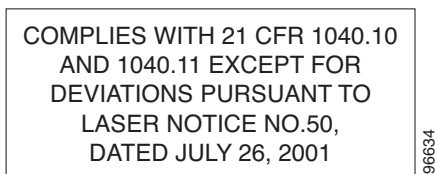
The Laser Source Connector label is shown in [Figure 2-3](#).

Figure 2-3 *Laser Source Connector Label*

This label indicates that a laser source is present at the optical connector where the label has been placed.

2.2.1.4 FDA Statement Label

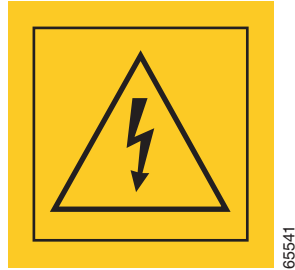
The FDA Statement label is shown in [Figure 2-4](#).

Figure 2-4 *FDA Statement Label*

This label shows compliance to FDA standards and that the hazard level classification is in accordance with IEC60825-1 Am.2 or Ed.1.2.

2.2.1.5 Shock Hazard Label

The Shock Hazard label is shown in [Figure 2-5](#).

Figure 2-5 Shock Hazard Label

This label alerts personnel to electrical hazard within the card. The potential of shock hazard exists when removing adjacent cards during maintenance, and touching exposed electrical circuitry on the card itself.

2.2.2 Class 1M Laser Product Cards

The cards that contains Class 1M Laser Products are:

- Optical Add/Drop cards (AD-1C-xx.x, AD-2C-xx.x, AD-4c-xx.x, AD-1B-xx.x, AD-4B-xx.xx)
- Optical Amplifier cards (OPT-PRE, OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L)
- Optical Multiplexer/Demultiplexer cards (32DMX-O, 32 DMX, 32DMX-L, 4MD-xx.x, 32WSS, 32WSS-L)
- Optical Mesh cards (MMU)
- Transponder and Muxponder cards (TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, TXP_MR_2.5G, TXPP_MR_2.5G, MXP_MR_2.5G, MXPP_MR_2.5G, MXP_MR_10DME_C, MXP_MR_10DME_L)

The labels that appear on these cards are described in the following subsections.

2.2.2.1 Class 1M Laser Product Label

The Class 1M Laser Product label is shown in [Figure 2-6](#).

Figure 2-6 Class 1M Laser Product Label

Class 1M lasers are products that produce either a highly divergent beam or a large diameter beam. Therefore, only a small part of the whole laser beam can enter the eye. However, these laser products can be harmful to the eye if the beam is viewed using magnifying optical instruments.

2.2.2.2 Hazard Level 1M Label

The Hazard Level 1M label is shown in [Figure 2-7](#).

Figure 2-7 Hazard Level Label



The Hazard Level label warns users against exposure to laser radiation of Class 1 limits calculated in accordance with IEC60825-1 Ed.1.2.

2.2.2.3 Laser Source Connector Label

The Laser Source Connector label is shown in [Figure 2-8](#).

Figure 2-8 Laser Source Connector Label

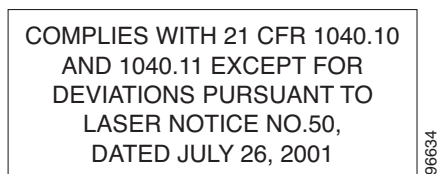


This label indicates that a laser source is present at the optical connector where the label has been placed.

2.2.2.4 FDA Statement Label

The FDA Statement label is shown in [Figure 2-9](#).

Figure 2-9 FDA Statement Label



This label shows compliance to FDA standards and that the hazard level classification is in accordance with IEC60825-1 Am.2 or Ed.1.2.

2.2.2.5 Shock Hazard Label

The Shock Hazard label is shown in [Figure 2-5](#).

Figure 2-10 **Shock Hazard Label**



This label alerts personnel to electrical hazard within the card. The potential of shock hazard exists when removing adjacent cards during maintenance, and touching exposed electrical circuitry on the card itself.

2.3 Common Control Cards

This section describes the common control cards (TCC2, TCC2P, AIC-I, and MS-ISC-100T).

2.3.1 TCC2 Card

The Advanced Timing, Communications, and Control (TCC2) card performs system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection/resolution, SONET section overhead (SOH) data communications channel/generic communications channel (DCC/GCC) termination, optical service channel (OSC) DWDM data communications network (DCN) termination, and system fault detection for the ONS 15454. The TCC2 also ensures that the system maintains Stratum 3 (Telcordia GR-253-CORE) timing requirements. It monitors the supply voltage of the system.

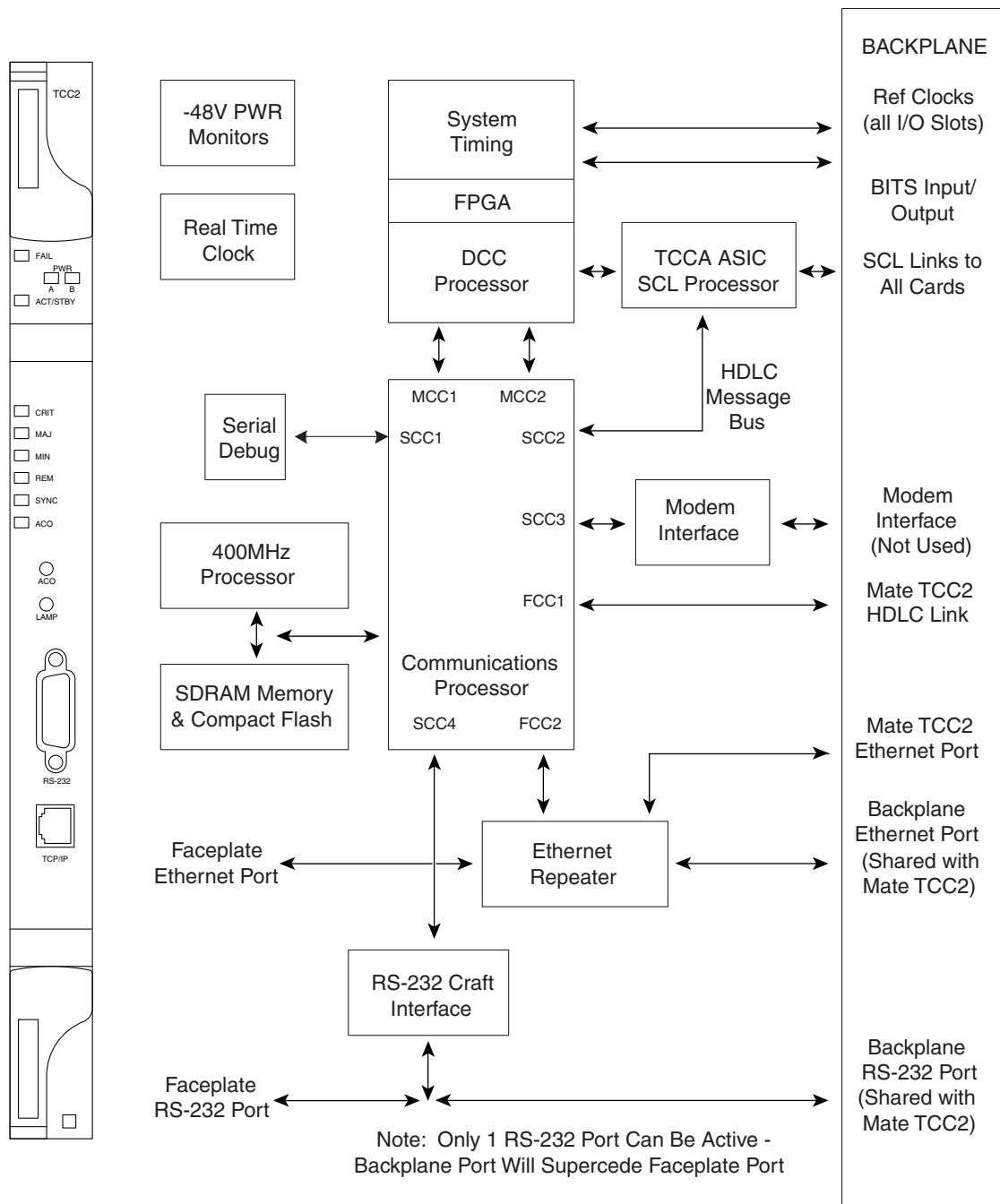


Note

The LAN interface of the TCC2 card meets the standard Ethernet specifications by supporting a cable length of 328 ft (100 m) at temperatures from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius).

[Figure 2-11](#) shows the faceplate and block diagram for the TCC2.

Figure 2-11 TCC2 Faceplate and Block Diagram



2.3.1.1 TCC2 Functionality

The TCC2 card terminates up to 32 DCCs. The TCC2 hardware is prepared for up to 84 DCCs, which will be available in a future software release.

The node database, IP address, and system software are stored in TCC2 nonvolatile memory, which allows quick recovery in the event of a power or card failure.

The TCC2 performs all system-timing functions for each ONS 15454. The TCC2 monitors the recovered clocks from each traffic card and two building integrated timing supply (BITS) ports for frequency accuracy. The TCC2 selects a recovered clock, a BITS, or an internal Stratum 3 reference as the system-timing reference. You can provision any of the clock inputs as primary or secondary timing sources. A slow-reference tracking loop allows the TCC2 to synchronize with the recovered clock, which provides holdover if the reference is lost.

The TCC2 monitors both supply voltage inputs on the shelf. An alarm is generated if one of the supply voltage inputs has a voltage out of the specified range.

Install TCC2 cards in Slots 7 and 11 for redundancy. If the active TCC2 fails, traffic switches to the protect TCC2.

The TCC2 card has two built-in interface ports for accessing the system: an RJ-45 10BaseT LAN interface and an EIA/TIA-232 ASCII interface for local craft access. It also has a 10BaseT LAN port for user interfaces via the backplane.

2.3.1.2 Redundant TCC2 Card Installation

Cisco does not support operation of the ONS 15454 with only one TCC2 card. For full functionality and to safeguard your system, always operate with two TCC2 cards.

When a second TCC2 card is inserted into a node, it synchronizes its software, its backup software, and its database with the active TCC2. If the software version of the new TCC2 does not match the version on the active TCC2, the newly inserted TCC2 copies from the active TCC2, taking about 15 to 20 minutes to complete. If the backup software version on the new TCC2 does not match the version on the active TCC2, the newly inserted TCC2 copies the backup software from the active TCC2 again, taking about 15 to 20 minutes. Copying the database from the active TCC2 takes about 3 minutes. Depending on the software version and backup version the new TCC2 started with, the entire process can take between 3 and 40 minutes.

2.3.1.3 TCC2 Card-Level Indicators

The TCC2 faceplate has ten LEDs. [Table 2-8](#) describes the two card-level LEDs on the TCC2 faceplate.

Table 2-8 TCC2 Card-Level Indicators

Card-Level LEDs	Definition
Red FAIL LED	This LED is on during reset. The FAIL LED flashes during the boot and write process. Replace the card if the FAIL LED persists.
ACT/STBY LED Green (Active) Yellow (Standby)	Indicates the TCC2 is active (green) or in standby (yellow) mode. The ACT/STBY LED also provides the timing reference and shelf control. When the active TCC2 is writing to its database or to the standby TCC2 database, the card LEDs blink. To avoid memory corruption, do not remove the TCC2 when the active or standby LED is blinking.

2.3.1.4 Network-Level Indicators

[Table 2-9](#) describes the six network-level LEDs on the TCC2 faceplate.

Table 2-9 TCC2 Network-Level Indicators

System-Level LEDs	Definition
Red CRIT LED	Indicates critical alarms in the network at the local terminal.
Red MAJ LED	Indicates major alarms in the network at the local terminal.
Yellow MIN LED	Indicates minor alarms in the network at the local terminal.
Red REM LED	Provides first-level alarm isolation. The remote (REM) LED turns red when an alarm is present in one or more of the remote terminals.
Green SYNC LED	Indicates that node timing is synchronized to an external reference.
Green ACO LED	After pressing the alarm cutoff (ACO) button, the ACO LED turns green. The ACO button opens the audible alarm closure on the backplane. ACO is stopped if a new alarm occurs. After the originating alarm is cleared, the ACO LED and audible alarm control are reset.

2.3.1.5 Power-Level Indicators

Table 2-10 describes the two power-level LEDs on the TCC2 faceplate.

Table 2-10 TCC2 Power-Level Indicators

Power-Level LEDs	Definition
Green/Amber/Red PWR A LED	The PWR A LED is green when the voltage on supply input A is between the low battery voltage (LWBATVG) and high battery voltage (HIBATVG) thresholds. The LED is amber when the voltage on supply input A is between the high battery voltage and extremely high battery voltage (EHIBATVG) thresholds or between the low battery voltage and extremely low battery voltage (ELWBATVG) thresholds. The LED is red when the voltage on supply input A is above extremely high battery voltage or below extremely low battery voltage thresholds.
Green/Amber/Red PWR B LED	The PWR B LED is green when the voltage on supply input B is between the low battery voltage and high battery voltage thresholds. The LED is amber when the voltage on supply input B is between the high battery voltage and extremely high battery voltage thresholds or between the low battery voltage and extremely low battery voltage thresholds. The LED is red when the voltage on supply input B is above extremely high battery voltage or below extremely low battery voltage thresholds.


Note

For ONS 15454 ETSI shelf, the power-level LEDs are either green or red. The LED is green when the voltage on supply inputs is between the extremely low battery voltage and extremely high battery voltage thresholds. The LED is red when the voltage on supply inputs is above extremely high battery voltage or below extremely low battery voltage thresholds.

2.3.2 TCC2P Card

The Advanced Timing, Communications, and Control Plus (TCC2P) card is an enhanced version of the TCC2 card. The primary enhancements are Ethernet security features and 64K composite clock BITS timing.

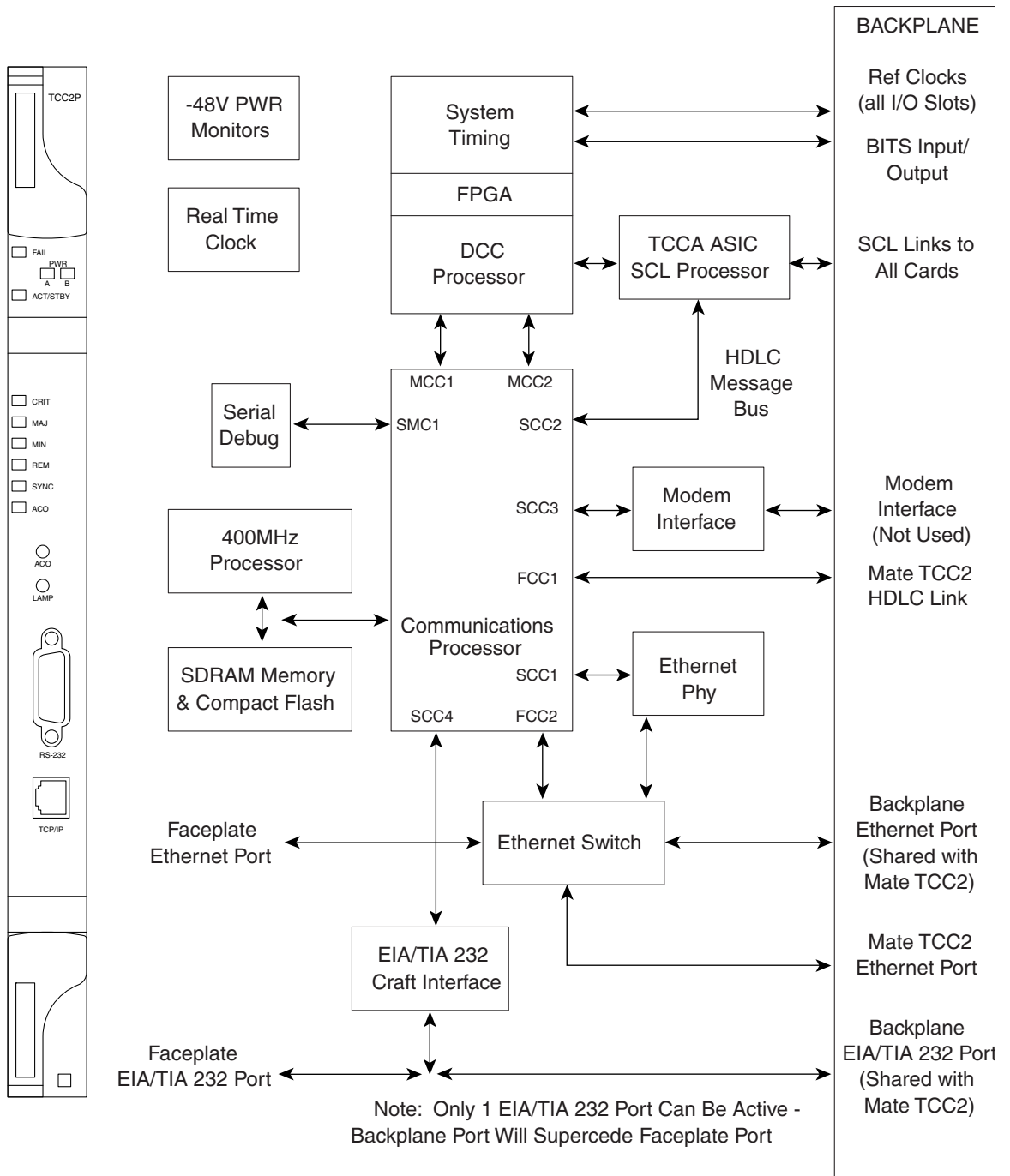
The TCC2P card performs system initialization, provisioning, alarm reporting, maintenance, diagnostics, IP address detection/resolution, SONET SOH DCC/GCC termination, and system fault detection for the ONS 15454. The TCC2P also ensures that the system maintains Stratum 3 (Telcordia GR-253-CORE) timing requirements. It monitors the supply voltage of the system.

**Note**

The LAN interface of the TCC2P card meets the standard Ethernet specifications by supporting a cable length of 328 ft (100 m) at temperatures from 32 to 149 degrees Fahrenheit (0 to 65 degrees Celsius). The interfaces can operate with a cable length of 32.8 ft (10 m) maximum at temperatures from -40 to 32 degrees Fahrenheit (-40 to 0 degrees Celsius).

[Figure 2-12](#) shows the faceplate and block diagram for the TCC2P card.

Figure 2-12 TCC2P Faceplate and Block Diagram



2.3.3 TCC2P Functionality

The TCC2P card supports multichannel, high-level data link control (HDLC) processing for the DCC. Up to 84 DCCs can be routed over the TCC2P card and up to 84 section DCCs can be terminated at the TCC2P card (subject to the available optical digital communication channels). The TCC2P selects and processes 84 DCCs to facilitate remote system management interfaces.

The TCC2P card also originates and terminates a cell bus carried over the module. The cell bus supports links between any two cards in the node, which is essential for peer-to-peer communication. Peer-to-peer communication accelerates protection switching for redundant cards.

The node database, IP address, and system software are stored in TCC2P card nonvolatile memory, which allows quick recovery in the event of a power or card failure.

The TCC2P card performs all system-timing functions for each ONS 15454. The TCC2P card monitors the recovered clocks from each traffic card and two BITS ports for frequency accuracy. The TCC2P card selects a recovered clock, a BITS, or an internal Stratum 3 reference as the system-timing reference. You can provision any of the clock inputs as primary or secondary timing sources. A slow-reference tracking loop allows the TCC2P card to synchronize with the recovered clock, which provides holdover if the reference is lost.

The TCC2P card supports 64/8K composite clock and 6.312 MHz timing output.

The TCC2P card monitors both supply voltage inputs on the shelf. An alarm is generated if one of the supply voltage inputs has a voltage out of the specified range.

Install TCC2P cards in Slots 7 and 11 for redundancy. If the active TCC2P card fails, traffic switches to the protect TCC2P card. All TCC2P card protection switches conform to protection switching standards when the bit error rate (BER) counts are not in excess of $1 * 10^{exp - 3}$ and completion time is less than 50 ms.

The TCC2P card has two built-in Ethernet interface ports for accessing the system: one built-in RJ-45 port on the front faceplate for on-site craft access and a second port on the backplane. The rear Ethernet interface is for permanent LAN access and all remote access via TCP/IP as well as for Operations Support System (OSS) access. The front and rear Ethernet interfaces can be provisioned with different IP addresses using CTC.

Two EIA/TIA-232 serial ports, one on the faceplate and a second on the backplane, allow for craft interface in TL1 mode.

**Note**

To use the serial port craft interface wire-wrap pins on the backplane, the DTR signal line on the backplane port wire-wrap pin must be connected and active.

2.3.3.1 Redundant TCC2P Card Installation

Cisco does not support operation of the ONS 15454 with only one TCC2P card. For full functionality and to safeguard your system, always operate with two TCC2P cards.

When a second TCC2P card is inserted into a node, it synchronizes its software, its backup software, and its database with the active TCC2P card. If the software version of the new TCC2P card does not match the version on the active TCC2P card, the newly inserted TCC2P card copies from the active TCC2P card, taking about 15 to 20 minutes to complete. If the backup software version on the new TCC2P card does not match the version on the active TCC2P card, the newly inserted TCC2P card copies the backup software from the active TCC2P card again, taking about 15 to 20 minutes. Copying the database from the active TCC2P card takes about 3 minutes. Depending on the software version and backup version the new TCC2P card started with, the entire process can take between 3 and 40 minutes.

2.3.3.2 TCC2P Card-Level Indicators

The TCC2P faceplate has ten LEDs. [Table 2-11](#) describes the two card-level LEDs on the TCC2P faceplate.

Table 2-11 TCC2P Card-Level Indicators

Card-Level LEDs	Definition
Red FAIL LED	This LED is on during reset. The FAIL LED flashes during the boot and write process. Replace the card if the FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	Indicates the TCC2P is active (green) or in standby (amber) mode. The ACT/STBY LED also provides the timing reference and shelf control. When the active TCC2P is writing to its database or to the standby TCC2P database, the card LEDs blink. To avoid memory corruption, do not remove the TCC2P when the active or standby LED is blinking.

2.3.3.3 Network-Level Indicators

[Table 2-12](#) describes the six network-level LEDs on the TCC2P faceplate.

Table 2-12 TCC2P Network-Level Indicators

System-Level LEDs	Definition
Red CRIT LED	Indicates critical alarms in the network at the local terminal.
Red MAJ LED	Indicates major alarms in the network at the local terminal.
Amber MIN LED	Indicates minor alarms in the network at the local terminal.
Red REM LED	Provides first-level alarm isolation. The remote (REM) LED turns red when an alarm is present in one or more of the remote terminals.
Green SYNC LED	Indicates that node timing is synchronized to an external reference.
Green ACO LED	After pressing the ACO button, the ACO LED turns green. The ACO button opens the audible alarm closure on the backplane. ACO is stopped if a new alarm occurs. After the originating alarm is cleared, the ACO LED and audible alarm control are reset.

2.3.3.4 Power-Level Indicators

Table 2-13 describes the two power-level LEDs on the TCC2P faceplate.

Table 2-13 TCC2P Power-Level Indicators

Power-Level LEDs	Definition
Green/Amber/Red PWR A LED	The PWR A LED is green when the voltage on supply input A is between the low battery voltage (LWBATVG) and high battery voltage (HIBATVG) thresholds. The LED is amber when the voltage on supply input A is between the high battery voltage and extremely high battery voltage (EHIBATVG) thresholds or between the low battery voltage and extremely low battery voltage (ELWBATVG) thresholds. The LED is red when the voltage on supply input A is above extremely high battery voltage or below extremely low battery voltage thresholds.
Green/Amber/Red PWR B LED	The PWR B LED is green when the voltage on supply input B is between the low battery voltage and high battery voltage thresholds. The LED is amber when the voltage on supply input B is between the high battery voltage and extremely high battery voltage thresholds or between the low battery voltage and extremely low battery voltage thresholds. The LED is red when the voltage on supply input B is above extremely high battery voltage or below extremely low battery voltage thresholds.



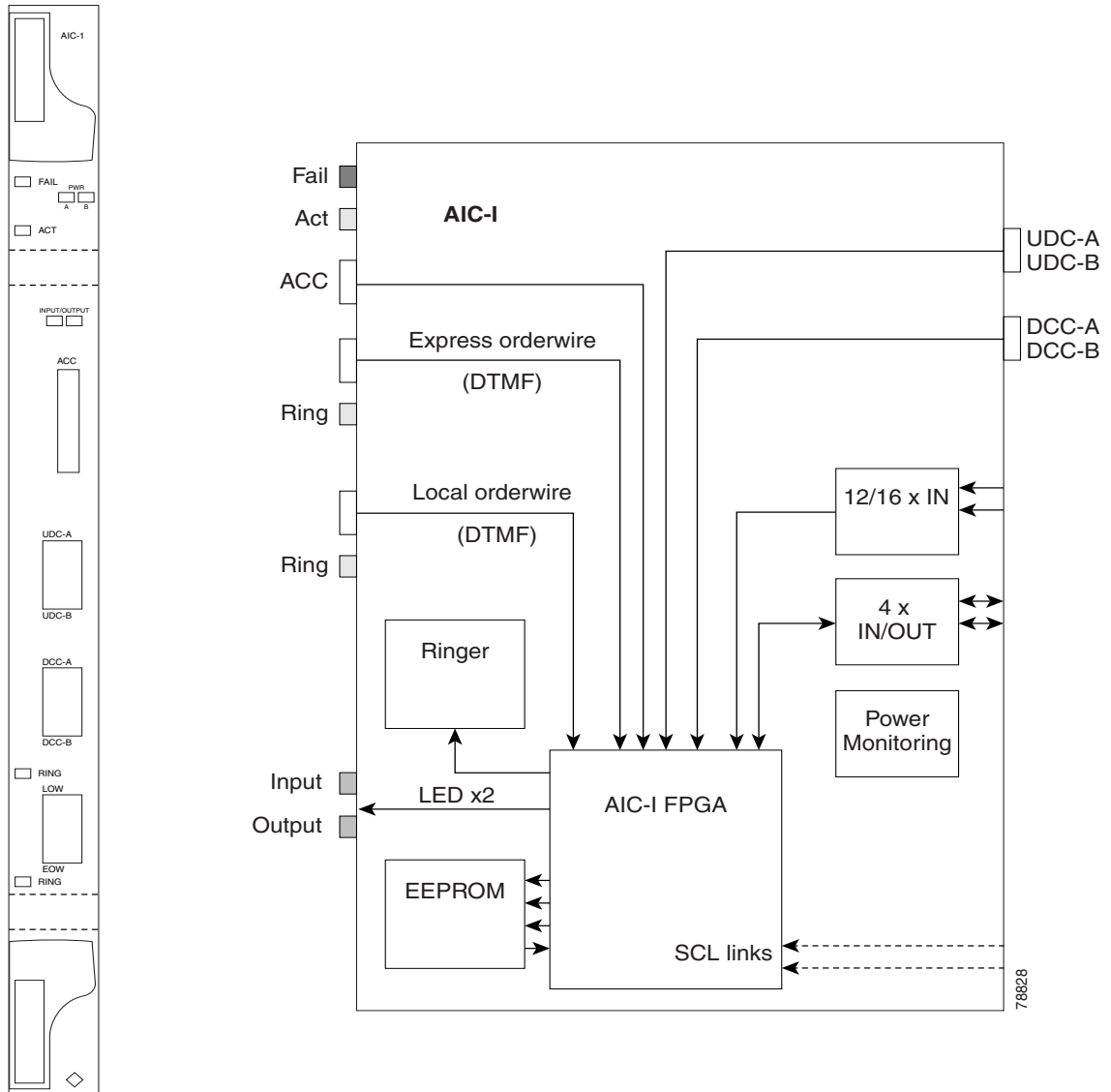
Note

For ONS 15454 ETSI shelf, the power-level LEDs are either green or red. The LED is green when the voltage on supply inputs is between the extremely low battery voltage and extremely high battery voltage thresholds. The LED is red when the voltage on supply inputs is above extremely high battery voltage or below extremely low battery voltage thresholds.

2.3.4 AIC-I Card

The optional Alarm Interface Controller–International (AIC-I) card provides customer-defined (environmental) alarms and controls and supports local and express orderwire. It provides 12 customer-defined input and 4 customer-defined input/output contacts. The physical connections are via the backplane wire-wrap pin terminals. If you use the additional alarm expansion panel (AEP), the AIC-I card can support up to 32 inputs and 16 outputs, which are connected on the AEP connectors. The AEP is compatible with ANSI shelves only. A power monitoring function monitors the supply voltage (–48 VDC). Figure 2-13 shows the AIC-I faceplate and a block diagram of the card.

Figure 2-13 AIC-I Faceplate and Block Diagram



2.3.4.1 AIC-I Card-Level Indicators

Table 2-14 describes the eight card-level LEDs on the AIC-I card faceplate.

Table 2-14 AIC-I Card-Level Indicators

Card-Level LEDs	Description
Red FAIL LED	Indicates that the card's processor is not ready. The FAIL LED is on during reset and flashes during the boot process. Replace the card if the red FAIL LED persists.
Green ACT LED	Indicates the AIC-I card is provisioned for operation.

Table 2-14 AIC-I Card-Level Indicators (continued)

Card-Level LEDs	Description
Green/Red PWR A LED	The PWR A LED is green when a supply voltage within a specified range has been sensed on supply input A. It is red when the input voltage on supply input A is out of range.
Green/Red PWR B LED	The PWR B LED is green when a supply voltage within a specified range has been sensed on supply input B. It is red when the input voltage on supply input B is out of range.
Yellow INPUT LED	The INPUT LED is yellow when there is an alarm condition on at least one of the alarm inputs.
Yellow OUTPUT LED	The OUTPUT LED is yellow when there is an alarm condition on at least one of the alarm outputs.
Green RING LED	The RING LED on the local orderwire (LOW) side is flashing green when a call is received on the LOW.
Green RING LED	The RING LED on the express orderwire (EOW) side is flashing green when a call is received on the EOW.

2.3.4.2 External Alarms and Controls

The AIC-I card provides input/output alarm contact closures. You can define up to 12 external alarm inputs and 4 external alarm inputs/outputs (user configurable). The physical connections are made using the backplane wire-wrap pins or FMEC connections. See the [“1.9 ONS 15454 ANSI Alarm Expansion Panel” section on page 1-31](#) for information about increasing the number of input/output contacts.

LEDs on the front panel of the AIC-I indicate the status of the alarm lines, one LED representing all of the inputs and one LED representing all of the outputs. External alarms (input contacts) are typically used for external sensors such as open doors, temperature sensors, flood sensors, and other environmental conditions. External controls (output contacts) are typically used to drive visual or audible devices such as bells and lights, but they can control other devices such as generators, heaters, and fans.

You can program each of the twelve input alarm contacts separately. You can program each of the sixteen input alarm contacts separately. Choices include:

- Alarm on Closure or Alarm on Open
- Alarm severity of any level (Critical, Major, Minor, Not Alarmed, Not Reported)
- Service Affecting or Non-Service Affecting alarm-service level
- 63-character alarm description for CTC display in the alarm log

You cannot assign the fan-tray abbreviation for the alarm; the abbreviation reflects the generic name of the input contacts. The alarm condition remains raised until the external input stops driving the contact or you provision the alarm input.

The output contacts can be provisioned to close on a trigger or to close manually. The trigger can be a local alarm severity threshold, a remote alarm severity, or a virtual wire:

- Local NE alarm severity: A hierarchy of Not Reported, Not Alarmed, Minor, Major, or Critical alarm severities that you set to cause output closure. For example, if the trigger is set to Minor, a Minor alarm or above is the trigger.
- Remote NE alarm severity: Same as the local NE alarm severity but applies to remote alarms only.

- Virtual wire entities: You can provision any environmental alarm input to raise a signal on any virtual wire on external outputs 1 through 4 when the alarm input is an event. You can provision a signal on any virtual wire as a trigger for an external control output.

You can also program the output alarm contacts (external controls) separately. In addition to provisionable triggers, you can manually force each external output contact to open or close. Manual operation takes precedence over any provisioned triggers that might be present.

**Note**

For ANSI shelves, the number of inputs and outputs can be increased using the AEP. The AEP is connected to the shelf backplane and requires an external wire-wrap panel.

2.3.4.3 Orderwire

Orderwire allows a craftsperson to plug a phoneset into an ONS 15454 and communicate with craftspeople working at other ONS 15454s or other facility equipment. The orderwire is a pulse code modulation (PCM) encoded voice channel that uses E1 or E2 bytes in section/line overhead.

The AIC-I allows simultaneous use of both local (section overhead signal) and express (line overhead channel) orderwire channels on a SONET/SDH ring or particular optics facility. Express orderwire also allows communication via regeneration sites when the regenerator is not a Cisco device.

You can provision orderwire functions with CTC similar to the current provisioning model for DCC/GCC channels. In CTC, you provision the orderwire communications network during ring turn-up so that all NEs on the ring can reach one another. Orderwire terminations (that is, the optics facilities that receive and process the orderwire channels) are provisionable. Both express and local orderwire can be configured as on or off on a particular SONET/SDH facility. The ONS 15454 supports up to four orderwire channel terminations per shelf. This allows linear, single ring, dual ring, and small hub-and-spoke configurations. Orderwire is not protected in ring topologies such as bidirectional line switched ring (BLSR), multiplex section-shared protection ring (MS-SPRing), path protection, or subnetwork connection protection (SNCP) ring.

**Caution**

Do not configure orderwire loops. Orderwire loops cause feedback that disables the orderwire channel.

The ONS 15454 implementation of both local and express orderwire is broadcast in nature. The line acts as a party line. Anyone who picks up the orderwire channel can communicate with all other participants on the connected orderwire subnetwork. The local orderwire party line is separate from the express orderwire party line. Up to four OC-N/STM-N facilities for each local and express orderwire are provisionable as orderwire paths.

The AIC-I supports selective dual tone multifrequency (DTMF) dialing for telephony connectivity, which causes one AIC-I card or all ONS 15454 AIC-I cards on the orderwire subnetwork to “ring.” The ringer/buzzer resides on the AIC-I. There is also a “ring” LED that mimics the AIC-I ringer. It flashes when a call is received on the orderwire subnetwork. A party line call is initiated by pressing *0000 on the DTMF pad. Individual dialing is initiated by pressing * and the individual four-digit number on the DTMF pad.

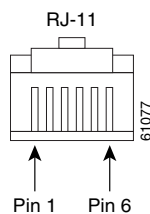
Table 2-15 shows the pins on the orderwire connector that correspond to the tip and ring orderwire assignments.

Table 2-15 Orderwire Pin Assignments

RJ-11 Pin Number	Description
1	Four-wire receive ring
2	Four-wire transmit tip
3	Two-wire ring
4	Two-wire tip
5	Four-wire transmit ring
6	Four-wire receive tip

When provisioning the orderwire subnetwork, make sure that an orderwire loop does not exist. Loops cause oscillation and an unusable orderwire channel.

Figure 2-14 shows the standard RJ-11 connectors used for orderwire ports.

Figure 2-14 RJ-11 Connector

2.3.4.4 Power Monitoring

The AIC-I card provides a power monitoring circuit that monitors the supply voltage of -48 VDC for presence, undervoltage, and overvoltage.

2.3.4.5 User Data Channel

The user data channel (UDC) features a dedicated data channel of 64 kbps (F1 byte) between two nodes in an ONS 15454 network. Each AIC-I card provides two user data channels, UDC-A and UDC-B, through separate RJ-11 connectors on the front of the AIC-I card. Each UDC can be routed to an individual optical interface in the ONS 15454. For instructions, see the *Cisco ONS 15454 DWDM Procedure Guide*.

The UDC ports are standard RJ-11 receptacles. Table 2-16 lists the UDC pin assignments.

Table 2-16 UDC Pin Assignments

RJ-11 Pin Number	Description
1	For future use
2	TXN
3	RXN
4	RXP

Table 2-16 UDC Pin Assignments (continued)

RJ-11 Pin Number	Description
5	TXP
6	For future use

2.3.4.6 Data Communications Channel

The DCC features a dedicated data channel of 576 kbps (D4 to D12 bytes) between two nodes in an ONS 15454 network. Each AIC-I card provides two data communications channels, DCC-A and DCC-B, through separate RJ-45 connectors on the front of the AIC-I card. Each DCC can be routed to an individual optical interface in the ONS 15454. For instructions, see the *Cisco ONS 15454 DWDM Procedure Guide*.

The DCC ports are synchronous serial interfaces. The DCC ports are standard RJ-45 receptacles. [Table 2-17](#) lists the DCC pin assignments.

Table 2-17 DCC Pin Assignments

RJ-45 Pin Number	Description
1	TCLKP
2	TCLKN
3	TXP
4	TXN
5	RCLKP
6	RCLKN
7	RXP
8	RXN

2.3.5 MS-ISC-100T Card

The Multishelf Internal Switch Card (MS-ISC-100T) is an Ethernet switch used to implement the multishelf LAN. It connects the node controller shelf to the network and to subtending shelves. The MS-ISC-100T must always be equipped on the node controller shelf; it cannot be provisioned on a subtending controller shelf.

The recommended configuration is to implement LAN redundancy using two MS-ISC-100T cards: one switch is connected to the Ethernet front panel port of the TCC2/TCC2P card in Slot 7, and the other switch is connected to the Ethernet front panel port of the TCC2/TCC2P card in Slot 11. The Ethernet configuration of the MS-ISC-100T card is part of the software package and is automatically loaded. The MS-ISC-100T card operates in Slots 1 to 6 and 12 to 17 on the node controller shelf; the recommended slots are Slot 6 and Slot 12.

[Table 2-18](#) lists the MS-ISC-100T port assignments.

Table 2-18 MS-ISC-100T Card Port Assignments

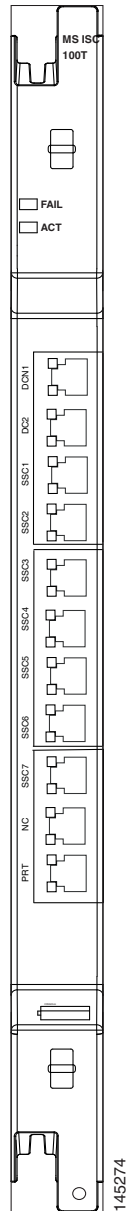
Port	Description
DCN 1 and DCN 2	Connection to the network
SSC1 to SSC7	Connection to subtending shelves
NC	Connection to TCC2/TCC2P using a cross-over cable
PRT	Connection to the PRT port of the redundant MS-ISC-100T

Figure 2-15 shows the card faceplate.

**Caution**

Shielded twisted-pair cabling should be used for interbuilding applications.

Figure 2-15 MS-ISC-100T Faceplate



2.3.5.1 MS-ISC-100T Card-Level Indicators

The MS-ISC-100T card supports two card-level LED indicators. The card-level indicators are described in [Table 2-19](#).

Table 2-19 MS-ISC-100T Card-Level Indicators

Card-Level LEDs	Description
FAIL LED (Red)	The red FAIL LED indicates that the card processor is not ready or that a catastrophic software failure occurred on the card. As part of the boot sequence, the FAIL LED is turned on until the software deems the card operational.
ACT LED (Green)	The green ACT LED provides the operational status of the card. If the ACT LED is green, it indicates that the card is active and the software is operational.

2.4 Front Mount Electrical Connections

This section describes the MIC-A/P and MIC-C/T/P FMECs, which provide power, external alarm, and timing connections for the ONS 15454 ETSI shelf.

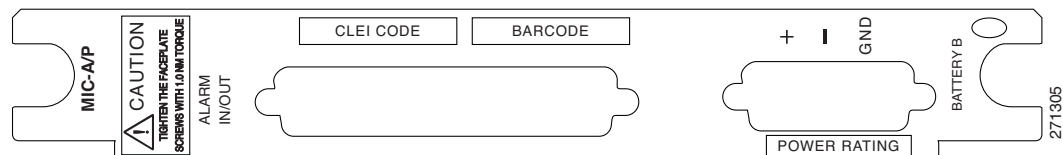
2.4.1 MIC-A/P FMEC

The MIC-A/P FMEC provides connection for the BATTERY B input, one of the two possible redundant power supply inputs. It also provides connection for eight alarm outputs (coming from the TCC2/TCC2P card), sixteen alarm inputs, and four configurable alarm inputs/outputs. Its position is in Slot 23 in the center of the subrack Electrical Facility Connection Assembly (EFCA) area.

The MIC-A/P FMEC has the following features:

- Connection for one of the two possible redundant power supply inputs
- Connection for eight alarm outputs (coming from the TCC2/TCC2P card)
- Connection for four configurable alarm inputs/outputs
- Connection for sixteen alarm inputs
- Storage of manufacturing and inventory data

For proper system operation, both the MIC-A/P and MIC-C/T/P FMECs must be installed in the ONS 15454 ETSI shelf. [Figure 2-16](#) shows the MIC-A/P faceplate.

Figure 2-16 MIC-A/P Faceplate

[Figure 2-17](#) shows a block diagram of the MIC-A/P.

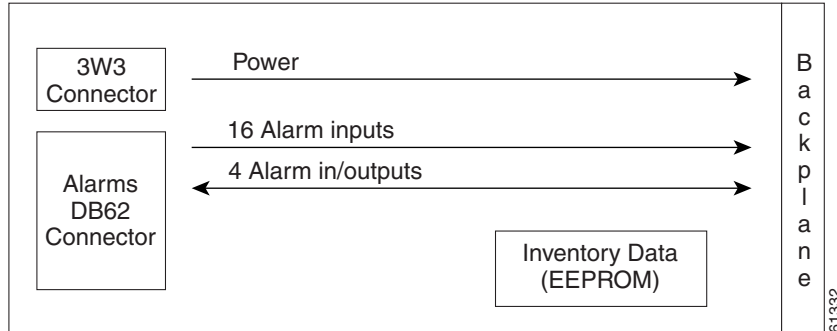
Figure 2-17 MIC-A/P Block Diagram

Table 2-20 shows the alarm interface pinouts on the MIC-A/P DB-62 connector.

Table 2-20 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector

Pin No.	Signal Name	Signal Description
1	ALMCUTOFF N	Alarm cutoff, normally open ACO pair
2	ALMCUTOFF P	Alarm cutoff, normally open ACO pair
3	ALMINP0 N	Alarm input pair 1, reports closure on connected wires
4	ALMINP0 P	Alarm input pair 1, reports closure on connected wires
5	ALMINP1 N	Alarm input pair 2, reports closure on connected wires
6	ALMINP1 P	Alarm input pair 2, reports closure on connected wires
7	ALMINP2 N	Alarm input pair 3, reports closure on connected wires
8	ALMINP2 P	Alarm input pair 3, reports closure on connected wires
9	ALMINP3 N	Alarm input pair 4, reports closure on connected wires
10	ALMINP3 P	Alarm input pair 4, reports closure on connected wires
11	EXALM0 N	External customer alarm 1
12	EXALM0 P	External customer alarm 1
13	GND	Ground
14	EXALM1 N	External customer alarm 2
15	EXALM1 P	External customer alarm 2
16	EXALM2 N	External customer alarm 3
17	EXALM2 P	External customer alarm 3
18	EXALM3 N	External customer alarm 4
19	EXALM3 P	External customer alarm 4
20	EXALM4 N	External customer alarm 5
21	EXALM4 P	External customer alarm 5
22	EXALM5 N	External customer alarm 6
23	EXALM5 P	External customer alarm 6
24	EXALM6 N	External customer alarm 7
25	EXALM6 P	External customer alarm 7

Table 2-20 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector (continued)

Pin No.	Signal Name	Signal Description
26	GND	Ground
27	EXALM7 N	External customer alarm 8
28	EXALM7 P	External customer alarm 8
29	EXALM8 N	External customer alarm 9
30	EXALM8 P	External customer alarm 9
31	EXALM9 N	External customer alarm 10
32	EXALM9 P	External customer alarm 10
33	EXALM10 N	External customer alarm 11
34	EXALM10 P	External customer alarm 11
35	EXALM11 N	External customer alarm 12
36	EXALM11 P	External customer alarm 12
37	ALMOUP0 N	Normally open output pair 1
38	ALMOUP0 P	Normally open output pair 1
39	GND	Ground
40	ALMOUP1 N	Normally open output pair 2
41	ALMOUP1 P	Normally open output pair 2
42	ALMOUP2 N	Normally open output pair 3
43	ALMOUP2 P	Normally open output pair 3
44	ALMOUP3 N	Normally open output pair 4
45	ALMOUP3 P	Normally open output pair 4
46	AUDALM0 N	Normally open Minor audible alarm
47	AUDALM0 P	Normally open Minor audible alarm
48	AUDALM1 N	Normally open Major audible alarm
49	AUDALM1 P	Normally open Major audible alarm
50	AUDALM2 N	Normally open Critical audible alarm
51	AUDALM2 P	Normally open Critical audible alarm
52	GND	Ground
53	AUDALM3 N	Normally open Remote audible alarm
54	AUDALM3 P	Normally open Remote audible alarm
55	VISALM0 N	Normally open Minor visual alarm
56	VISALM0 P	Normally open Minor visual alarm
57	VISALM1 N	Normally open Major visual alarm
58	VISALM1 P	Normally open Major visual alarm
59	VISALM2 N	Normally open Critical visual alarm
60	VISALM2 P	Normally open Critical visual alarm

Table 2-20 Alarm Interface Pinouts on the MIC-A/P DB-62 Connector (continued)

Pin No.	Signal Name	Signal Description
61	VISALM3 N	Normally open Remote visual alarm
62	VISALM3 P	Normally open Remote visual alarm

2.4.2 MIC-C/T/P FMEC

The MIC-C/T/P FMEC provides connection for the BATTERY A input, one of the two possible redundant power supply inputs. It also provides connection for system management serial port, system management LAN port, modem port (for future use), and system timing inputs and outputs. Install the MIC-C/T/P in Slot 24.

The MIC-C/T/P FMEC has the following features:

- Connection for one of the two possible redundant power supply inputs
- Connection for two serial ports for local craft/modem (for future use)
- Connection for one LAN port
- Connection for two system timing inputs
- Connection for two system timing outputs
- Storage of manufacturing and inventory data

For proper system operation, both the MIC-A/P and MIC-C/T/P FMECs must be installed in the shelf.

Figure 2-18 shows the MIC-C/T/P FMEC faceplate.

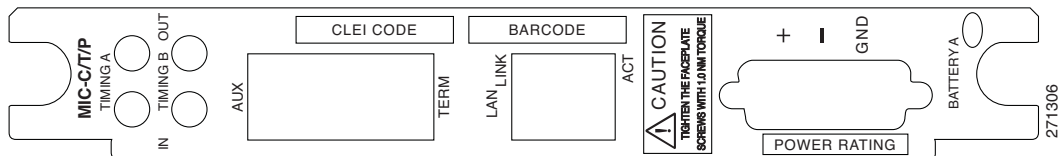
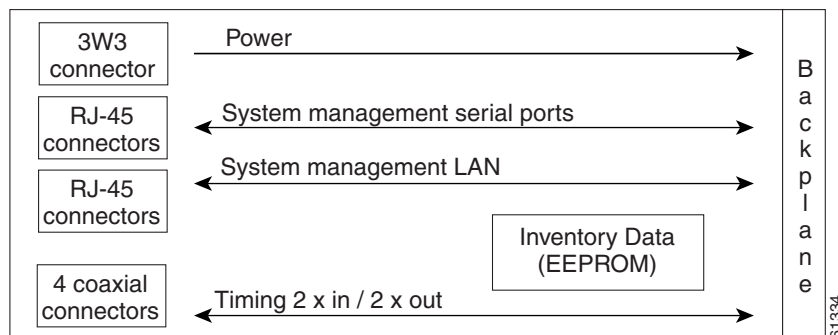
Figure 2-18 MIC-C/T/P Faceplate

Figure 2-19 shows a block diagram of the MIC-C/T/P.

Figure 2-19 MIC-C/T/P Block Diagram

The MIC-C/T/P FMEC has one pair of LEDs located on the RJ45 LAN connector. The green LED is on when a link is present, and the amber LED is on when data is being transferred.

2.5 Optical Service Channel Cards

This section describes the optical service channel cards. An optical service channel (OSC) is a bidirectional channel connecting two adjacent nodes in a DWDM ring. For every DWDM node (except terminal nodes), two different OSC terminations are present, one for the west side and another for the east side. The channel transports OSC overhead that is used to manage ONS 15454 DWDM networks. An OSC signal uses the 1510-nm wavelength and does not affect client traffic. The primary purpose of this channel is to carry clock synchronization and orderwire channel communications for the DWDM network. It also provides transparent links between each node in the network. The OSC is an OC-3/STM-1 formatted signal.

There are two versions of the OSC modules: the OSCM, and the OSC-CSM, which contains the OSC wavelength combiner and separator component in addition to the OSC module.

2.5.1 OSCM Card

The OSCM card is used in amplified nodes that include the OPT-BST, OPT-BST-E, or OPT-BST-L booster amplifier. The OPT-BST, OPT-BST-E, and OPT-BST-L cards include the required OSC wavelength combiner and separator component. The OSCM cannot be used in nodes where you use OC-N/STM-N cards, electrical cards, or cross-connect cards. The OSCM uses Slots 8 and 10, which are also cross-connect card slots.

The OSCM supports the following features:

- OC-3/STM-1 formatted OSC
- Supervisory data channel (SDC) forwarded to the TCC2/TCC2P cards for processing
- Distribution of the synchronous clock to all nodes in the ring
- 100BaseT far-end (FE) User Channel (UC)
- Monitoring functions such as orderwire support and optical safety

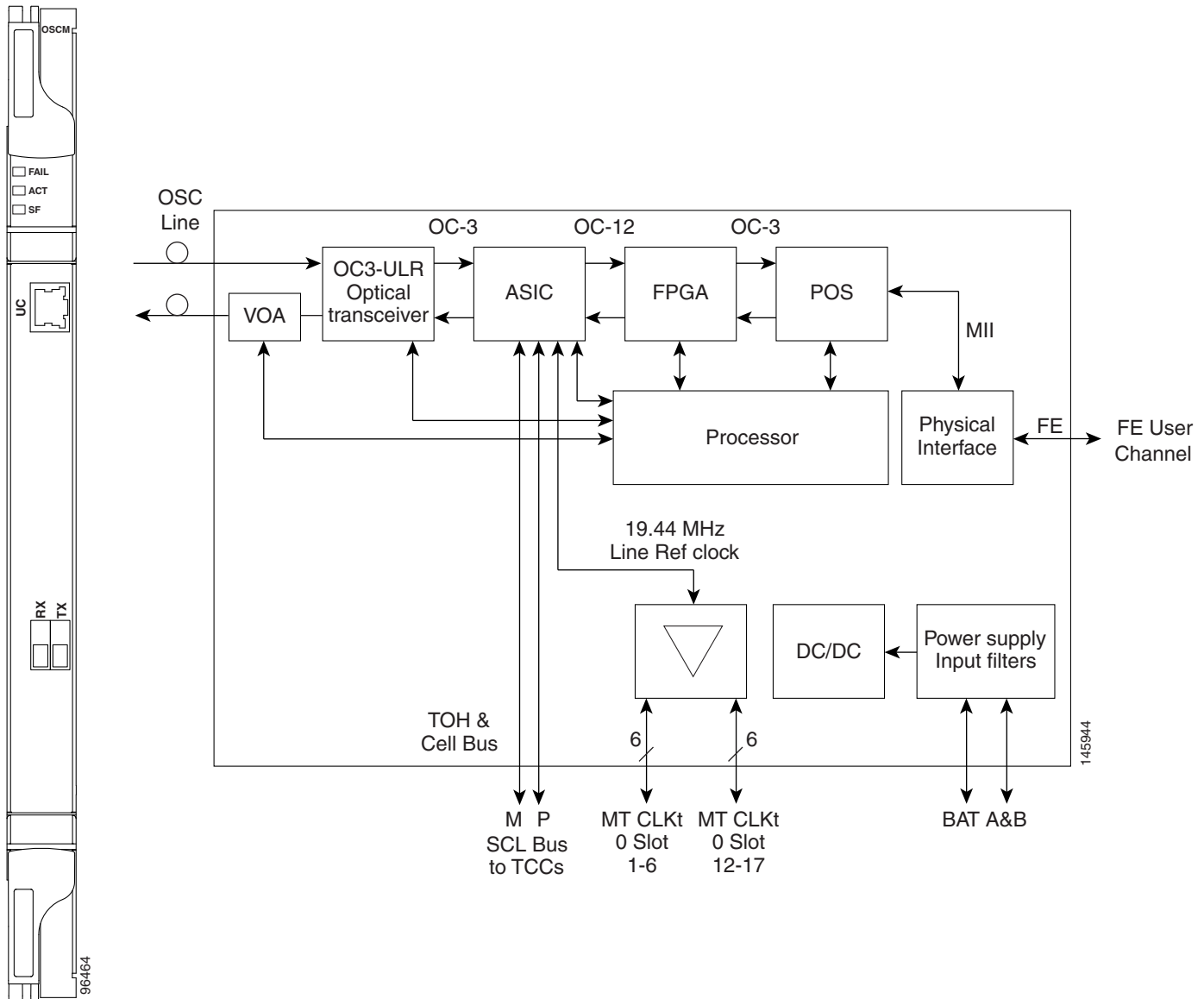
The OC-3/STM-1 section data communications channel (SDCC or RS-DCC) overhead bytes are used for network communications. An optical transceiver terminates the OC-3/STM-1, then it is regenerated and converted into an electrical signal. The SDCC or RS-DCC bytes are forwarded to the active and standby TCC2/TCC2P cards for processing through the system communication link (SCL) bus on the backplane. Orderwire bytes (E1, E2, F1) are also forwarded via the SCL bus to the TCC2/TCC2P for forwarding to the AIC-I card.

The payload portion of the OC-3/STM-1 is used to carry the fast Ethernet UC. The frame is sent to a packet-over-SONET/SDH (POS) processing block that extracts the Ethernet packets and makes them available at the RJ-45 connector.

The OSCM distributes the reference clock information by removing it from the incoming OC-3/STM-1 signal and then sending it to the DWDM cards. The DWDM cards then forward the clock information to the active and standby TCC2/TCC2P cards.

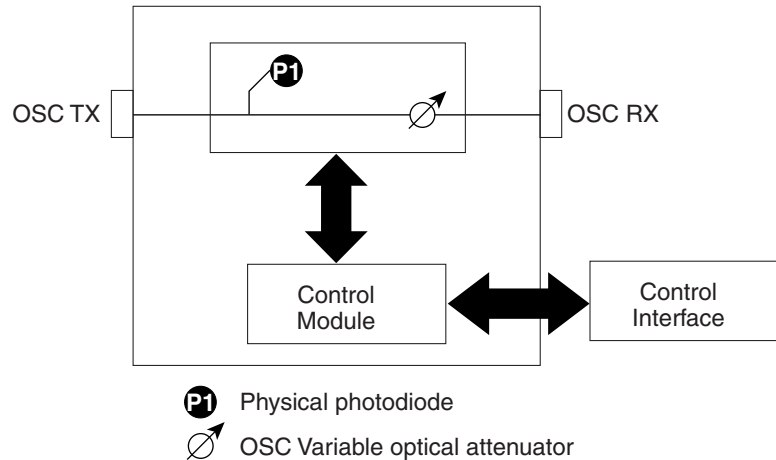
Figure 2-20 shows the OSCM card faceplate and block diagram.

Figure 2-20 OSCM Card Faceplate



For information on safety labels for the card, see the “2.2.1 Class 1 Laser Product Cards” section on page 2-13.

Figure 2-21 shows the block diagram of the variable optical attenuator (VOA) within the OSCM.

Figure 2-21 OSCM VOA Optical Module Functional Block Diagram

2.5.1.1 Power Monitoring

Physical photodiode P1 monitors the power for the OSCM card. The returned power level value is calibrated to the OSC TX port (Table 2-21).

Table 2-21 OSCM VOA Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Output OSC	OSC TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.5.1.2 OSCM Card-Level Indicators

The OSCM card has three card-level LED indicators, described in Table 2-22.

Table 2-22 OSCM Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OSCM is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as loss of signal (LOS), loss of frame alignment (LOF), line alarm indication signal (AIS-L), or high BER on one or more of the card’s ports. The amber signal fail (SF) LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.5.1.3 OSCM Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The OSCM has one OC-3/STM-1 optical port located on the faceplate. One long-reach OSC transmits and receives the OSC to and from another DWDM node. Both DCN data and FE payload are carried on this link.

2.5.2 OSC-CSM Card

The OSC-CSM card is used in unamplified nodes. This means that the booster amplifier with the OSC wavelength combiner and separator is not required for OSC-CSM operation. The OSC-CSM can be installed in Slots 1 to 6 and 12 to 17. To operate in hybrid mode, the OSC-CSM cards must be accompanied by cross-connect cards. The cross-connect cards enable functionality on the OC-N/STM-N cards and electrical cards.

The OSC-CSM supports the following features:

- Optical combiner and separator module for multiplexing and demultiplexing the optical service channel to or from the wavelength division multiplexing (WDM) signal
- OC-3/STM-1 formatted OSC
- SDC forwarded to the TCC2/TCC2P cards for processing
- Distribution of the synchronous clock to all nodes in the ring
- 100BaseT FE UC
- Monitoring functions such as orderwire support
- Optical safety: Signal loss detection and alarming, fast transmitted power shut down by means of an optical 1x1 switch
- Optical safety remote interlock (OSRI), a feature capable of shutting down the optical output power
- Automatic laser shutdown (ALS), a safety mechanism used in the event of a fiber cut. For details on ALS provisioning for the card, see the *Cisco ONS 15454 DWDM Procedure Guide*. For information on using the card to implement ALS in a network, see the [“4.7 Network Optical Safety—Automatic Laser Shutdown”](#) section on page 4-14.

The WDM signal coming from the line is passed through the OSC combiner and separator, where the OSC signal is extracted from the WDM signal. The WDM signal is sent along with the remaining channels to the COM port (label on the front panel) for routing to the OADM or amplifier units, while the OSC signal is sent to an optical transceiver.

The OSC is an OC-3/STM-1 formatted signal. The OC-3/STM-1 SDCC or RS-DCC overhead bytes are used for network communications. An optical transceiver terminates the OC-3/STM-1, and then it is regenerated and converted into an electrical signal. The SDCC or RS-DCC bytes are forwarded to the active and standby TCC2/TCC2P cards for processing via the SCL bus on the backplane. Orderwire bytes (E1, E2, F1) are also forwarded via the SCL bus to the TCC2/TCC2P for forwarding to the AIC-I card.

The payload portion of the OC-3/STM-1 is used to carry the fast Ethernet UC. The frame is sent to a POS processing block that extracts the Ethernet packets and makes them available at the RJ-45 front panel connector.

The OSC-CSM distributes the reference clock information by removing it from the incoming OC-3/STM-1 signal and then sending it to the active and standby TCC2/TCC2P cards. The clock distribution is different from the OSCM card because the OSC-CSM does not use Slot 8 or 10 (cross-connect card slots).

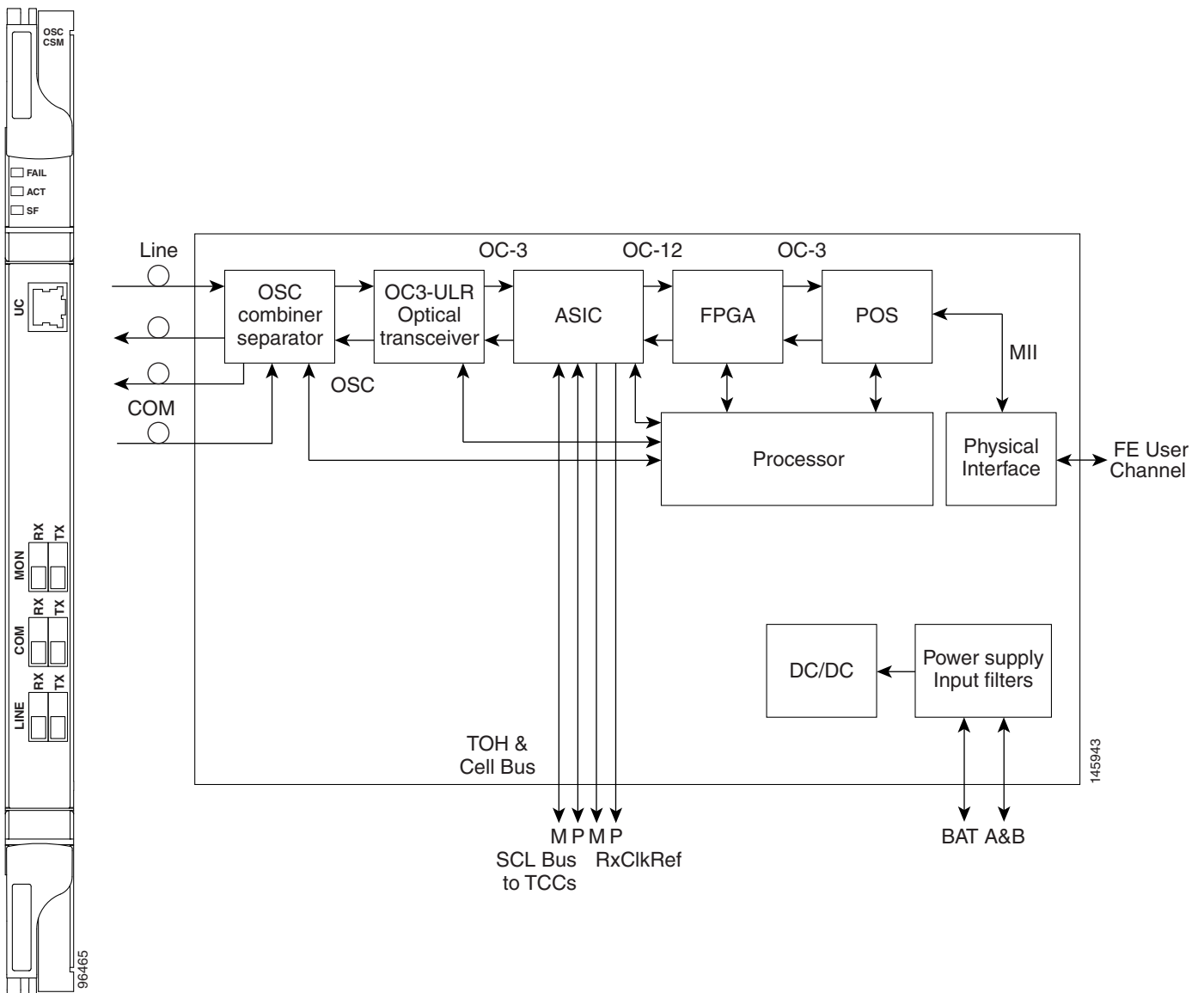


Note

S1 and S2 (Figure 2-24 on page 2-43) are optical splitters with a splitter ratio of 2:98. The result is that the power at the MON TX port is about 17 dB lower than the relevant power at the COM RX port, and the power at the MON RX port is about 20 dB lower than the power at the COM TX port. The difference is due to the presence of a tap coupler for the P1 photodiode.

Figure 2-22 shows the OSC-CSM faceplate.

Figure 2-22 OSC-CSM Faceplate



For information on safety labels for the card, see the “2.2.1 Class 1 Laser Product Cards” section on page 2-13.

Figure 2-23 shows a block diagram of the OSC-CSM card.

Figure 2-23 OSC-CSM Block Diagram

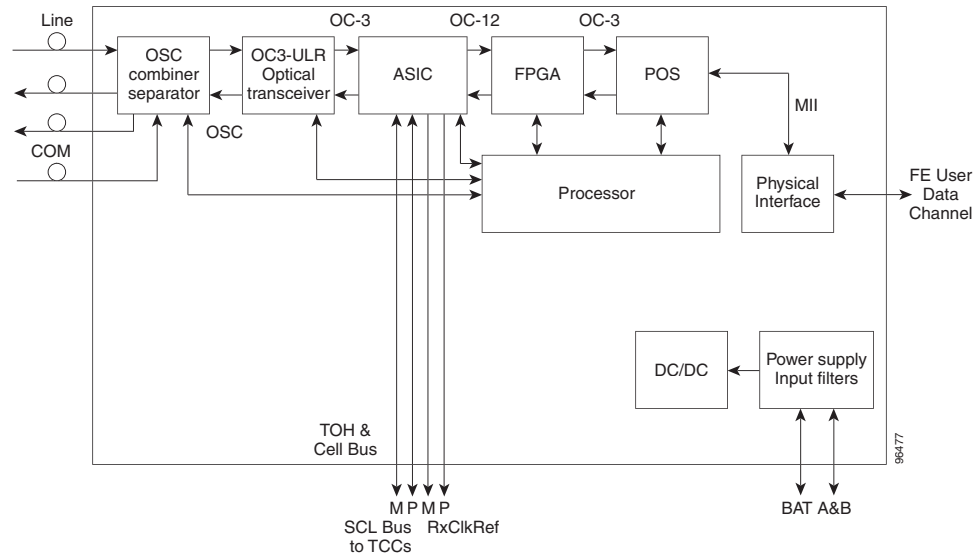
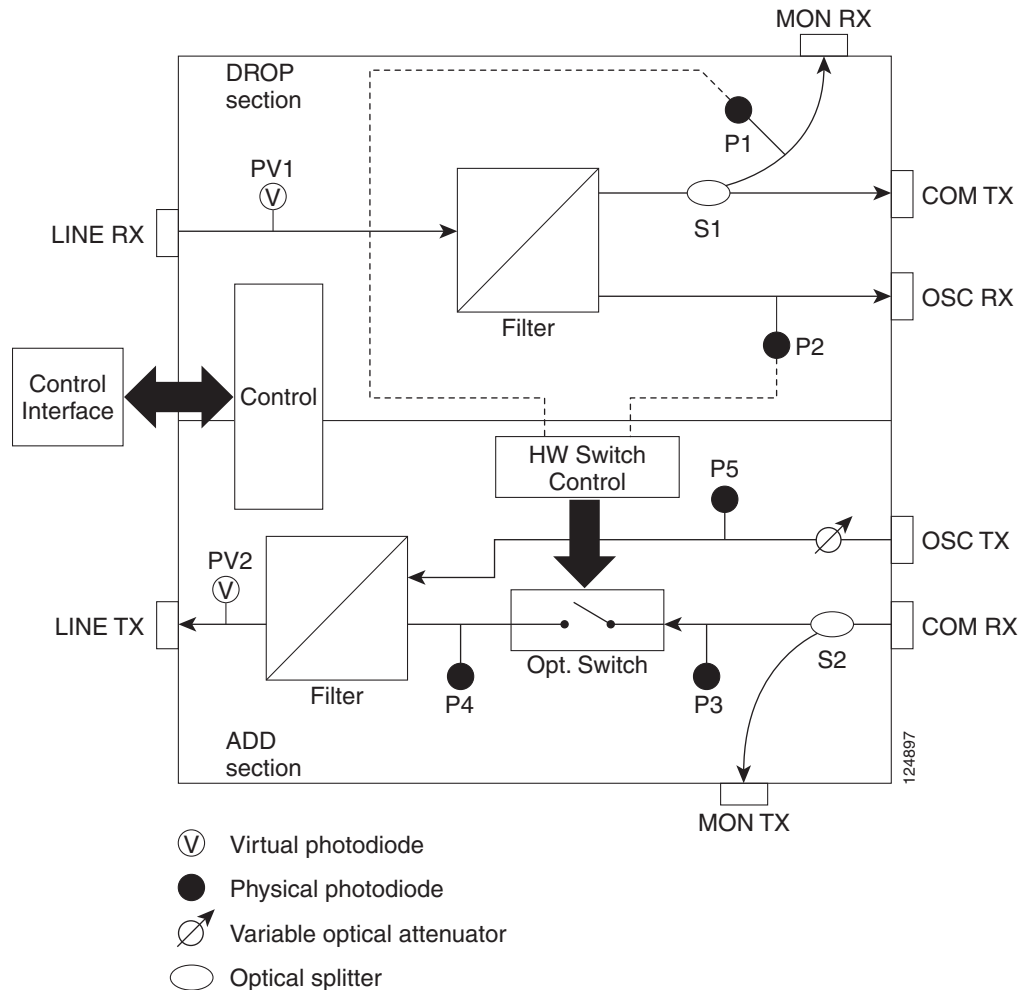


Figure 2-24 shows the OSC-CSM optical module functional block diagram.

Figure 2-24 OSC-CSM Optical Module Functional Block Diagram



2.5.2.1 Power Monitoring

Physical photodiodes P1, P2, P3, and P5 monitor the power for the OSC-CSM card. Their function is as follows:

- P1 and P2: The returned power value is calibrated to the LINE RX port, including the insertion loss of the previous filter (the reading of this power dynamic range has been brought backward towards the LINE RX output).
- P3: The returned value is calibrated to the COM RX port.
- P5: The returned value is calibrated to the LINE TX port, including the insertion loss of the subsequent filter.

The returned power level values are calibrated to the ports as shown in Table 2-23.

Table 2-23 OSC-CSM Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Out Com	LINE RX
P2	Input OSC	LINE RX
P3	In Com	COM RX
P5	Output Osc	LINE TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.5.2.2 OSC-CSM Card-Level Indicators

The OSC-CSM card has three card-level LED indicators, described in [Table 2-24](#).

Table 2-24 OSC-CSM Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OSC-CSM is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, AIS-L, or high BER on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.5.2.3 OSC-CSM Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The OSC-CSM has a OC3 port and three other sets of ports located on the faceplate.

2.6 Optical Amplifier Cards

This section describes the optical amplifier cards. Optical amplifiers are used in amplified nodes, such as hub nodes, amplified OADM nodes, and line amplifier nodes. There are five forms of amplifiers, the Optical Pre-amplifier (OPT-PRE), the Optical Booster (OPT-BST) amplifier, the Optical Booster Enhanced (OPT-BST-E) amplifier, the Optical Booster L-Band amplifier (OPT-BST-L), and the Optical L-Band pre-amplifier (OPT-AMP-L).


Note

The OPT-AMP-L pre-amplifier is software configurable as a pre-amplifier or as a booster amplifier.

The optical amplifier card architecture includes an optical plug-in module with a controller that manages optical power, laser current, and temperature control loops. The amplifier also manages communication with the TCC2/TCC2P card, and operation, administration, maintenance, and provisioning (OAM&P) functions such as provisioning, controls, and alarms.

Optical amplifiers have a linear power feature that enables them to be kept in the constant gain mode if the gain is less than 28 dB. However, for longer span solutions it is necessary to place the amplifier in constant power mode. In constant power mode, automatic power control (APC) requirements change. This is because span loss degradation does not affect the system and amplifiers are not able to automatically modify the output power for variations in the number of channels when provisioning changes and a failure occurs.

2.6.1 OPT-PRE Amplifier

This section describes the OPT-PRE amplifier card. The OPT-PRE is designed to support 64 channels at 50-GHz channel spacing, but is currently limited to 32 channels at 100 GHz. The OPT-PRE is a C-band DWDM, two-stage erbium-doped fiber amplifier (EDFA) with mid-amplifier loss (MAL) for allocation to a DCU. To control the gain tilt, the OPT-PRE is equipped with a built-in VOA. The VOA can also be used to pad the DCU to a reference value. You can install the OPT-PRE in Slots 1 to 6 and 12 to 17.

The OPT-PRE features:

- Fixed gain mode with programmable tilt
- True variable gain
- Fast transient suppression
- Nondistorting low-frequency transfer function
- Settable maximum output power
- Fixed output power mode (mode used during provisioning)
- MAL for fiber-based DCU
- Amplified spontaneous emissions (ASE) compensation in fixed gain mode
- Full monitoring and alarm handling with settable thresholds
- Four signal photodiodes to monitor the input and output optical power of the two amplifier stages through CTC
- An optical output port for external monitoring

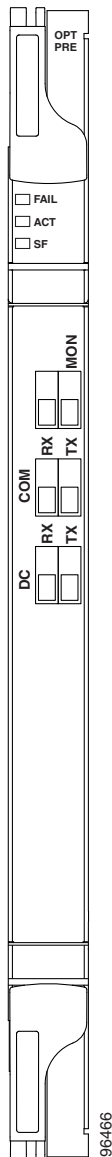


Note

The optical splitter has a ratio of 1:99. The result is that the power at the MON port is about 20 dB lower than the power at the COM TX port.

Figure 2-25 shows the OPT-PRE amplifier faceplate.

Figure 2-25 OPT-PRE Faceplate



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

Figure 2-26 shows a block diagram of the OPT-PRE card.

Figure 2-26 OPT-PRE Block Diagram

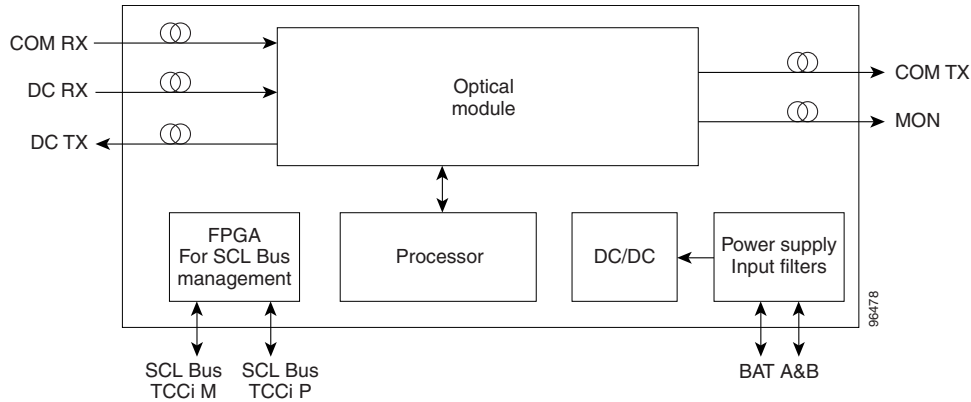
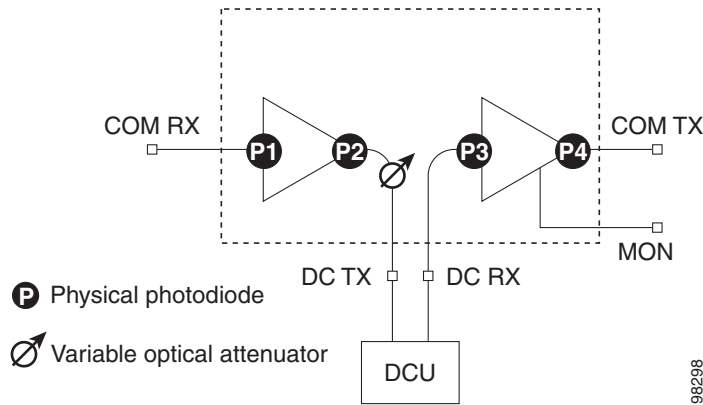


Figure 2-27 shows the OPT-PRE optical module functional block diagram.

Figure 2-27 OPT-PRE Optical Module Functional Block Diagram



2.6.1.1 Power Monitoring

Physical photodiodes P1, P2, P3, and P4 monitor the power for the OPT-PRE card. The returned power level values are calibrated to the ports as shown in Table 2-25.

Table 2-25 OPT-PRE Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Input Com	COM RX
P2	Output DC	DC TX
P3	Input DC	DC RX
P4	Output COM (Total Output)	COM TX
	Output COM (Signal Output)	

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.6.1.2 OPT-PRE Amplifier Card-Level Indicators

The OPT-PRE amplifier has three card-level LED indicators, described in [Table 2-26](#).

Table 2-26 OPT-PRE Amplifier Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OPT-PRE is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS on one or more of the card's ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.6.1.3 OPT-PRE Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The OPT-PRE amplifier has five optical ports located on the faceplate. MON is the output monitor port. COM RX (receive) is the input signal port. COM TX (transmit) is the output signal port. DC RX is the MAL input signal port. DC TX is the MAL output signal port.

2.6.2 OPT-BST Amplifier Card

This section describes the OPT-BST amplifier card. The OPT-BST gain range is 5 to 20 dB in constant gain mode and output power mode. The OPT-BST is designed to support 64 channels at 50-GHz channel spacing, but currently is limited to 32 channels at 100 GHz. The OPT-BST is a C-band DWDM EDFA with OSC add-and-drop capability. When an ONS 15454 has an OPT-BST installed, it is only necessary to have the OSCM to process the OSC. You can install the OPT-BST in Slots 1 to 6 and 12 to 17. To control the gain tilt, the OPT-BST is equipped with a built-in VOA.

The OPT-BST features include:

- Fixed gain mode (with programmable tilt)
- True variable gain
- Fast transient suppression
- Nondistorting low-frequency transfer function
- Settable maximum output power
- Fixed output power mode (mode used during provisioning)
- ASE compensation in fixed gain mode
- Full monitoring and alarm handling with settable thresholds
- OSRI, which is a software feature capable (through CTC) of shutting down the optical output power or reducing the power to a safe level (automatic power reduction)

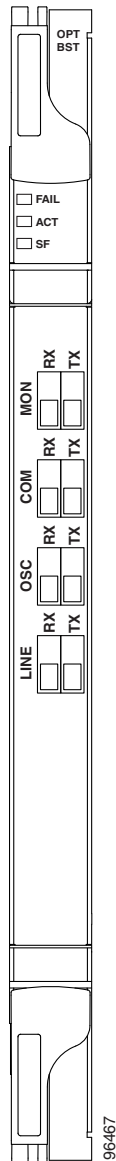
- Automatic laser shutdown (ALS), a safety mechanism used in the event of a fiber cut. For details on ALS provisioning for the card, see the *Cisco ONS 15454 DWDM Procedure Guide*. For information on using the card to implement ALS in a network, see the “4.7 Network Optical Safety—Automatic Laser Shutdown” section on page 4-14.

**Note**

The optical splitters each have a ratio of 1:99. The result is that the power at the MON TX and MON RX ports is about 20 dB lower than the power at the COM TX and COM RX ports.

Figure 2-28 shows the OPT-BST amplifier faceplate.

Figure 2-28 OPT-BST Faceplate



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

Figure 2-29 shows a block diagram of the OPT-BST card.

Figure 2-29 OPT-BST Block Diagram

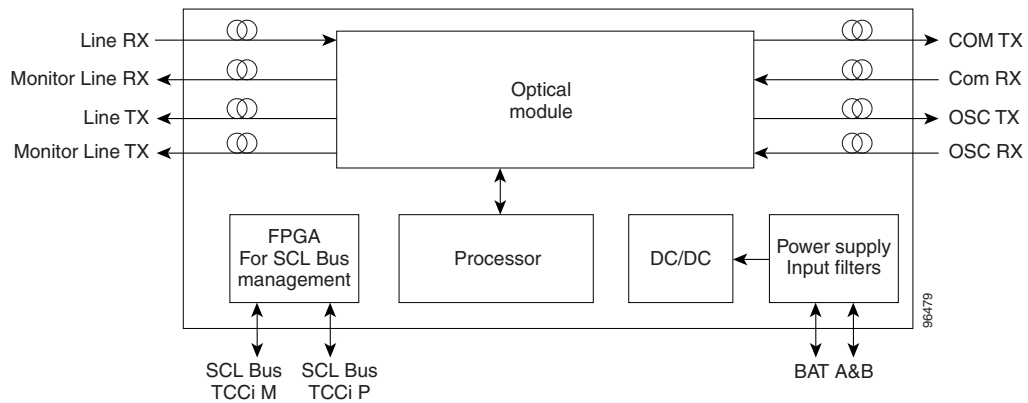
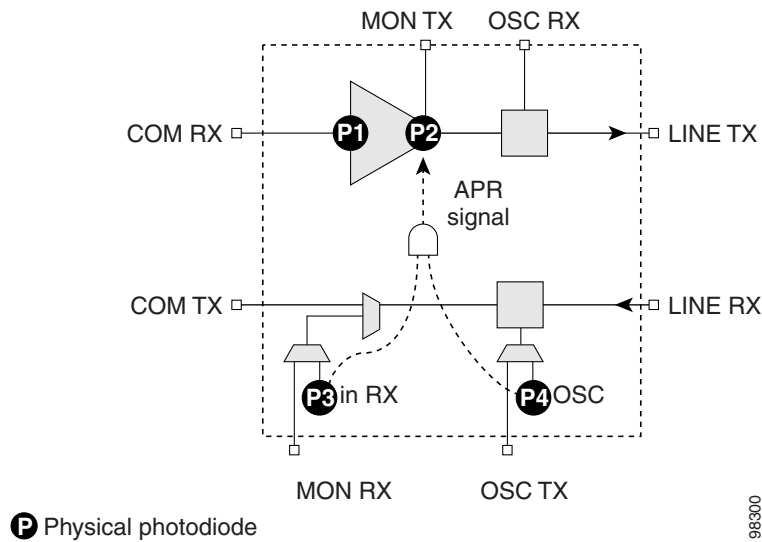


Figure 2-30 shows the OPT-BST optical module functional block diagram.

Figure 2-30 OPT-BST Optical Module Functional Block Diagram



2.6.2.1 Power Monitoring

Physical photodiodes P1, P2, P3, and P4 monitor the power for the OPT-BST card. The returned power level values are calibrated to the ports as shown in Table 2-27.

Table 2-27 OPT-BST Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Input Com	COM RX

Table 2-27 OPT-BST Port Calibration (continued)

Photodiode	CTC Type Name	Calibrated to Port
P2	Output Line (Total Output)	LINE TX
	Output Line (Signal Output)	
P3	Output COM	LINE RX
P4	Output OSC	

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.6.2.2 OPT-BST Amplifier Card-Level Indicators

The OPT-BST amplifier has three card-level LED indicators, described in [Table 2-28](#).

Table 2-28 OPT-BST Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OPT-BST is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.6.2.3 OPT-BST Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The OPT-BST amplifier has eight optical ports located on the faceplate. MON RX is the output monitor port (receive section). MON TX is the output monitor port. COM RX is the input signal port. LINE TX is the output signal port. LINE RX is the input signal port (receive section). COM TX is the output signal port (receive section). OSC RX is the OSC add input port. OSC TX is the OSC drop output port.

2.6.3 OPT-BST-E Amplifier Card

This section describes the OPT-BST-E amplifier card, which is a gain-enhanced version of the OPT-BST card. The OPT-BST-E gain range is 8 to 23 dBm with the tilt managed at 0 dBm in constant gain mode and output power mode. However, an enhanced gain range of 23 to 26 dBm is available with the tilt unmanaged. See [Appendix A, “Hardware Specifications”](#) for detailed specification information. The OPT-BST-E is designed to support 64 channels at 50-GHz channel spacing, but currently is limited to 32 channels at 100 GHz. The OPT-BST-E is a C-band DWDM EDFA with OSC add-and-drop capability.

When an ONS 15454 has an OPT-BST-E installed, it is only necessary to have the OSCM to process the OSC. You can install the OPT-BST-E in Slots 1 to 6 and 12 to 17. To control the gain tilt, the OPT-BST-E is equipped with a built-in VOA.

The OPT-BST-E features include:

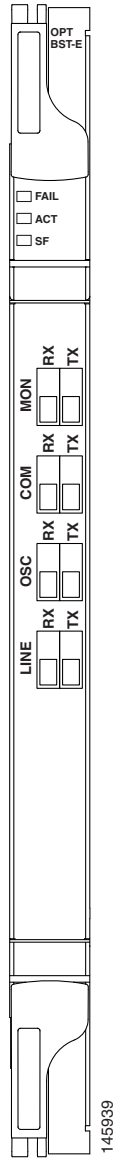
- Fixed gain mode (with programmable tilt)
- True variable gain
- Enhanced gain (with unmanaged tilt)
- Fast transient suppression
- Nondistorting low-frequency transfer function
- Settable maximum output power
- Fixed output power mode (mode used during provisioning)
- ASE compensation in fixed gain mode
- Full monitoring and alarm handling with settable thresholds
- OSRI, which is a software feature capable (through CTC) of shutting down the optical output power or reducing the power to a safe level (automatic power reduction)
- Automatic laser shutdown (ALS), a safety mechanism used in the event of a fiber cut. For details on ALS provisioning for the card, see the *Cisco ONS 15454 DWDM Procedure Guide*. For information on using the card to implement ALS in a network, see the “4.7 Network Optical Safety—Automatic Laser Shutdown” section on page 4-14.

**Note**

The optical splitters each have a ratio of 1:99. The result is that the power at the MON TX and MON RX ports is about 20 dB lower than the power at the COM TX and COM RX ports.

Figure 2-31 shows the OPT-BST-E amplifier faceplate.

Figure 2-31 OPT-BST-E Faceplate



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

Figure 2-32 shows a block diagram of the OPT-BST-E card.

Figure 2-32 OPT-BST-E Block Diagram

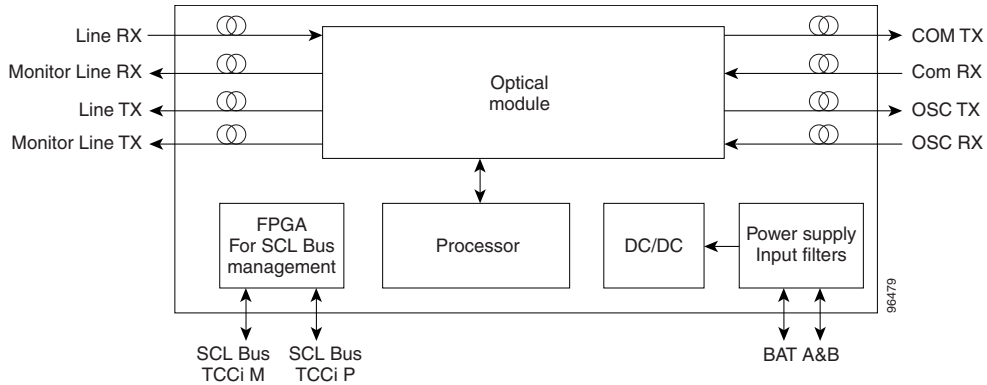
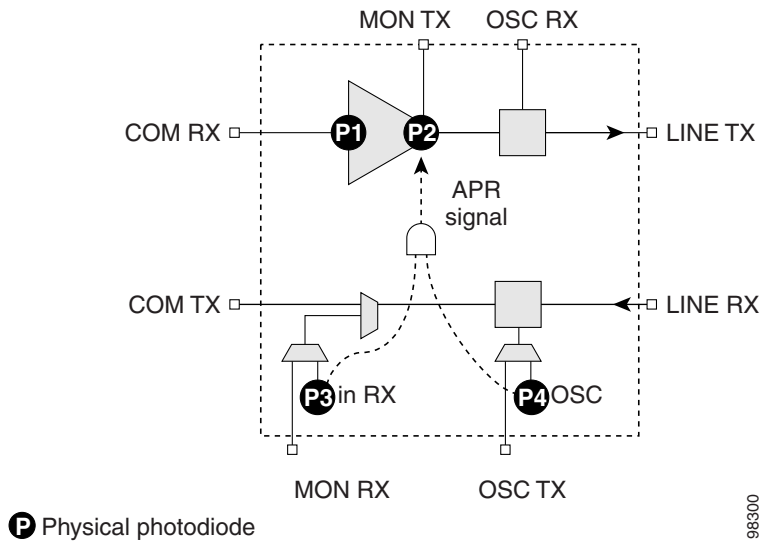


Figure 2-33 shows the OPT-BST-E optical module functional block diagram.

Figure 2-33 OPT-BST-E Optical Module Functional Block Diagram



P Physical photodiode

2.6.3.1 Power Monitoring

Physical photodiodes P1, P2, P3, and P4 monitor the power for the OPT-BST-E card. The returned power level values are calibrated to the ports as shown in Table 2-29.

Table 2-29 OPT-BST-E Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Input Com	COM RX
P2	Output Line (Total Output)	LINE TX
	Output Line (Signal Output)	

Table 2-29 OPT-BST-E Port Calibration (continued)

Photodiode	CTC Type Name	Calibrated to Port
P3	Output COM	LINE RX
P4	Output OSC	

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.6.3.2 OPT-BST-E Amplifier Card-Level Indicators

The OPT-BST-E amplifier has three card-level LED indicators, described in [Table 2-30](#).

Table 2-30 OPT-BST-E Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OPT-BST-E is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.6.3.3 OPT-BST-E Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The OPT-BST-E amplifier has eight optical ports located on the faceplate. MON RX is the output monitor port (receive section). MON TX is the output monitor port. COM RX is the input signal port. LINE TX is the output signal port. LINE RX is the input signal port (receive section). COM TX is the output signal port (receive section). OSC RX is the OSC add input port. OSC TX is the OSC drop output port.

2.6.4 OPT-BST-L Amplifier Card

This section describes the OPT-BST-L amplifier card. The OPT-BST-L standard gain range is 8 to 20 dB in the controllable gain tilt mode, and 20 to 27 dB in the uncontrolled gain tilt mode. The OPT-BST-L is designed to support 64 channels at 50-GHz channel spacing, but currently is limited to 32 channels at 100 GHz spacing. The OPT-BST-L is an L-band DWDM EDFA with OSC add-and-drop capability. The card is particularly well suited for use in networks that employ dispersion shifted (DS) fiber or SMF-28 single-mode fiber. When an ONS 15454 has an OPT-BST-L installed, it is only necessary to have the OSCM to process the OSC. You can install the OPT-BST-L in Slots 1 to 6 and 12 to 17. To control the gain tilt, the OPT-BST-L is equipped with a built-in VOA.

The OPT-BST-L features include:

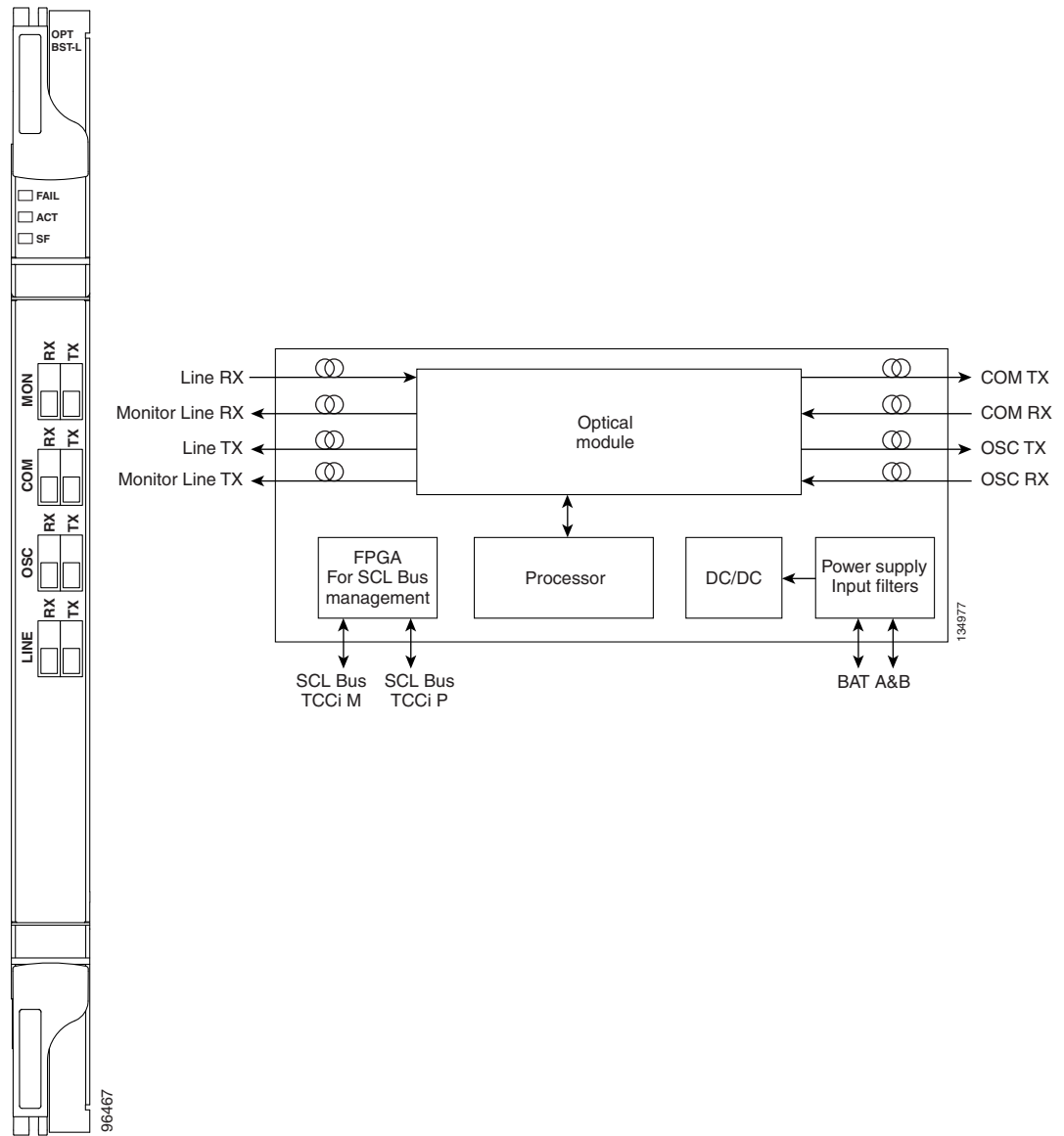
- Fixed gain mode (with programmable tilt)
- True variable gain
- Fast transient suppression
- Nondistorting low-frequency transfer function
- Settable maximum output power
- Fixed output power mode (mode used during provisioning)
- ASE compensation in fixed gain mode
- Full monitoring and alarm handling with settable thresholds
- OSRI, which is a software feature capable (through CTC) of shutting down the optical output power or reducing the power to a safe level (automatic power reduction)
- Automatic laser shutdown (ALS), a safety mechanism used in the event of a fiber cut. For details on ALS provisioning for the card, see the *Cisco ONS 15454 DWDM Procedure Guide*. For information on using the card to implement ALS in a network, see the “[4.7 Network Optical Safety—Automatic Laser Shutdown](#)” section on page 4-14.

**Note**

The optical splitters each have a ratio of 1:99. The result is that the power at the MON TX and MON RX ports is about 20 dB lower than the power at the COM TX and COM RX ports.

Figure 2-34 shows the OPT-BST-L amplifier faceplate and block diagram.

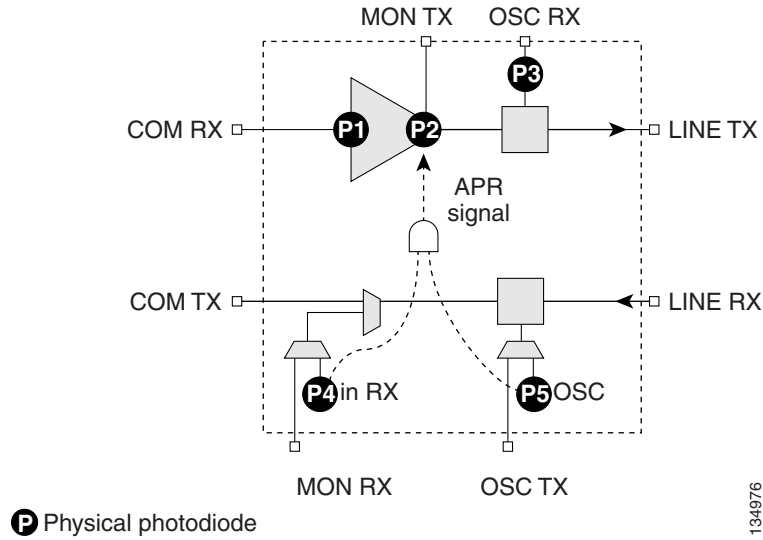
Figure 2-34 OPT-BST-L Faceplate



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

Figure 2-35 shows the OPT-BST-L optical module functional block diagram.

Figure 2-35 OPT-BST-L Optical Module Functional Block Diagram



2.6.4.1 Power Monitoring

Physical photodiodes P1, P2, P3, P4, and P5 monitor the power for the OPT-BST-L card. The returned power level values are calibrated to the ports as shown in [Table 2-31](#).

Table 2-31 OPT-BST-L Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Input COM	COM RX
P2	Output Line (Total Output)	LINE TX
	Output Line (Signal Output)	
P3	Output OSC-RX	OSC-RX
P4	Output COM	LINE RX
P5	Output OSC-TX	

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.6.4.2 OPT-BST-L Amplifier Card-Level Indicators

The OPT-BST-L amplifier has three card-level LED indicators, described in [Table 2-32](#).

Table 2-32 OPT-BST-L Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OPT-BST-L is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS on one or more of the card's ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.6.4.3 OPT-BST-L Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The OPT-BST-L amplifier has eight optical ports located on the faceplate. MON RX is the output monitor port (receive section). MON TX is the output monitor port. COM RX is the input signal port. LINE TX is the output signal port. LINE RX is the input signal port (receive section). COM TX is the output signal port (receive section). OSC RX is the OSC add input port. OSC TX is the OSC drop output port.

2.6.5 OPT-AMP-L Card

This section describes the OPT-AMP-L preamplifier card. The OPT-AMP-L is an L-band DWDM optical amplifier module consisting of a two-stage EDFA with mid-stage access loss (MSL) for an external DCU and OSC add-and-drop capability. Using CTC, the card is provisionable as a preamplifier (OPT-PRE) or booster amplifier (OPT-BST), and is well suited for use in networks that employ DS fiber or SMF-28 single-mode fiber. The amplifier can operate up to 64 optical transmission channels at a channel spacing of 50 GHz in the wavelength range from 1570 nm to 1605 nm.

The OPT-AMP-L is able to achieve a maximum signal power of 20 dBm throughout the gain and MSL ranges. The amplifier has a variable gain range that is settable from 12 to 24 dBm in the standard gain range and from 24 dBm to 35 dBm with uncontrolled gain tilt. It also provides up to 12 dBm MSL for an external DCU.

When an ONS 15454 has an OPT-AMP-L installed, it is only necessary to have the OSCM to process the OSC. You can install the two-slot OPT-AMP-L in Slots 1 to 6 and 12 to 17. To control the gain tilt, the OPT-AMP-L is equipped with a built-in VOA.

The OPT-AMP-L has the following features:

- Maximum power output of 20 dBm
- True variable gain amplifier
- Fast transient suppression; able to adjust power levels in hundreds of microseconds to avoid bit errors in failure or capacity growth situations
- Nondistorting low frequency transfer function
- Mid-stage access loss for dispersion compensation unit
- Constant pump current mode (test mode)

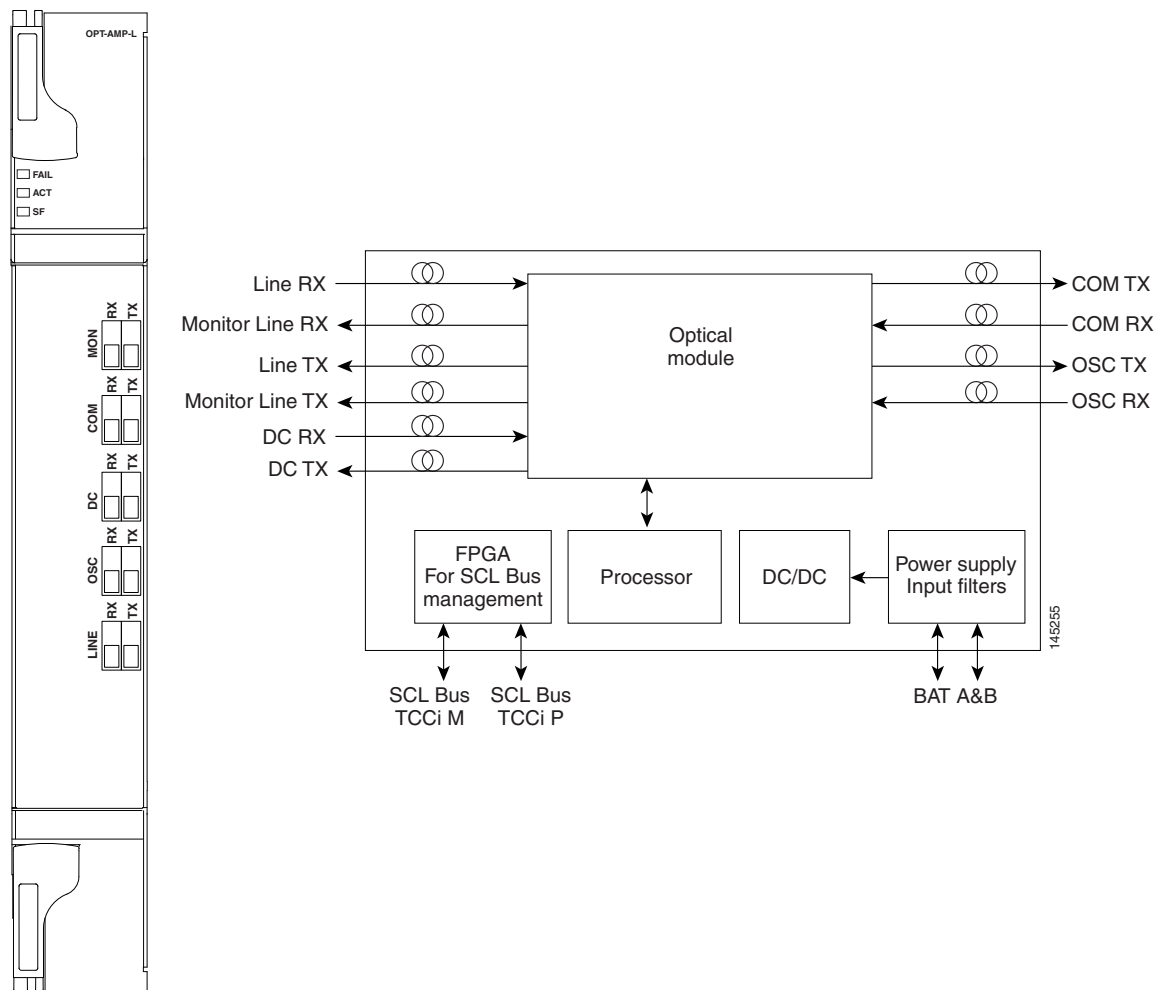
- Constant output power mode (used during optical node setup)
- Constant gain mode.
- Internal ASE compensation in Constant Gain and in Constant Output Power mode
- Programmable tilt
- Full monitoring and alarm handling capability
- Optical safety support through signal loss detection and alarm at any input port, fast power down control (less than one second), and reduced maximum output power in safe power mode. For details on ALS provisioning for the card, see the *Cisco ONS 15454 DWDM Procedure Guide*. For information on using the card to implement ALS in a network, see the “4.7 Network Optical Safety—Automatic Laser Shutdown” section on page 4-14.

**Note**

Before disconnecting any OPT AMP-L fiber for troubleshooting, make sure the OPT AMP-L is unplugged.

Figure 2-36 shows the OPT-AMP-L amplifier faceplate and block diagram.

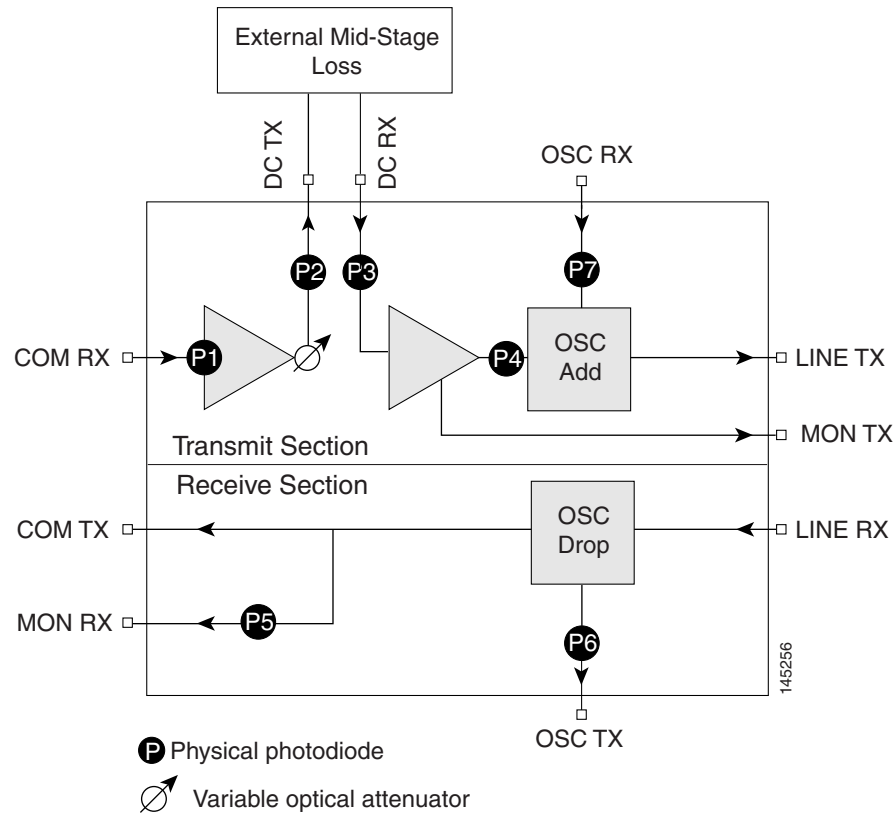
Figure 2-36 OPT-AMP-L Faceplate



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

Figure 2-37 shows the OPT-AMP-L optical module functional block diagram.

Figure 2-37 OPT-AMP-L Optical Module Functional Block Diagram



2.6.5.1 Power Monitoring

Physical photodiodes P1 through P7 monitor the power for the OPT-AMP-L card. The returned power level values are calibrated to the ports as shown in Table 2-33.

Table 2-33 OPT-AMP-L Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	Input COM Power	COM RX
P2	Output DC (total power)	DC TX
	Output DC (signal power)	
P3	Input DC (input power)	DC RX
P4	Output Line Transmit (total power)	LINE TX
	Output Line Transmit (signal power)	

Table 2-33 *OPT-AMP-L Port Calibration (continued)*

Photodiode	CTC Type Name	Calibrated to Port
P5	Input Line Receive Power	LINE RX
P6	Input OSC Receive Power	
P7	Output OSC Transmit Power	OSC RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.6.5.2 OPT-AMP-L Amplifier Card-Level Indicators

The OPT-AMP-L amplifier has three card-level LED indicators, described in [Table 2-34](#).

Table 2-34 *OPT-AMP-L Card-Level Indicators*

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the OPT-AMP-L is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.6.5.3 OPT-AMP-L Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The OPT-AMP-L amplifier has ten optical ports located on the faceplate. MON RX is the output monitor port (receive section). MON TX is the output monitor port. COM RX is the input signal port. LINE TX is the output signal port. LINE RX is the input signal port (receive section). COM TX is the output signal port (receive section). OSC RX is the OSC add input port. OSC TX is the OSC drop output port. DC TX is the output signal to the DCU, and DC RX is the input signal from the DCU.

2.7 Multiplexer and Demultiplexer Cards

This section describes the multiplexer and demultiplexer cards.

2.7.1 32MUX-O Card

The 32-Channel Multiplexer (32MUX-O) card multiplexes 32 100-GHz-spaced channels identified in the channel plan. The 32MUX-O card takes up two slots in an ONS 15454 and can be installed in Slots 1 to 5 and 12 to 16.

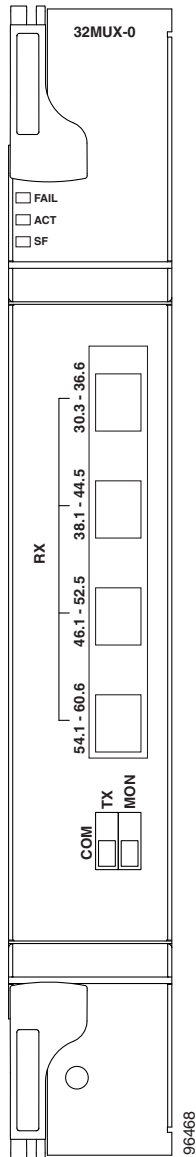
The 32MUX-O features include:

- Arrayed waveguide grating (AWG) device that enables full multiplexing functions for the channels.
- Each single-channel port is equipped with VOAs for automatic optical power regulation prior to multiplexing. In the case of electrical power failure, the VOA is set to its maximum attenuation for safety purposes. A manual VOA setting is also available.
- Each single-channel port is monitored using a photodiode to enable automatic power regulation.

An additional optical monitoring port with 1:99 splitting ratio is available.

[Figure 2-38](#) shows the 32MUX-O faceplate.

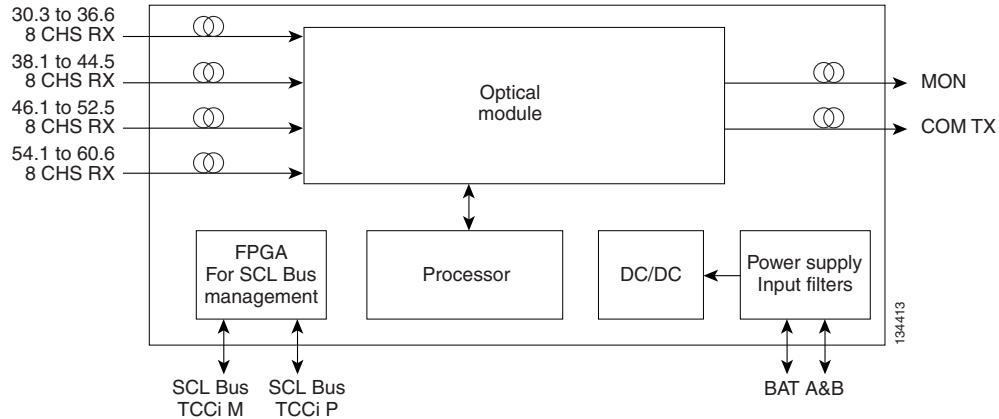
Figure 2-38 32MUX-O Faceplate



For information on safety labels for the card, see the “[2.2.1 Class 1 Laser Product Cards](#)” section on [page 2-13](#).

[Figure 2-39](#) shows a block diagram of the 32MUX-O card.

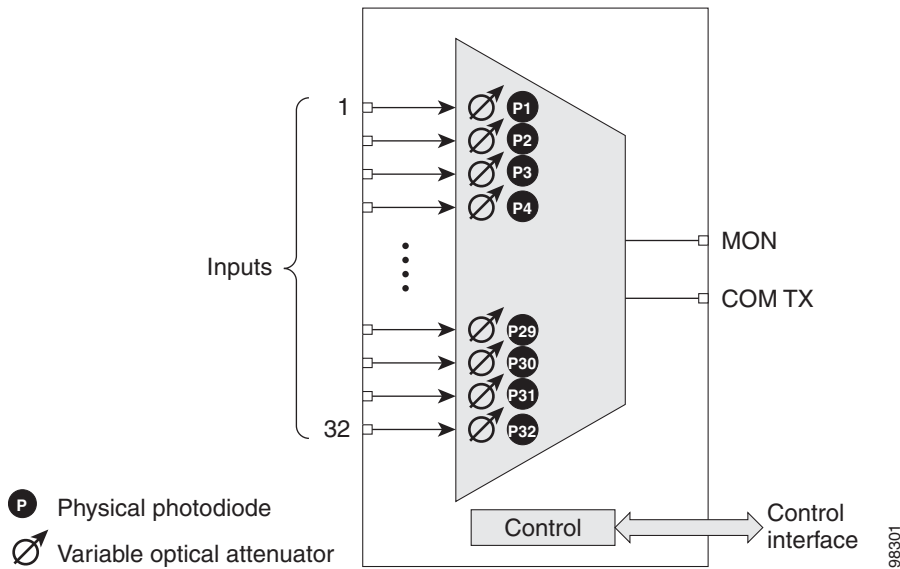
Figure 2-39 32MUX-O Block Diagram



The 32MUX-O card has four receive connectors that accept multifiber push-on (MPO) cables on its front panel for the client input interfaces. MPO cables break out into eight separate cables. The 32MUX-O card also has two LC-PC-II optical connectors, one for the main output and the other for the monitor port.

Figure 2-40 shows the 32MUX-O optical module functional block diagram.

Figure 2-40 32MUX-O Optical Module Functional Block Diagram



2.7.1.1 Channel Plan

The 32MUX-O is typically used in hub nodes and provides the multiplexing of 32 channels, spaced at 100 GHz, into one fiber before their amplification and transmission along the line. The channel plan is shown in Table 2-35.

Table 2-35 32MUX-O Channel Plan

Channel Number ¹	Channel ID	Frequency (GHz)	Wavelength (nm)
1	30.3	195.9	1530.33
2	31.2	195.8	1531.12
3	31.9	195.7	1531.90
4	32.6	195.6	1532.68
5	34.2	195.4	1534.25
6	35.0	195.3	1535.04
7	35.8	195.2	1535.82
8	36.6	195.1	1536.61
9	38.1	194.9	1538.19
10	38.9	194.8	1538.98
11	39.7	194.7	1539.77
12	40.5	194.6	1540.56
13	42.1	194.4	1542.14
14	42.9	194.3	1542.94
15	43.7	194.2	1543.73
16	44.5	194.1	1544.53
17	46.1	193.9	1546.12
18	46.9	193.8	1546.92
19	47.7	193.7	1547.72
20	48.5	193.6	1548.51
21	50.1	193.4	1550.12
22	50.9	193.3	1550.92
23	51.7	193.2	1551.72
24	52.5	193.1	1552.52
25	54.1	192.9	1554.13
26	54.9	192.8	1554.94
27	55.7	192.7	1555.75
28	56.5	192.6	1556.55
29	58.1	192.4	1558.17
30	58.9	192.3	1558.98
31	59.7	192.2	1559.79
32	60.6	192.1	1560.61

1. The Channel Number column is only for reference purposes. The channel ID is consistent with the ONS 15454 and is used in card identification.

2.7.1.2 Power Monitoring

Physical photodiodes P1 through P32 monitor the power for the 32MUX-O card. The returned power level values are calibrated to the ports as shown in [Table 2-36](#).

Table 2-36 32MUX-O Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	ADD	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.7.1.3 32MUX-O Card-Level Indicators

The 32MUX-O card has three card-level LED indicators, described in [Table 2-37](#).

Table 2-37 32MUX-O Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the 32MUX-O is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.7.1.4 32MUX-O Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The 32MUX-O card has five sets of ports located on the faceplate.

COM TX is the line output. COM MON is the optical monitoring port. The xx.x to yy.y RX ports represent the four groups of eight channels ranging from wavelength xx.x to wavelength yy.y, according to the channel plan.

2.7.2 32DMX-O Card

The 32-Channel Demultiplexer (32DMX-O) card demultiplexes 32 100-GHz-spaced channels identified in the channel plan. The 32DMX-O takes up two slots in an ONS 15454 and can be installed in Slots 1 to 5 and 12 to 16.

The 32DMX-O features include:

- AWG that enables channel demultiplexing functions.

- Each single-channel port is equipped with VOAs for automatic optical power regulation after demultiplexing. In the case of electrical power failure, the VOA is set to its maximum attenuation for safety purposes. A manual VOA setting is also available.
- The 32DXM-O has four physical receive connectors that accept MPO cables on its front panel for the client input interfaces. MPO cables break out into eight separate cables.

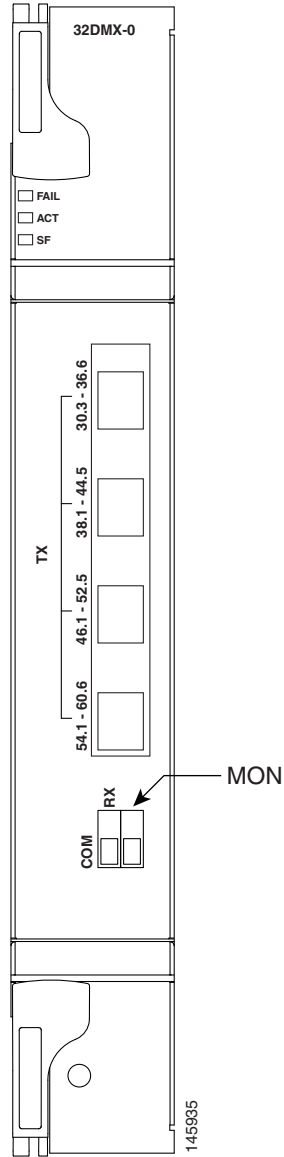


Note In contrast, the single-slot 32DMX card does not have VOAs on each drop port for optical power regulation. The 32DMX optical demultiplexer module is used in conjunction with the 32WSS card in ONS 15454 Multiservice Transport Platform (MSTP) nodes.

- Each single-channel port is monitored using a photodiode to enable automatic power regulation.

[Figure 2-41](#) shows the 32DMX-O card faceplate.

Figure 2-41 32DMX-O Faceplate



For information on safety labels for the card, see the [“2.2.2 Class 1M Laser Product Cards”](#) section on page 2-15.

[Figure 2-42](#) shows a block diagram of the 32DMX-O card.

Figure 2-42 32DMX-O Block Diagram

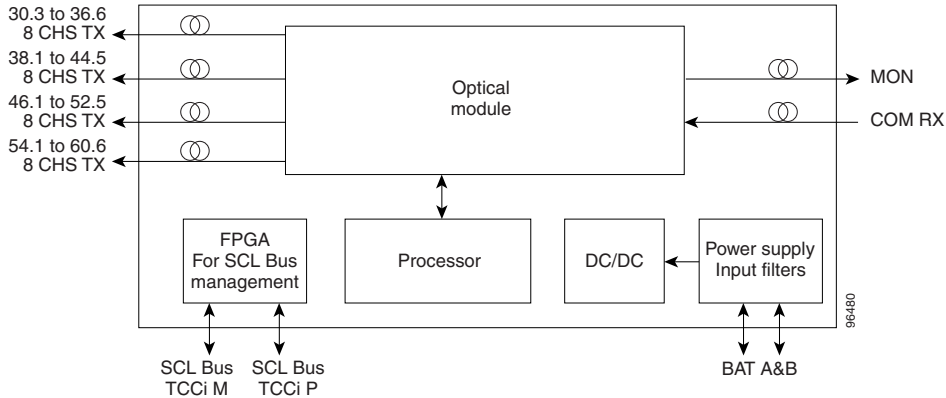
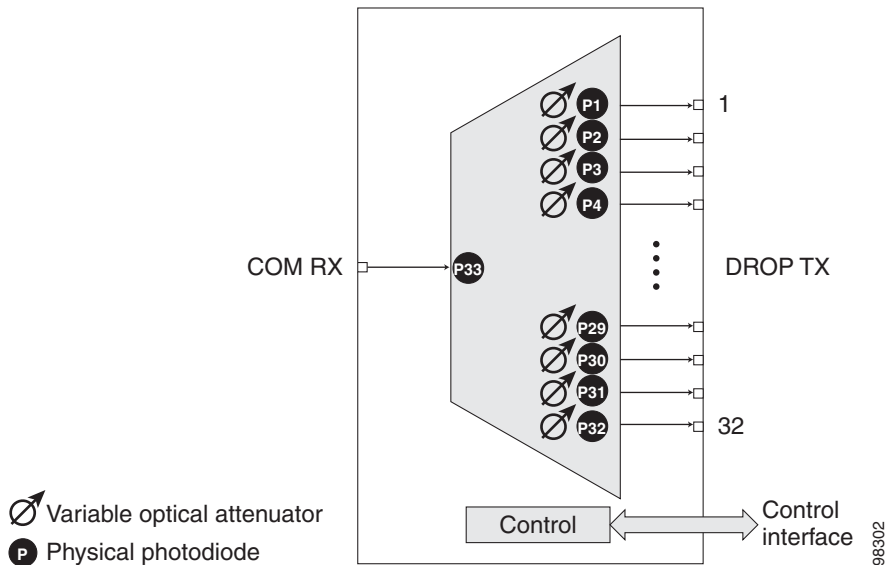


Figure 2-43 shows the 32DMX-O optical module functional block diagram.

Figure 2-43 32DMX-O Optical Module Functional Block Diagram



2.7.2.1 Power Monitoring

Physical photodiodes P1 through P33 monitor the power for the 32DMX-O card. The returned power level values are calibrated to the ports as shown in Table 2-38.

Table 2-38 32DMX-O Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	DROP	DROP TX
P33	INPUT COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.7.2.2 32DMX-O Card-Level Indicators

The 32DMX-O card has three card-level LED indicators, described in [Table 2-39](#).

Table 2-39 32DMX-O Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the 32DMX-O is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.7.2.3 32DMX-O Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The 32DMX-O card has five sets of ports located on the faceplate. MON is the output monitor port. COM RX is the line input. The xx.x to yy.y TX ports represent the four groups of eight channels ranging from wavelength xx.x to wavelength yy.y according to the channel plan.

2.7.3 32DMX Card

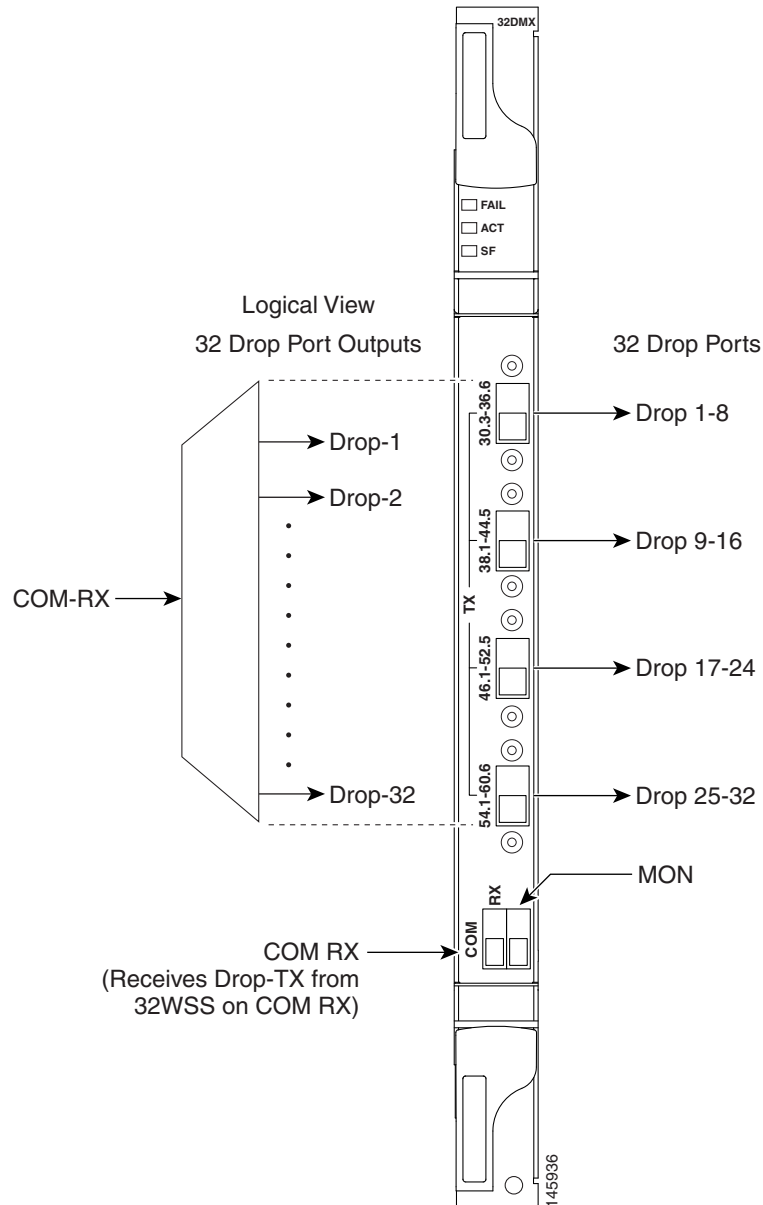
The 32-Channel Demultiplexer (32DMX) card is a single-slot optical demultiplexer. The card receives an aggregate optical signal on its COM RX port and demultiplexes it into 32 100-GHz-spaced channels. The 32DMX card can be installed in Slots 1 to 6 and in Slots 12 to 17.

The 32DMX includes these high-level features:

- **COM RX port:** COM RX is the input port for the aggregate optical signal being demultiplexed. This port is supported by both a VOA for optical power regulation and a photodiode for optical power monitoring.
- **DROP ports (1 to 32):** On its output, the 32DMX provides 32 drop ports that are typically used for dropping channels within the ROADM node. Each drop port has a photodiode for optical power monitoring. Unlike the two-slot 32DMX-O demultiplexer, the drop ports on the 32DMX do not have a VOA per channel for optical power regulation.
- **A terminal site can be configured using only a 32WSS card and a 32DMX card plugged into the east or west side of the shelf.**

[Figure 2-44](#) shows the 32DMX card front panel and the basic traffic flow through the ports.

Figure 2-44 32DMX Faceplate and Ports



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

The 32DMX front panel has connectors for 32 DROP TX ports. These ports are connected using four 8-fiber MPO ribbon connectors. The incoming optical signal to the demultiplexer comes into the COM RX port. This input port is connected using a single LC duplex optical connector.

A block diagram of the 32DMX card is shown in Figure 2-45.

Figure 2-45 32DMX Block Diagram

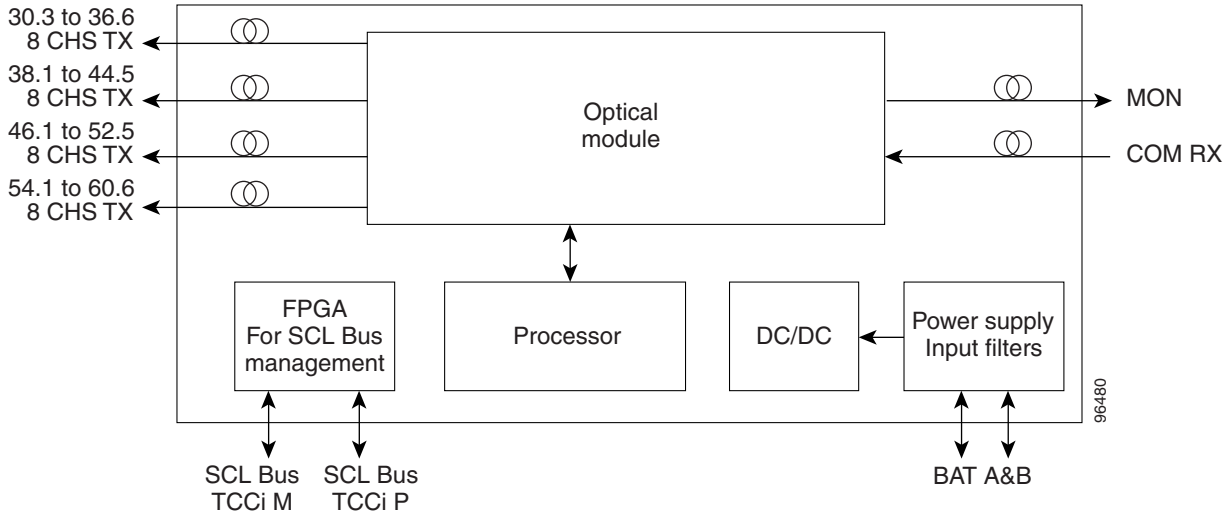
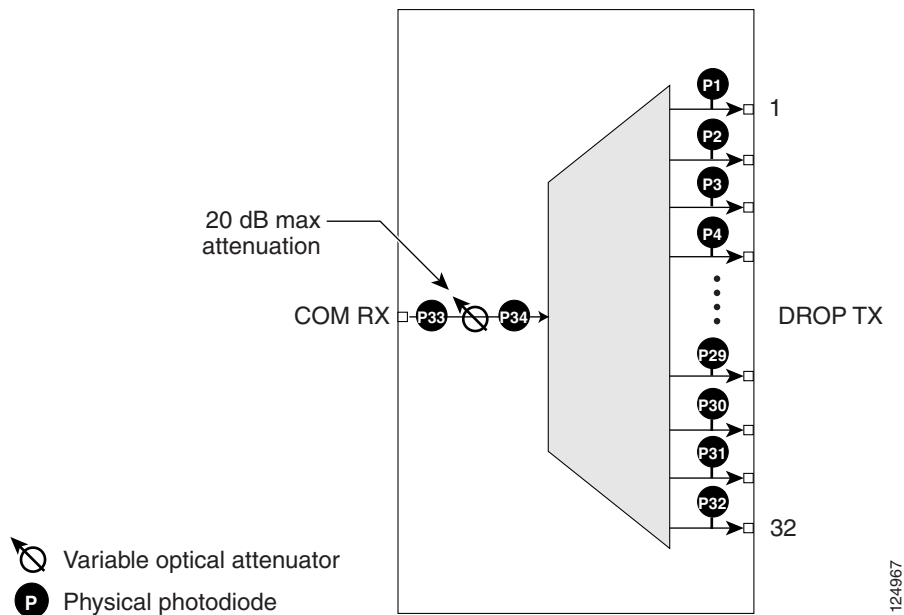


Figure 2-46 shows the 32DMX optical module functional block diagram.

Figure 2-46 32DMX Optical Module Functional Block Diagram



2.7.3.1 ROADM

The 32DMX card works in conjunction with the 32WSS card to create a software-controlled network element (NE) with ROADM functionality. ROADM functionality requires two 32DMX single-slot cards and two 32WSS double-slot cards (six slots total in the ONS 15454 chassis).

Equipped with ROADM functionality, ONS 15454 MSTP nodes can be configured at the optical channel level using CTC, Cisco MetroPlanner, and Cisco Transport Manager (CTM). Both the 32DMX card and 32WSS cards utilize planar lightwave circuit (PLC) technology to perform wavelength-level processing.

2.7.3.2 Power Monitoring

Physical photodiodes P1 through P33 monitor the power for the 32DMX card. The returned power level values are calibrated to the ports as shown in [Table 2-40](#).

Table 2-40 32DMX Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	DROP	DROP TX
P33	INPUT COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.7.3.3 32DMX Card-Level Indicators

[Table 2-41](#) describes the three card-level LED indicators on the 32DMX card.

Table 2-41 32DMX Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the 32DMX card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.7.3.4 32DMX Port-Level Indicators

You can find the status of the 32DMX ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot.

The 32DMX card has five ports located on the faceplate. The port labeled COM RX is the line input (it typically receives DROP TX from the 32WSS module). The TX ports are 32 drop ports. The connectors provide four groups of eight channels ranging from wavelength xx.x to wavelength yy.y according to the channel plan.

2.7.4 32DMX-L Card

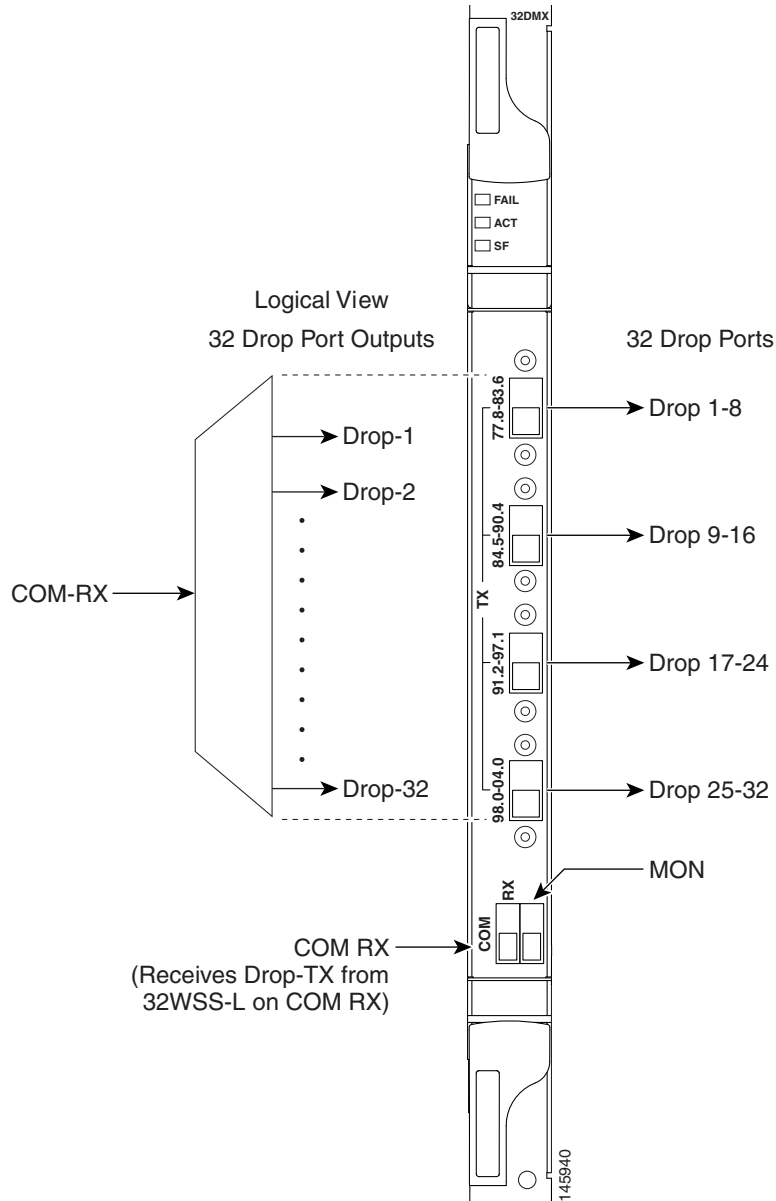
The 32-Channel Demultiplexer L-Band card (32DMX-L) is a single-slot optical demultiplexer. The card receives an aggregate optical signal on its COM RX port and demultiplexes it into 32 100-GHz-spaced channels. The 32DMX-L card is particularly well suited for use in networks that employ DS fiber or SMF-28 single-mode fiber. The 32DMX-L card can be installed in Slots 1 to 6 and in Slots 12 to 17.

The 32DMX-L card includes these high-level features:

- **COM RX port:** COM RX is the input port for the aggregate optical signal being demultiplexed. This port is supported by both a VOA for optical power regulation and a photodiode for optical power monitoring.
- **DROP ports (1 to 32):** On its output, the 32DMX-L card provides 32 drop ports that are typically used for dropping channels within the ROADM node. Each drop port has a photodiode for optical power monitoring. Unlike the two-slot 32DMX-O demultiplexer, the drop ports on the 32DMX-L do not have a VOA per channel for optical power regulation.
- A terminal site can be configured using only a 32WSS-L card and a 32DMX-L card plugged into the east or west side of the shelf.

Figure 2-47 shows the 32DMX-L card front panel and the basic traffic flow through the ports.

Figure 2-47 32DMX-L Faceplate and Ports



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

The 32DMX-L front panel has connectors for 32 DROP TX ports. These ports are connected using four 8-fiber MPO ribbon connectors. The incoming optical signal to the demultiplexer comes into COM RX. This input port is connected using a single LC duplex optical connector.

A block diagram of the 32DMX-L card is shown in Figure 2-45.

Figure 2-48 32DMX-L Block Diagram

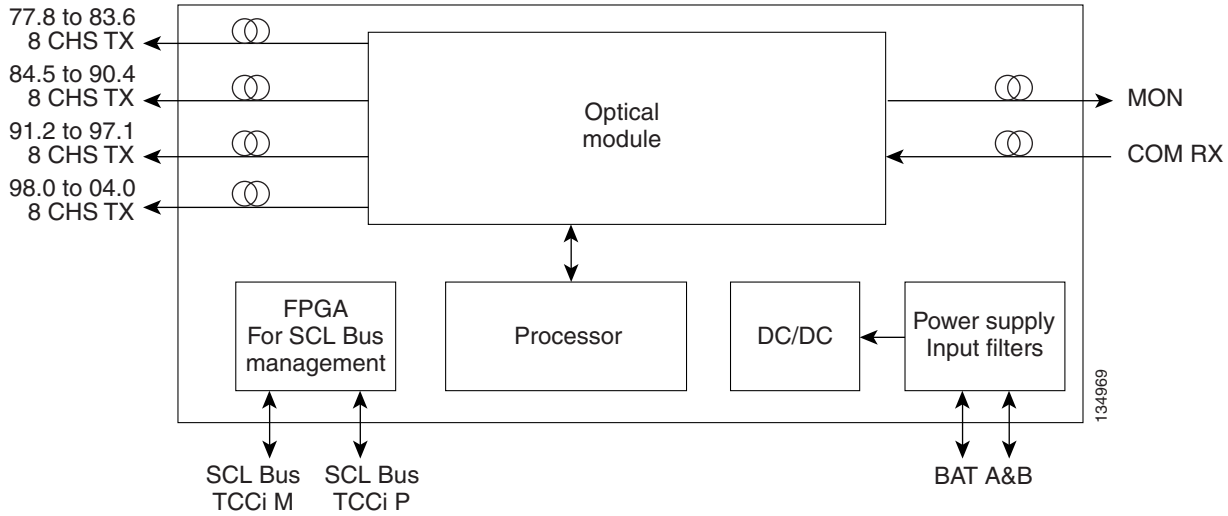
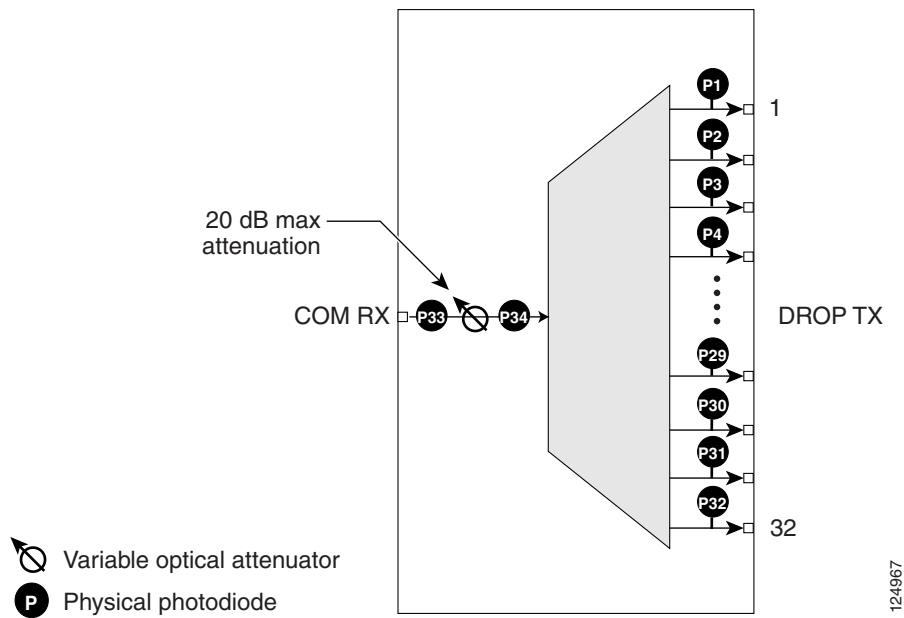


Figure 2-46 shows the 32DMX-L optical module functional block diagram.

Figure 2-49 32DMX-L Optical Module Functional Block Diagram



2.7.4.1 ROADM

The 32DMX-L card works in conjunction with the 32WSS-L card to create a software-controlled NE with ROADM functionality. ROADM functionality requires two 32DMX-L single-slot cards and two 32WSS-L double-slot cards (six slots total in the ONS 15454 chassis).

Equipped with ROADM functionality, ONS 15454 MSTP nodes can be configured at the optical channel level using CTC, Cisco MetroPlanner, and CTM. Both the 32DMX-L card and 32WSS-L cards utilize PLC technology to perform wavelength-level processing.

2.7.4.2 Power Monitoring

Physical photodiodes P1 through P33 monitor the power for the 32DMX-L card. The returned power level values are calibrated to the ports as shown in [Table 2-40](#).

Table 2-42 32DMX-L Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	DROP	DROP TX
P33	INPUT COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.7.4.3 32DMX-L Card-Level Indicators

[Table 2-41](#) describes the three card-level LED indicators on the 32DMX-L card.

Table 2-43 32DMX-L Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the 32DMX-L card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.7.4.4 32DMX-L Port-Level Indicators

You can find the status of the 32DMX-L ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot.

The 32DMX-L card has five ports located on the faceplate. The port labeled COM RX is the line input (it typically receives DROP TX from the 32WSS-L module). The TX ports are 32 drop ports. The connectors provide four groups of eight channels ranging from wavelength xx.x to wavelength yy.y according to the channel plan.

2.7.5 32WSS Card

The 32-Channel Wavelength Selective Switch (32WSS) card performs channel add/drop processing within the ONS 15454 DWDM node. The 32WSS works in conjunction with the 32DMX to implement ROADM functionality. Equipped with ROADM functionality, the ONS 15454 DWDM can be configured to add or drop individual optical channels using CTC, Cisco MetroPlanner, and CTM.

An ROADM NE utilizes two 32WSS cards (two slots each) and two 32DMX cards (one slot each), for a total of six slots in the chassis. For a diagram of a typical ROADM configuration, see the [“3.1.4 ROADM Node” section on page 3-8](#). The 32WSS card can be installed in Slots 1 and 2, 3 and 4, 5 and 6, 12 and 13, 14 and 15, or 16 and 17.

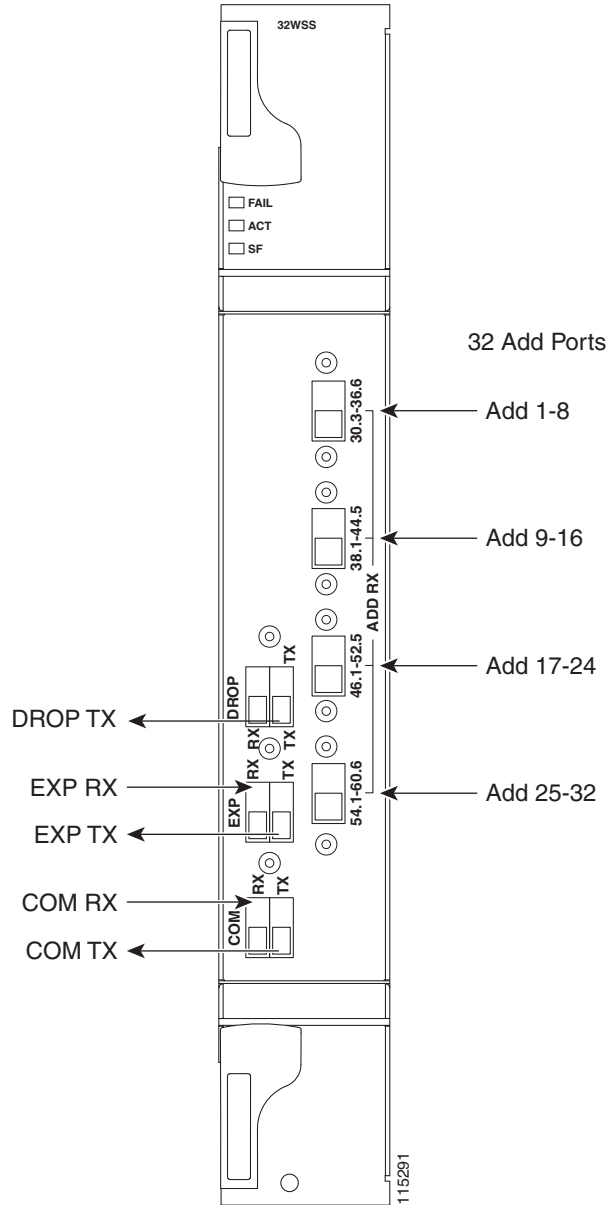
The 32WSS has six types of ports:

- **ADD RX ports (1 to 32):** These ports are used for adding channels. Each add channel is associated with an individual switch element that selects whether an individual channel is added. Each add port has optical power regulation provided by a VOA. The 32WSS has four physical receive connectors that accept MPO cables on its front panel for the client input interfaces. MPO cables break out into eight separate cables.
- **EXP RX port:** The EXP RX port receives an optical signal from another 32WSS module in the same NE.
- **EXP TX port:** The EXP TX port sends an optical signal to the other 32WSS module within the NE.
- **COM TX port:** The COM TX port sends an aggregate optical signal to a booster amplifier card (for example, OPT-BST) for transmission outside of the NE.
- **COM RX port:** The COM RX port receives the optical signal from a preamplifier and sends it to the optical splitter.
- **DROP TX port:** The DROP TX port sends the split-off optical signal that contains drop channels to the 32DMX card where the channels are further processed and dropped.

A terminal site can be configured using only a 32WSS card and a 32DMX card plugged into the east or west side of the shelf.

[Figure 2-50](#) shows the 32WSS module front panel and identifies the traffic flow through the ports.

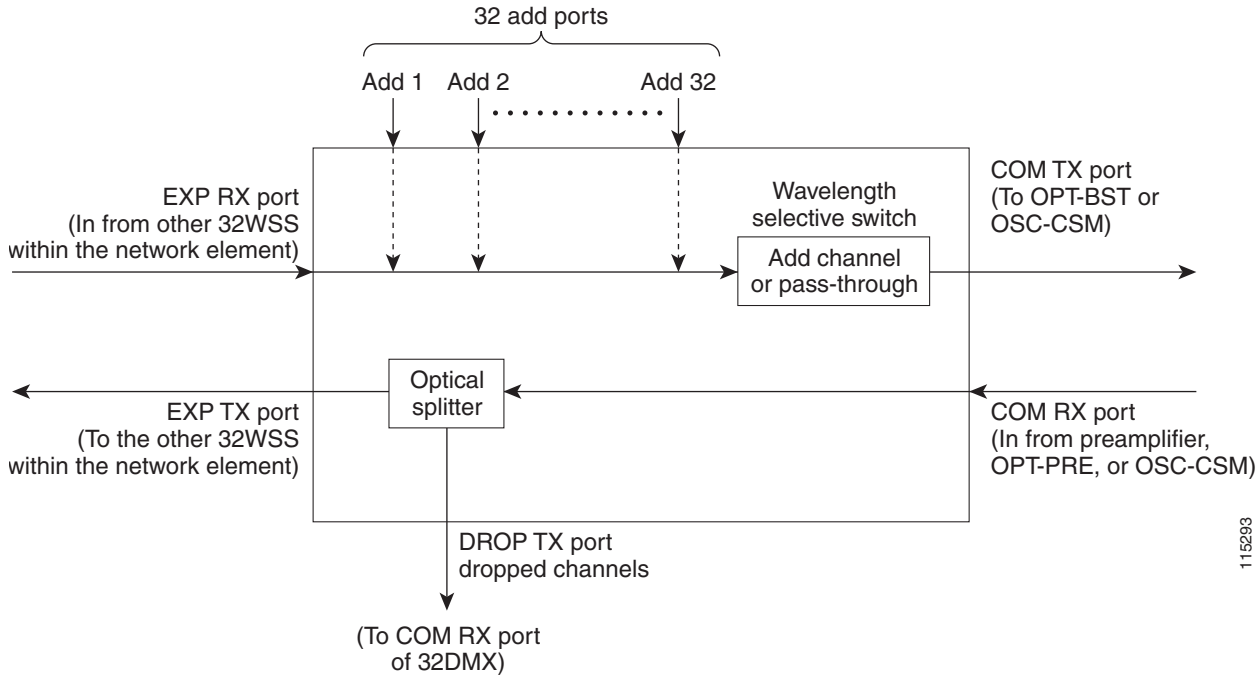
Figure 2-50 32WSS Faceplate and Ports



For information on safety labels for the card, see the “[2.2.2 Class 1M Laser Product Cards](#)” section on page 2-15.

Figure 2-51 provides a high-level functional block diagram of the 32WSS card.

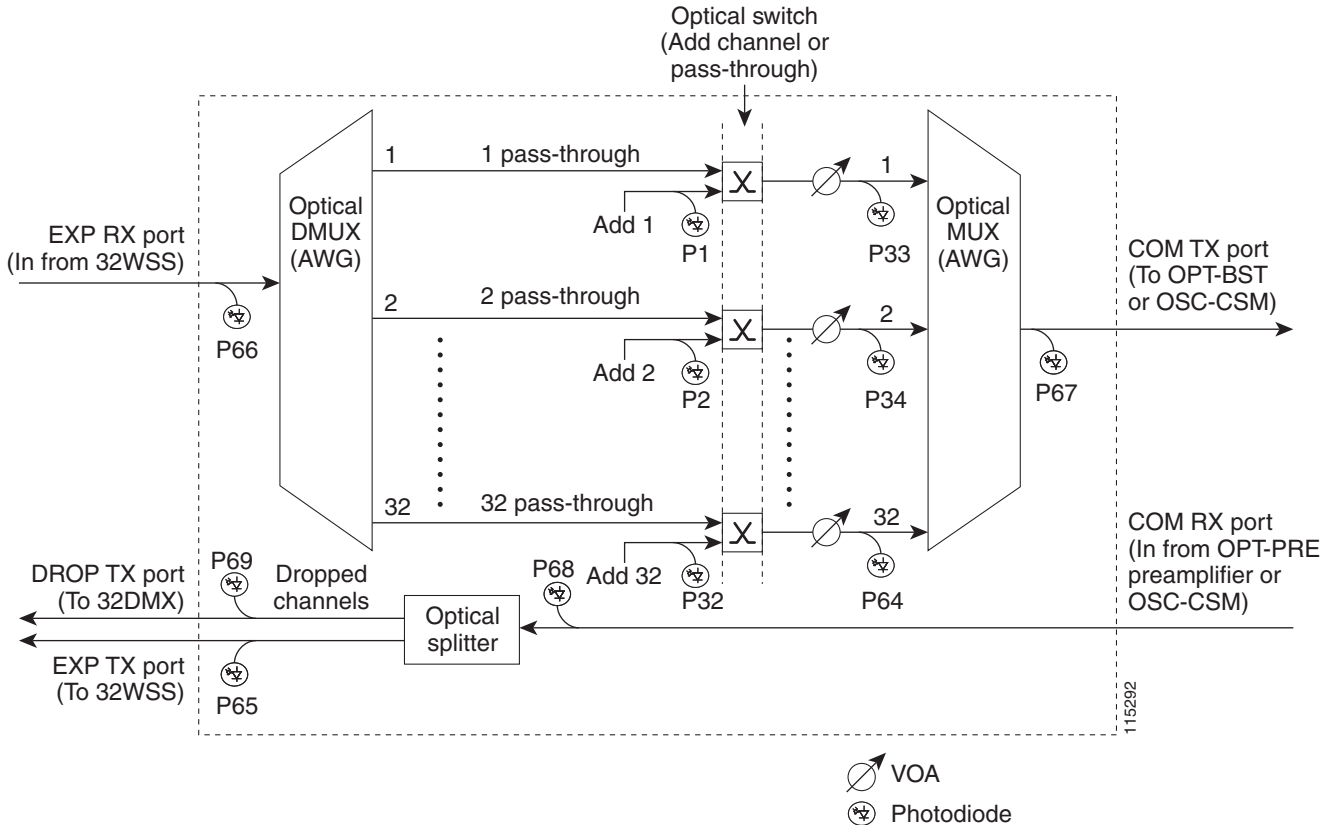
Figure 2-51 32WSS Block Diagram



115293

Aggregate optical signals that enter the EXP RX and COM RX port are processed in two ways. The optical processing stages are shown in [Figure 2-52](#), which provides a detailed optical functional diagram of the 32WSS card.

Figure 2-52 32WSS Optical Block Diagram



The EX PORT and COM PORT operate as follows:

- **EXP RX Port Add Channel/Pass-through Processing**

The incoming optical signal is received at the EXP RX port from the other 32WSS module within the NE. The incoming aggregate optical signal is demultiplexed into 32 individual wavelength components, or channels. Then, each channel is individually processed by the optical switch, which performs add/pass-through processing. Under software control, the switch either selects the optical channel coming in from the demultiplexer (the pass-through channel) or it selects the external ADD channel. If the ADD port channel is selected, the optical signal coming from the demultiplexer is blocked, and the ADD channel is transmitted in its place.

After the optical switch stage, all of the channels are multiplexed together into an aggregate optical signal, which is sent out on the COM TX port. The output is typically connected to an OPT-BST or OPT-BST-E (in the event a booster amplifier is needed) or to an OSC-CSM (if no amplification is needed).

- **COM RX Port Optical Splitter Processing**

The incoming optical signal received at the COM RX port and is applied to the optical splitter within the 32WSS. Channels that are designated to be dropped are diverted optically to the DROP TX port by the splitter. The DROP TX port on the 32WSS is typically connected to the COM RX port of the 32DMX where the drop channels are dropped. Channels that are not dropped pass through the optical splitter and flow out of the EXP TX port of the 32WSS. This optical signal is typically connected to the other 32WSS module within the NE.

2.7.5.1 Power Monitoring

Physical photodiodes P1 through P69 monitor the power for the 32WSS card. The returned power level values are calibrated to the ports as shown in [Table 2-44](#).

Table 2-44 32WSS Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	ADD (Power ADD)	ADD RX
P33–P64 ¹	PASS THROUGH	COM TX
	ADD (Power)	COM TX
P65	OUT EXP	EXP TX
P66	IN EXP	EXP RX
P67	OUT COM	COM TX
P68	IN COM	COM RX
P69	DROP	DROP TX

1. P33–P64 monitor either ADD or PASSTHROUGH power, depending on the state of the optical switch

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.7.5.2 32WSS Card-Level Indicators

[Table 2-45](#) describes the three card-level LED indicators on the 32WSS card.

Table 2-45 32WSS Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the 32WSS card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card’s ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.7.5.3 32WSS Port-Level Indicators

You can find the status of the 32WSS card’s ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The 32WSS card has five sets of ports located on the faceplate. COM RX is the line input, COM TX is the line output, EXP RX is the port where a channel can be added

or passed through, EXP TX is the port that passes through the channels that are not dropped, and DROP TX is the port for the dropped channels. The xx.x to yy.y TX ports represent the four groups of eight channels ranging from wavelength xx.x to wavelength yy.y according to the channel plan.

2.7.6 32WSS-L Card

The 32-Channel Wavelength Selective Switch L-Band (32WSS-L) card performs channel add/drop processing within the ONS 15454 DWDM node. The 32WSS-L works in conjunction with the 32DMX-L to implement ROADM functionality within the L band (1570 to 1620 nm). The 32WSS-L card is particularly well suited for use in networks that employ DS fiber or SMF-28 single-mode fiber. Equipped with ROADM functionality, the ONS 15454 DWDM can be configured to add or drop individual optical channels using CTC, Cisco MetroPlanner, and CTM.

An ROADM NE utilizes two 32WSS-L cards (two slots each) and two 32DMX-L cards (one slot each), for a total of six slots in the chassis. For a diagram of a typical ROADM configuration, see the [“3.1.4 ROADM Node” section on page 3-8](#). The 32WSS-L card can be installed in Slots 1 and 2, 3 and 4, 5 and 6, 12 and 13, 14 and 15, or 16 and 17.

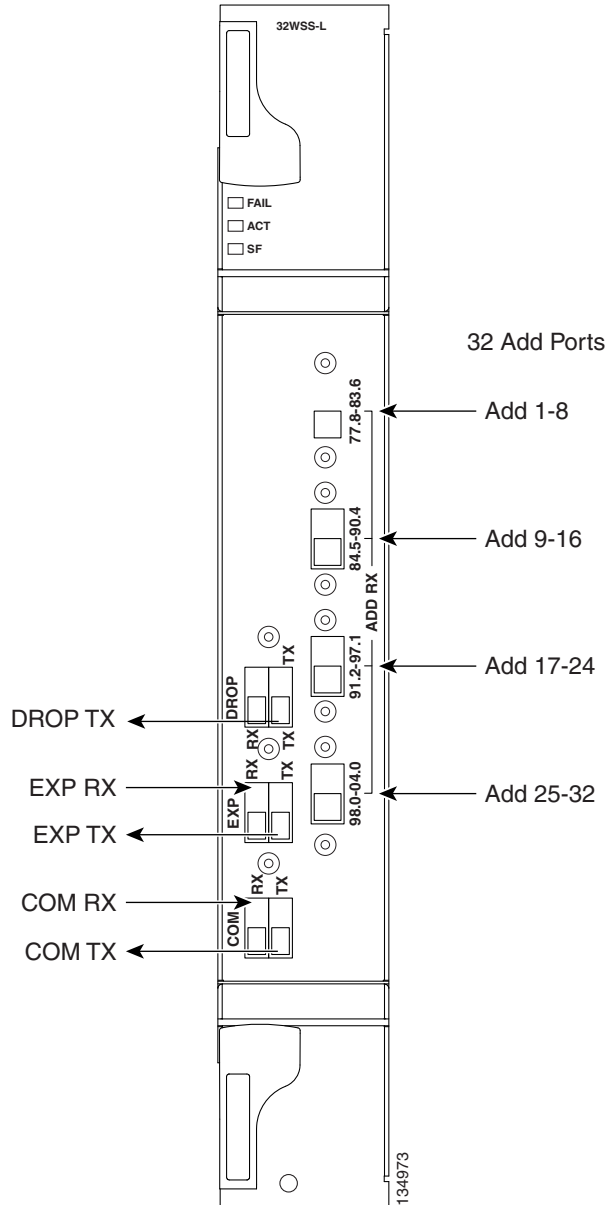
The 32WSS-L has six types of ports:

- ADD RX ports (1 to 32): These ports are used for adding channels. Each add channel is associated with an individual switch element that selects whether an individual channel is added. Each add port has optical power regulation provided by a VOA.
- EXP RX port: The EXP RX port receives an optical signal from another 32WSS-L module in the same NE.
- EXP TX port: The EXP TX port sends an optical signal to the other 32WSS-L module within the NE.
- COM TX port: The COM TX port sends an aggregate optical signal to a booster amplifier card (for example, OPT-BST) for transmission outside of the NE.
- COM RX port: The COM RX port receives the optical signal from a preamplifier and sends it to the optical splitter.
- DROP TX port: The DROP TX port sends the split off optical signal that contains drop channels to the 32DMX-L card where the channels are further processed and dropped.

A terminal site can be configured using only a 32WSS-L card and a 32DMX-L card plugged into the east or west side of the shelf.

[Figure 2-53](#) shows the 32WSS-L module front panel and identifies the traffic flow through the ports.

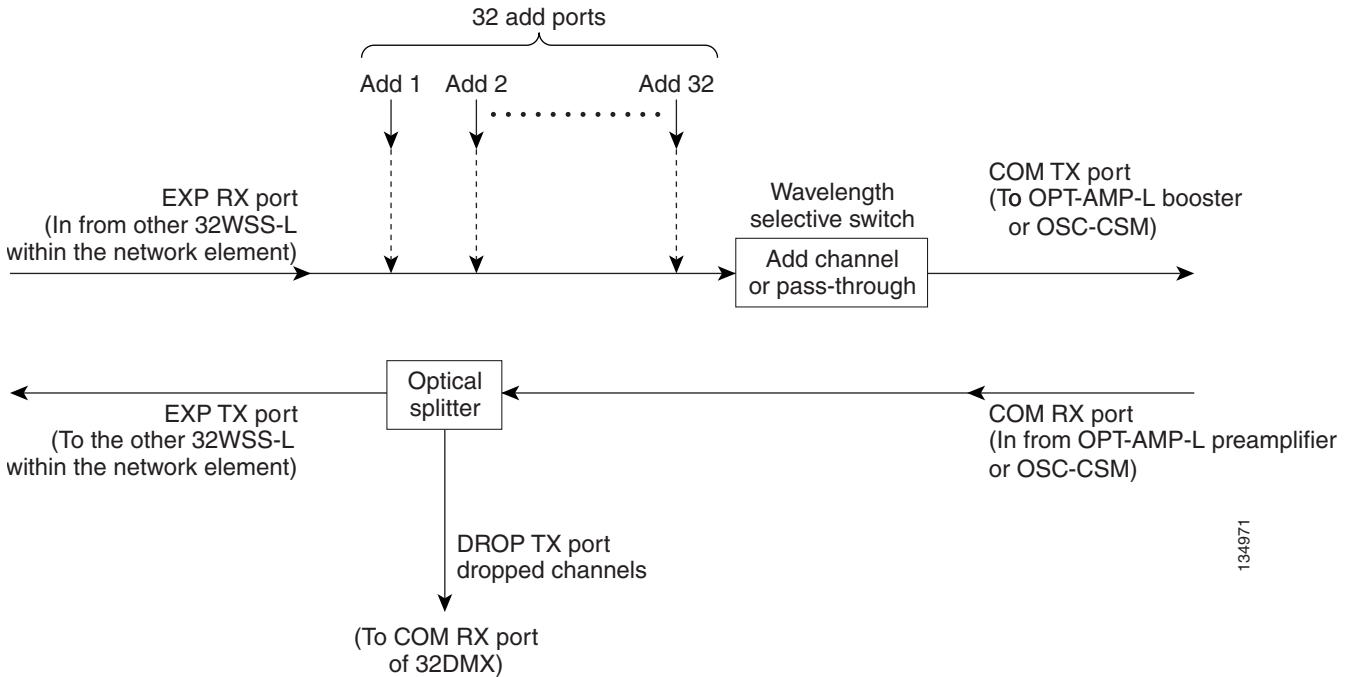
Figure 2-53 32WSS-L Faceplate and Ports



For information on safety labels for the card, see the “[2.2.2 Class 1M Laser Product Cards](#)” section on [page 2-15](#).

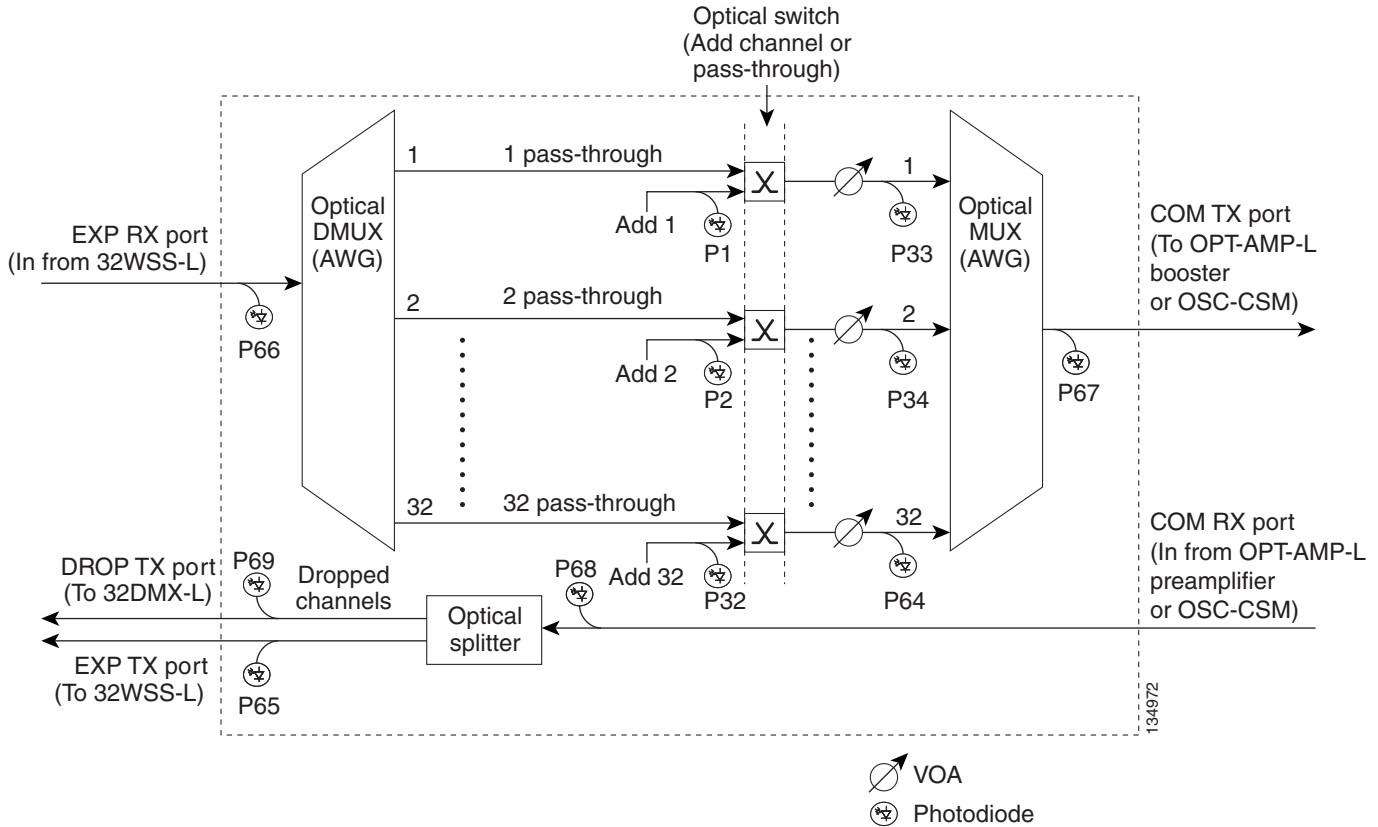
[Figure 2-54](#) provides a high-level functional block diagram of the 32WSS-L card.

Figure 2-54 32WSS-L Block Diagram



Aggregate optical signals that enter the EXP RX and COM RX ports are processed in two ways. The optical processing stages are shown in [Figure 2-55](#), which provides a detailed optical functional diagram of the 32WSS-L card.

Figure 2-55 32WSS-L Optical Block Diagram



The EX PORT and COM PORT operate as follows:

- EXP RX Port Add Channel/Pass-through Processing

The incoming optical signal is received at the EXP RX port from the other 32WSS-L module within the NE. The incoming aggregate optical signal is demultiplexed into 32 individual wavelength components, or channels. Then each channel is individually processed by the optical switch, which does add/pass-through processing. Under software control, the switch either selects the optical channel coming in from the demultiplexer (the pass-through channel) or it selects the external ADD channel. If the ADD port channel is selected, the optical signal coming from the demultiplexer is blocked, and the ADD channel is transmitted in its place.

After the optical switch stage, all of the channels are multiplexed together into an aggregate optical signal, which is sent out on the COM TX port. The output is typically connected to an OPT-AMP-L (in the event a booster amplifier is needed) or to an OSC-CSM (if no amplification is needed).

- COM RX Port Optical Splitter Processing

The incoming optical signal received at the COM RX port is applied to the optical splitter within the 32WSS-L. Channels that are designated to be dropped are diverted optically to the DROP TX port by the splitter. The DROP TX port on the 32WSS-L is typically connected to the COM RX port of the 32DMX-L where the drop channels are dropped. Channels that are not dropped pass through the optical splitter and flow out of the EXP TX port of the 32WSS-L. This optical signal is typically connected to the other 32WSS-L module within the NE.

2.7.6.1 Power Monitoring

Physical photodiodes P1 through P69 monitor the power for the 32WSS-L card. The returned power level values are calibrated to the ports as shown in [Table 2-46](#).

Table 2-46 32WSS-L Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P32	ADD (Power ADD)	ADD RX
P33–P64 ¹	PASS THROUGH	COM TX
	ADD (Power)	COM TX
P65	OUT EXP	EXP TX
P66	IN EXP	EXP RX
P67	OUT COM	COM TX
P68	IN COM	COM RX
P69	DROP	DROP TX

1. P33–P64 monitor either ADD or PASSTHROUGH power, depending on the state of the optical switch

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.7.6.2 Channel Plan

The 32WSS-L card uses 32 channels on the ITU 100-GHz grid in a banded configuration (see [Table 2-47](#)).

Table 2-47 32WSS-L Channel Plan

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B77.8	77.8	190	1577.86
	78.6	189.9	1578.69
	79.5	189.8	1579.52
	80.3	189.7	1580.35
B81.1	81.1	189.6	1581.18
	82.0	189.5	1582.02
	82.8	189.4	1582.85
	83.6	189.3	1583.69
B84.5	84.5	189.2	1584.53
	85.3	189.1	1585.36
	86.2	189	1586.20
	87.0	188.9	1587.04

Table 2-47 32WSS-L Channel Plan (continued)

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B87.8	87.8	188.8	1587.88
	88.7	188.7	1588.73
	89.5	188.6	1589.57
	90.4	188.5	1590.41

Table 2-47 32WSS-L Channel Plan (continued)

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B91.2	91.2	188.4	1591.26
	92.1	188.3	1592.10
	92.9	188.2	1592.95
	93.7	188.1	1593.79
B94.6	94.6	188	1594.64
	95.4	187.9	1595.49
	96.3	187.8	1596.34
	97.1	187.7	1597.19
B98.0	98.0	187.6	1598.04
	98.8	187.5	1598.89
	99.7	187.4	1599.75
	00.6	187.3	1600.60
B01.4	01.4	187.2	1601.46
	02.3	187.1	1602.31
	03.1	187	1603.17
	04.0	186.9	1604.03

2.7.6.3 32WSS-L Card-Level Indicators

Table 2-45 describes the three card-level LED indicators on the 32WSS-L card.

Table 2-48 32WSS-L Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the 32WSS-L card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card's ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.7.6.4 32WSS-L Port-Level Indicators

You can find the status of the 32WSS-L card's ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The 32WSS-L card has five sets of ports located on the faceplate. COM RX is the line input, COM TX is the line output, EXP RX is the port where a channel can be added or passed through, EXP TX is the port that passes through the channels that are not

dropped, and DROP TX is the port for the dropped channels. The xx.x to yy.y TX ports represent the four groups of eight channels ranging from wavelength xx.x to wavelength yy.y according to the channel plan.

2.7.7 4MD-xx.x Card

The 4-Channel Multiplexer/Demultiplexer (4MD-xx.x) card multiplexes and demultiplexes four 100-GHz-spaced channels identified in the channel plan. The 4MD-xx.x card is designed to be used with band OADMs (both AD-1B-xx.x and AD-4B-xx.x).

The card is bidirectional. The demultiplexer and multiplexer functions are implemented in two different sections of the same card. In this way, the same card can manage signals flowing in opposite directions.

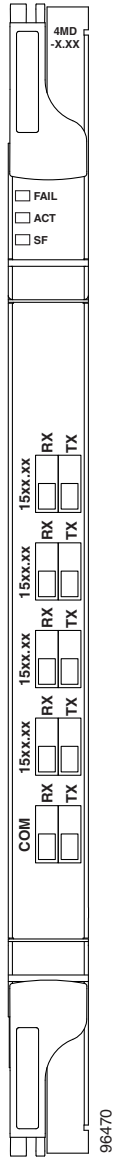
There are eight versions of this card that correspond with the eight sub-bands specified in [Table 2-49 on page 2-94](#). The 4MD-xx.x can be installed in Slots 1 to 6 and 12 to 17.

The 4MD-xx.x has the following features implemented inside a plug-in optical module:

- Passive cascade of interferential filters perform the channel multiplex/demultiplex function.
- Software-controlled VOAs at every port of the multiplex section regulate the optical power of each multiplexed channel.
- Software-monitored photodiodes at the input and output multiplexer and demultiplexer ports for power control and safety purposes.
- Software-monitored virtual photodiodes at the common DWDM output and input ports. A virtual photodiode is a firmware calculation of the optical power at that port. This calculation is based on the single channel photodiode reading and insertion losses of the appropriated paths.

[Figure 2-56](#) shows the 4MD-xx.x faceplate.

Figure 2-56 4MD-xx.x Faceplate



For information on safety labels for the card, see the “[2.2.2 Class 1M Laser Product Cards](#)” section on page 2-15.

Figure 2-57 shows a block diagram of the 4MD-xx.x card.

Figure 2-57 4MD-xx.x Block Diagram

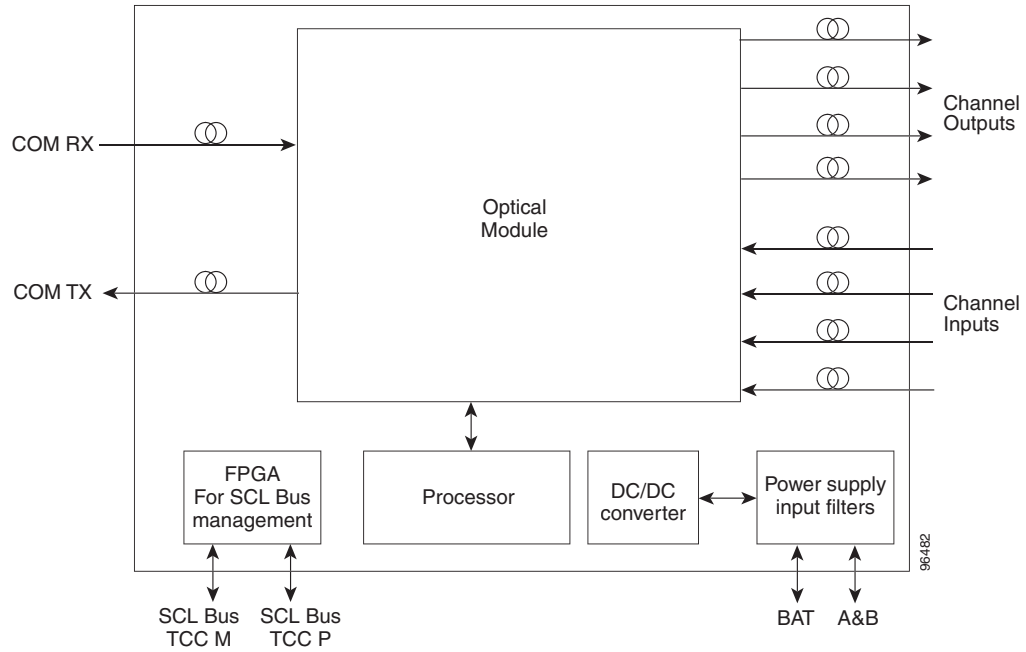
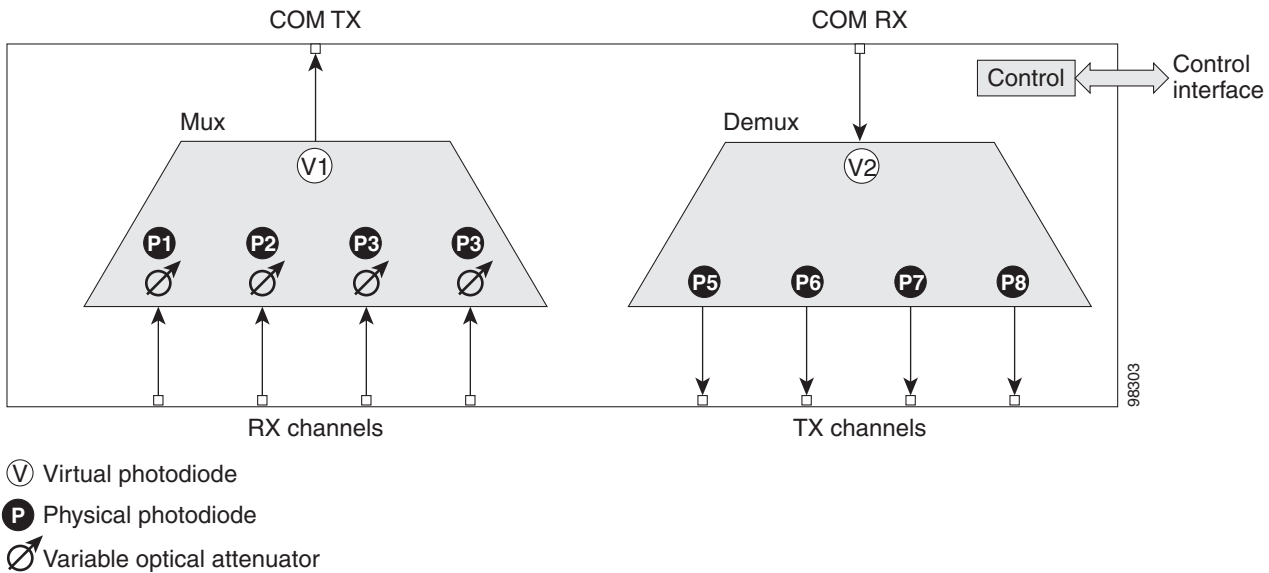


Figure 2-58 shows the 4MD-xx.x optical module functional block diagram.

Figure 2-58 4MD-xx.x Optical Module Functional Block Diagram



The optical module shown in Figure 2-58 is optically passive and consists of a cascade of interferential filters that perform the channel multiplexing and demultiplexing functions.

VOAs are present in every input path of the multiplex section in order to regulate the optical power of each multiplexed channel. Some optical input and output ports are monitored by means of photodiodes implemented both for power control and for safety purposes. An internal control manages VOA settings and functionality as well as photodiode detection and alarm thresholds. The power at the main output

and input ports is monitored through the use of virtual photodiodes. A virtual photodiode is implemented in the firmware of the plug-in module. This firmware calculates the power on a port, summing the measured values from all single channel ports (and applying the proper path insertion loss) and then providing the TCC2/TCC2P card with the obtained value.

2.7.7.1 Wavelength Pairs

Table 2-49 shows the band IDs and the add/drop channel IDs for the 4MD-xx.x card.

Table 2-49 4MD-xx.x Channel Sets

Band ID	Add/Drop Channel IDs
Band 30.3 (A)	30.3, 31.2, 31.9, 32.6
Band 34.2 (B)	34.2, 35.0, 35.8, 36.6
Band 38.1 (C)	38.1, 38.9, 39.7, 40.5
Band 42.1 (D)	42.1, 42.9, 43.7, 44.5
Band 46.1 (E)	46.1, 46.9, 47.7, 48.5
Band 50.1 (F)	50.1, 50.9, 51.7, 52.5
Band 54.1 (G)	54.1, 54.9, 55.7, 56.5
Band 58.1 (H)	58.1, 58.9, 59.7, 60.6

2.7.7.2 Power Monitoring

Physical photodiodes P1 through P8 and virtual photodiodes V1 and V2 monitor the power for the 4MD-xx.x card. The returned power level values are calibrated to the ports as shown in Table 2-50.

Table 2-50 4MD-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P4	ADD	COM TX
P5–P8	DROP	DROP TX
V1	OUT COM	COM TX
V2	IN COM	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.7.7.3 4MD-xx.x Card-Level Indicators

The 4MD-xx.x card has three card-level LED indicators, described in Table 2-51.

Table 2-51 4MD-xx.x Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the 4MD-xx.x card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card's ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.7.7.4 4MD-xx.x Port-Level Indicators

You can find the status of the card ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The 4MD-xx.x card has five sets of ports located on the faceplate. COM RX is the line input. COM TX is the line output. The 15xx.x TX ports represent demultiplexed channel outputs 1 to 4. The 15xx.x RX ports represent multiplexed channel inputs 1 to 4.

2.8 Optical Add/Drop Cards

This section discusses the optical add/drop multiplexer cards, including the AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-4B-xx.x, and AD-1B-xx.x cards.

2.8.1 AD-1C-xx.x Card

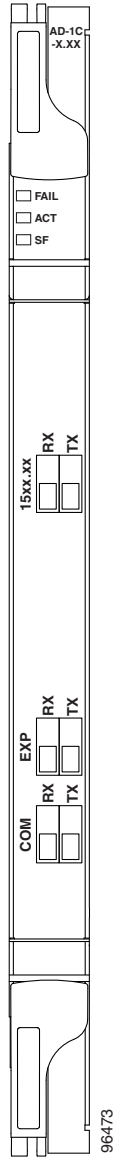
The 1-Channel OADM (AD-1C-xx.x) card passively adds or drops one of the 32 channels utilized within the 100-GHz-spacing of the DWDM card system. Thirty-two versions of this card—each designed only for use with one wavelength—are used in the ONS 15454 DWDM system. Each wavelength version of the card has a different part number. The AD-1C-xx.x can be installed in Slots 1 to 6 and 12 to 17.

The AD-1C-xx.x has the following internal features:

- Two cascaded passive optical interferential filters perform the channel add and drop functions.
- One software-controlled VOA regulates the optical power of the inserted channel.
- Software-controlled VOA regulates the insertion loss of the express optical path.
- Internal control of the VOA settings and functions, photodiode detection, and alarm thresholds.
- Software-monitored virtual photodiodes (firmware calculations of port optical power) at the common DWDM output and input ports.

Figure 2-59 shows the AD-1C-xx.x faceplate.

Figure 2-59 AD-1C-xx.x Faceplate



For information on safety labels for the card, see the “[2.2.2 Class 1M Laser Product Cards](#)” section on page 2-15.

[Figure 2-60](#) shows a block diagram of the AD-1C-xx.x card.

Figure 2-60 AD-1C-xx.x Block Diagram

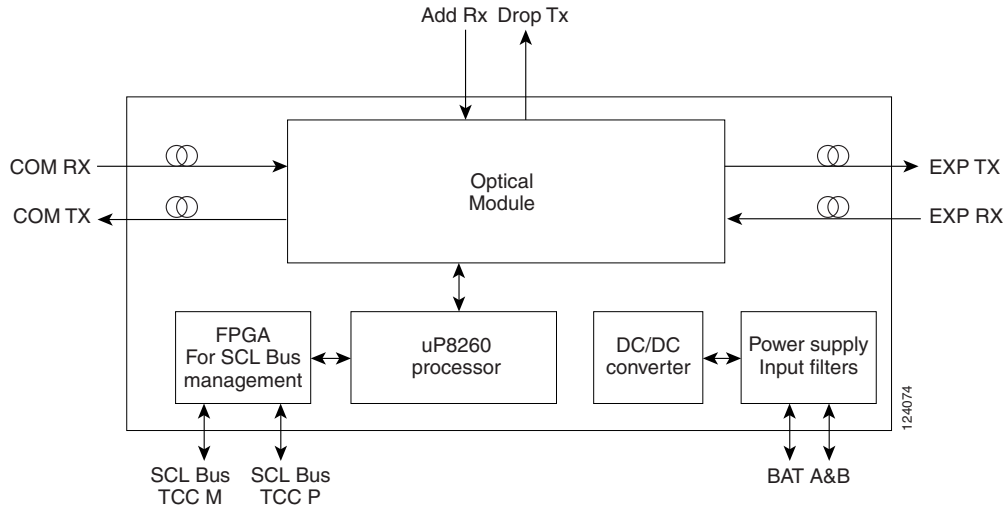
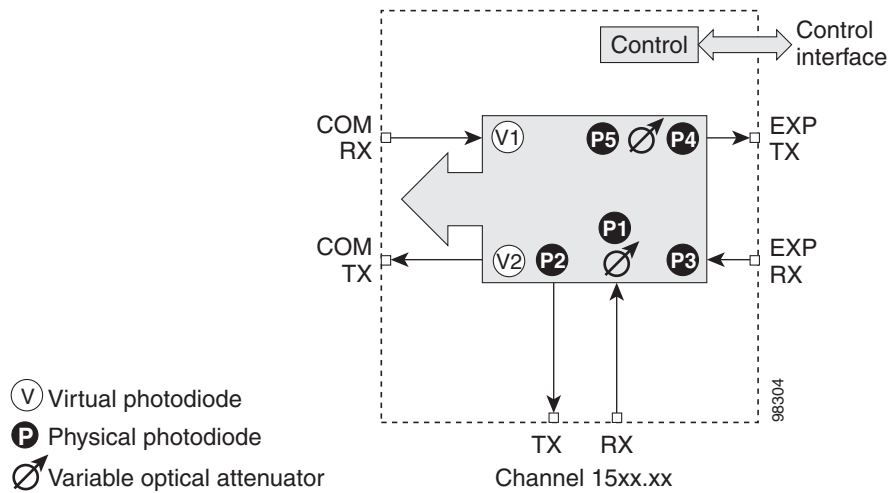


Figure 2-61 shows the AD-1C-xx.x optical module functional block diagram.

Figure 2-61 AD-1C-xx.x Optical Module Functional Block Diagram



2.8.1.1 Power Monitoring

Physical photodiodes P1 through P4 and virtual photodiodes V1 and V2 monitor the power for the AD-1C-xx.x card. The returned power level values are calibrated to the ports as shown in Table 2-52

Table 2-52 AD-1C-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	ADD	COM TX
P2	DROP	DROP TX
P3	IN EXP	EXP RX

Table 2-52 AD-1C-xx.x Port Calibration (continued)

Photodiode	CTC Type Name	Calibrated to Port
P4	OUT EXP	EXP TX
V1	IN COM	COM RX
V2	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.8.1.2 AD-1C-xx.x Card-Level Indicators

The AD-1C-xx.x card has three card-level LED indicators, described in [Table 2-53](#).

Table 2-53 AD-1C-xx.x Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the AD-1C-xx.x card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure. The SF LED also illuminates when the transmitting and receiving fibers are incorrectly connected. When the fibers are properly connected, the LED turns off.

2.8.1.3 AD-1C-xx.x Port-Level Indicators

You can find the status of the card port using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The AD-1C-xx.x has six LC-PC-II optical ports: two for add/drop channel client input and output, two for express channel input and output, and two for communication.

2.8.2 AD-2C-xx.x Card

The 2-Channel OADM (AD-2C-xx.x) card passively adds or drops two adjacent 100-GHz channels within the same band. Sixteen versions of this card—each designed for use with one pair of wavelengths—are used in the ONS 15454 DWDM system. The card bidirectionally adds and drops in two different sections on the same card to manage signal flow in both directions. Each version of the card has a different part number.

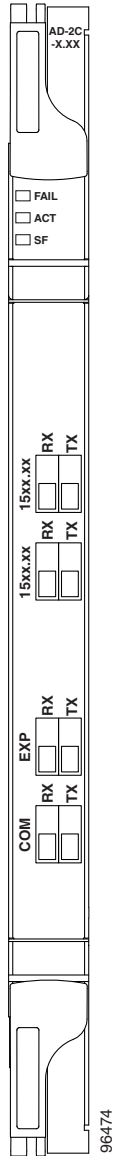
The AD-2C-xx.x has the following features:

- Passive cascade of interferential filters perform the channel add and drop functions.
- Two software-controlled VOAs in the add section, one for each add port, regulate the optical power of inserted channels.
- Software-controlled VOAs regulate insertion loss on express channels.
- Internal control of the VOA settings and functions, photodiode detection, and alarm thresholds.

- Software-monitored virtual photodiodes (firmware calculation of port optical power) at the common DWDM output and input ports.

Figure 2-62 shows the AD-2C-xx.x faceplate.

Figure 2-62 AD-2C-xx.x Faceplate



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

Figure 2-63 shows a block diagram of the AD-2C-xx.x card.

Figure 2-63 AD-2C-xx.x Block Diagram

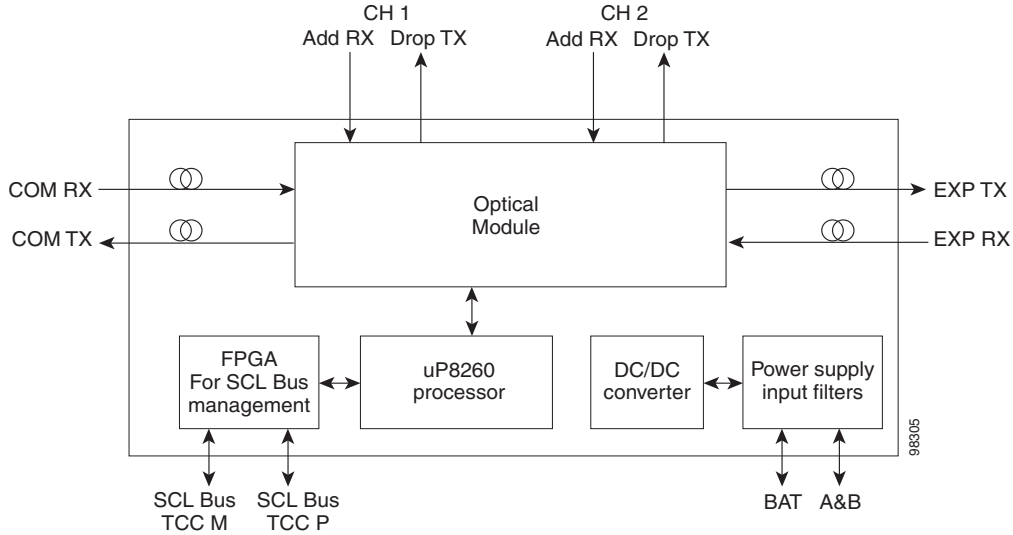
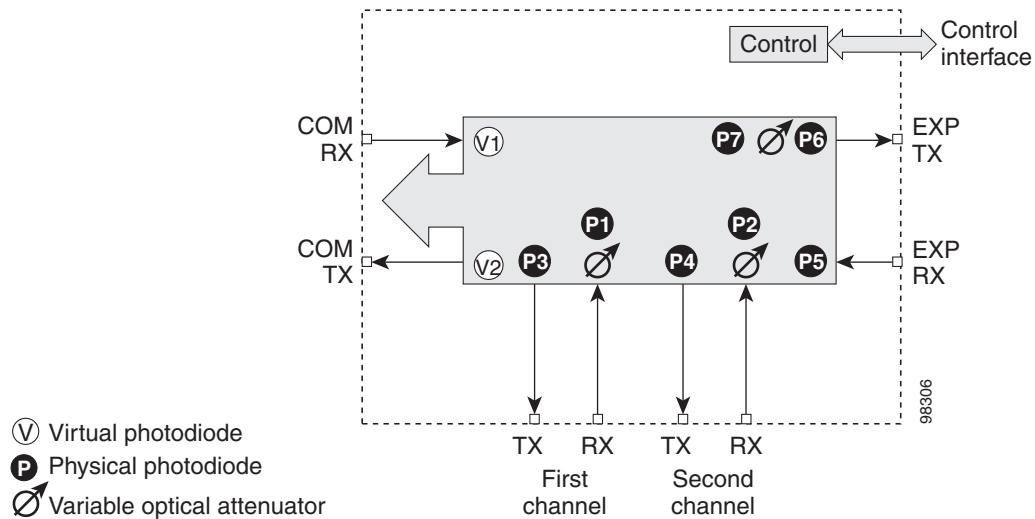


Figure 2-64 shows the AD-2C-xx.x optical module functional block diagram.

Figure 2-64 AD-2C-xx.x Optical Module Functional Block Diagram



2.8.2.1 Wavelength Pairs

The AD-2C-xx.x cards are provisioned for the wavelength pairs in [Table 2-54](#). In this table, channel IDs are given rather than wavelengths. To compare channel IDs with the actual wavelengths they represent, see [Table 2-6](#) on page 2-10.

Table 2-54 AD-2C-xx.x Channel Pairs

Band ID	Add/Drop Channel ID
Band 30.3 (A)	30.3, 31.2
	31.9, 32.6
Band 34.2 (B)	34.2, 35.0
	35.8, 36.6
Band 38.1 (C)	38.1, 38.9
	39.7, 40.5
Band 42.1 (D)	42.1, 42.9
	43.7, 44.5
Band 46.1 (E)	46.1, 46.9
	47.7, 48.5
Band 50.1 (F)	50.1, 50.9
	51.7, 52.5
Band 54.1 (G)	54.1, 54.9
	55.7, 56.5
Band 58.1 (H)	58.1, 58.9
	59.7, 60.6

2.8.2.2 Power Monitoring

Physical photodiodes P1 through P10 and virtual photodiodes V1 and V2 monitor the power for the AD-2C-xx.x card. The returned power level values are calibrated to the ports as shown in [Table 2-55](#).

Table 2-55 AD-2C-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P4	ADD	COM TX
P5–P8	DROP	DROP TX
P9	IN EXP	EXP RX
P10	OUT EXP	EXP TX
V1	IN COM	COM RX
V2	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.8.2.3 AD-2C-xx.x Card-Level Indicators

The AD-2C-xx.x card has three card-level LED indicators, described in [Table 2-56](#).

Table 2-56 AD-2C-xx.x Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the AD-2C-xx.x card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.8.2.4 AD-2C-xx.x Port-Level Indicators

You can find the status of the card port using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The AD-2C-xx.x card has eight LC-PC-II optical ports: four for add/drop channel client input and output, two for express channel input and output, and two for communication.

2.8.3 AD-4C-xx.x Card

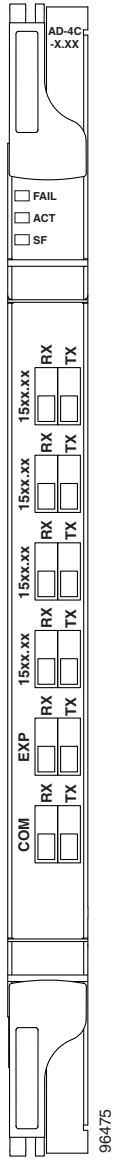
The 4-Channel OADM (AD-4C-xx.x) card passively adds or drops all four 100-GHz-spaced channels within the same band. Eight versions of this card—each designed for use with one band of wavelengths—are used in the ONS 15454 DWDM system. The card bidirectionally adds and drops in two different sections on the same card to manage signal flow in both directions. There are eight versions of this card with eight part numbers.

The AD-4C-xx.x has the following features:

- Passive cascade of interferential filters perform the channel add and drop functions.
- Four software-controlled VOAs in the add section, one for each add port, regulate the optical power of inserted channels.
- Two software-controlled VOAs regulate insertion loss on express and drop path, respectively.
- Internal control of the VOA settings and functions, photodiode detection, and alarm thresholds.
- Software-monitored virtual photodiodes (firmware calculation of port optical power) at the common DWDM output and input ports.

Figure 2-65 shows the AD-4C-xx.x faceplate.

Figure 2-65 AD-4C-xx.x Faceplate



For information on safety labels for the card, see the “[2.2.2 Class 1M Laser Product Cards](#)” section on [page 2-15](#).

[Figure 2-66](#) shows a block diagram of the AD-4C-xx.x card.

Figure 2-66 AD-4C-xx.x Block Diagram

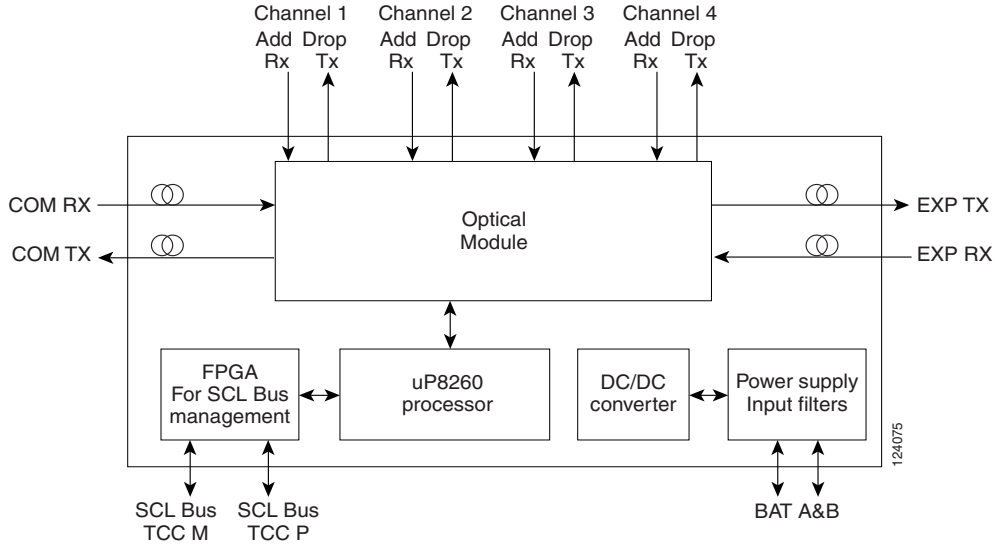
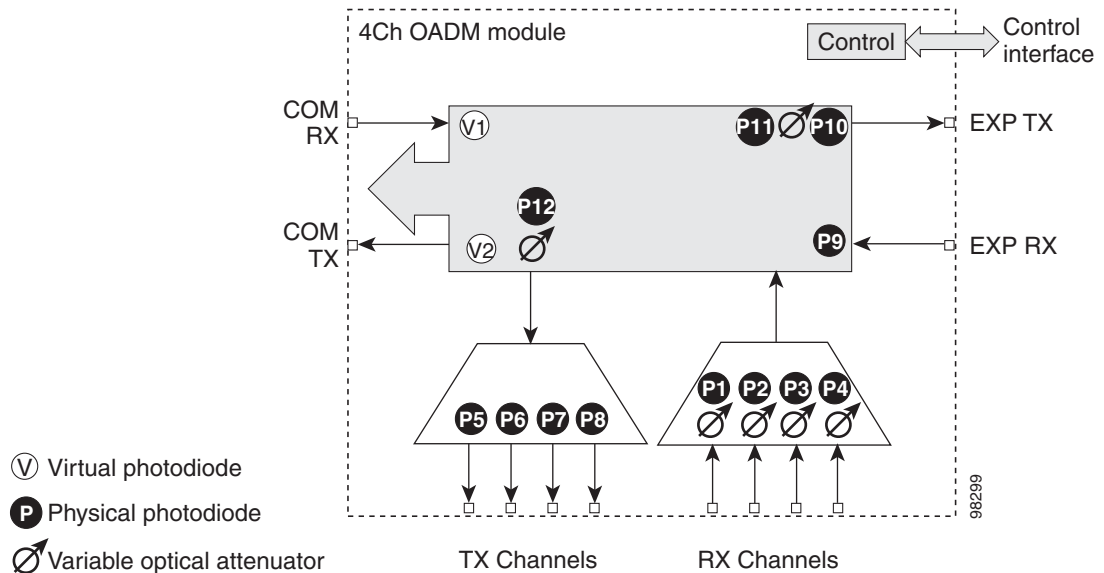


Figure 2-67 shows the AD-4C-xx.x optical module functional block diagram.

Figure 2-67 AD-4C-xx.x Optical Module Functional Block Diagram



2.8.3.1 Wavelength Sets

The AD-4C-xx.x cards are provisioned for the sets of four 100-GHz-spaced wavelengths shown [Table 2-57 on page 2-105](#).

Table 2-57 AD-4C-xx.x Channel Sets

Band ID	Add/Drop Wavelengths
Band 30.3 (A)	1530.3, 1531.2, 1531.9, 1532.6
Band 34.2 (B)	1534.2, 1535.0, 1535.8, 1536.6
Band 38.1 (C)	1538.1, 1538.9, 1539.7, 1540.5
Band 42.1 (D)	1542.1, 1542.9, 1543.7, 1544.5
Band 46.1 (E)	1546.1, 1546.9, 1547.7, 1548.5
Band 50.1 (F)	1550.1, 1550.9, 1551.7, 1552.5
Band 54.1 (G)	1554.1, 1554.9, 1555.7, 1556.5
Band 58.1 (H)	1558.1, 1558.9, 1559.7, 1560.6

2.8.3.2 Power Monitoring

Physical photodiodes P1 through P10 and virtual photodiodes V1 and V2 monitor the power for the AD-4C-xx.x card. The returned power level values are calibrated to the ports as shown in [Table 2-58](#).

Table 2-58 AD-4C-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P4	ADD	COM TX
P5–P8	DROP	DROP TX
P9	IN EXP	EXP RX
P10	OUT EXP	EXP TX
V1	IN COM	COM RX
V2	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.8.3.3 AD-4C-xx.x Card-Level Indicators

The AD-4C-xx.x card has three card-level LED indicators, described in [Table 2-59](#).

Table 2-59 AD-4C-xx.x Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.

Table 2-59 AD-4C-xx.x Card-Level Indicators (continued)

Card-Level Indicators	Description
Green ACT LED	The green ACT LED indicates that the AD-4C-xx.x card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure or condition. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.8.3.4 AD-4C-xx.x Port-Level Indicators

You can find the status of the card port using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The AD-4C-xx.x card has 12 LC-PC-II optical ports: eight for add/drop channel client input and output, two for express channel input and output, and two for communication.

2.8.4 AD-1B-xx.x Card

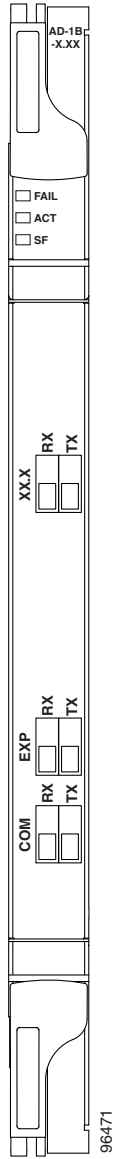
The 1-Band OADM (AD-1B-xx.x) card passively adds or drops a single band of four adjacent 100-GHz-spaced channels. Eight versions of this card with eight different part numbers—each version designed for use with one band of wavelengths—are used in the ONS 15454 DWDM system. The card bidirectionally adds and drops in two different sections on the same card to manage signal flow in both directions. This card can be used when there is asymmetric adding and dropping on each side (east or west) of the node; a band can be added or dropped on one side but not on the other.

The AD-1B xx.x can be installed in Slots 1 to 6 and 12 to 17 and has the following features:

- Passive cascaded interferential filters perform the channel add and drop functions.
- Two software-controlled VOAs regulate the optical power flowing in the express and drop OADM paths (drop section).
- Output power of the dropped band is set by changing the attenuation of the VOA drop.
- The VOA express is used to regulate the insertion loss of the express path.
- Internally controlled VOA settings and functions, photodiode detection, and alarm thresholds.
- Software-monitored virtual photodiode (firmware calculation of port optical power) at the common DWDM output.

Figure 2-68 shows the AD-1B-xx.x faceplate.

Figure 2-68 AD-1B-xx.x Faceplate



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

Figure 2-69 shows a block diagram of the AD-1B-xx.x card.

Figure 2-69 AD-1B-xx.x Block Diagram

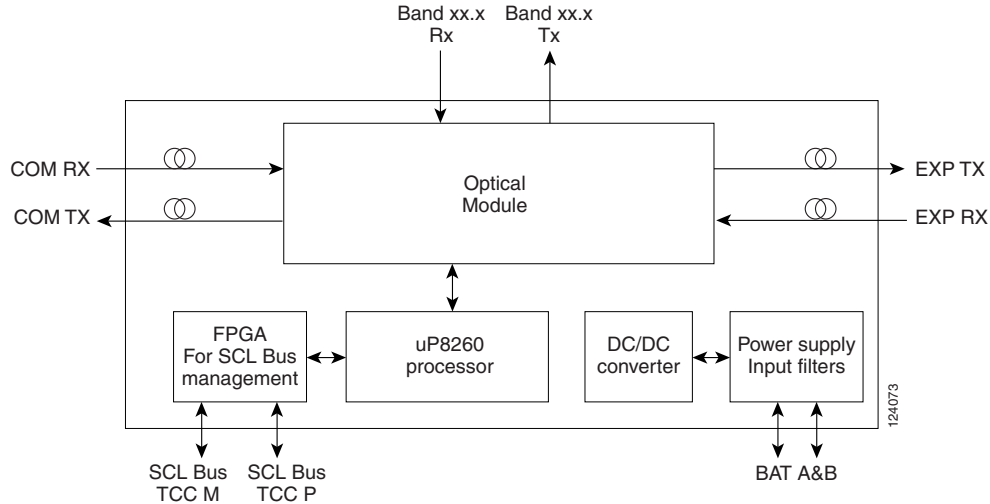
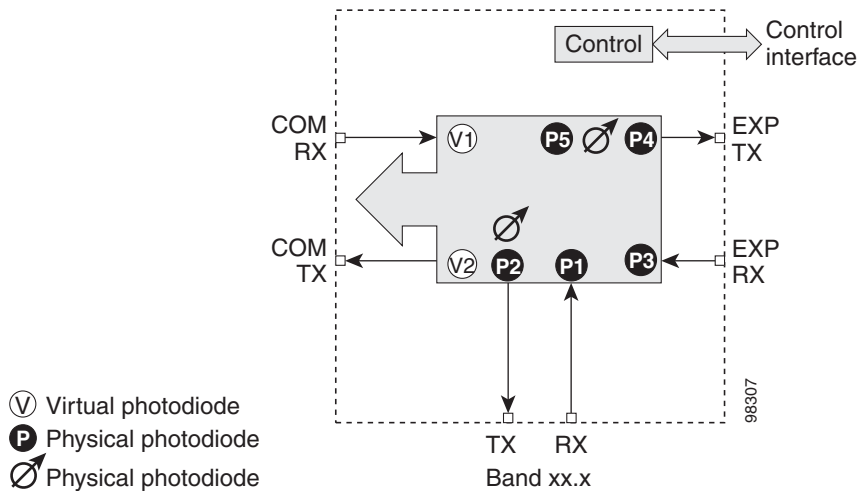


Figure 2-70 shows the AD-1B-xx.x optical module functional block diagram.

Figure 2-70 AD-1B-xx.x Optical Module Functional Block Diagram



2.8.4.1 Power Monitoring

Physical photodiodes P1 through P4 and virtual photodiodes V1 and V2 monitor the power for the AD-1B-xx.x card. The returned power level values are calibrated to the ports as shown in Table 2-60.

Table 2-60 AD-1B-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	ADD	BAND RX
P2	DROP	BAND TX
P3	IN EXP	EXP RX

Table 2-60 AD-1B-xx.x Port Calibration (continued)

Photodiode	CTC Type Name	Calibrated to Port
P4	OUT EXP	EXP TX
V1	IN COM	COM RX
V2	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.8.4.2 AD-1B-xx.x Card-Level Indicators

The AD-1B-xx.x card has three card-level LED indicators, described in [Table 2-61](#).

Table 2-61 AD-1B-xx.x Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the AD-1B-xx.x card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.8.4.3 AD-1B-xx.x Port-Level Indicators

You can find the status of the card port using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The AD-1B-xx.x has six LC-PC-II optical ports: two for add/drop channel client input and output, two for express channel input and output, and two for communication.

2.8.5 AD-4B-xx.x Card

The 4-Band OADM (AD-4B-xx.x) card passively adds or drops four bands of four adjacent 100-GHz-spaced channels. Two versions of this card with different part numbers—each version designed for use with one set of bands—are used in the ONS 15454 DWDM system. The card bidirectionally adds and drops in two different sections on the same card to manage signal flow in both directions. This card can be used when there is asymmetric adding and dropping on each side (east or west) of the node; a band can be added or dropped on one side but not on the other.

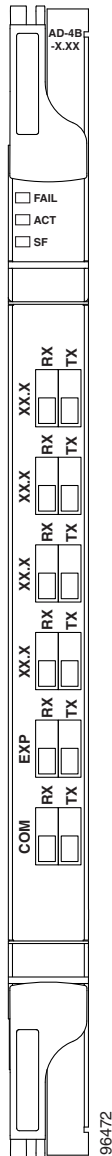
The AD1B-xx.x can be installed in Slots 1 to 6 and 12 to 17 and has the following features:

- Five software-controlled VOAs regulate the optical power flowing in the OADM paths.
- Output power of each dropped band is set by changing the attenuation of each VOA drop.
- The VOA express is used to regulate the insertion loss of the express path.
- Internally controlled VOA settings and functions, photodiode detection, and alarm thresholds.

- Software-monitored virtual photodiode (firmware calculation of port optical power) at the common DWDM output port.

Figure 2-71 shows the AD-4B-xx.x faceplate.

Figure 2-71 AD-4B-xx.x Faceplate



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

Figure 2-72 shows a block diagram of the AD-4B-xx.x card.

Figure 2-72 AD-4B-xx.x Block Diagram

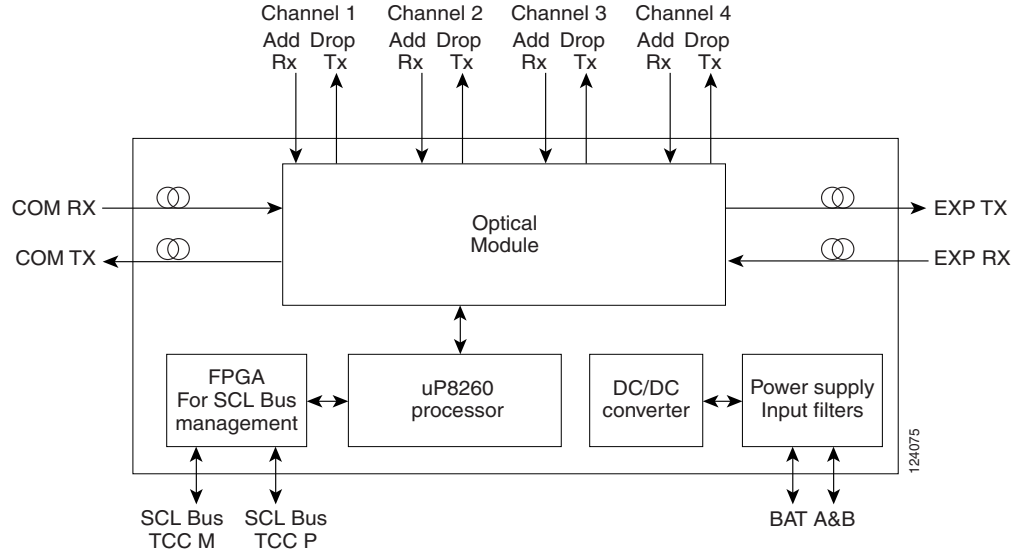
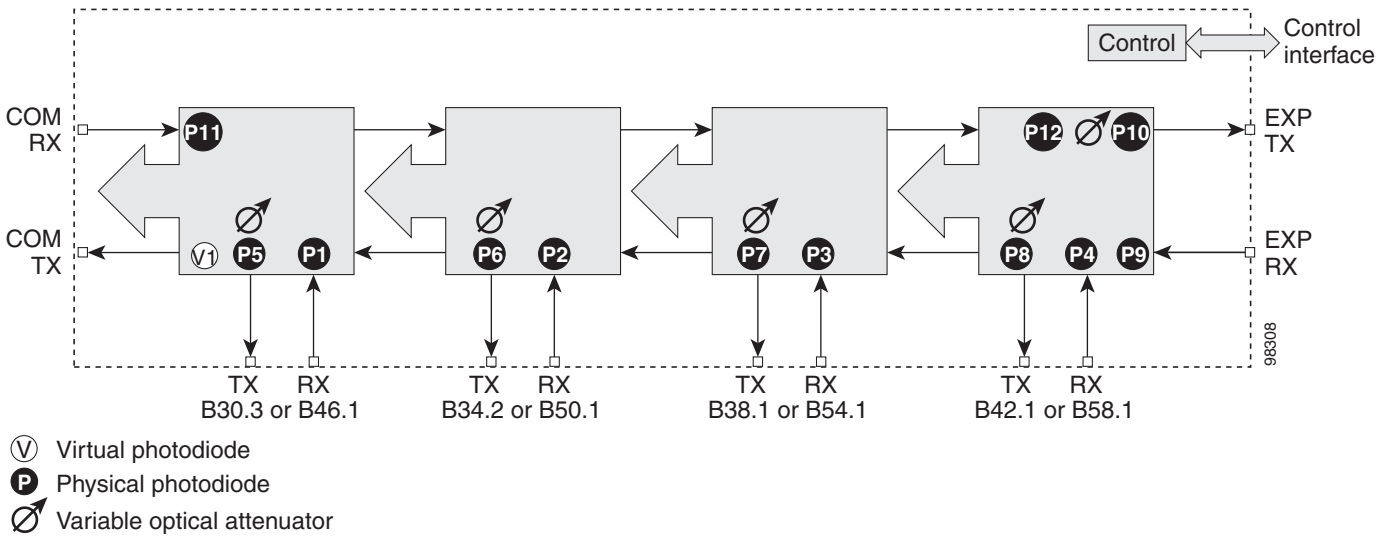


Figure 2-73 shows the AD-4B-xx.x optical module functional block diagram.

Figure 2-73 AD-4B-xx.x Optical Module Functional Block Diagram



2.8.5.1 Power Monitoring

Physical photodiodes P1 through P11 and virtual photodiode V1 monitor the power for the AD-4B-xx.x card. The returned power level values are calibrated to the ports as shown in Table 2-62.

Table 2-62 AD-4B-xx.x Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1–P4	ADD	COM TX
P5–P8	DROP	DROP TX
P9	IN EXP	EXP RX
P10	OUT EXP	EXP TX
P11	IN COM	COM RX
V1	OUT COM	COM TX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.8.5.2 AD-4B-xx.x Card-Level Indicators

The AD-4B-xx.x card has three card-level LED indicators, described in [Table 2-63](#).

Table 2-63 AD-4B-xx.x Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the AD-4B-xx.x card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.8.5.3 AD-4B-xx.x Port-Level Indicators

You can find the status of the card port using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The AD-4B-xx.x has 12 LC-PC-II optical ports: eight for add/drop band client input and output, two for express channel input and output, and two for communication.

2.9 Optical Mesh Cards

This section describes the Mesh/Multiring (MMU) card.

2.9.1 MMU Card

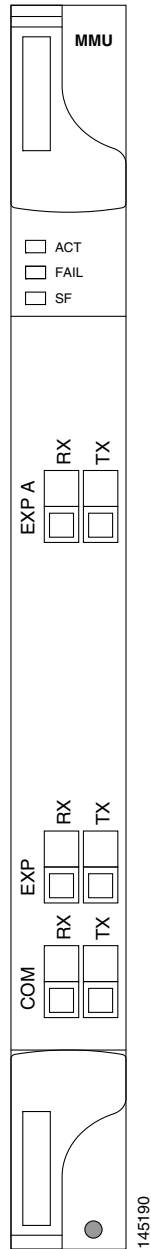
The MMU card supports multiring and mesh upgrades for ROADMs in both the C band and the L band. Mesh/multiring upgrade is the capability to optically bypass a given wavelength from one section of the network or ring to another one without requiring 3R regeneration. In each node, you need to install two MMUs, one on the east side and one on the west side. You can install the MMU card in Slots 1 through 6 and 12 through 17.

The MMU has six ports:

- EXP RX port: The EXP RX port receives the optical signal from the ROADM section available on the NE.
- EXP TX port: The EXP TX port sends the optical signal to the ROADM section available on the NE.
- EXP-A RX port: The EXP-A RX port receives the optical signal from the ROADM section available on other NEs or rings.
- EXP-A TX port: The EXP-A TX port sends the optical signal to the ROADM section available on other NEs or rings.
- COM TX port: The COM TX port sends the optical signal to the fiber stage section.
- COM RX port: The COM RX port receives the optical signal from the fiber stage section.

[Figure 2-53](#) shows the MMU module front panel.

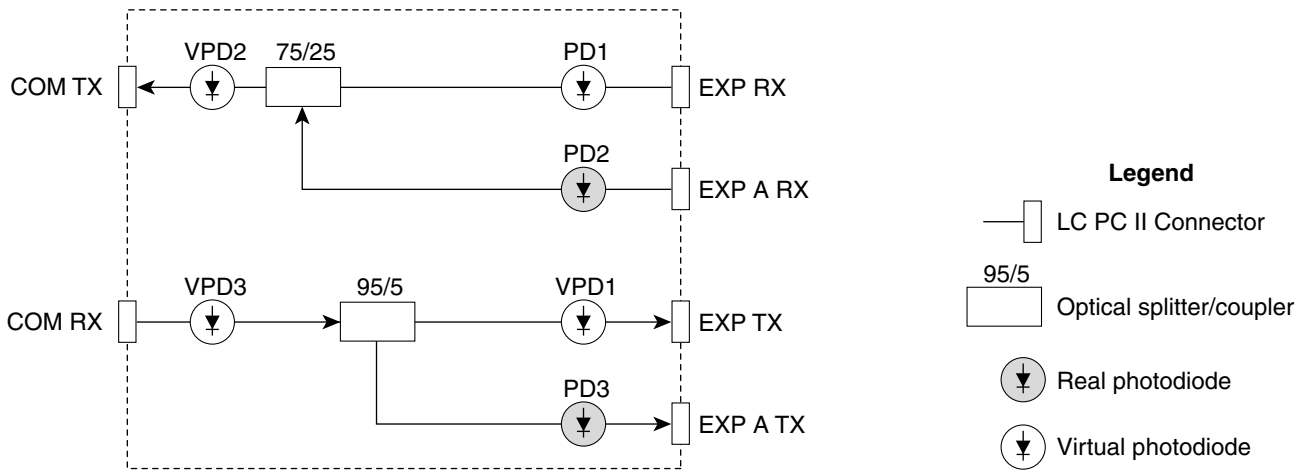
Figure 2-74 MMU Faceplate and Ports



For information on safety labels for the card, see the [“2.2.2 Class 1M Laser Product Cards”](#) section on page 2-15.

[Figure 2-54](#) provides a high-level functional block diagram of the MMU card.

Figure 2-75 MMU Block Diagram



145191

2.9.1.1 Power Monitoring

Physical photodiodes P1 through P3 monitor the power for the MMU card. The returned power level values are calibrated to the ports as shown in [Table 2-64](#). VP1 to VP3 are virtual photodiodes that have been created by adding (by software computation) the relevant path insertion losses of the optical splitters (stored in the module) to the real photodiode (P1 to P3) measurement.

Table 2-64 MMU Port Calibration

Photodiode	CTC Type Name	Calibrated to Port
P1	1 (EXP-RX)	EXP RX
P2	5 (EXP A-RX)	EXP A RX
P3	6 (EXP A-TX)	EXP A TX
VP1	2 (EXP-TX)	EXP TX
VP2	4 (COM-TX)	COM TX
VP3	3 (COM-RX)	COM RX

For information on the associated TL1 AIDs for the optical power monitoring points, refer the “CTC Port Numbers and TL1 Aids” section in *Cisco ONS SONET TL1 Command Guide, Release 7.2*.

2.9.1.2 MMU Card-Level Indicators

[Table 2-65](#) describes the three card-level LED indicators on the MMU card.

Table 2-65 MMU Card-Level Indicators

Card-Level Indicators	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready or that there is an internal hardware failure. Replace the card if the red FAIL LED persists.
Green ACT LED	The green ACT LED indicates that the MMU card is carrying traffic or is traffic-ready.
Amber SF LED	The amber SF LED indicates a signal failure on one or more of the card's ports. The amber SF LED also illuminates when the transmit and receive fibers are incorrectly connected. When the fibers are properly connected, the light turns off.

2.9.1.3 MMU Port-Level Indicators

You can find the status of the MMU card's ports using the LCD screen on the ONS 15454 fan-tray assembly. Use the LCD to view the status of any port or card slot; the screen displays the number and severity of alarms for a given port or slot. The MMU card has six ports located on the faceplate. COM RX is the line input, COM TX is the line output, EXP RX and EXP-A RX are the ports where a channel can be added or passed through, and EXP TX and EXP-A TX are the ports that pass through the channels that are not dropped.

2.10 Transponder and Muxponder Cards

This section describes the transponder (TXP) and muxponder (MXP) cards. Detailed specifications for the cards are found in [Appendix A, "Hardware Specifications"](#).

TXP and MXP cards detect SF, LOS, and LOF conditions on the optical facility. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide* for a description of these conditions. The cards also count section and line bit interleaved parity (BIP) errors from B1 and B2 byte registers in the section and line overhead.

2.10.1 TXP_MR_10G Card

The (TXP_MR_10G processes one 10-Gbps signal (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side). It provides one 10-Gbps port per card that can be provisioned for an STM-64/OC-192 short reach (1310-nm) signal, compliant with ITU-T G.707, G.709, ITU-T G.691, and Telcordia GR-253-CORE, or a 10GBASE-LR signal compliant with IEEE 802.3.

The TXP_MR_10G card is tunable over two neighboring wavelengths in the 1550-nm, ITU 100-GHz range. It is available in 16 different versions, each of which covers two wavelengths, for a total coverage of 32 different wavelengths in the 1550-nm range.



Note

ITU-T G.709 specifies a form of FEC that uses a "wrapper" approach. The digital wrapper lets you transparently take in a signal on the client side, wrap a frame around it and restore it to its original form. FEC enables longer fiber links because errors caused by the optical signal degrading with distance are corrected.

The trunk port operates at 9.95328 Gbps (or 10.70923 Gbps with ITU-T G.709 Digital Wrapper/FEC) and at 10.3125 Gbps (or 11.095 Gbps with ITU-T G.709 Digital Wrapper/FEC) over unamplified distances up to 80 km (50 miles) with different types of fiber such as C-SMF or dispersion compensated fiber limited by loss and/or dispersion.

**Caution**

Because the transponder has no capability to look into the payload and detect circuits, a TXP_MR_10G card does not display circuits under card view.

**Caution**

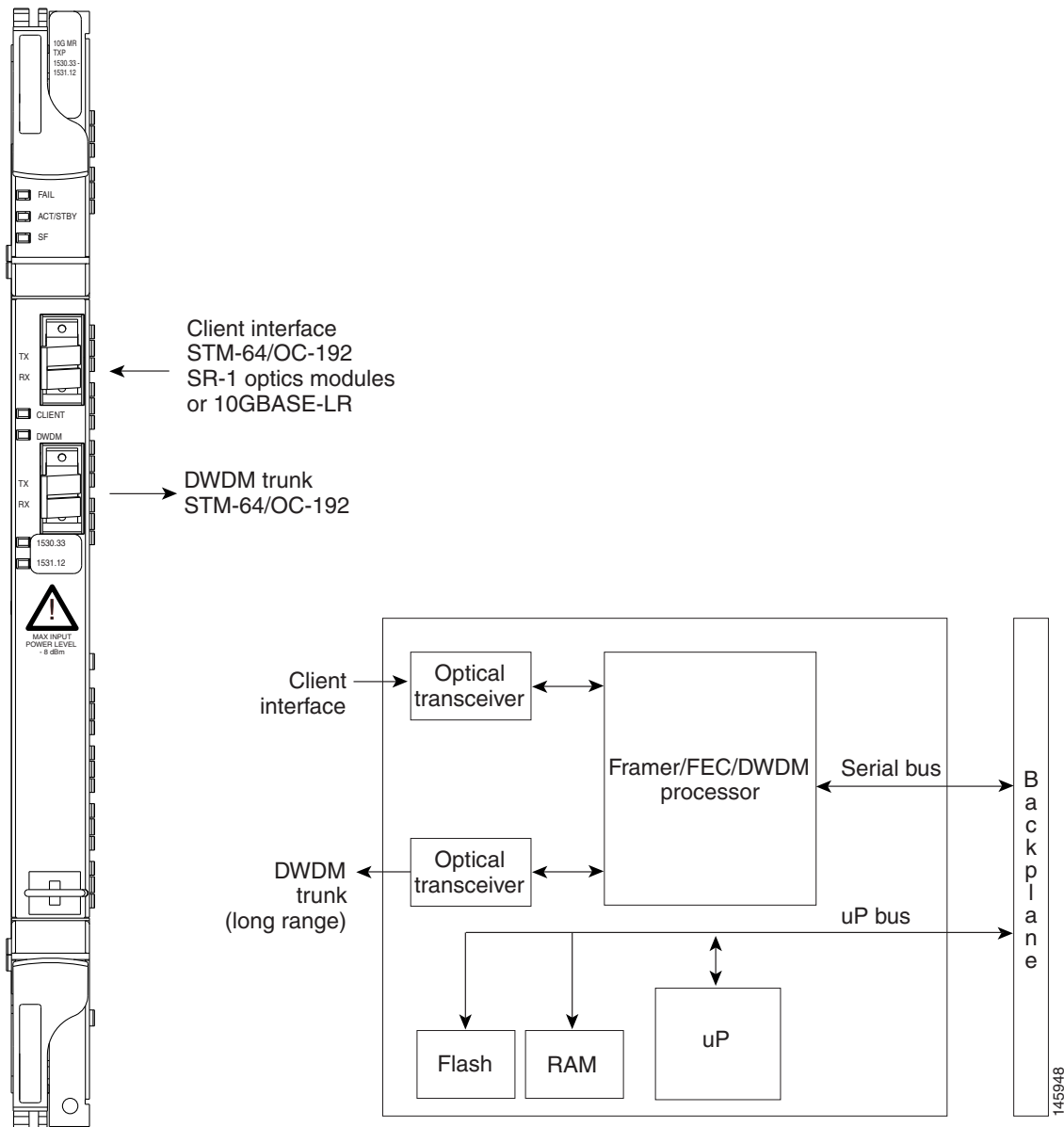
You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10G card in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_10G card. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_10G card.

You can install TXP_MR_10G cards in Slots 1 to 6 and 12 to 17 and provision this card in a linear configuration. TXP_MR_10G cards cannot be provisioned as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. They can only be used in the middle of BLSR/MS-SPRing and 1+1 spans when the card is configured for transparent termination mode.

The TXP_MR_10G port features a 1550-nm laser for the trunk port and a 1310-nm laser for the for the client port and contains two transmit and receive connector pairs (labeled) on the card faceplate.

[Figure 2-76](#) shows the TXP_MR_10G faceplate and block diagram.

Figure 2-76 TXP_MR_10G Faceplate and Block Diagram



For information on safety labels for the card, see the [“2.2.2 Class 1M Laser Product Cards”](#) section on page 2-15.

2.10.1.1 Y-Cable Protection

Two TXP_MR_10G cards can be joined in a Y-cable protection group. In Y-cable protection, the client ports of the two cards are joined by Y-cables. A single incoming receive (Rx) client signal is injected into the Rx Y-cable port and is split between the two TXP_MR_10G cards (connected to the Rx client ports) in the protection group. The transmit (Tx) client signals from the two protection group TXP_MR_10G cards are connected to the correspondent ports of the Tx Y-cable. Only the Tx client port

of the active TXP_MR_10G card is turned on and transmits the signal toward the receiving client equipment. See the “[2.11 Transponder and Muxponder Protection](#)” section on page 2-169 for more information.

**Note**

If you create a GCC on either card of the protection group, the trunk (span) port stays permanently active, regardless of the switch state. When you provision a GCC, you are provisioning unprotected overhead bytes. The GCC is not protected by the protect group.

2.10.1.2 Automatic Laser Shutdown

The ALS procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds and is user-configurable. For details on ALS provisioning for the card, see the *Cisco ONS 15454 DWDM Procedure Guide*.

2.10.1.3 TXP_MR_10G Card-Level Indicators

[Table 2-66](#) lists the three card-level LEDs on the TXP_MR_10G card.

Table 2-66 TXP_MR_10G Card-Level Indicators

Card-Level LED	Description
FAIL LED (Red)	Red indicates that the card’s processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	Green indicates that the card is operational (one or both ports active) and ready to carry traffic. Amber indicates that the card is operational and in standby (protect) mode.
SF LED (Amber)	Amber indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card’s ports. The amber SF LED is also illuminated if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the LED turns off.

2.10.1.4 TXP_MR_10G Port-Level Indicators

[Table 2-67](#) lists the four port-level LEDs in the TXP_MR_10G card.

Table 2-67 TXP_MR_10G Port-Level Indicators

Port-Level LED	Description
Green Client LED	The green Client LED indicates that the client port is in service and that it is receiving a recognized signal.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

Table 2-67 TXP_MR_10G Port-Level Indicators (continued)

Port-Level LED	Description
Green Wavelength 1 LED	Each port supports two wavelengths on the DWDM side. Each wavelength LED matches one of the wavelengths. This LED indicates that the card is configured for Wavelength 1.
Green Wavelength 2 LED	Each port supports two wavelengths on the DWDM side. Each wavelength LED matches one of the wavelengths. This LED indicates that the card is configured for Wavelength 2.

2.10.2 TXP_MR_10E Card

The TXP_MR_10E card is a multirate transponder for the ONS 15454 platform. The card is fully backward compatible with the TXP_MR_10G card. It processes one 10-Gbps signal (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side) that is tunable over four wavelength channels (spaced at 100 GHz on the ITU grid) in the C band and tunable over eight wavelength channels (spaced at 50 GHz on the ITU grid) in the L band. There are eight versions of the C-band card, with each version covering four wavelengths, for a total coverage of 32 wavelengths. There are five versions of the L-band card, with each version covering eight wavelengths, for a total coverage of 40 wavelengths.

You can install TXP_MR_10E cards in Slots 1 to 6 and 12 to 17 and provision the cards in a linear configuration, BLSR/MS-SPRing, path protection/SNCP, or a regenerator. The card can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the card is configured for transparent termination mode.

The TXP_MR_10E card features a 1550-nm tunable laser (C band) or a 1580-nm tunable laser (L band) for the trunk port and a separately orderable ONS-XC-10G-S1 1310-nm or ONS-XC-10G-L2 1550-nm laser XFP module for the client port.



Note

When the ONS-XC-10G-L2 XFP is installed, the TXP_MR_10E card is required to be installed in a high-speed slot (slot 5, 6, 12 or 13).

On its faceplate, the TXP_MR_10E card contains two transmit and receive connector pairs, one for the trunk port and one for the client port. Each connector pair is labeled.

2.10.2.1 Key Features

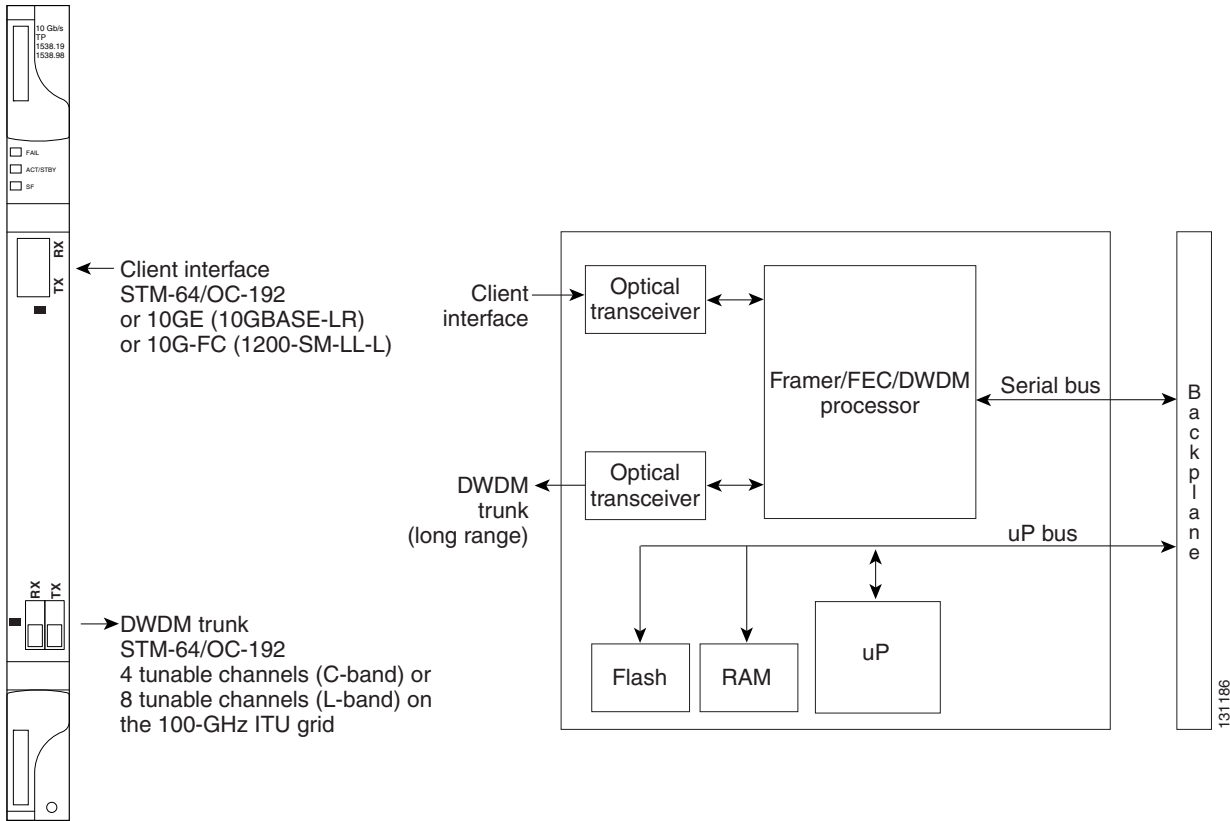
The key features of the TXP_MR_10E card are:

- A tri-rate client interface (available through the ONS-XC-10G-S1 XFP, ordered separately)
 - OC-192 (SR1)
 - 10GE (10GBASE-LR)
 - 10G-FC (1200-SM-LL-L)
- OC-192 to ITU-T G.709 OTU2 provisionable synchronous and asynchronous mapping

2.10.2.2 Faceplate and Block Diagram

Figure 2-77 shows the TXP_MR_10E faceplate and block diagram.

Figure 2-77 TXP_MR_10E Faceplate and Block Diagram



For information on safety labels for the card, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.



Caution

You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10E card in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_10E card. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_10E card.

2.10.2.3 Client Interface

The client interface is implemented with a separately orderable XFP module. The module is a tri-rate transceiver, providing a single port that can be configured in the field to support an OC-192 SR-1 (Telcordia GR-253-CORE) or STM-64 I-64.1 (ITU-T G.691) optical interface, as well as 10GE LAN PHY (10GBASE-LR), 10GE WAN PHY (10GBASE-LW), or 10G FC signals.

The client side XFP pluggable module supports LC connectors and is equipped with a 1310-nm laser.

2.10.2.4 DWDM Trunk Interface

On the trunk side, the TXP_MR_10E card provides a 10-Gbps STM-64/OC-192 interface. There are four tunable channels available in the 1550-nm band or eight tunable channels available in the 1580-nm band on the 50-GHz ITU grid for the DWDM interface. The TXP_MR_10E card provides 3R transponder

functionality for this 10-Gbps trunk interface. Therefore, the card is suited for use in long-range amplified systems. The DWDM interface is compliant with ITU-T G.707, ITU-T G.709, and Telcordia GR-253-CORE standards.

The DWDM trunk port operates at a rate that is dependent on the input signal and the presence or absence of the ITU-T G.709 Digital Wrapper/FEC. The possible trunk rates are:

- OC192 (9.95328 Gbps)
- OTU2 (10.70923 Gbps)
- 10GE (10.3125 Gbps) or 10GE into OTU2 (nonstandard 11.0957 Gbps)
- 10G FC (10.51875 Gbps) or 10G FC into OTU2 (nonstandard 11.31764 Gbps)

The maximum system reach in filterless applications without the use of optical amplification or regenerators is nominally rated at 23 dB over C-SMF fiber. This rating is not a product specification, but is given for informational purposes. It is subject to change.

2.10.2.5 Y-Cable Protection

The TXP_MR_10E card supports Y-cable protection, which provides transponder equipment protection without client terminal equipment interface protection. A single client interface can be split between two transponder cards using a Y-protection device.

With Y-cable protection, two TXP_MR_10E transponder cards can be joined in a Y-cable protection group. In Y-cable protection, the client ports of the two cards are joined by Y cables. An incoming client signal is injected into the Rx Y-cable port and is split between the two TXP_MR_10E cards (connected to Rx client ports) in the protection group. The Tx client signals from the two protection group TXP_MR_10E cards are connected to the correspondent ports of the Tx Y cable. Only the Tx client port of the active TXP_MR_10E card is turned on and transmits the signal towards the receiving client equipment. See the “[2.11.1 Y-Cable Protection](#)” section on page 2-169 for more details.



Note

If you create a GCC using a digital wrapper and apply it to either card of the Y-cable protect group, the DWDM trunk (span) port stays permanently active, regardless of the switch's state. When you provision a GCC, you are provisioning unprotected overhead (OH) bytes. The GCC is not protected by the protection group.

2.10.2.6 Enhanced FEC (E-FEC) Feature

A key feature of the TXP_MR_10E is the availability to configure the forward error correction in three modes: NO FEC, FEC, and E-FEC. The output bit rate is always 10.7092 Gbps as defined in ITU-T G.709, but the error coding performance can be provisioned as follows:

- NO FEC—No forward error correction
- FEC—Standard ITU-T G.975 Reed-Solomon algorithm
- E-FEC—Standard ITU-T G.975.1 I.7 algorithm, which is a super FEC code



Note

The E-FEC of the ONS 15454 and Cisco ASR 9000 are not compatible.

2.10.2.7 FEC and E-FEC Modes

As client side traffic passes through the TXP_MR_10E card, it can be digitally wrapped using FEC mode, E-FEC mode, or no error correction at all. The FEC mode setting provides a lower level of error detection and correction than the E-FEC mode setting of the card. As a result, using E-FEC mode allows higher sensitivity (lower optical signal-to-noise ratio [OSNR]) with a lower bit error rate than FEC mode. E-FEC enables longer distance trunk-side transmission than with FEC.

The E-FEC feature is one of three basic modes of FEC operation. FEC can be turned off, FEC can be turned on, or E-FEC can be turned on to provide greater range and lower BER. The default mode is FEC on and E-FEC off. E-FEC is provisioned using CTC.



Caution

Because the transponder has no visibility into the data payload and detect circuits, the TXP_MR_10E card does not display circuits under the card view.

2.10.2.8 Client-to-Trunk Mapping

The TXP_MR_10E card can perform ODU2-to-OCh mapping, which allows operators to provision data payloads in a standard way across 10-Gbps optical links.

Digital wrappers that define client side interfaces are called Optical Data Channel Unit 2 (ODU2) entities in ITU-T G.709. Digital wrappers that define trunk side interfaces are called Optical Channels (OCh) in ITU-T G.709. ODU2 digital wrappers can include Generalized Multiprotocol Label Switching (G-MPLS) signaling extensions to ITU-T G.709 (such as Least Significant Part [LSP] and Generalized Payload Identifier [G-PID] values) to define client interfaces and payload protocols.

2.10.2.9 Automatic Laser Shutdown

The ALS procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds. The on and off pulse duration is user-configurable. For details on ALS provisioning for the card, see the *Cisco ONS 15454 DWDM Procedure Guide*.

2.10.2.10 TXP_MR_10E Card-Level Indicators

Table 2-68 lists the three card-level LEDs on the TXP_MR_10E card.

Table 2-68 TXP_MR_10E Card-Level Indicators

Card-Level LED	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.

Table 2-68 TXP_MR_10E Card-Level Indicators (continued)

Card-Level LED	Description
ACT/STBY LED Green (Active) Amber (Standby)	If the ACT/STBY LED is green, the card is operational (one or both ports active) and ready to carry traffic. If the ACT/STBY LED is amber, the card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card's ports. The amber SF LED is also on if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the light turns off.

2.10.2.11 TXP_MR_10E Port-Level Indicators

Table 2-69 lists the two port-level LEDs in the TXP_MR_10E card.

Table 2-69 TXP_MR_10E Port-Level Indicators

Port-Level LED	Description
Green Client LED	The green Client LED indicates that the client port is in service and that it is receiving a recognized signal.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

2.10.3 TXP_MR_10E_C and TXP_MR_10E_L Cards

The TXP_MR_10E_C and TXP_MR_10E_L cards are multirate transponders for the ONS 15454 platform. The cards are fully backward compatible with the TXP_MR_10G and TXP_MR_10E cards. They process one 10-Gbps signal (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side). The TXP_MR_10E_C is tunable over the entire set of C-band wavelength channels (82 channels spaced at 50 GHz on the ITU grid). The TXP_MR_10E_L is tunable over the entire set of L-band wavelength channels (80 channels spaced at 50 GHz on the ITU grid) and is particularly well suited for use in networks that employ DS fiber or SMF-28 single-mode fiber.

The advantage of these cards over previous versions (TXP_MR_10G and TXP_MR_10E) is that there is only one version of each card (one C-band version and one L-band version) instead of several versions needed to cover each band.

You can install TXP_MR_10E_C and TXP_MR_10E_L cards in Slots 1 to 6 and 12 to 17 and provision the cards in a linear configuration, BLSR/MS-SPRing, path protection/SNCP, or a regenerator. The cards can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the cards are configured for transparent termination mode.

The TXP_MR_10E card features a universal transponder 2 (UT2) 1550-nm tunable laser (C band) or a UT2 1580-nm tunable laser (L band) for the trunk port and a separately orderable ONS-XC-10G-S1 1310-nm laser XFP module or ONS-XC-10G-L2 1550-nm laser XFP module for the client port.


Note

When the ONS-XC-10G-L2 XFP is installed, the TXP_MR_10E_C or TXP_MR_10E-L card is required to be installed in a high-speed slot (slot 6, 7, 12, or 13)

On its faceplate, the TXP_MR_10E_C and TXP_MR_10E_L cards contain two transmit and receive connector pairs, one for the trunk port and one for the client port. Each connector pair is labeled.

2.10.3.1 Key Features

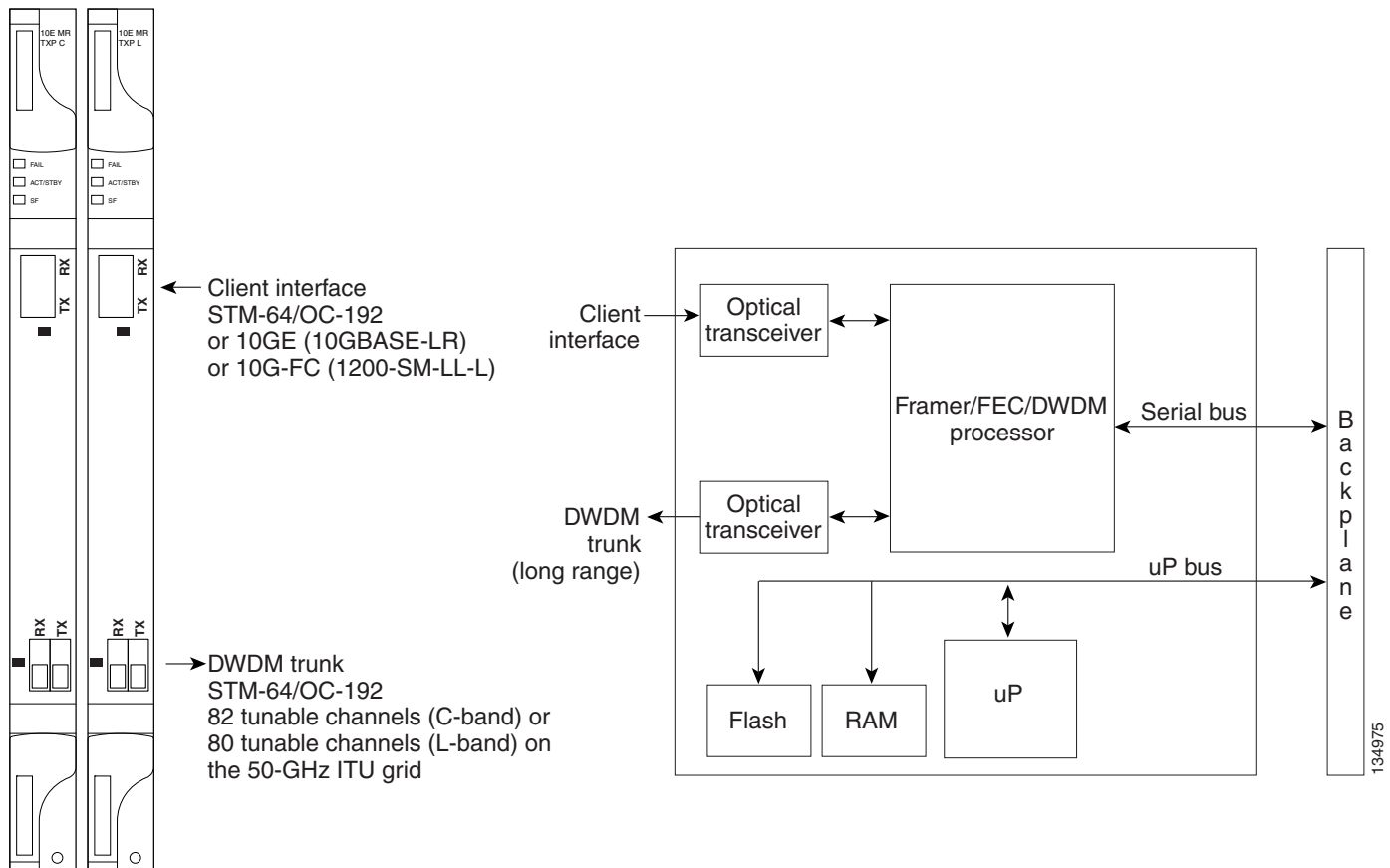
The key features of the TXP_MR_10E_C and TXP_MR_10E_L cards are:

- A tri-rate client interface (available through the ONS-XC-10G-S1 XFP, ordered separately):
 - OC-192 (SR1)
 - 10GE (10GBASE-LR)
 - 10G-FC (1200-SM-LL-L)
- A UT2 module tunable through the entire C band (TXP_MR_10E_C card) or L band (TXP_MR_10E_L card). The channels are spaced at 50 GHz on the ITU grid.
- OC-192 to ITU-T G.709 OTU2 provisionable synchronous and asynchronous mapping.

2.10.3.2 Faceplates and Block Diagram

Figure 2-78 shows the TXP_MR_10E_C and TXP_MR_10E_L faceplates and block diagram.

Figure 2-78 TXP_MR_10E_C and TXP_MR_10E_L Faceplates and Block Diagram



For information on safety labels for the cards, see the “[2.2.2 Class 1M Laser Product Cards](#)” section on [page 2-15](#).

**Caution**

You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10E_C or TXP_MR_10E_L card in a loopback on the trunk port. Do not use direct fiber loopbacks with the cards. Using direct fiber loopbacks causes irreparable damage to the cards.

2.10.3.3 Client Interface

The client interface is implemented with a separately orderable XFP module. The module is a tri-rate transceiver, providing a single port that can be configured in the field to support an OC-192 SR-1 (Telcordia GR-253-CORE) or STM-64 I-64.1 (ITU-T G.691) optical interface, as well as 10GE LAN PHY (10GBASE-LR), 10GE WAN PHY (10GBASE-LW), or 10G-FC signals.

The client side XFP pluggable module supports LC connectors and is equipped with a 1310-nm laser.

2.10.3.4 DWDM Trunk Interface

On the trunk side, the TXP_MR_10E_C and TXP_MR_10E_L cards provide a 10-Gbps STM-64/OC-192 interface. There are 80 tunable channels available in the 1550-nm C band or 82 tunable channels available in the 1580-nm L band on the 50-GHz ITU grid for the DWDM interface. The TXP_MR_10E_C and TXP_MR_10E_C cards provide 3R transponder functionality for this 10-Gbps trunk interface. Therefore, the card is suited for use in long-range amplified systems. The DWDM interface is compliant with ITU-T G.707, ITU-T G.709, and Telcordia GR-253-CORE standards.

The DWDM trunk port operates at a rate that is dependent on the input signal and the presence or absence of the ITU-T G.709 Digital Wrapper/FEC. The possible trunk rates are:

- OC192 (9.95328 Gbps)
- OTU2 (10.70923 Gbps)
- 10GE (10.3125 Gbps) or 10GE into OTU2 (nonstandard 11.0957 Gbps)
- 10G-FC (10.51875 Gbps) or 10G-FC into OTU2 (nonstandard 11.31764 Gbps)

The maximum system reach in filterless applications without the use of optical amplification or regenerators is nominally rated at 23 dB over C-SMF fiber. This rating is not a product specification, but is given for informational purposes. It is subject to change.

2.10.3.5 Y-Cable Protection

The TXP_MR_10E card supports Y-cable protection, which provides transponder equipment protection without client terminal equipment interface protection. A single client interface can be split between two transponder cards using a Y-protection device.

With Y-cable protection, two TXP_MR_10E_C or two TXP_MR_10E_L transponder cards can be joined in a Y-cable protection group. In Y-cable protection, the client ports of the two cards are joined by Y cables. An incoming client signal is injected into the Rx Y-cable port and is split between the two cards (connected to Rx client ports) in the protection group. The Tx client signals from the two protection group cards are connected to the correspondent ports of the Tx Y cable. Only the Tx client port of the active card is turned on and transmits the signal towards the receiving client equipment. See the “[2.11.1 Y-Cable Protection](#)” section on [page 2-169](#) for more details.

**Note**

If you create a GCC using a digital wrapper and apply it to either card of the Y-cable protect group, the DWDM trunk (span) port stays permanently active, regardless of the switch's state. When you provision a GCC, you are provisioning unprotected overhead (OH) bytes. The GCC is not protected by the protection group.

2.10.3.6 Enhanced FEC (E-FEC) Feature

A key feature of the TXP_MR_10E_C and TXP_MR_10E_L cards is the availability to configure the forward error correction in three modes: NO FEC, FEC, and E-FEC. The output bit rate is always 10.7092 Gbps as defined in ITU-T G.709, but the error coding performance can be provisioned as follows:

- NO FEC—No forward error correction
- FEC—Standard ITU-T G.975 Reed-Solomon algorithm
- E-FEC—Standard ITU-T G.975.1 I.7 algorithm, which is a super FEC code

2.10.3.7 FEC and E-FEC Modes

As client side traffic passes through the TXP_MR_10E_C and TXP_MR_10E_L cards, it can be digitally wrapped using FEC mode, E-FEC mode, or no error correction at all. The FEC mode setting provides a lower level of error detection and correction than the E-FEC mode setting of the card. As a result, using E-FEC mode allows higher sensitivity (lower OSNR) with a lower bit error rate than FEC mode. E-FEC enables longer distance trunk-side transmission than with FEC.

The E-FEC feature is one of three basic modes of FEC operation. FEC can be turned off, FEC can be turned on, or E-FEC can be turned on to provide greater range and lower BER. The default mode is FEC on and E-FEC off. E-FEC is provisioned using CTC.

**Caution**

Because the transponder has no visibility into the data payload and detect circuits, the TXP_MR_10E_C and TXP_MR_10E_L cards do not display circuits under the card view.

2.10.3.8 Client-to-Trunk Mapping

The TXP_MR_10E_C and TXP_MR_10E_L cards can perform ODU2-to-OCh mapping, which allows operators to provision data payloads in a standard way across 10-Gbps optical links.

Digital wrappers that define client side interfaces are called ODU2 entities in ITU-T G.709. Digital wrappers that define trunk side interfaces are called OCh in ITU-T G.709. ODU2 digital wrappers can include G-MPLS signaling extensions to ITU-T G.709 (such as LSP and G-PID values) to define client interfaces and payload protocols.

2.10.3.9 Automatic Laser Shutdown

The ALS procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds. The on and off pulse duration is user-configurable. For details regarding ALS provisioning for the TXP_MR_10E_C and TXP_MR_10E_L cards, see the *Cisco ONS 15454 DWDM Procedure Guide*.

2.10.3.10 TXP_MR_10E_C and TXP_MR_10E_L Card-Level Indicators

Table 2-70 lists the three card-level LEDs on the TXP_MR_10E_C and TXP_MR_10E_L cards.

Table 2-70 TXP_MR_10E_C and TXP_MR_10E_L Card-Level Indicators

Card-Level LED	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	If the ACT/STBY LED is green, the card is operational (one or both ports active) and ready to carry traffic. If the ACT/STBY LED is amber, the card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card's ports. The amber SF LED is also on if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the light turns off.

2.10.3.11 TXP_MR_10E_C and TXP_MR_10E_L Port-Level Indicators

Table 2-71 lists the two port-level LEDs in the TXP_MR_10E_C and TXP_MR_10E_L cards.

Table 2-71 TXP_MR_10E_C and TXP_MR_10E_L Port-Level Indicators

Port-Level LED	Description
Green Client LED	The green Client LED indicates that the client port is in service and that it is receiving a recognized signal.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

2.10.4 TXP_MR_2.5G and TXPP_MR_2.5G Cards

The TXP_MR_2.5G card processes one 8-Mbps to 2.488-Gbps signal (client side) into one 8-Mbps to 2.5-Gbps, 100-GHz DWDM signal (trunk side). It provides one long-reach STM-16/OC-48 port per card, compliant with ITU-T G.707, ITU-T G.709, ITU-T G.957, and Telcordia GR-253-CORE.

The TXPP_MR_2.5G card processes one 8-Mbps to 2.488-Gbps signal (client side) into two 8-Mbps to 2.5-Gbps, 100-GHz DWDM signals (trunk side). It provides two long-reach STM-16/OC-48 ports per card, compliant with ITU-T G.707, ITU-T G.957, and Telcordia GR-253-CORE.

The TXP_MR_2.5G and TXPP_MR_2.5G cards are tunable over four wavelengths in the 1550-nm, ITU 100-GHz range. They are available in eight versions, each of which covers four wavelengths, for a total coverage of 32 different wavelengths in the 1550-nm range.



Note

ITU-T G.709 specifies a form of FEC that uses a “wrapper” approach. The digital wrapper lets you transparently take in a signal on the client side, wrap a frame around it, and restore it to its original form. FEC enables longer fiber links because errors caused by the optical signal degrading with distance are corrected.

The trunk/line port operates at up to 2.488 Gbps (or up to 2.66 Gbps with ITU-T G.709 Digital Wrapper/FEC) over unamplified distances up to 360 km (223.7 miles) with different types of fiber such as C-SMF or higher if dispersion compensation is used.

**Caution**

Because the transponder has no capability to look into the payload and detect circuits, a TXP_MR_2.5G or TXPP_MR_2.5G card does not display circuits under card view.

The TXP_MR_2.5G and TXPP_MR_2.5G cards support 2R and 3R modes of operation where the client signal is mapped into a ITU-T G.709 frame. The mapping function is simply done by placing a digital wrapper around the client signal. Only OC-48/STM-16 client signals are fully ITU-T G.709 compliant, and the output bit rate depends on the input client signal. [Table 2-72](#) shows the possible combinations of client interfaces, input bit rates, 2R and 3R modes, and ITU-T G.709 monitoring.

Table 2-72 2R and 3R Mode and ITU-T G.709 Compliance by Client Interface

Client Interface	Input Bit Rate	3R vs. 2R	ITU-T G.709
OC-48/STM-16	2.488 Gbps	3R	On or Off
DV-6000	2.38 Gbps	2R	—
2 Gigabit Fibre Channel (2G-FC)/fiber connectivity (FICON)	2.125 Gbps	3R ¹	On or Off
High-Definition Television (HDTV)	1.48 Gbps	2R	—
Gigabit Ethernet (GE)	1.25 Gbps	3R	On or Off
1 Gigabit Fibre Channel (1G-FC)/FICON	1.06 Gbps	3R	On or Off
OC-12/STM-4	622 Mbps	3R	On or Off
OC-3/STM-1	155 Mbps	3R	On or Off
Enterprise System Connection (ESCON)	200 Mbps	2R	—
SDI/D1 video	270 Mbps	2R	—
ISC-1 Compat	1.06 Gbps	3R	Off
ISC-3	1.06 or 2.125 Gbps	2R	—
ETR_CLO	16 Mbps	2R	—

1. No monitoring

The output bit rate is calculated for the trunk bit rate by using the 255/238 ratio as specified in ITU-T G.709 for OTU1. [Table 2-73](#) lists the calculated trunk bit rates for the client interfaces with ITU-T G.709 enabled.

Table 2-73 Trunk Bit Rates With ITU-T G.709 Enabled

Client Interface	ITU-T G.709 Disabled	ITU-T G.709 Enabled
OC-48/STM-16	2.488 Gbps	2.66 Gbps
2G-FC	2.125 Gbps	2.27 Gbps
GE	1.25 Gbps	1.34 Gbps
1G-FC	1.06 Gbps	1.14 Gbps

Table 2-73 Trunk Bit Rates With ITU-T G.709 Enabled (continued)

Client Interface	ITU-T G.709 Disabled	ITU-T G.709 Enabled
OC-12/STM-3	622 Mbps	666.43 Mbps
OC-3/STM-1	155 Mbps	166.07 Mbps

For 2R operation mode, the TXP_MR_2.5G and TXPP_MR_2.5G cards have the ability to pass data through transparently from client side interfaces to a trunk side interface, which resides on an ITU grid. The data might vary at any bit rate from 200-Mbps up to 2.38-Gbps, including ESCON and video signals. In this pass-through mode, no performance monitoring (PM) or digital wrapping of the incoming signal is provided, except for the usual PM outputs from the SFPs. Similarly, this card has the ability to pass data through transparently from the trunk side interfaces to the client side interfaces with bit rates varying from 200-Mbps up to 2.38-Gbps. Again, no PM or digital wrapping of received signals is available in this pass-through mode.

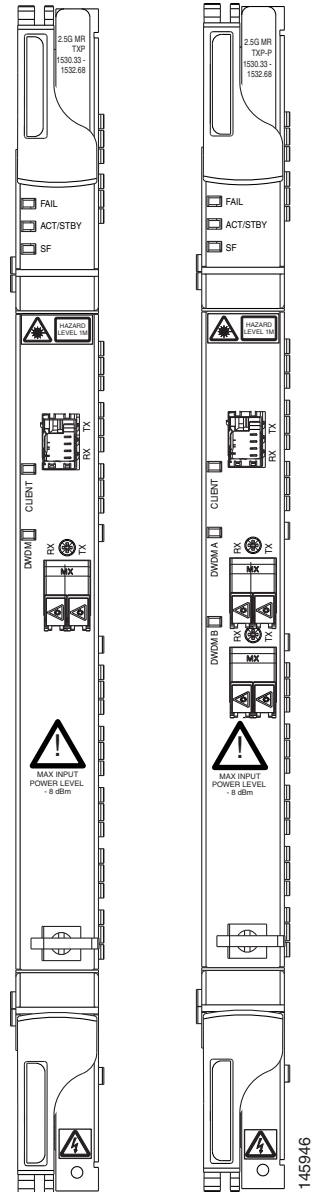
For 3R operation mode, the TXP_MR_2.5G and TXPP_MR_2.5G cards apply a digital wrapper to the incoming client interface signals (OC-N/STM-N, 1G-FC, 2G-FC, GE). PM is available on all of these signals except for 2G-FC, and varies depending upon the type of signal. For client inputs other than OC-48/STM-16, a digital wrapper might be applied but the resulting signal is not ITU-T G.709 compliant. The card applies a digital wrapper that is scaled to the frequency of the input signal.

The TXP_MR_2.5G and TXPP_MR_2.5G cards have the ability to take digitally wrapped signals in from the trunk interface, remove the digital wrapper, and send the unwrapped data through to the client interface. PM of the ITU-T G.709 OH and SONET/SDH OH is implemented.

2.10.4.1 Faceplate

Figure 2-79 shows the TXP_MR_2.5G and TXPP_MR_2.5G faceplates.

Figure 2-79 TXP_MR_2.5G and TXPP_MR_2.5G Faceplates

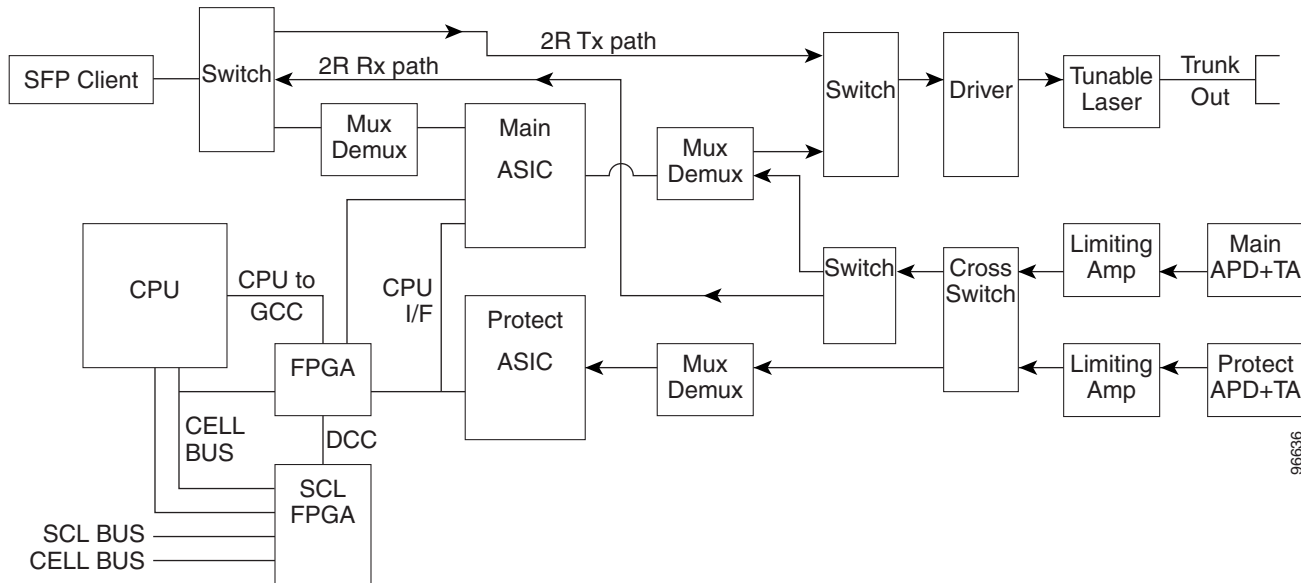


For information on safety labels for the cards, see the “[2.2.2 Class 1M Laser Product Cards](#)” section on [page 2-15](#).

2.10.4.2 Block Diagram

[Figure 2-80](#) shows a block diagram of the TXP_MR_2.5G and TXPP_MR_2.5G cards.

Figure 2-80 TXP_MR_2.5G and TXPP_MR_2.5G Block Diagram

**Caution**

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the TXP_MR_2.5G and TXPP_MR_2.5G cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_2.5G and TXPP_MR_2.5G cards. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_2.5G and TXPP_MR_2.5G cards.

You can install TXP_MR_2.5G and TXPP_MR_2.5G cards in Slots 1 to 6 and 12 to 17. You can provision this card in a linear configuration. TXP_MR_10G and TXPP_MR_2.5G cards cannot be provisioned as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. They can be used in the middle of BLSR/MS-SPRing or 1+1 spans only when the card is configured for transparent termination mode.

The TXP_MR_2.5G card features a 1550-nm laser for the trunk/line port and a 1310-nm laser for the client port. It contains two transmit and receive connector pairs (labeled) on the card faceplate. The card uses dual LC connectors for optical cable termination.

The TXPP_MR_2.5G card features a 1550-nm laser for the trunk/line port and a 1310-nm or 850-nm laser (depending on the SFP) for the client port and contains three transmit and receive connector pairs (labeled) on the card faceplate. The card uses dual LC connectors for optical cable termination.

2.10.4.3 Y-Cable Protection

For the TXP_MR_2.5G card, protection is done using Y-cable protection. In Y-cable protection, the client ports of two TXP_MR_2.5G cards can be joined by Y cables in a Y-cable protection group. A single incoming Rx client signal is injected into the Rx Y-cable port and is split between the two TXP_MR_2.5G cards (connected to the Rx client ports) in the protection group. The Tx client signals from the two protection group TXP_MR_2.5G cards are connected to the correspondent ports of the Tx Y-cable. Only the Tx client port of the active TXP_MR_2.5G card is turned on and transmits the signal towards the receiving client equipment. See the “[2.11 Transponder and Muxponder Protection](#)” section on [page 2-169](#) for more information.

**Note**

If you create a GCC on either card of the protect group, the trunk (span) port stays permanently active, regardless of the switch state. When you provision a GCC, you are provisioning unprotected overhead bytes. The GCC is not protected by the protect group.

2.10.4.4 Splitter Protection

For the TXPP_MR_2.5G card, protection is done using splitter protection. In splitter protection, the single client signal is injected into the client Rx port. It is then split into two separate signals on the two trunk Tx ports. The two signals are transmitted over diverse paths. The far-end TXPP_MR_2.5G card chooses one of the two trunk Rx port signals and injects it into the Tx client port. The TXPP_MR_2.5G card switches the selected trunk Rx port signal in case of failure. See the “[2.11 Transponder and Muxponder Protection](#)” section on page 2-169 for more details.

2.10.4.5 Automatic Laser Shutdown

The ALS procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds. The on and off pulse duration is user-configurable. For details regarding ALS provisioning for the TXP_MR_2.5G and TXPP_MR_2.5G cards, see the *Cisco ONS 15454 DWDM Procedure Guide*.

2.10.4.6 TXP_MR_2.5G and TXPP_MR_2.5G Card-Level Indicators

[Table 2-74](#) lists the three card-level LEDs on the TXP_MR_2.5G and TXPP_MR_2.5G cards.

Table 2-74 TXP_MR_2.5G and TXPP_MR_2.5G Card-Level Indicators

Card-Level LED	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	If the ACT/STBY LED is green, the card is operational (one or both ports active) and ready to carry traffic. If the ACT/STBY LED is amber, the card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card's ports. The amber SF LED is also on if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the light turns off.

2.10.4.7 TXP_MR_2.5G and TXPP_MR_2.5G Port-Level Indicators

[Table 2-75](#) lists the four port-level LEDs on the TXP_MR_2.5G and TXPP_MR_2.5G cards.

Table 2-75 TXP_MR_2.5G and TXPP_MR_2.5G Port-Level Indicators

Port-Level LED	Description
Green Client LED	The green Client LED indicates that the client port is in service and that it is receiving a recognized signal.
Green DWDM LED (TXP_MR_2.5G only)	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.
Green DWDM A LED (TXPP_MR_2.5G only)	The green DWDM A LED indicates that the DWDM A port is in service and that it is receiving a recognized signal.
Green DWDM B LED (TXPP_MR_2.5G only)	The green DWDM B LED indicates that the DWDM B port is in service and that it is receiving a recognized signal.

2.10.5 MXP_2.5G_10G Card

The MXP_2.5G_10G card multiplexes/demultiplexes four 2.5-Gbps signals (client side) into one 10-Gbps, 100-GHz DWDM signal (trunk side). It provides one extended long-range STM-64/OC-192 port per card on the trunk side (compliant with ITU-T G.707, ITU-T G.709, ITU-T G.957, and Telcordia GR-253-CORE) and four intermediate- or short-range OC-48/STM-16 ports per card on the client side. The port operates at 9.95328 Gbps over unamplified distances up to 80 km (50 miles) with different types of fiber such as C-SMF or dispersion compensated fiber limited by loss and/or dispersion.

Client ports on the MXP_2.5G_10G card are also interoperable with SONET OC-1 (STS-1) fiber optic signals defined in Telcordia GR-253-CORE. An OC-1 signal is the equivalent of one DS-3 channel transmitted across optical fiber. OC-1 is primarily used for trunk interfaces to phone switches in the United States. There is no SDH equivalent for SONET OC-1.

The MXP_2.5G_10G card is tunable over two neighboring wavelengths in the 1550-nm, ITU 100-GHz range. It is available in 16 different versions, each of which covers two wavelengths, for a total coverage of 32 different wavelengths in the 1550-nm range.



Note

ITU-T G.709 specifies a form of FEC that uses a “wrapper” approach. The digital wrapper lets you transparently take in a signal on the client side, wrap a frame around it and restore it to its original form. FEC enables longer fiber links because errors caused by the optical signal degrading with distance are corrected.

The port can also operate at 10.70923 Gbps in ITU-T G.709 Digital Wrapper/FEC mode.



Caution

Because the transponder has no capability to look into the payload and detect circuits, an MXP_2.5G_10G card does not display circuits under card view.



Caution

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_2.5G_10G card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_2.5G_10G card. Using direct fiber loopbacks causes irreparable damage to the MXP_2.5G_10G card.

You can install MXP_2.5G_10G cards in Slots 1 to 6 and 12 to 17.

**Caution**

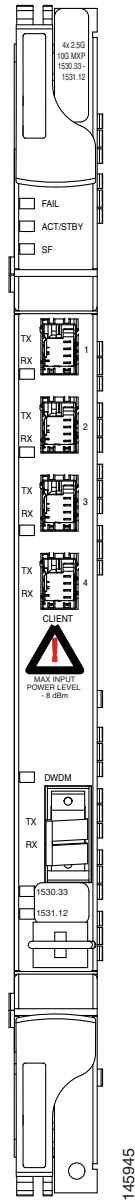
Do not install an MXP_2.5G_10G card in Slot 3 if you have installed a DS3/EC1-48 card in Slots 1 or 2. Likewise, do not install an MXP_2.5G_10G card in Slot 17 if you have installed a DS3/EC1-48 card in Slots 15 or 16. If you do, the cards will interact and cause DS-3 bit errors.

You can provision this card in a linear configuration. MXP_2.5G_10G cards cannot be provisioned as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. They can be used in the middle of BLSR/MS-SPRing or 1+1 spans only when the card is configured for transparent termination mode.

The MXP_2.5G_10G port features a 1550-nm laser on the trunk port and four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The card uses a dual LC connector on the trunk side and SFP connectors on the client side for optical cable termination.

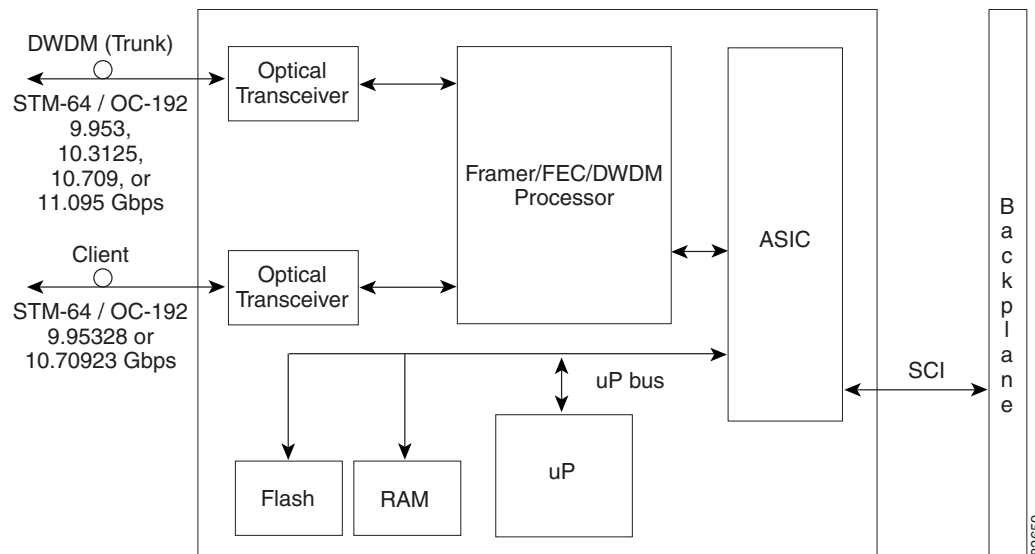
[Figure 2-81](#) shows the MXP_2.5G_10G faceplate.

Figure 2-81 MXP_2.5G_10G Faceplate



For information on safety labels for the card, see the “[2.2.1 Class 1 Laser Product Cards](#)” section on [page 2-13](#).

[Figure 2-82](#) shows a block diagram of the MXP_2.5G_10G card.

Figure 2-82 MXP_2.5G_10G Card Block Diagram

2.10.5.1 Y-Cable Protection

For the MXP_2.5G_10G card, protection is done using Y-cable protection. In Y-cable protection, the client ports of two MXP_2.5G_10G cards can be joined by Y cables in a Y-cable protection group. A single Rx client signal is injected into the Rx Y-cable and is split between the two MXP_2.5G_10G cards in the protection group. The Tx client signals from the two protection group MXP_2.5G_10G cards are connected via the TX Y cable with only the active card signal passing through as the single TX client signal. See the “[2.11.1 Y-Cable Protection](#)” section on page 2-169 for more details.



Note

If you create a GCC on either card of the protect group, the trunk port stays permanently active, regardless of the switch state. When you provision a GCC, you are provisioning unprotected overhead bytes. The GCC is not protected by the protect group.

2.10.5.2 Timing Synchronization

The MXP_2.5G_10G card is synchronized to the TCC2/TCC2P clock during normal conditions and transmits the ITU-T G.709 frame using this clock. The TCC2/TCC2P card can operate from an external BITS clock, an internal Stratum 3 clock, or from clock recovered from one of the four valid client clocks. If clocks from both TCC2/TCC2P cards are not available, the MXP_2.5G_10G card switches automatically (with errors, not hitless) to an internal 19.44 MHz clock that does not meet SONET clock requirements. This will result in a clock alarm.

2.10.5.3 Automatic Laser Shutdown

The ALS procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds. The on and off pulse duration is user-configurable. For details regarding ALS provisioning for the MXP_2.5G_10G card, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

2.10.5.4 MXP_2.5G_10G Card-Level Indicators

Table 2-76 describes the three card-level LEDs on the MXP_2.5G_10G card.

Table 2-76 MXP_2.5G_10G Card-Level Indicators

Card-Level LED	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	If the ACT/STBY LED is green, the card is operational (one or more ports active) and ready to carry traffic. If the ACT/STBY LED is amber, the card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card's ports. The amber SF LED is also on if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the light turns off.

2.10.5.5 MXP_2.5G_10G Port-Level Indicators

Table 2-77 describes the four port-level LEDs on the MXP_2.5G_10G card.

Table 2-77 MXP_2.5G_10G Port-Level Indicators

Port-Level LED	Description
Green Client LED (four LEDs)	The green Client LED indicates that the client port is in service and that it is receiving a recognized signal. The card has four client ports, and so has four Client LEDs.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.
Green Wavelength 1 LED	Each port supports two wavelengths on the DWDM side. Each wavelength LED matches one of the wavelengths. This LED indicates that the card is configured for Wavelength 1.
Green Wavelength 2 LED	Each port supports two wavelengths on the DWDM side. Each wavelength LED matches one of the wavelengths. This LED indicates that the card is configured for Wavelength 2.

2.10.6 MXP_2.5G_10E Card

The MXP_2.5G_10E card is a DWDM muxponder for the ONS 15454 platform that supports full optical transparency on the client side. The card multiplexes four 2.5 Gbps client signals (4 x OC48/STM-16 SFP) into a single 10-Gbps DWDM optical signal on the trunk side. The MXP_2.5G_10E provides wavelength transmission service for the four incoming 2.5 Gbps client interfaces. The MXP_2.5G_10E muxponder passes all SONET/SDH overhead bytes transparently.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate performance monitoring.

The MXP_2.5G_10E works with OTN devices defined in ITU-T G.709. The card supports ODU1 to OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. See the “[2.10.6.5 Multiplexing Function](#)” section on page 2-141.

The MXP_2.5G_10E card is not compatible with the MXP_2.5G_10G card, which does not support full optical transparency. The faceplate designation of the card is “4x2.5G 10E MXP.”

You can install MXP_2.5G_10E cards in Slots 1 to 6 and 12 to 17. You can provision this card in a linear configuration, as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. The card can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the card is configured for transparent termination mode.

The MXP_2.5G_10E features a 1550-nm laser on the trunk port and four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The card uses a dual LC connector on the trunk side and uses SFP modules on the client side for optical cable termination. The SFP pluggable modules are short reach (SR) or intermediate reach (IR) and support an LC fiber connector.

2.10.6.1 Key Features

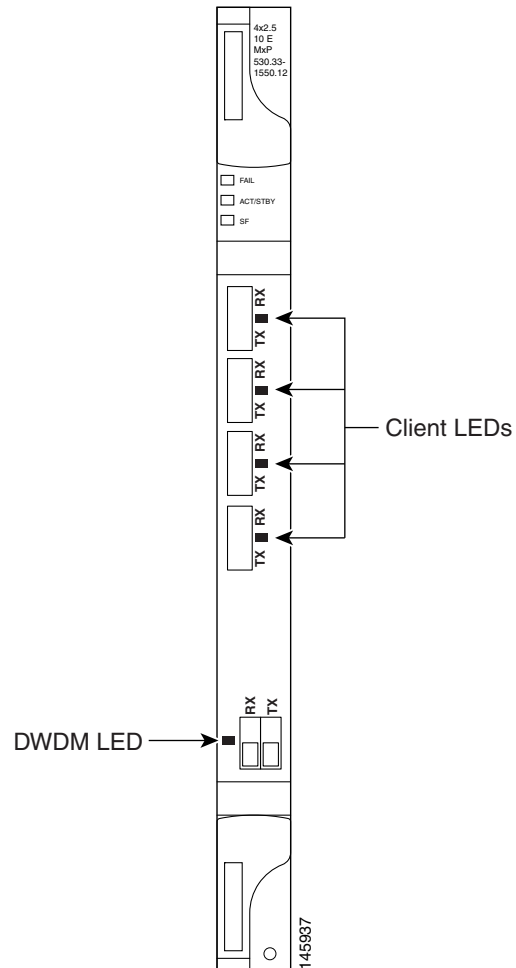
The MXP_2.5G_10E card has the following high level features:

- Four 2.5 Gbps client interfaces (OC-48/STM-16) and one 10 Gbps trunk. The four OC-48 signals are mapped into a ITU-T G.709 OTU2 signal using standard ITU-T G.709 multiplexing.
- Onboard E-FEC processor: The processor supports both standard Reed-Solomon (RS, specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm. A new block code (BCH) algorithm implemented in E-FEC allows recovery of an input BER up to 1E-3.
- Pluggable client interface optic modules: The MXP_MP_10E card has modular interfaces. Two types of optics modules can be plugged into the card. These include an OC-48/STM 16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).
- High level provisioning support: The MXP_MP_10E card is initially provisioned using Cisco MetroPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- Link monitoring and management: The MXP_MP_10E card uses standard OC-48 OH (overhead) bytes to monitor and manage incoming interfaces. The card passes the incoming SDH/SONET data stream and its overhead bytes transparently.
- Control of layered SONET/SDH transport overhead: The card is provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- Automatic timing source synchronization: The MXP_MP_10E normally synchronizes from the TCC2/TCC2P card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P is not available, the MXP_MP_10E automatically synchronizes to one of the input client interface clocks.
- Configurable squelching policy: The card can be configured to squelch the client interface output if there is LOS at the DWDM receiver or if there is a remote fault. In the event of a remote fault, the card manages multiplex section alarm indication signal (MS-AIS) insertion.

2.10.6.2 Faceplate

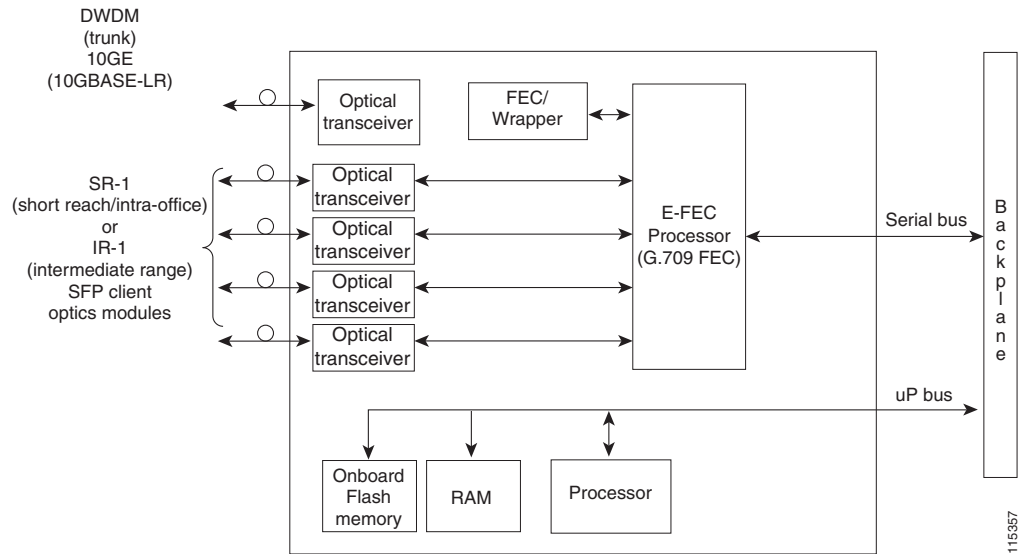
Figure 2-83 shows the MXP_2.5G_10E faceplate.

Figure 2-83 MXP_2.5G_10E Faceplate



For information on safety labels for the card, see the “2.2.1 Class 1 Laser Product Cards” section on page 2-13.

Figure 2-84 shows a block diagram of the MXP_2.5G_10E card.

Figure 2-84 MXP_2.5G_10E Block Diagram

2.10.6.3 Client Interfaces

The MXP_2.5G_10E provides four intermediate- or short-range OC-48/STM-16 ports per card on the client side. Both SR-1 or IR-1 optics can be supported and the ports use SFP connectors. The client interfaces use four wavelengths in the 1310-nm, ITU 100-MHz-spaced, channel grid.

2.10.6.4 DWDM Interface

The MXP_MP_10E serves as an OTN multiplexer, transparently mapping four OC-48 channels asynchronously to ODU1 into one 10-Gbps trunk. The DWDM trunk is tunable for transmission over four wavelengths in the 1550-nm, ITU 100-GHz spaced channel grid.



Caution

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_MP_10E card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_MP_10E card. Using direct fiber loopbacks causes irreparable damage to the MXP_MP_10E card.

2.10.6.5 Multiplexing Function

The muxponder is an integral part of the optically transparent ROADM network in which data payload channels and wavelengths are processed exclusively at the optical level without electrical to optical (E-O) conversion. The key function of MXP_MP_10E is to multiplex 4 OC-48/STM16 signals onto one ITU-T G.709 OTU2 optical signal (DWDM transmission). The multiplexing mechanism allows the signal to be terminated at a far-end node by another MXP_2.5G_10E card.

Optical transparency on the muxponder is configured using OTUx and ODUx OH bytes. The ITU-T G.709 specification defines OH byte formats that are used to configure, set, and monitor frame alignment, FEC mode, section monitoring, tandem connection monitoring, and optical transparency.

The MXP_2.5G_10E card performs ODU to OTU multiplexing as defined in ITU-T G.709. The ODU is the framing structure and byte definition (ITU-T G.709 digital wrapper) used to define the data payload coming into one of the SONET/SDH client interfaces on MXP_2.5G_10E. The term ODU1 refers to an ODU that operates at 2.5-Gbps line rate. On the MXP_2.5G_10E, there are four client interfaces that can be defined using ODU1 framing structure and format by asserting a ITU-T G.709 digital wrapper.

The output of the muxponder is a single 10-Gbps DWDM trunk interface defined using OTU2. It is within the OTU2 framing structure that FEC or E-FEC information is appended to enable error checking and correction.

2.10.6.6 Timing Synchronization

The MXP_2.5G_10E card is synchronized to the TCC2/TCC2P clock during normal conditions and transmits the ITU-T G.709 frame using this clock. No holdover function is implemented. If neither TCC2/TCC2P clock is available, the MXP_2.5G_10E switches automatically (hitless) to the first of the four valid client clocks with no time restriction as to how long it can run on this clock. The MXP_2.5G_10E continues to monitor the TCC2/TCC2P card. If a TCC2/TCC2P card is restored to working order, the MXP_2.5G_10E reverts to the normal working mode of running from the TCC2/TCC2P clock. If there is no valid TCC2/TCC2P clock and all of the client channels become invalid, the card waits (no valid frames processed) until one of the TCC2/TCC2P cards supplies a valid clock. In addition, the card is allowed to select the recovered clock from one active and valid client channel and supply that clock to the TCC2/TCC2P card.

2.10.6.7 Y-Cable Protection

The MXP_2.5G_10E card supports Y-cable protection. Two MXP_2.5G_10E cards can be joined in a Y-cable protection group with one card assigned as the working card and the other defined as the protection card. This protection mechanism provides redundant bidirectional paths. See the [“2.11.1 Y-Cable Protection” section on page 2-169](#) for more detailed information.

The Y-protection mechanism is provisionable and can be set ON or OFF (OFF is the default mode). When a signal fault is detected (LOS, LOF, signal degrade [SD], or SF on the DWDM receiver port in the case of ITU-T G.709 mode) the protection mechanism software automatically switches between paths.



Note

If you create a GCC on either card of the protect group, the trunk port stays permanently active, regardless of the switch state. When you provision a GCC, you are provisioning unprotected overhead bytes. The GCC is not protected by the protect group.

2.10.6.8 Enhanced FEC (E-FEC) Capability

The MXP_2.5G_10E can configure the FEC in three modes: NO FEC, FEC, and E-FEC. The output bit rate is always 10.7092 Gbps as defined in ITU-T G.709, but the error coding performance can be provisioned as follows:

- NO FEC—No FEC
- FEC—Standard ITU-T G.975 Reed-Solomon algorithm
- E-FEC—Standard ITU-T G.975.1 I.7, two orthogonally concatenated BCH super FEC code. This FEC scheme contains three parameterizations of the same scheme of two orthogonally interleaved BCH. The constructed code is decoded iteratively to achieve the expected performance.

2.10.6.9 FEC and E-FEC Modes

As client side traffic passes through the MXP_2.5G_10E card, it can be digitally wrapped using FEC mode error correction or E-FEC mode error correction (or no error correction at all). The FEC mode setting provides a lower level of error detection and correction than the E-FEC mode setting of the card. As a result, using E-FEC mode allows higher sensitivity (lower OSNR) with a lower BER than FEC mode. E-FEC enables longer distance trunk-side transmission than with FEC.

The E-FEC feature is one of three basic modes of FEC operation. FEC can be turned off, FEC can be turned on, or E-FEC can be turned on to provide greater range and lower BER. The default mode is FEC on and E-FEC off. E-FEC is provisioned using CTC.

2.10.6.10 SONET/SDH Overhead Byte Processing

The card passes the incoming SONET/SDH data stream and its overhead bytes for the client signal transparently. The card can be provisioned to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.

2.10.6.11 Client Interface Monitoring

The following parameters are monitored on the MXP_2.5G_10E card:

- Laser bias current is measured as a PM parameter
- LOS is detected and signaled
- Rx and Tx power are monitored

The following parameters are monitored in real time mode (one second):

- Optical power transmitted (client)
- Optical power received (client)

In case of loss of communication (LOC) at the DWDM receiver or far-end LOS, the client interface behavior is configurable. AIS can be invoked or the client signal can be squelched.

2.10.6.12 Wavelength Identification

The card uses trunk lasers that are wave-locked, which allows the trunk transmitter to operate on the ITU grid effectively. [Table 2-78](#) describes the required trunk transmit laser wavelengths. The laser is tunable over eight wavelengths at 50-GHz spacing or four at 100-GHz spacing.

Table 2-78 MXP_2.5G_10E Trunk Wavelengths

Band	Wavelength (nm)
30.3	1530.33
30.3	1531.12
30.3	1531.90
30.3	1532.68
34.2	1534.25
34.2	1535.04

Table 2-78 MXP_2.5G_10E Trunk Wavelengths (continued)

Band	Wavelength (nm)
34.2	1535.82
34.2	1536.61
38.1	1538.19
38.1	1538.98
38.1	1539.77
38.1	1540.56
42.1	1542.14
42.1	1542.94
42.1	1543.73
42.1	1544.53
46.1	1546.12
46.1	1546.92
46.1	1547.72
46.1	1548.51
50.1	1550.12
50.1	1550.92
50.1	1551.72
50.1	1552.52
54.1	1554.13
54.1	1554.94
54.1	1555.75
54.1	1556.55
58.1	1558.17
58.1	1558.98
58.1	1559.79
58.1	1560.61

2.10.6.13 Automatic Laser Shutdown

The ALS procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds. The on and off pulse duration is user-configurable. For details regarding ALS provisioning for the MXP_2.5G_10E card, see the *Cisco ONS 15454 DWDM Procedure Guide*.

2.10.6.14 Jitter

For SONET and SDH signals, the MXP_2.5G_10E card complies with Telcordia GR-253-CORE, ITU-T G.825, and ITU-T G.873 for jitter generation, jitter tolerance, and jitter transfer. See the “[2.13 Jitter Considerations](#)” section on page 2-172 for more information.

2.10.6.15 Lamp Test

The MXP_2.5G_10E card supports a lamp test function that is activated from the ONS 15454 front panel or through CTC to ensure that all LEDs are functional.

2.10.6.16 Onboard Traffic Generation

The MXP_2.5G_10E card provides internal traffic generation for testing purposes according to pseudo-random bit sequence (PRBS), SONET/SDH, or ITU-T G.709.

2.10.6.17 MXP_2.5G_10E Card-Level Indicators

[Table 2-79](#) describes the three card-level LEDs on the MXP_2.5G_10E card.

Table 2-79 MXP_2.5G_10E Card-Level Indicators

Card-Level LED	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	If the ACT/STBY LED is green, the card is operational (one or more ports active) and ready to carry traffic. If the ACT/STBY LED is amber, the card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card’s ports. The amber SF LED is also on if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the light turns off.

2.10.6.18 MXP_2.5G_10E Port-Level Indicators

[Table 2-80](#) describes the port-level LEDs on the MXP_2.5G_10E card.

Table 2-80 MXP_2.5G_10E Port-Level Indicators

Port-Level LED	Description
Green Client LED (four LEDs)	A green Client LED indicates that the client port is in service and that it is receiving a recognized signal. The card has four client ports, and so has four Client LEDs.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

2.10.7 MXP_2.5G_10E_C and MXP_2.5G_10E_L Cards

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards are DWDM muxponders for the ONS 15454 platform that support full optical transparency on the client side. The cards multiplex four 2.5-Gbps client signals (4 x OC48/STM-16 SFP) into a single 10-Gbps DWDM optical signal on the trunk side. The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards provide wavelength transmission service for the four incoming 2.5 Gbps client interfaces. The MXP_2.5G_10E_C and MXP_2.5G_10E_L muxponders pass all SONET/SDH overhead bytes transparently.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate PM.

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards work with OTN devices defined in ITU-T G.709. The cards support ODU1 to OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. See the [“2.10.6.5 Multiplexing Function” section on page 2-141](#).

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards are not compatible with the MXP_2.5G_10G card, which does not support full optical transparency. The faceplate designation of the cards is “4x2.5G 10E MXP C” for the MXP_2.5G_10E_C card and “4x2.5G 10E MXP L” for the MXP_2.5G_10E_L card.

You can install MXP_2.5G_10E_C and MXP_2.5G_10E_L cards in Slots 1 to 6 and 12 to 17. You can provision a card in a linear configuration, as a BLSR/MS-SPRing, a path protection/SNCP, or a regenerator. The cards can be used in the middle of BLSR/MS-SPRing or 1+1 spans when the cards are configured for transparent termination mode.

The MXP_2.5G_10E_C card features a tunable 1550-nm C-band laser on the trunk port. The laser is tunable across 82 wavelengths on the ITU grid with 50-GHz spacing between wavelengths. The MXP_2.5G_10E_L features a tunable 1580-nm L-band laser on the trunk port. The laser is tunable across 80 wavelengths on the ITU grid, also with 50-GHz spacing. Each card features four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The cards use dual LC connectors on the trunk side and use SFP modules on the client side for optical cable termination. The SFP pluggable modules are SR or IR and support an LC fiber connector.

2.10.7.1 Key Features

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards have the following high level features:

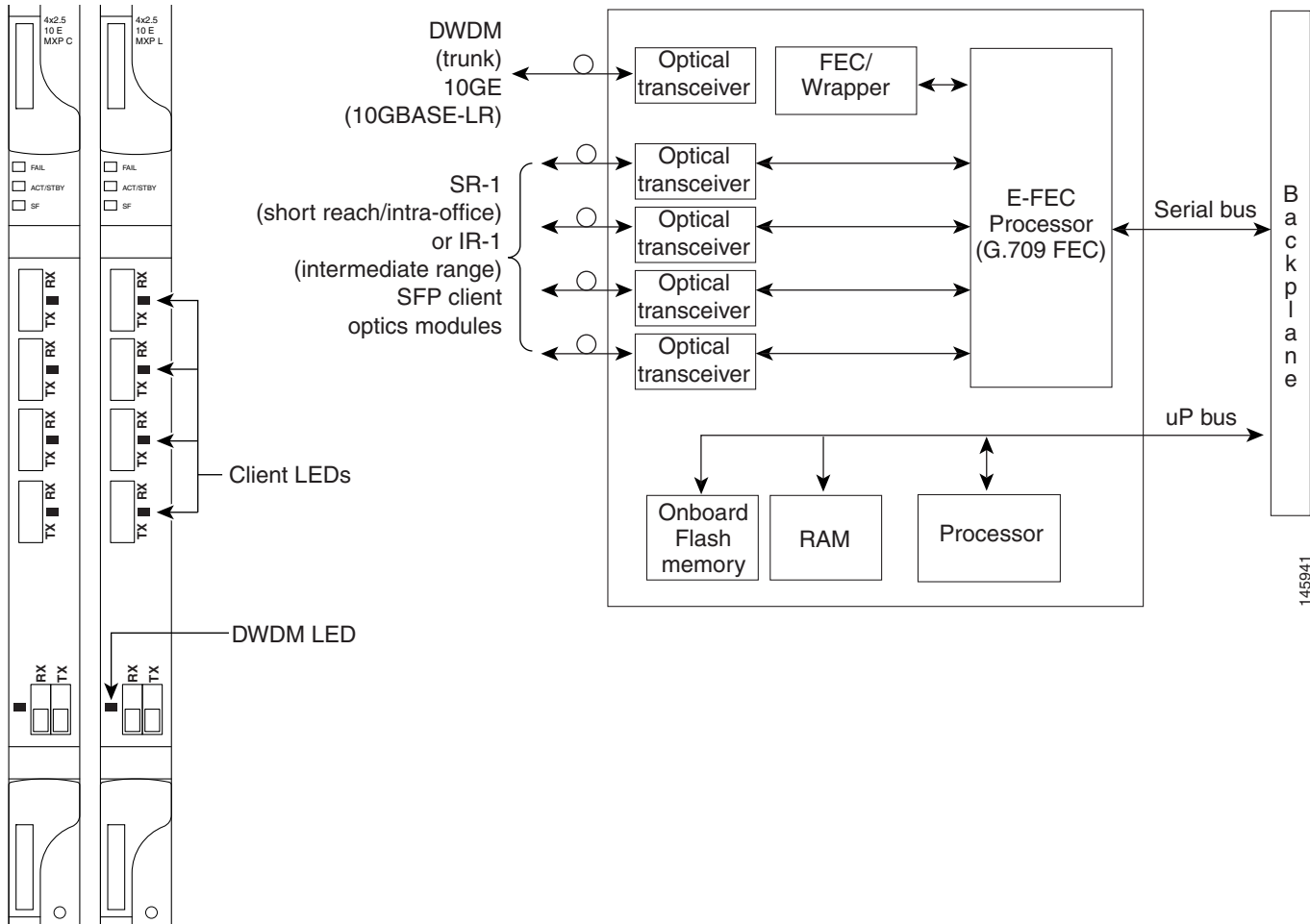
- Four 2.5 Gbps client interfaces (OC-48/STM-16) and one 10 Gbps trunk. The four OC-48 signals are mapped into a ITU-T G.709 OTU2 signal using standard ITU-T G.709 multiplexing.
- Onboard E-FEC processor: The processor supports both standard RS (specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm. A new BCH algorithm implemented in E-FEC allows recovery of an input BER up to 1E-3.
- Pluggable client interface optic modules: The MXP_MP_10E_C and MXP_MP_10E_L cards have modular interfaces. Two types of optics modules can be plugged into the card. These include an OC-48/STM 16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).

- High level provisioning support: The cards are initially provisioned using Cisco MetroPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- Link monitoring and management: The cards use standard OC-48 OH (overhead) bytes to monitor and manage incoming interfaces. The cards pass the incoming SDH/SONET data stream and its overhead bytes transparently.
- Control of layered SONET/SDH transport overhead: The cards are provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- Automatic timing source synchronization: The MXP_MP_10E_C and MXP_MP_10E_L cards normally synchronize from the TCC2/TCC2P card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P is not available, the cards automatically synchronize to one of the input client interface clocks.
- Configurable squelching policy: The cards can be configured to squelch the client interface output if there is LOS at the DWDM receiver or if there is a remote fault. In the event of a remote fault, the card manages MS-AIS insertion.
- The cards are tunable across the full C band (MXP_2.5G_10E_C) or full L band (MXP_MP_10E_L), thus eliminating the need to use different versions of each card to provide tunability across specific wavelengths in a band.

2.10.7.2 Faceplate

Figure 2-85 shows the MXP_2.5G_10E_C and MXP_2.5G_10E_L faceplates and block diagram.

Figure 2-85 MXP_2.5G_10E_C and MXP_2.5G_10E_L Faceplates and Block Diagram



For information on safety labels for the cards, see the “2.2.1 Class 1 Laser Product Cards” section on page 2-13.

2.10.7.3 Client Interfaces

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards provide four intermediate- or short-range OC-48/STM-16 ports per card on the client side. Both SR-1 and IR-1 optics can be supported and the ports use SFP connectors. The client interfaces use four wavelengths in the 1310-nm, ITU 100-GHz-spaced, channel grid.

2.10.7.4 DWDM Interface

The MXP_MP_10E_C and MXP_MP_10E_L cards serve as OTN multiplexers, transparently mapping four OC-48 channels asynchronously to ODU1 into one 10-Gbps trunk. For the MXP_MP_10E_C card, the DWDM trunk is tunable for transmission over the entire C band and for the MXP_MP_10E_L card, the DWDM trunk is tunable for transmission over the entire L band. Channels are spaced at 50-GHz on the ITU grid.

**Caution**

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MP_10E_C and MXP_MP_10E_L cards.

2.10.7.5 Multiplexing Function

The muxponder is an integral part of the optically transparent ROADM network in which data payload channels and wavelengths are processed exclusively at the optical level without electrical to optical (E-O) conversion. The key function of the MXP_MP_10E_C and MXP_MP_10E_L cards is to multiplex 4 OC-48/STM16 signals onto one ITU-T G.709 OTU2 optical signal (DWDM transmission). The multiplexing mechanism allows the signal to be terminated at a far-end node by another similar card.

Optical transparency on the muxponder is configured using OTUx and ODUx OH bytes. The ITU-T G.709 specification defines OH byte formats that are used to configure, set, and monitor frame alignment, FEC mode, section monitoring, tandem connection monitoring, and optical transparency.

The MXP_2.5G_10E and MXP_MP_10E_L cards perform ODU to OTU multiplexing as defined in ITU-T G.709. The ODU is the framing structure and byte definition (ITU-T G.709 digital wrapper) used to define the data payload coming into one of the SONET/SDH client interfaces on the cards. The term ODU1 refers to an ODU that operates at 2.5-Gbps line rate. On the cards, there are four client interfaces that can be defined using ODU1 framing structure and format by asserting a ITU-T G.709 digital wrapper.

The output of the muxponder is a single 10-Gbps DWDM trunk interface defined using OTU2. It is within the OTU2 framing structure that FEC or E-FEC information is appended to enable error checking and correction.

2.10.7.6 Timing Synchronization

The MXP_2.5G_10E_C and MXP_MP_10E_L cards are synchronized to the TCC2/TCC2P clock during normal conditions and transmit the ITU-T G.709 frame using this clock. No holdover function is implemented. If neither TCC2/TCC2P clock is available, the card switches automatically (hitless) to the first of the four valid client clocks with no time restriction as to how long it can run on this clock. The card continues to monitor the TCC2/TCC2P card. If a TCC2/TCC2P card is restored to working order, the card reverts to the normal working mode of running from the TCC2/TCC2P clock. If there is no valid TCC2/TCC2P clock and all of the client channels become invalid, the card waits (no valid frames processed) until one of the TCC2/TCC2P cards supplies a valid clock. In addition, the card is allowed to select the recovered clock from one active and valid client channel and supply that clock to the TCC2/TCC2P card.

2.10.7.7 Y-Cable Protection

The MXP_2.5G_10E_C and MXP_MP_10E_L cards support Y-cable protection. Two cards can be joined in a Y-cable protection group with one card assigned as the working card and the other defined as the protection card. This protection mechanism provides redundant bidirectional paths. See the [“2.11.1 Y-Cable Protection”](#) section on page 2-169 for more detailed information.

The Y-protection mechanism is provisionable and can be set ON or OFF (OFF is the default mode). When a signal fault is detected (LOS, LOF, SD, or SF on the DWDM receiver port in the case of ITU-T G.709 mode) the protection mechanism software automatically switches between paths.

**Note**

If you create a GCC on either card of the protect group, the trunk port stays permanently active, regardless of the switch state. When you provision a GCC, you are provisioning unprotected overhead bytes. The GCC is not protected by the protect group.

2.10.7.8 Enhanced FEC (E-FEC) Capability

The MXP_2.5G_10E_C and MXP_MP_10E_L cards can configure the FEC in three modes: NO FEC, FEC, and E-FEC. The output bit rate is always 10.7092 Gbps as defined in ITU-T G.709, but the error coding performance can be provisioned as follows:

- NO FEC—No FEC
- FEC—Standard ITU-T G.975 Reed-Solomon algorithm
- E-FEC—Standard ITU-T G.975.1 I.7, two orthogonally concatenated BCH super FEC code. This FEC scheme contains three parameterizations of the same scheme of two orthogonally interleaved block codes (BCH). The constructed code is decoded iteratively to achieve the expected performance.

2.10.7.9 FEC and E-FEC Modes

As client side traffic passes through the card, it can be digitally wrapped using FEC mode error correction or E-FEC mode error correction (or no error correction at all). The FEC mode setting provides a lower level of error detection and correction than the E-FEC mode setting of the card. As a result, using E-FEC mode allows higher sensitivity (lower OSNR) with a lower BER than FEC mode. E-FEC enables longer distance trunk-side transmission than with FEC.

The E-FEC feature is one of three basic modes of FEC operation. FEC can be turned off, FEC can be turned on, or E-FEC can be turned on to provide greater range and lower BER. The default mode is FEC on and E-FEC off. E-FEC is provisioned using CTC.

2.10.7.10 SONET/SDH Overhead Byte Processing

The card passes the incoming SONET/SDH data stream and its overhead bytes for the client signal transparently. The card can be provisioned to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.

2.10.7.11 Client Interface Monitoring

The following parameters are monitored on the MXP_2.5G_10E_C and MXP_MP_10E_L cards:

- Laser bias current is measured as a PM parameter.
- LOS is detected and signaled.
- Rx and Tx power are monitored.

The following parameters are monitored in real time mode (one second):

- Optical power transmitted (client)
- Optical power received (client)

In case of LOC at the DWDM receiver or far-end LOS, the client interface behavior is configurable. AIS can be invoked or the client signal can be squelched.

2.10.7.12 Wavelength Identification

The card uses trunk lasers that are wavelocked, which allows the trunk transmitter to operate on the ITU grid effectively. Both the MXP_2.5G_10E_C and MXP_MP_10E_L cards implement the UT2 module. The MXP_2.5G_10E_C card uses a C-band version of the UT2 and the MXP_2.5G_10E_L card uses an L-band version.

Table 2-81 describes the required trunk transmit laser wavelengths for the MXP_2.5G_10E_C card. The laser is tunable over 82 wavelengths in the C band at 50-GHz spacing on the ITU grid.

Table 2-81 MXP_2.5G_10E_C Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747

Table 2-81 MXP_2.5G_10E_C Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

Table 2-82 describes the required trunk transmit laser wavelengths for the MXP_2.5G_10E_L card. The laser is fully tunable over 80 wavelengths in the L band at 50-GHz spacing on the ITU grid.

Table 2-82 MXP_2.5G_10E_L Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95

Table 2-82 MXP_2.5G_10E_L Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

2.10.7.13 Automatic Laser Shutdown

The ALS procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds. The on and off pulse duration is user-configurable. For details regarding ALS provisioning for the MXP_2.5G_10E_C and MXP_2.5G_10E_L cards, see the *Cisco ONS 15454 DWDM Procedure Guide*.

2.10.7.14 Jitter

For SONET and SDH signals, the MXP_2.5G_10E_C and MXP_2.5G_10E_L cards comply with Telcordia GR-253-CORE, ITU-T G.825, and ITU-T G.873 for jitter generation, jitter tolerance, and jitter transfer. See the “[2.13 Jitter Considerations](#)” section on [page 2-172](#) for more information.

2.10.7.15 Lamp Test

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards support a lamp test function that is activated from the ONS 15454 front panel or through CTC to ensure that all LEDs are functional.

2.10.7.16 Onboard Traffic Generation

The MXP_2.5G_10E_C and MXP_2.5G_10E_L cards provide internal traffic generation for testing purposes according to PRBS, SONET/SDH, or ITU-T G.709.

2.10.7.17 MXP_2.5G_10E_C and MXP_2.5G_10E_L Card-Level Indicators

[Table 2-79](#) describes the three card-level LEDs on the MXP_2.5G_10E_C and MXP_2.5G_10E_L cards.

Table 2-83 MXP_2.5G_10E_C and MXP_2.5G_10E_L Card-Level Indicators

Card-Level LED	Description
Red FAIL LED	The red FAIL LED indicates that the card’s processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	If the ACT/STBY LED is green, the card is operational (one or more ports active) and ready to carry traffic. If the ACT/STBY LED is amber, the card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card’s ports. The amber SF LED is also on if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the light turns off.

2.10.7.18 MXP_2.5G_10E and MXP_2.5G_10E_L Port-Level Indicators

[Table 2-84](#) describes the port-level LEDs on the MXP_2.5G_10E_C and MXP_2.5G_10E_L cards.

Table 2-84 MXP_2.5G_10E_C and MXP_2.5G_10E_L Port-Level Indicators

Port-Level LED	Description
Green Client LED (four LEDs)	A green Client LED indicates that the client port is in service and that it is receiving a recognized signal. The card has four client ports, and so has four Client LEDs.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

2.10.8 MXP_MR_2.5G and MXPP_MR_2.5G Cards

The MXP_MR_2.5G card aggregates a mix and match of client Storage Area Network (SAN) service client inputs (GE, FICON, Fibre Channel, and ESCON) into one 2.5 Gbps STM-16/OC-48 DWDM signal on the trunk side. It provides one long-reach STM-16/OC-48 port per card and is compliant with Telcordia GR-253-CORE.



Note

In Release 7.0 and greater, two additional operating modes have been made available to the user: pure ESCON (all 8 ports running ESCON), and mixed mode (port 1 running FC/GE/FICON, and ports 5 through 8 running ESCON). When the card is part of a system running Release 6.0 or below, only one operating mode, (FC/GE) is available for use.

The 2.5-Gbps Multirate Muxponder–Protected–100 GHz–Tunable 15xx.xx-15yy.yy (MXPP_MR_2.5G) card aggregates various client SAN service client inputs (GE, FICON, Fibre Channel, and ESCON) into one 2.5 Gbps STM-16/OC-48 DWDM signal on the trunk side. It provides two long-reach STM-16/OC-48 ports per card and is compliant with ITU-T G.957 and Telcordia GR-253-CORE.

Because the cards are tunable to one of four adjacent grid channels on a 100-GHz spacing, each card is available in eight versions, with 15xx.xx representing the first wavelength and 15yy.yy representing the last wavelength of the four available on the card. In total, 32 DWDM wavelengths are covered in accordance with the ITU-T 100-GHz grid standard, G.692, and Telcordia GR-2918-CORE, Issue 2. The card versions along with their corresponding wavelengths are shown in [Table 2-85](#).

Table 2-85 Card Versions

Card Version	Frequency Channels at 100 GHz (0.8 nm) Spacing			
1530.33–1532.68	1530.33 nm	1531.12 nm	1531.90 nm	1532.68 nm
1534.25–1536.61	1534.25 nm	1535.04 nm	1535.82 nm	1536.61 nm
1538.19–1540.56	1538.19 nm	1538.98 nm	1539.77 nm	1540.56 nm
1542.14–1544.53	1542.14 nm	1542.94 nm	1543.73 nm	1544.53 nm
1546.12–1548.51	1546.12 nm	1546.92 nm	1547.72 nm	1548.51 nm
1550.12–1552.52	1550.12 nm	1550.92 nm	1551.72 nm	1552.52 nm
1554.13–1556.55	1554.13 nm	1554.94 nm	1555.75 nm	1556.55 nm
1558.17–1560.61	1558.17 nm	1558.98 nm	1559.79 nm	1560.61 nm

The muxponders are intended to be used in applications with long DWDM metro or regional unregenerated spans. Long transmission distances are achieved through the use of flat gain optical amplifiers.

The client interface supports the following payload types:

- 2G FC
- 1G FC
- 2G FICON
- 1G FICON
- GE
- ESCON

**Note**

Because the client payload cannot oversubscribe the trunk, a mix of client signals can be accepted, up to a maximum limit of 2.5 Gbps.

Table 2-86 shows the input data rate for each client interface, and the encapsulation method. The current version of the ITU-T Transparent Generic Framing Procedure (GFP-T) G.7041 supports transparent mapping of 8B/10B block-coded protocols, including Gigabit Ethernet, Fibre Channel, and FICON.

In addition to the GFP mapping, 1-Gbps traffic on Port 1 or 2 of the high-speed serializer/deserializer (SERDES) is mapped to an STS-24c channel. If two 1-Gbps client signals are present at Port 1 and Port 2 of the SERDES, the Port 1 signal is mapped into the first STS-24c channel and the Port 2 signal into the second STS-24c channel. The two channels are then mapped into an OC-48 trunk channel.

Table 2-86 MXP_MR_2.5G and MXPP_MR_2.5G Client Interface Data Rates and Encapsulation

Client Interface	Input Data Rate	ITU-T GFP-T G.7041 Encapsulation
2G FC	2.125 Gbps	Yes
1G FC	1.06 Gbps	Yes
2G FICON	2.125 Gbps	Yes
1G FICON	1.06 Gbps	Yes
GE	1.25 Gbps	Yes
ESCON	0.2 Gbps	Yes

Table 2-87 shows some of the mix and match possibilities on the various client ports. The table is intended to show the full client payload configurations for the card.

Table 2-87 Client Data Rates and Ports

Mode	Port(s)	Aggregate Data Rate
2G FC	1	2.125 Gbps
1G FC	1, 2	2.125 Gbps
2G FICON	1	2.125 Gbps
1G FICON	1, 2	2.125 Gbps
GE	1, 2	2.5 Gbps
1G FC ESCON (mixed mode)	1 5, 6, 7, 8	1.06 Gbps 0.8 Gbps 1.86 Gbps total
1G FICON ESCON (mixed mode)	1 5, 6, 7, 8	1.06 Gbps 0.8 Gbps 1.86 Gbps total
GE ESCON (mixed mode)	1 5, 6, 7, 8	1.25 Gbps 0.8 Gbps Total 2.05 Gbps
ESCON	1, 2, 3, 4, 5, 6, 7, 8	1.6 Gbps

2.10.8.1 Card Protection

For the MXP_MR_2.5G card, protection is done using Y-cable protection. Two MXP_MR_2.5G cards can be joined in a Y-cable protection group, which provides protection against failures both on the fiber and in the muxponders.

For the MXPP_MR_2.5G card, protection is done using splitter protection, which provides protection against failures due to fiber cuts or unacceptable signal degradation on the trunk side. See the [“2.11 Transponder and Muxponder Protection”](#) section on page 2-169 for more detailed information.



Note

Switching is performed only if the protect line is error free.

2.10.8.2 Performance Monitoring

GFP-T performance monitoring (GFP-T PM) is available via remote monitoring (RMON), and trunk PM is managed according to Telcordia GR-253-CORE and ITU G.783/826. Client PM is achieved through RMON for FC and GE.

2.10.8.3 Distance Extension

A buffer-to-buffer credit management scheme provides FC flow control. With this feature enabled, a port indicates the number of frames that can be sent to it (its buffer credit), before the sender is required to stop transmitting and wait for the receipt of a “ready” indication. The MXP_MR_2.5G and MXPP_MR_2.5 cards support FC credit-based flow control with a buffer-to-buffer credit extension of up to 1200 km (745.6 miles) for 1G FC, up to 600 km (372.8 miles) for 2G FC, and up to 500 km (310.7 miles) for 4G FC. The feature can be enabled or disabled.

2.10.8.4 Slot Compatibility

You can install MXP_MR_2.5G and MXPP_MR_2.5G cards in Slots 1 to 6 and 12 to 17. The TCC2/TCC2P card is the only other card required to be used with these muxponder cards. Cross-connect cards do not affect the operation of the muxponder cards.

2.10.8.5 Interoperability with Cisco MDS Switches

You can provision a string (port name) for each fiber channel/FICON interface on the MXP_MR_2.5G and MXPP_MR_2.5G cards, which allows the MDS Fabric Manager to create a link association between that SAN port and a SAN port on a Cisco MDS 9000 switch.

2.10.8.6 Client and Trunk Ports

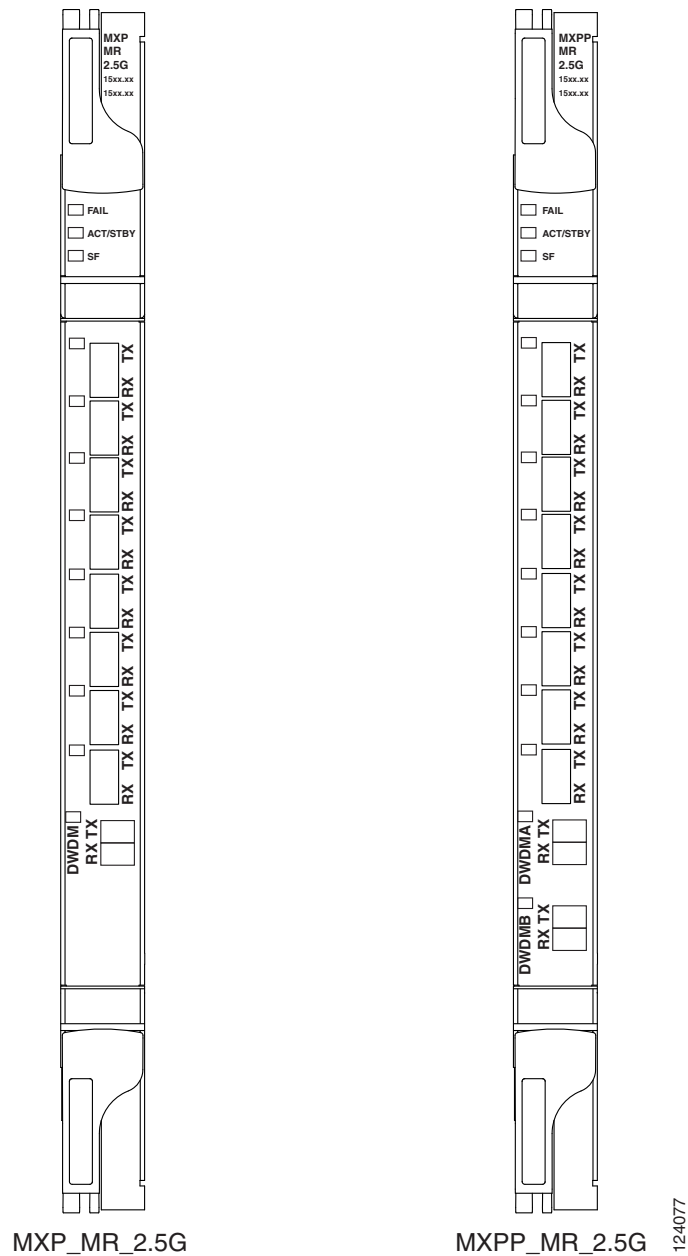
The MXP_MR_2.5G card features a 1550-nm laser for the trunk/line port and a 1310-nm or 850-nm laser (depending on the SFP) for the client ports. The card contains eight 12.5 degree downward tilt SFP modules for the client interfaces. For optical termination, each SFP uses two LC connectors, which are labeled TX and RX on the faceplate. The trunk port is a dual-LC connector with a 45 degree downward angle.

The MXPP_MR_2.5G card features a 1550-nm laser for the trunk/line port and a 1310-nm or 850-nm laser (depending on the SFP) for the client port. The card contains eight 12.5 degree downward tilt SFP modules for the client interfaces. For optical termination, each SFP uses two LC connectors, which are labeled TX and RX on the faceplate. There are two trunk port connectors (one for working and one for protect). Each is a dual-LC connector with a 45-degree downward angle.

2.10.8.7 Faceplates

Figure 2-86 shows the MXP_MR_2.5G and MXPP_MR_2.5G faceplates.

Figure 2-86 MXP_MR_2.5G and MXPP_MR_2.5G Faceplates



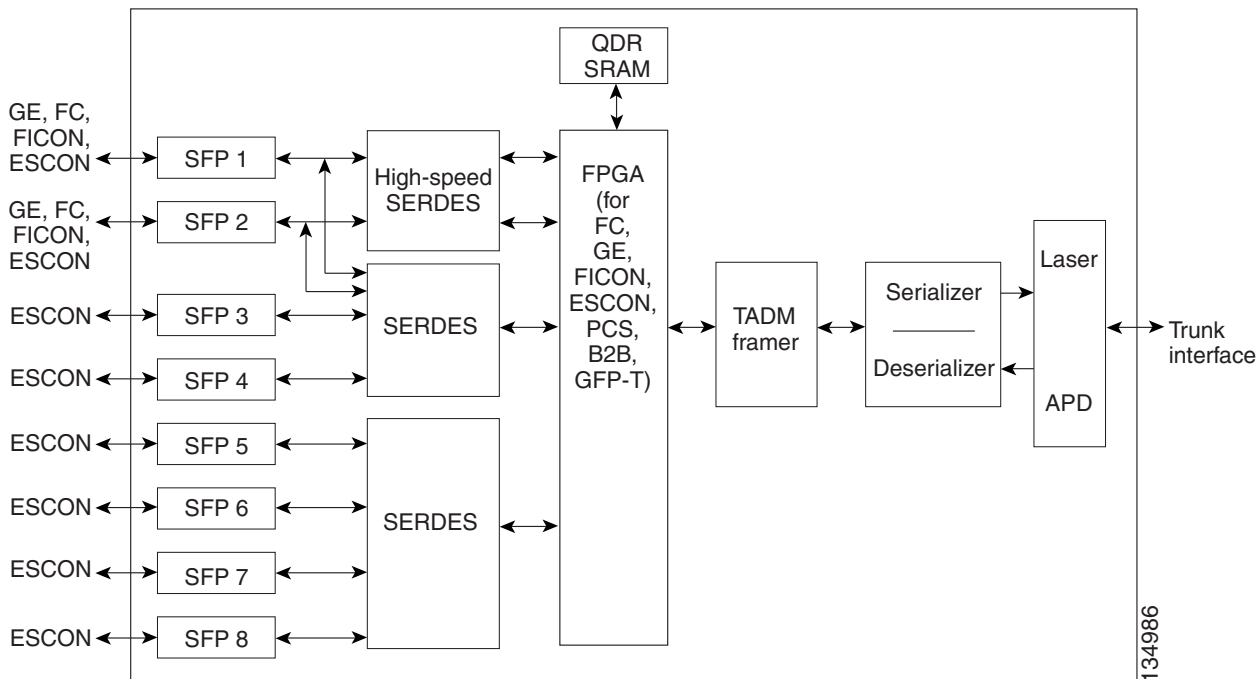
For information on safety labels for the cards, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.

2.10.8.8 Block Diagram

Figure 2-87 shows a block diagram of the MXP_MR_2.5G card. The card has eight SFP client interfaces. Ports 1 and 2 can be used for GE, FC, FICON, or ESCON. Ports 3 through 8 are used for ESCON client interfaces. There are two SERDES blocks dedicated to the high-speed interfaces (GE, FC, FICON, and ESCON) and two SERDES blocks for the ESCON interfaces. A FPGA is provided to support different configurations for different modes of operation. This FPGA has a Universal Test and Operations Physical Interface for ATM (UTOPIA) interface. A transceiver add/drop multiplexer (TADM) chip supports framing. Finally, the output signal is serialized and connected to the trunk front end with a direct modulation laser. The trunk receive signal is converted into an electrical signal with an avalanche photodiode (APD), is deserialized, and is then sent to the TADM framer and FPGA.

The MXPP_MR_2.5G is the same, except a 50/50 splitter divides the power at the trunk interface. In the receive direction, there are two APDs, two SERDES blocks, and two TADM framers. This is necessary to monitor both the working and protect paths. A switch selects one of the two paths to connect to the client interface.

Figure 2-87 MXP_MR_2.5G and MXPP_MR_2.5G Block Diagram



Caution

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_MR_2.5G and MXPP_MR_2.5G cards in a loopback configuration on the trunk port. Do not use direct fiber loopbacks with the MXP_MR_2.5G and MXPP_MR_2.5G cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_2.5G and MXPP_MR_2.5G cards.

2.10.8.9 Automatic Laser Shutdown

The ALS procedure is supported on both client and trunk interfaces. On the client interface, ALS is compliant with ITU-T G.664 (6/99). On the data application and trunk interface, the switch on and off pulse duration is greater than 60 seconds. The on and off pulse duration is user-configurable. For details regarding ALS provisioning for the MXP_MR_2.5G and MXPP_MR_2.5G cards, see the *Cisco ONS 15454 DWDM Procedure Guide*.

2.10.8.10 MXP_MR_2.5G and MXPP_MR_2.5G Card-Level Indicators

Table 2-88 lists the four card-level LEDs on the MXP_MR_2.5G and MXPP_MR_2.5G cards.

Table 2-88 MXP_MR_2.5G and MXPP_MR_2.5G Card-Level Indicators

Card-Level LED	Description
FAIL LED (Red)	Red indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	Green indicates that the card is operational (one or both ports active) and ready to carry traffic. Amber indicates that the card is operational and in standby (protect) mode.
SF LED (Amber)	Amber indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card's ports. The amber SF LED is also illuminated if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the LED turns off.

2.10.8.11 MXP_MR_2.5G and MXPP_MR_2.5G Port-Level Indicators

Table 2-89 lists the eight port-level LEDs on the MXP_MR_2.5G and MXPP_MR_2.5G cards.

Table 2-89 MXP_MR_2.5G and MXPP_MR_2.5G Port-Level Indicators

Port-Level LED	Description
Client LEDs (eight LEDs)	Green indicates that the port is carrying traffic (active) on the interface. Amber indicates that the port is carrying protect traffic (MXPP_MR_2.5G). Red indicates that the port has detected a loss of signal.
DWDM LED (MXP_MR_2.5G) Green (Active) Red (LOS)	Green indicates that the card is carrying traffic (active) on the interface. A red LED indicates that the interface has detected an LOS or LOC.
DWDMA and DWDMA LEDs (MXPP_MR_2.5G) Green (Active) Amber (Protect Traffic) Red (LOS)	Green indicates that the card is carrying traffic (active) on the interface. When the LED is amber, it indicates that the interface is carrying protect traffic in a splitter protection card (MXPP_MR_2.5G). A red LED indicates that the interface has detected an LOS or LOC.

2.10.9 MXP_MR_10DME_C and MXP_MR_10DME_L Cards

The MXP_MR_10DME_C and MXP_MR_10DME_L cards aggregate a mix of client SAN service client inputs (GE, FICON, and Fibre Channel) into one 10.0 Gbps STM-64/OC-192 DWDM signal on the trunk side. It provides one long-reach STM-64/OC-192 port per card and is compliant with Telcordia GR-253-CORE and ITU-T G.957.

The cards support aggregation of the following signal types:

- 1-Gigabit Fibre Channel
- 2-Gigabit Fibre Channel
- 4-Gigabit Fibre Channel
- 1-Gigabit Ethernet
- 1-Gigabit ISC-Compatible (ISC-1)
- 2-Gigabit ISC-Peer (ISC-3)

**Note**

On the card faceplates, the MXP_MR_10DME_C and MXP_MR_10DME_L cards are displayed as 10DME_C and 10DME_L, respectively.

**Caution**

The card can be damaged by dropping it. Handle it safely.

The MXP_MR_10DME_C and MXP_MR_10DME_L muxponders pass all SONET/SDH overhead bytes transparently.

The digital wrapper function (ITU-T G.709 compliant) formats the DWDM wavelength so that it can be used to set up GCCs for data communications, enable FEC, or facilitate PM. The MXP_MR_10DME_C and MXP_MR_10DME_L cards work with the OTN devices defined in ITU-T G.709. The cards support ODU1 to OTU2 multiplexing, an industry standard method for asynchronously mapping a SONET/SDH payload into a digitally wrapped envelope. See the [“2.10.6.5 Multiplexing Function” section on page 2-141](#).

**Note**

Because the client payload cannot oversubscribe the trunk, a mix of client signals can be accepted, up to a maximum limit of 10 Gbps.

You can install MXP_MR_10DME_C and MXP_MR_10DME_L cards in Slots 1 to 6 and 12 to 17.

**Note**

The MXP_MR_10DME_C and MXP_MR_10DME_L cards are not compatible with the MXP_2.5G_10G card, which does not support full optical transparency.

The MXP_MR_10DME_C card features a tunable 1550-nm C-band laser on the trunk port. The laser is tunable across 82 wavelengths on the ITU grid with 50-GHz spacing between wavelengths. The MXP_MR_10DME_L features a tunable 1580-nm L-band laser on the trunk port. The laser is tunable across 80 wavelengths on the ITU grid, also with 50-GHz spacing. Each card features four 1310-nm lasers on the client ports and contains five transmit and receive connector pairs (labeled) on the card faceplate. The cards uses dual LC connectors on the trunk side and use SFP modules on the client side for optical cable termination. The SFP pluggable modules are SR or IR and support an LC fiber connector.

Table 2-90 shows the input data rate for each client interface, and the encapsulation method. The current version of the GFP-T G.7041 supports transparent mapping of 8B/10B block-coded protocols, including Gigabit Ethernet, Fibre Channel, ISC, and FICON.

In addition to the GFP mapping, 1-Gbps traffic on Port 1 or 2 of the high-speed SERDES is mapped to an STS-24c channel. If two 1-Gbps client signals are present at Port 1 and Port 2 of the high-speed SERDES, the Port 1 signal is mapped into the first STS-24c channel and the Port 2 signal into the second STS-24c channel. The two channels are then mapped into an OC-48 trunk channel.

Table 2-90 MXP_MR_10DME_C and MXP_MR_10DME_L Client Interface Data Rates and Encapsulation

Client Interface	Input Data Rate	GFP-T G.7041 Encapsulation
2G FC	2.125 Gbps	Yes
1G FC	1.06 Gbps	Yes
2G FICON/2G ISC-Compatible (ISC-1)/ 2G ISC-Peer (ISC-3)	2.125 Gbps	Yes
1G FICON/1G ISC-Compatible (ISC-1)/ 1G ISC-Peer (ISC-3)	1.06 Gbps	Yes
Gigabit Ethernet	1.25 Gbps	Yes

There are two FPGAs on each MXP_MR_10DME_C and MXP_MR_10DME_L, and a group of four ports is mapped to each FPGA. Group 1 consists of Ports 1 through 4, and Group 2 consists of Ports 5 through 8. Table 2-91 shows some of the mix and match possibilities on the various client data rates for Ports 1 through 4, and Ports 5 through 8. An X indicates that the data rate is supported in that port.

Table 2-91 Supported Client Data Rates for Ports 1 through 4

Port (Group 1)	Port (Group 2)	Gigabit Ethernet	1G FC	2G FC	4G FC
1	5	X	X	X	X
2	6	X	X	—	—
3	7	X	X	X	—
4	8	X	X	—	—

GFP-T PM is available through RMON and trunk PM is managed according to Telcordia GR-253-CORE and ITU G.783/826. Client PM is achieved through RMON for FC and GE.

A buffer-to-buffer credit management scheme provides FC flow control. With this feature enabled, a port indicates the number of frames that can be sent to it (its buffer credit), before the sender is required to stop transmitting and wait for the receipt of a “ready” indication. The MXP_MR_10DME_C and MXP_MR_10DME_L cards support FC credit-based flow control with a buffer-to-buffer credit extension of up to 1600 km (994.1 miles) for 1G FC, up to 800 km (497.1 miles) for 2G FC, or up to 400 km (248.5 miles) for 4G FC. The feature can be enabled or disabled.

The MXP_MR_10DME_C and MXP_MR_10DME_L cards feature a 1550-nm laser for the trunk/line port and a 1310-nm or 850-nm laser (depending on the SFP) for the client ports. The cards contains eight 12.5 degree downward tilt SFP modules for the client interfaces. For optical termination, each SFP uses two LC connectors, which are labeled TX and RX on the faceplate. The trunk port is a dual-LC connector with a 45 degree downward angle.

The throughput of the MXP_MR_10DME_C and MXP_MR_10DME_L cards is affected by the following parameters:

- Distance extension—If distance extension is enabled on the card, it provides more throughput but more latency. If distance extension is disabled on the card, the buffer to buffer credits on the storage switch affects the throughput; higher the buffer to buffer credits higher is the throughput.



Note For each link to operate at the maximum throughput, it requires a minimum number of buffer credits to be available on the devices which the link connects to. The number of buffer credits required is a function of the distance between the storage switch extension ports and the link bandwidth, that is, 1G, 2G, or 4G. These buffer credits are provided by either the storage switch (if distance extension is disabled) or by both the storage switch and the card (if distance extension is enabled).

- Forward Error Correction (FEC)—If Enhanced FEC (E-FEC) is enabled on the trunk port of the card, the throughput is significantly reduced in comparison to standard FEC being set on the trunk port.



Note If distance extension is enabled on the card, the FEC status does not usually affect the throughput of the card.

- Payload size—The throughput of the card decreases with decrease in payload size.

The resultant throughput of the card is usually the combined effect of the above parameters.

2.10.9.1 Key Features

The MXP_MR_10DME_C and MXP_MR_10DME_L cards have the following high-level features:

- Onboard E-FEC processor: The processor supports both standard RS (specified in ITU-T G.709) and E-FEC, which allows an improved gain on trunk interfaces with a resultant extension of the transmission range on these interfaces. The E-FEC functionality increases the correction capability of the transponder to improve performance, allowing operation at a lower OSNR compared to the standard RS (237,255) correction algorithm. A new BCH algorithm implemented in E-FEC allows recovery of an input BER up to 1E-3.
- Pluggable client interface optic modules: The MXP_MR_10DME_C and MXP_MR_10DME_L cards have modular interfaces. Two types of optics modules can be plugged into the card. These include an OC-48/STM 16 SR-1 interface with a 7-km (4.3-mile) nominal range (for short range and intra-office applications) and an IR-1 interface with a range up to 40 km (24.9 miles). SR-1 is defined in Telcordia GR-253-CORE and in I-16 (ITU-T G.957). IR-1 is defined in Telcordia GR-253-CORE and in S-16-1 (ITU-T G.957).
- Y-cable protection: Supports Y-cable protection between the same card type only, on ports with the same port number and signal rate. See the [“2.11.1 Y-Cable Protection”](#) section on page 2-169 for more detailed information.
- High level provisioning support: The cards are initially provisioned using Cisco MetroPlanner software. Subsequently, the card can be monitored and provisioned using CTC software.
- ALS: A safety mechanism used in the event of a fiber cut. For details regarding ALS provisioning for the MXP_MR_10DME_C and MXP_MR_10DME_L cards, see the *Cisco ONS 15454 DWDM Procedure Guide*.

- **Link monitoring and management:** The cards use standard OC-48 OH bytes to monitor and manage incoming interfaces. The cards pass the incoming SDH/SONET data stream and its OH bytes transparently.
- **Control of layered SONET/SDH transport overhead:** The cards are provisionable to terminate regenerator section overhead. This is used to eliminate forwarding of unneeded layer overhead. It can help reduce the number of alarms and help isolate faults in the network.
- **Automatic timing source synchronization:** The MXP_MR_10DME_C and MXP_MR_10DME_L cards normally synchronize from the TCC2/TCC2P card. If for some reason, such as maintenance or upgrade activity, the TCC2/TCC2P is not available, the cards automatically synchronize to one of the input client interface clocks.



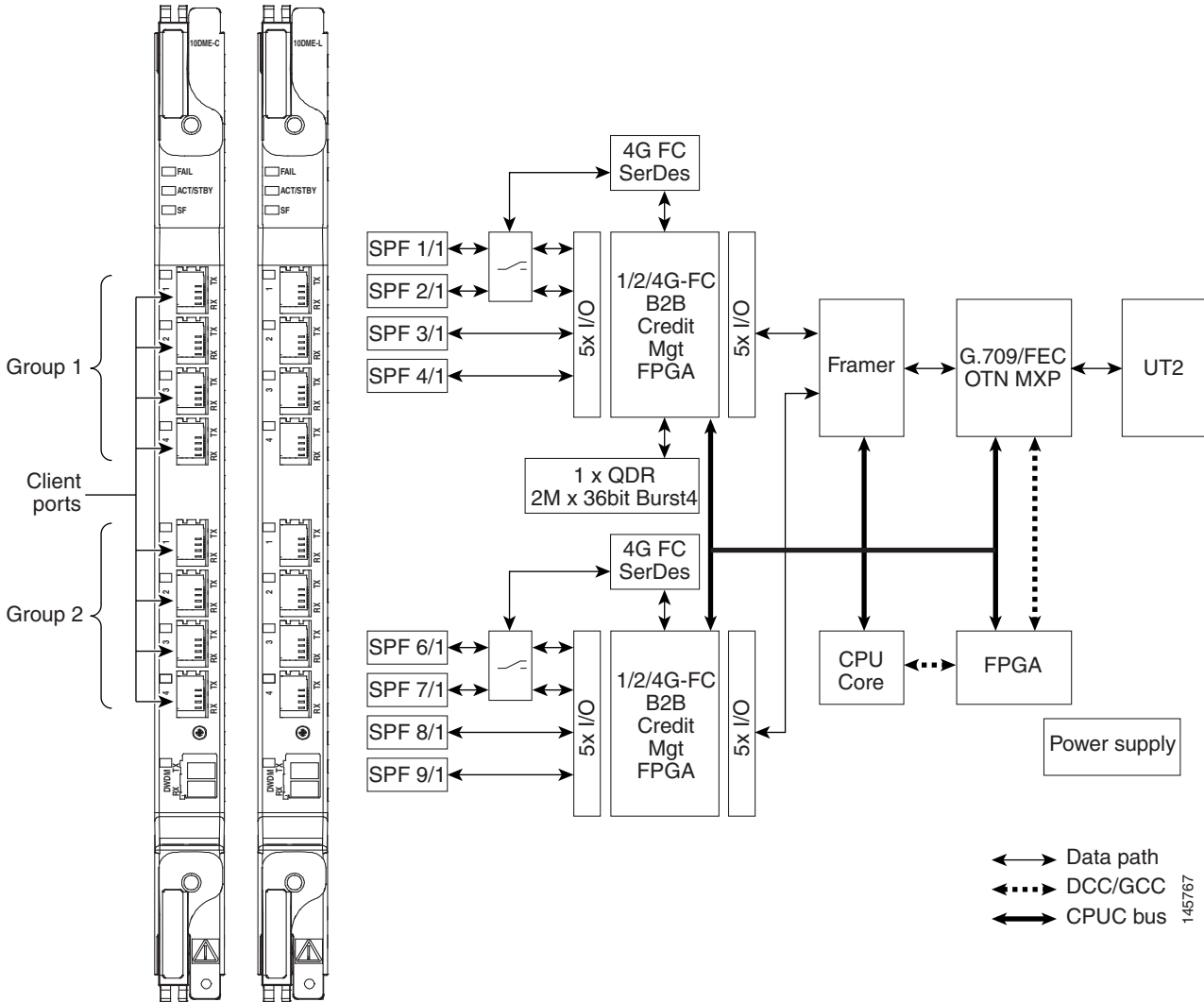
Note MXP_MR_10DME_C and MXP_MR_10DME_L cards cannot be used for line timing.

- **Configurable squelching policy:** The cards can be configured to squelch the client interface output if there is LOS at the DWDM receiver or if there is a remote fault. In the event of a remote fault, the card manages MS-AIS insertion.
- The cards are tunable across the full C band (MXP_MR_10DME_C) or full L band (MXP_MR_10DME_L), thus eliminating the need to use different versions of each card to provide tunability across specific wavelengths in a band.
- You can provision a string (port name) for each fiber channel/FICON interface on the MXP_MR_10DME_C and MXP_MR_10DME_L cards, which allows the MDS Fabric Manager to create a link association between that SAN port and a SAN port on a Cisco MDS 9000 switch.

2.10.9.2 Faceplate

Figure 2-88 shows the MXP_MR_10DME_C and MXP_MR_10DME_L faceplates and block diagram.

Figure 2-88 MXP_MR_10DME_C and MXP_MR_10DME_L Faceplates and Block Diagram



For information on safety labels for the cards, see the “2.2.2 Class 1M Laser Product Cards” section on page 2-15.



Caution

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_10DME_C and MXP_MR_10DME_L cards.

2.10.9.3 Wavelength Identification

The card uses trunk lasers that are wavelocked, which allows the trunk transmitter to operate on the ITU grid effectively. Both the MXP_MR_10DME_C and MXP_MR_10DME_L cards implement the UT2 module. The MXP_MR_10DME_C card uses a C-band version of the UT2 and the MXP_MR_10DME_L card uses an L-band version.

Table 2-92 describes the required trunk transmit laser wavelengths for the MXP_MR_10DME_C card. The laser is tunable over 82 wavelengths in the C band at 50-GHz spacing on the ITU grid.

Table 2-92 MXP_MR_10DME_C Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578

Table 2-92 MXP_MR_10DME_C Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

Table 2-93 describes the required trunk transmit laser wavelengths for the MXP_MR_10DME_L card. The laser is fully tunable over 80 wavelengths in the L band at 50-GHz spacing on the ITU grid.

Table 2-93 MXP_MR_10DME_L Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91

Table 2-93 MXP_MR_10DME_L Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

2.10.9.4 MXP_MR_10DME_C and MXP_MR_10DME_L Card-Level Indicators

Table 2-94 describes the three card-level LEDs on the MXP_MR_10DME_C and MXP_MR_10DME_L cards.

Table 2-94 MXP_MR_10DME_C and MXP_MR_10DME_L Card-Level Indicators

Card-Level LED	Description
Red FAIL LED	The red FAIL LED indicates that the card's processor is not ready. This LED is on during reset. The FAIL LED flashes during the boot process. Replace the card if the red FAIL LED persists.
ACT/STBY LED Green (Active) Amber (Standby)	If the ACT/STBY LED is green, the card is operational (one or more ports active) and ready to carry traffic. If the ACT/STBY LED is amber, the card is operational and in standby (protect) mode.
Amber SF LED	The amber SF LED indicates a signal failure or condition such as LOS, LOF, or high BERs on one or more of the card's ports. The amber SF LED is also on if the transmit and receive fibers are incorrectly connected. If the fibers are properly connected and the link is working, the light turns off.

2.10.9.5 MXP_MR_10DME_C and MXP_MR_10DME_L Port-Level Indicators

Table 2-95 describes the port-level LEDs on the MXP_MR_10DME_C and MXP_MR_10DME_L cards.

Table 2-95 MXP_MR_10DME_C and MXP_MR_10DME_L Port-Level Indicators

Port-Level LED	Description
Port LED (eight LEDs, four for each group, one for each SFP)	When green, the port LED indicates that the client port is either in service and receiving a recognized signal (that is, no signal fail), or Out of Service and Maintenance (OOS,MT or locked, maintenance) and the signal fail and alarms are being ignored.
Green/Red/Amber/Off	When red, the port LED indicates that the client port is in service but is receiving a signal fail (LOS). When amber, the port LED indicates that the port is provisioned and in a standby state. When off, the port LED indicates that the SFP is either not provisioned, out of service, not properly inserted, or the SFP hardware has failed.
Green DWDM LED	The green DWDM LED indicates that the DWDM port is in service and that it is receiving a recognized signal.

2.11 Transponder and Muxponder Protection

Two types of protection are available for TXP and MXP cards:

- Y-cable protection
- Splitter protection

2.11.1 Y-Cable Protection

Y-cable protection is available for the following ONS 15454 TXP and MXP cards:

- TXP_MR_10G
- TXP_MR_10E
- TXP_MR_2.5G
- MXP_2.5G_10G
- MXP_2.5G_10E
- MXP_2.5G_10E_C
- MXP_2.5G_10E_L
- MXP_MR_2.5G
- MXP_MR_10DME_C
- MXP_MR_10DME_L

To create Y-cable protection, you create a Y-cable protection group for two TXP or MXP cards using the CTC software, then connect the client ports of the two cards physically with a Y-cable. The single client signal is sent into the Rx Y-cable and is split between the two TXP or MXP cards. The two Tx signals

from the client side of the TXP or MXP cards are combined in the TX Y-cable into a single client signal. Only the active card signal passes through as the single TX client signal. The other card must have its laser turned off to avoid signal degradation where the Y-cable joins.

**Note**

If you create a GCC on either card of the protect group, the trunk port stays permanently active, regardless of the switch state. When you provision a GCC, you are provisioning unprotected overhead bytes. The GCC is not protected by the protect group.

**Note**

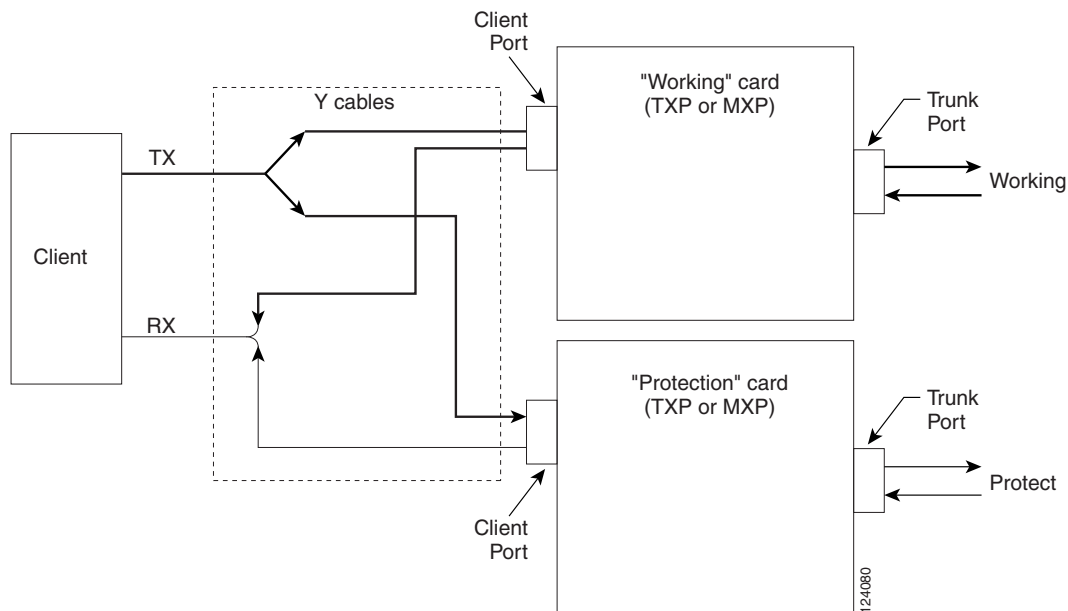
In a MXP_MR_10DME card provisioned with Y-Cable protection, if a failure is detected on the active path, the traffic is switched to the protect card. In the process of performing the switch operation, the actual end-to-end traffic is affected for up to 15-20 seconds.

Figure 2-89 shows the Y-cable signal flow.

**Note**

Loss of Signal–Payload (LOS-P) alarms, also called Incoming Payload Signal Absent alarms, can occur on a split signal if the ports are not in a Y-cable protection group.

Figure 2-89 Y-Cable Protection

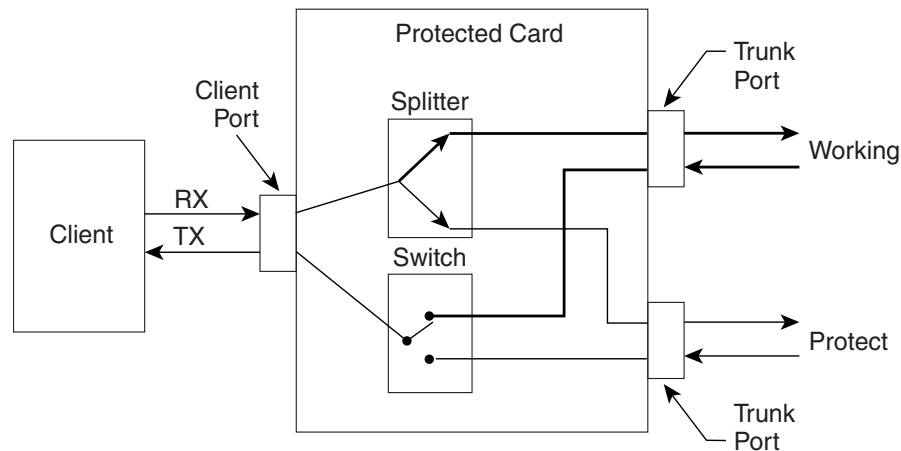


2.11.2 Splitter Protection

Splitter protection, shown in Figure 2-90, is provided with TXPP and MXPP cards. To implement splitter protection, a client injects a single signal into the client Rx port. An optical splitter internal to the card then splits the signal into two separate signals and routes them to the two trunk Tx ports. The two signals are transmitted over diverse optical paths. The far-end MXPP or TXPP card uses an optical switch to choose one of the two trunk Rx port signals and injects it into the Tx client port. When using splitter

protection with two MXPP or TXPP cards, there are two different optical signals that flow over diverse paths in each direction. In case of failure, the far-end switch must choose the appropriate signal using its built-in optical switch. The triggers for a protection switch are LOS, LOF, SF, or SD.

Figure 2-90 Splitter Protection



124079

Create and modify protection schemes using CTC software.

2.12 Far-End Laser Control

The 15454 DWDM cards provide a transparent mode that accurately conveys the client input signal to the far-end client output signal. The client signal is normally carried as payload over the DWDM signals. Certain client signals, however, cannot be conveyed as payload. In particular, client LOS or LOF cannot be carried. Far-end laser control (FELC) is the ability to convey an LOS or LOF from the near-end client input to the far-end client output.

If an LOS is detected on the near-end client input, the near-end trunk sets the appropriate bytes in the OTN overhead of the DWDM line. These bytes are received by the far-end trunk, and cause the far-end client laser to be turned off. When the laser is turned off, it is said to be squelched. If the near-end LOS clears, the near-end trunk clears the appropriate bytes in the OTN overhead, the far-end detects the changed bytes, and the far-end client squelch is removed.

FELC also covers the situation in which the trunk port detects that it has an invalid signal; the client is squelched so as not to propagate the invalid signal.

Payload types with the 2R mode preclude the use of OTN overhead bytes. In 2R mode, an LOS on the client port causes the trunk laser to turn off. The far end detects the LOS on its trunk receiver and squelches the client.

FELC is not provisionable. It is always enabled when the DWDM card is in Transparent mode. However, FELC signaling to the far-end is only possible when ITU-T G.709 is enabled on both ends of the trunk span.

2.13 Jitter Considerations

Jitter introduced by the SFPs used in the transponders and muxponders must be considered when cascading several cards. With TXP_MR_2.5G, TXPP_MR_2.5G, MXP_MR_2.5G, MXPP_MR_2.5G, and TXP_MR_10E cards, several transponders can be cascaded before the cumulative jitter violates the jitter specification. The recommended limit is 20 cards. With TXP_MR_10G cards, you can also cascade several cards, although the recommended limit is 12 cards. With MXP_2.5G_10G and MXP_2.5G_10E cards, any number of cards can be cascaded as long as the maximum reach between any two is not exceeded. This is because any time the signal is demultiplexed, the jitter is eliminated as a limiting factor.

The maximum reach between one transponder and the other must be halved if a Y cable is used. For more information on Y-cable operation, see the “2.11.1 Y-Cable Protection” section on page 2-169.

2.14 Termination Modes

Transponder and muxponder cards have various SONET and SDH termination modes that can be configured using CTC (see the “Provision Transponder and Muxponder Cards” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*). The termination modes are summarized in [Table 2-96](#).

Table 2-96 Termination Modes

Cards	Termination Mode	Description
All TXP and MXP cards, with the exception of the MXP_2.5G_10G card (see next section of this table)	Transparent Termination	All the bytes of the payload pass transparently through the cards.
	Section Termination	The SONET transport overhead (TOH) section bytes and the SDH regenerator section overhead (SOH) bytes are terminated. None of these SOH bytes are passed through. They are all regenerated, including the SONET TOH section DCC (SDCC) bytes and the SDH regenerator section DCC (RS-DCC) bytes. In the section termination mode, the SONET TOH line and SDH multiplex section overhead bytes are passed transparently.
	Line Termination	In line termination mode, the section and line overhead bytes for SONET and the overhead bytes for the SDH multiplex and regenerator sections are terminated. None of the overhead bytes are passed through. They are all regenerated, including the SONET SDCC and line DCC (LDCC) bytes and the SDH RS-DCC and multiplexer section DCC (MS-DCC) bytes.
MXP_2.5G_10G ¹	Transparent Termination	All of the client bytes of the clients passes transparently through except the following: B1 is rebuilt, S1 is rewritten, A1 to A2 are regenerated, and H1 to H3 are regenerated.
	Section Termination	The SONET TOH section bytes and the SDH regenerator section overhead bytes are terminated. None of these section overhead bytes are passed through. They are all regenerated, including the SONET TOH section DCC bytes and the SDH RS-DCC bytes. In the section termination mode, the SONET TOH line and SDH multiplex section overhead bytes are passed transparently.
	Line Termination	In the line termination mode, the section and line overhead bytes for SONET and the overhead bytes for the SDH multiplex and regenerators sections are terminated. None of the overhead bytes are passed through. They are all regenerated, including the SONET SDCC and LDCC bytes and the SDH RS-DCC and MS-DCC bytes.

1. Clients operating at the OC48/STM16 rate are multiplexed into an OC192/STM64 frame before going to OTN or DWDM.

For TXP and MXP cards, adhere to the following conditions while DCC termination provisioning:

- For SDCC/RS-DCC provisioning, the card should be in the Section/RS-DCC or Line/MS-DCC termination mode.
- For LDCC/MS-DCC provisioning, the card should be in the Line/MS-DCC termination mode.

For more information on enabling termination modes, see the procedures for changing card setting in the “Provision Transponder and Muxponder Cards” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

2.15 SFP and XFP Modules

SFPs and 10-Gbps SFPs (XFPs) are integrated fiber optic transceivers that provide high-speed serial links from a port or slot to the network. For more information on SFPs/XFPs and for a list of SFPs/XFPs supported by the transponder and muxponder cards, see the [Installing the GBIC, SFP, and XFP Optics Modules in Cisco ONS Platforms](#).

In CTC, SFPs/XFPs are called pluggable port modules (PPMs). To provision SFPs/XFPs and change the line rate for multirate PPMs, see the *Cisco ONS 15454 DWDM Procedure Guide*.



Node Reference

This chapter explains the ONS 15454 dense wavelength division multiplexing (DWDM) node types that are available for the ONS 15454. The DWDM node type is determined by the type of amplifier and filter cards that are installed in an ONS 15454. The chapter also explains the DWDM automatic power control (APC), reconfigurable optical add/drop multiplexing (ROADM) power equalization, span loss verification, and automatic node setup (ANS) functions.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.



Note

In this chapter, OPT-BST refers to the OPT-BST, OPT-BST-E, and OPT-BST-L cards, 32WSS refers to the 32WSS and 32WSS-L cards, and 32DMX refers to the 32DMX and 32DMX-L cards (but not the 32-DMX-O card). OPT-PRE refers to both the OPT-PRE card and the OPT-AMP-L card provisioned in OPT-Line mode.



Note

OPT-BST-L, 32WSS-L, 32DMX-L, and OPT-AMP-L cards can only be installed in L-band-compatible nodes and networks. OPT-BST, OPT-BST-E, 32WSS, and 32DMX, cards can only be installed in C-band-compatible nodes and networks.

Chapter topics include:

- [3.1 DWDM Node Configurations, page 3-1](#)
- [3.2 DWDM Node Cabling, page 3-15](#)
- [3.3 DWDM and TDM Hybrid Node Types, page 3-31](#)
- [3.4 Automatic Node Setup, page 3-46](#)

3.1 DWDM Node Configurations

The ONS 15454 supports the following DWDM node configurations: hub, terminal, optical add/drop multiplexing (OADM), ROADM, anti-amplified spontaneous emission (anti-ASE), line amplifier, optical service channel (OSC) regeneration line, and multishelf node.

Single-shelf and multishelf configurations support use of secure mode and locked secure mode. For more information about these options, see the “[Scenario 9: IP Addressing with Secure Mode Enabled](#)” section on page 8-19.



The Cisco MetroPlanner tool creates a plan for amplifier placement and proper node equipment.

3.1.1 Hub Node

A hub node is a single ONS 15454 node equipped with two TCC2/TCC2P cards and one of the following combinations:

- Two 32MUX-O cards and two 32DMX-O or 32DMX cards
- Two 32WSS cards and two 32DMX or 32DMX-O cards



The 32WSS and 32DMX cards are normally installed in ROADM nodes, but they can be installed in hub and terminal nodes. If the cards are installed in a hub node, the 32WSS express (EXP RX and EXP TX) ports are not cabled.

A dispersion compensation unit (DCU) can also be added, if necessary. [Figure 3-1](#) shows a hub node configuration with 32MUX-O and 32DMX-O cards installed.



The OADM AD-xC-xx.x or AD-xB-xx.x cards are not part of a hub node because the 32MUX-O and 32DMX-O cards drop and add all 32 channels; therefore, no other cards are necessary.

Figure 3-1 Hub Node Configuration Example

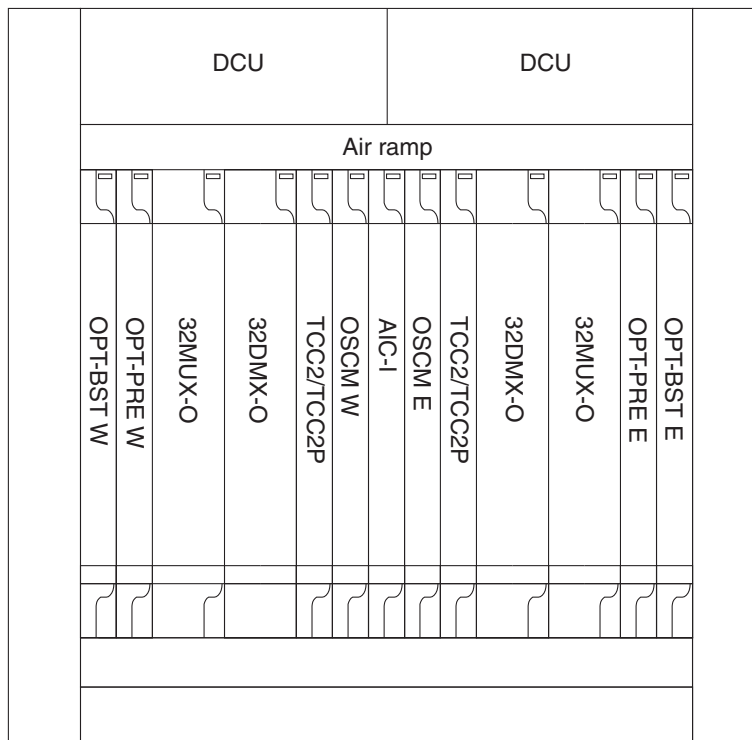
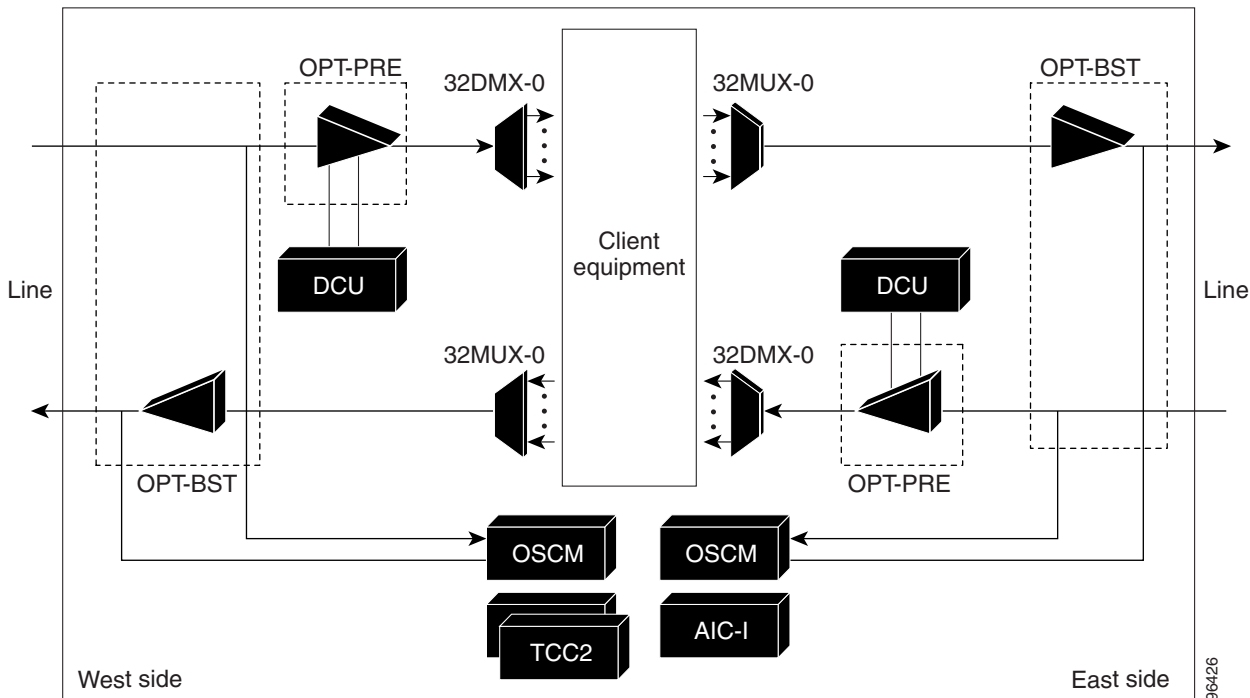


Figure 3-2 shows the channel flow for a hub node. Up to 32 channels from the client ports are multiplexed and equalized onto one fiber using the 32MUX-O card. Then, multiplexed channels are transmitted on the line in the eastward direction and fed to the OPT-BST amplifier. The output of this amplifier is combined with an output signal from the OSCM card and transmitted toward the east line.

Received signals from the east line port are split between the OSCM card and an OPT-PRE card. Dispersion compensation is applied to the signal received by the OPT-PRE amplifier, and it is then sent to the 32DMX-O card, which demultiplexes and attenuates the input signal. The west receive fiber path is identical through the west OPT-BST amplifier, the west OPT-PRE amplifier, and the west 32DMX-O card.

Figure 3-2 Hub Node Channel Flow Example



3.1.2 Terminal Node

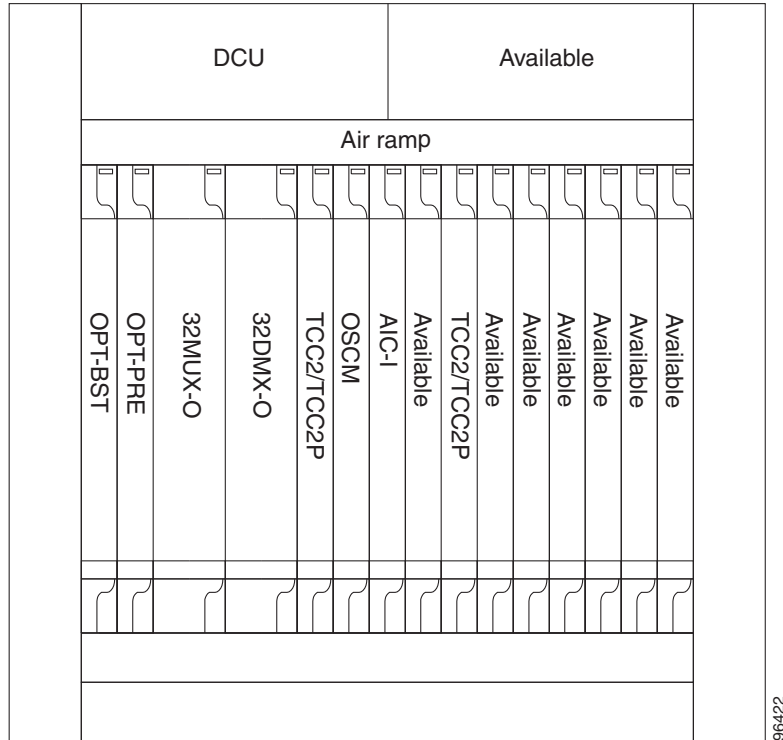
A terminal node is a single ONS 15454 node equipped with two TCC2/TCC2P cards and one of the following combinations:

- One 32MUX-O card and one 32DMX-O card
- One 32WSS and either a 32DMX or a 32DMX-O card

Terminal nodes can be either east or west. In west terminal nodes, the cards are installed in the east slots (Slots 1 through 6). In east terminal nodes, cards are installed in the west slots (Slots 12 through 17).

Figure 3-3 shows an example of an east terminal configuration with a 32MUX-O and 32DMX-O cards installed. The channel flow for a terminal node is the same as the hub node (Figure 3-2).

Figure 3-3 Terminal Node Configuration Example



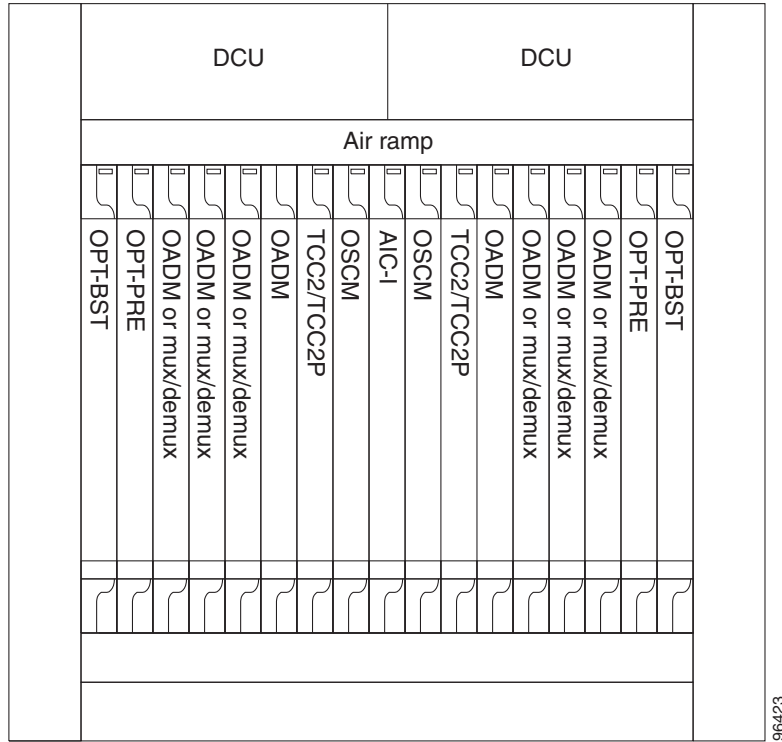
3.1.3 OADM Node

An OADM node is a single ONS 15454 node equipped with cards installed on both sides and at least one AD-xC-xx.x card or one AD-xB-xx.x card and two TCC2/TCC2P cards. 32MUX-O or 32DMX-O cards cannot be installed in an OADM node. In an OADM node, channels can be added or dropped independently from each direction, and then passed through the reflected bands of all OADMs in the DWDM node (called express path). They can also be passed through one OADM card to another OADM card without using a TDM ITU-T line card (called optical pass-through) if an external patchcord is installed.

Unlike express path, an optical pass-through channel can be converted later to an add/drop channel in an altered ring without affecting another channel. OADM amplifier placement and required card placement is determined by the Cisco MetroPlanner tool or your site plan.

OADM nodes can be amplified or passive. In amplified OADMs, the OPT-PRE and the OPT-BST amplifiers are installed on the east and west sides of the node. Figure 3-4 shows an example of an amplified OADM node configuration.

Figure 3-4 Amplified OADM Node Configuration Example



96423

Figure 3-5 shows an example of the channel flow on the amplified OADM node. Since the 32-wavelength plan is based on eight bands (each band contains four channels), optical adding and dropping can be performed at the band level and/or at the channel level (meaning individual channels can be dropped).

Figure 3-5 Amplified OADM Node Channel Flow Example

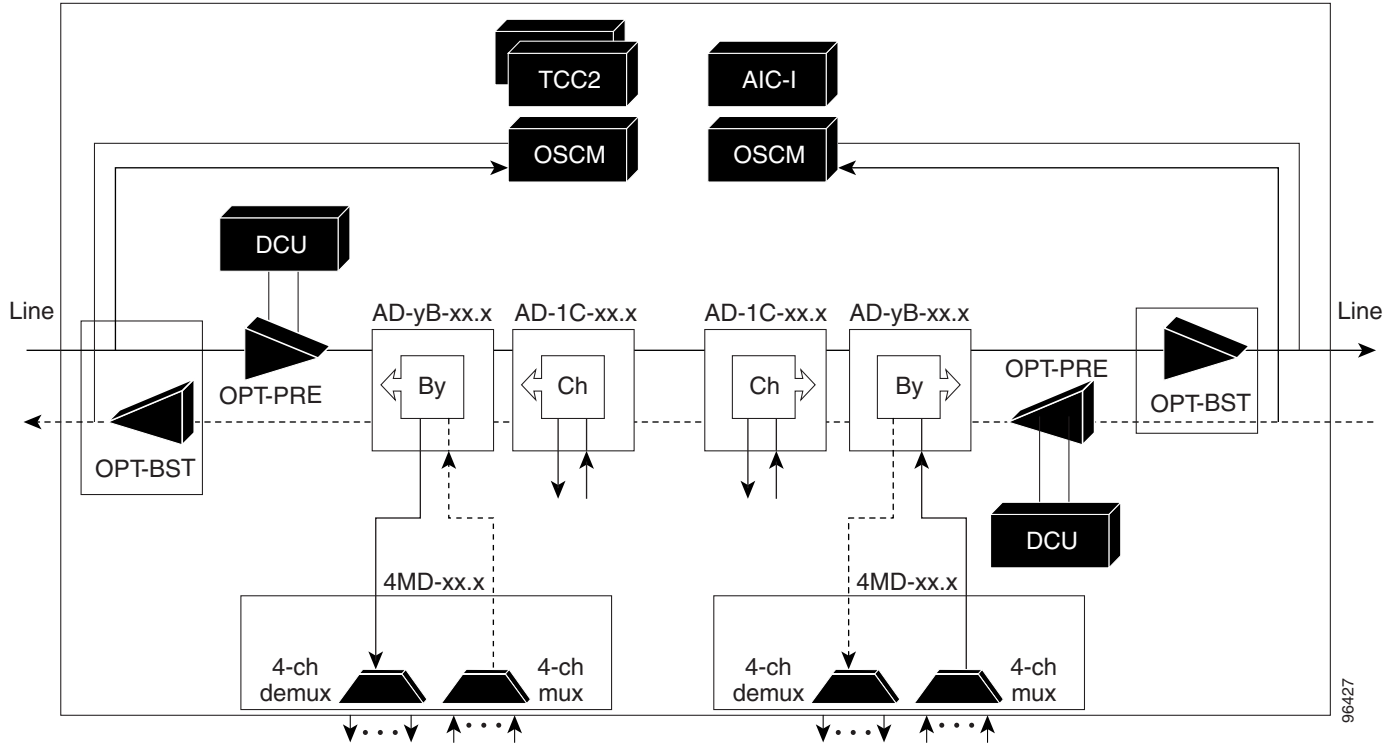


Figure 3-6 shows an example of a passive OADM node configuration. The passive OADM node is equipped with a band filter, one four-channel multiplexer/demultiplexer, and a channel filter on each side of the node.

Figure 3-6 *Passive OADM Node Configuration Example*

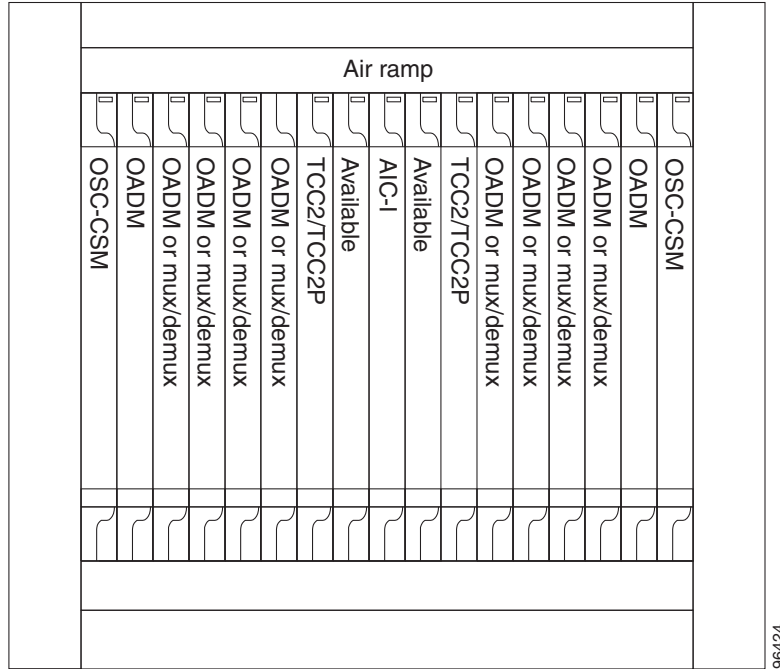
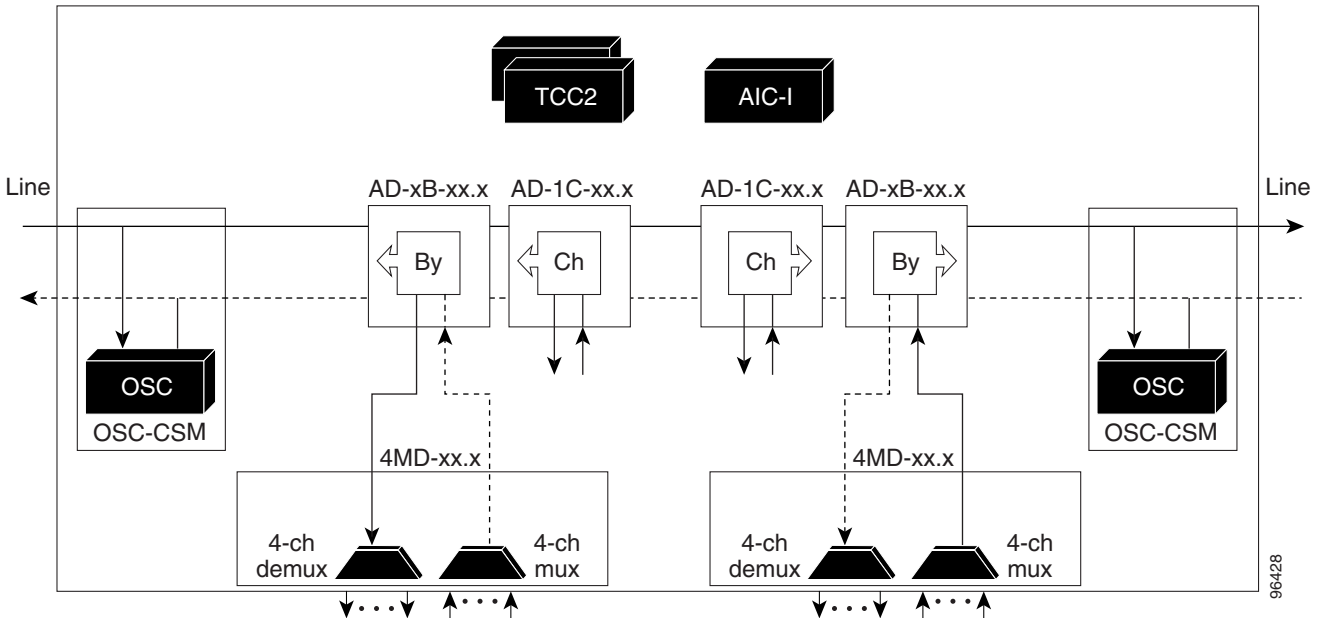


Figure 3-7 shows an example of traffic flow on the passive OADM node. The signal flow of the channels is the same as the amplified OADM, except that the OSC-CSM card is used instead of the OPT-BST amplifier and the OSCM card.

Figure 3-7 *Passive OADM Node Channel Flow Example*



3.1.4 ROADM Node

An ROADM node allows you to add and drop wavelengths without changing the physical fiber connections. ROADM nodes are equipped with two 32WSS cards. 32DMX or 32DMX-O demultiplexers are typically installed, but are not required. Transponders (TXPs) and muxponders (MXPs) can be installed in Slots 6 and 12 and, if amplification is not used, in any open slot. [Figure 3-8](#) shows an example of an amplified ROADM node configuration.


Note

32DMX and 32DMX-O cards can be used in an ROADM node. Cisco Metroplanner automatically chooses the demultiplexer to use for the ROADM node based on the overall network requirements.

Figure 3-8 ROADM Node with OPT-PRE, OPT-BST, and 32DMX Cards Installed

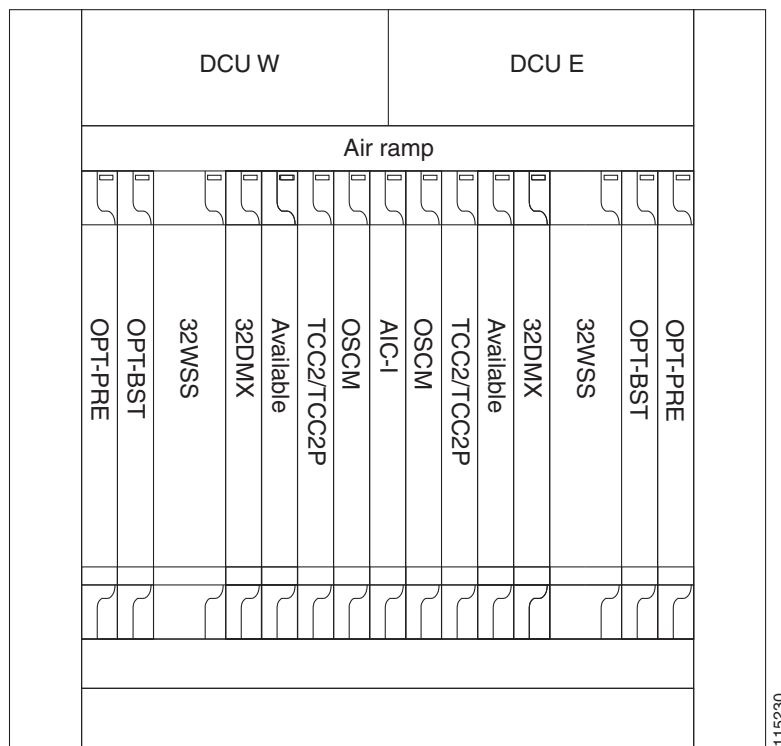


Figure 3-9 shows an example of an ROADM node with 32DMX-O cards installed.

Figure 3-9 ROADM Node with *BST-PRE*, *OPT-BST*, and *32DMX-O* Cards Installed

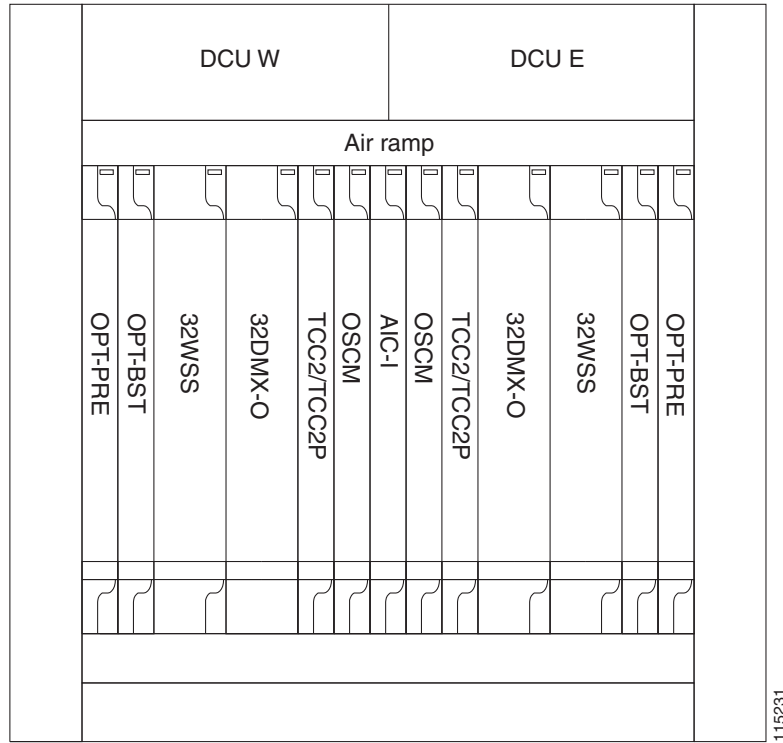
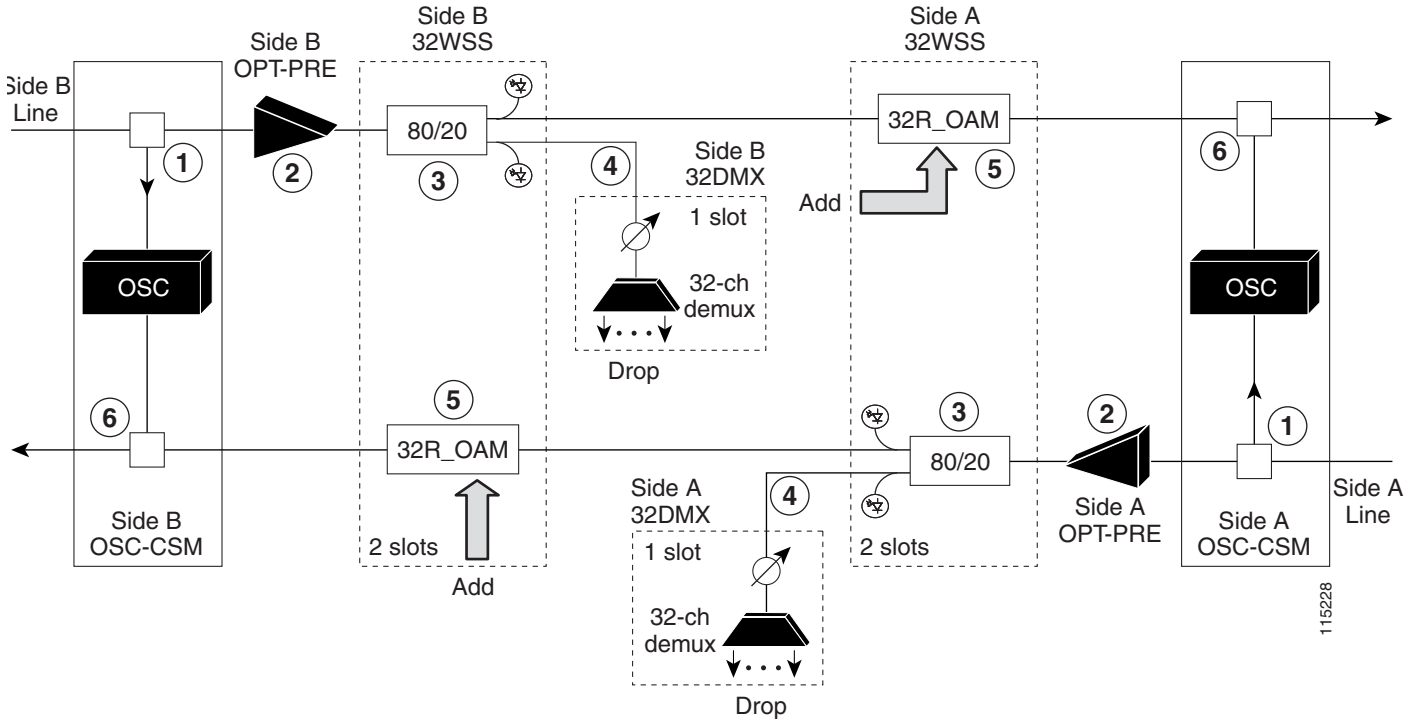


Figure 3-10 shows an example of an ROADM east-to-west optical signal flow. The west-to-east optical signal flow follows an identical path through the west OSC-CSM and west 32WSS modules. In this example, OSC-CSM cards are installed so OPT-BST cards are not needed.

Figure 3-10 ROADM Optical Signal Flow Example



1	The OSC-CSM receives the optical signal. It separates the optical service channel from the optical payload and sends the payload to the OPT-PRE module.
2	The OPT-PRE compensates for chromatic dispersion, amplifies the optical payload, and sends it to the 32WSS.
3	The 32WSS splits the signal into two components. The 80 percent component is sent to the DROP-TX port and the 20 percent component is sent to the EXP-TX port.
4	The drop component goes to the 32DMX where it is demultiplexed and dropped.
5	The express wavelength aggregate signal goes to the 32WSS on the other side where it is demultiplexed. Channels are stopped or forwarded based upon their switch states. Forwarded wavelengths are merged with those coming from the ADD path and sent to the OSC-CSM module.
6	The OSC-CSM combines the multiplexed payload with the OSC and sends the signal out the transmission line.

The MMU card can also be installed in a ROADM node to act as a splitter. Each node will require two MMU cards, one for the east side and one for the west side. The MMU card receives the payload signal on the COM RX port. This signal is split with an 80/20 ratio; 80 percent goes to the EXP TX port. For future use, the remaining 20 percent will go to the EXP-A TX port to allow upgrades to multiring topologies.

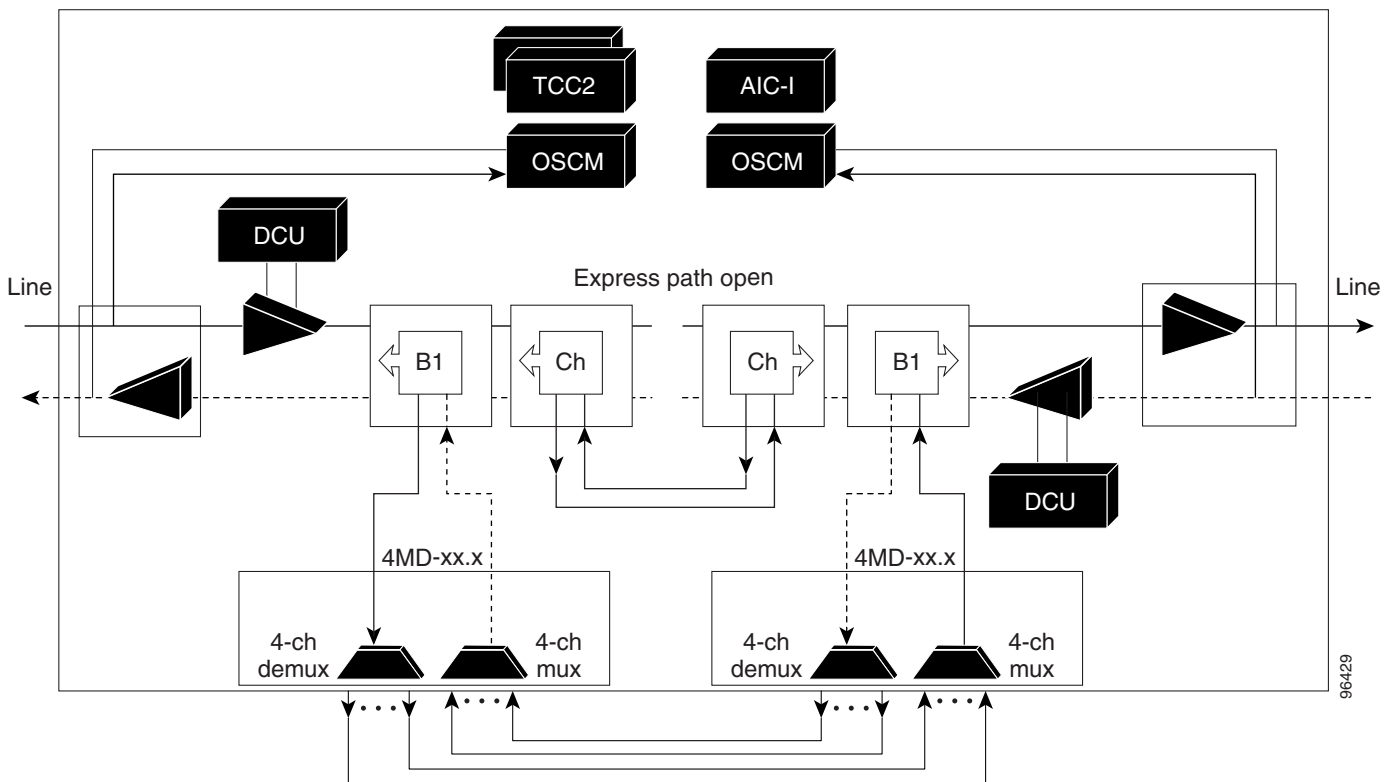
3.1.5 Anti-ASE Node

In a meshed ring network, the ONS 15454 requires a node configuration that prevents amplified spontaneous emission (ASE) accumulation and lasing. An anti-ASE node can be created by configuring a hub node or an OADM node with some modifications. No channels can travel through the express path, but they can be demultiplexed and dropped at the channel level on one side and added and multiplexed on the other side.

The hub node is the preferred node configuration when some channels are connected in pass-through mode. For rings that require a limited number of channels, combine AD-xB-xx.x and 4MD-xx.x cards, or cascade AD-xC-xx.x cards. See [Figure 3-5 on page 3-6](#).

[Figure 3-11](#) shows an anti-ASE node that uses all wavelengths in the pass-through mode. Use Cisco MetroPlanner to determine the best configuration for anti-ASE nodes.

Figure 3-11 Anti-ASE Node Channel Flow Example

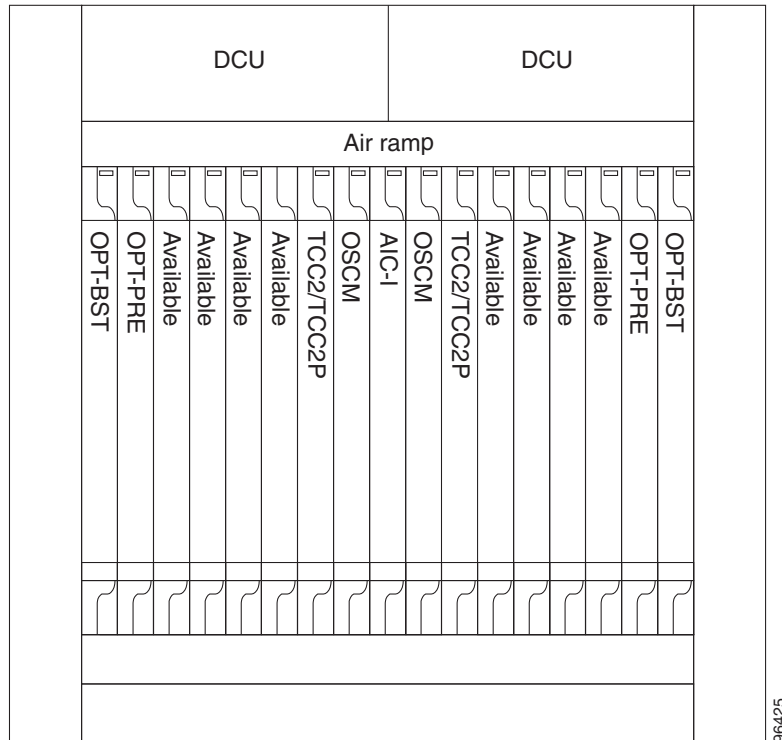


3.1.6 Line Amplifier Node

A line amplifier node is a single ONS 15454 node equipped with OPT-PRE and OPT-BST amplifiers and TCC2/TCC2P cards. Attenuators might also be required between each preamplifier and booster amplifier to match the optical input power value and to maintain the amplifier gain tilt value.

Two OSCM cards are connected to the east or west ports of the booster amplifiers to multiplex the OSC signal with the pass-through channels. If the node does not contain an OPT-BST card, you must use OSC-CSM cards instead of OSCM cards in your configuration. [Figure 3-12](#) shows an example of a line node configuration.

Figure 3-12 Line Amplifier Node Configuration Example



3.1.7 OSC Regeneration Node

The OSC regeneration node is added to the DWDM networks for two purposes:

- To electrically regenerate the OSC channel whenever the span links are 37 dB or longer and payload amplification and add/drop capabilities are not present. Cisco MetroPlanner places an OSC regeneration node in spans longer than 37 dB. 31 dB is the longest span between the OSC regeneration node and the next DWDM network site.
- To add data communications network (DCN) capability wherever needed within the network.

OSC regeneration nodes require two OSC-CSM cards, as shown in [Figure 3-13](#).

Figure 3-13 OSC Regeneration Line Node Configuration Example

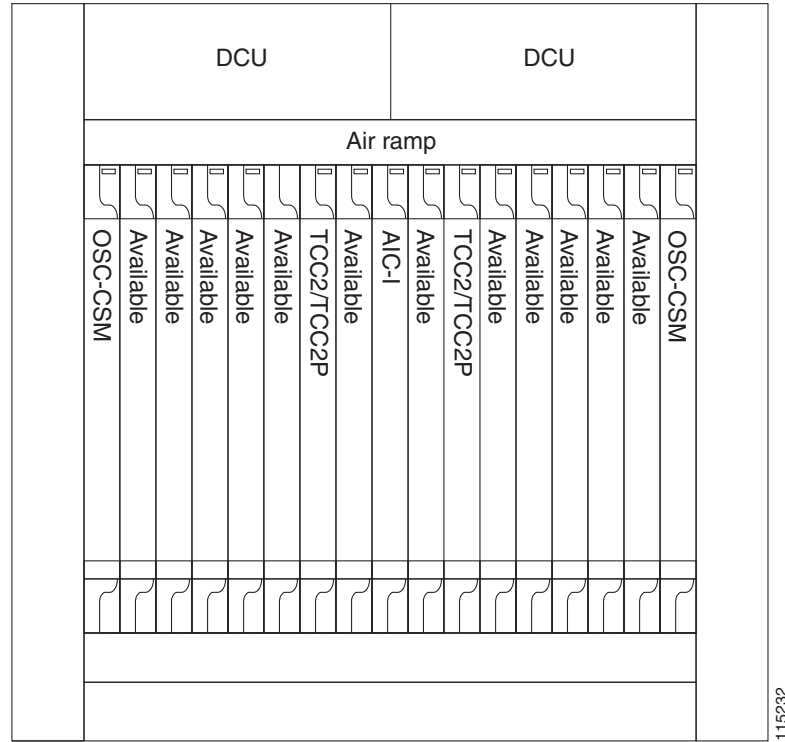
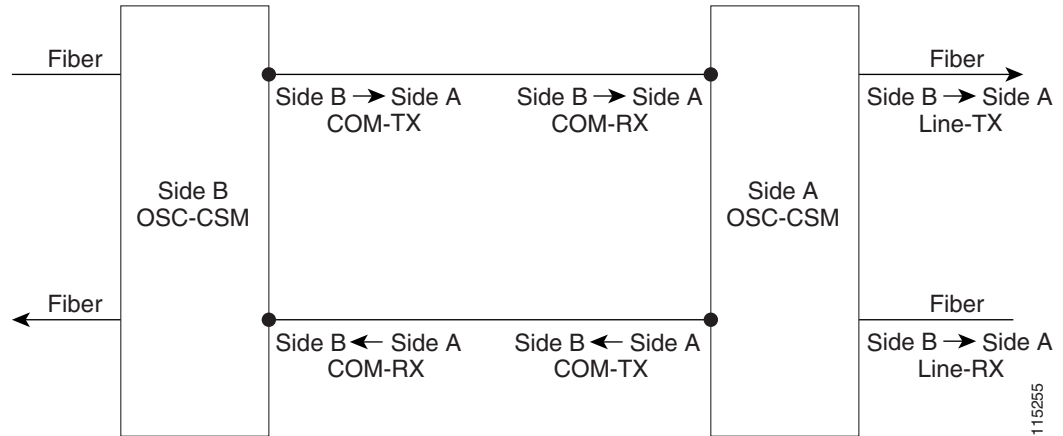


Figure 3-14 shows the OSC regeneration line node OSC signal flow.

Figure 3-14 OSC Regeneration Line Node Flow



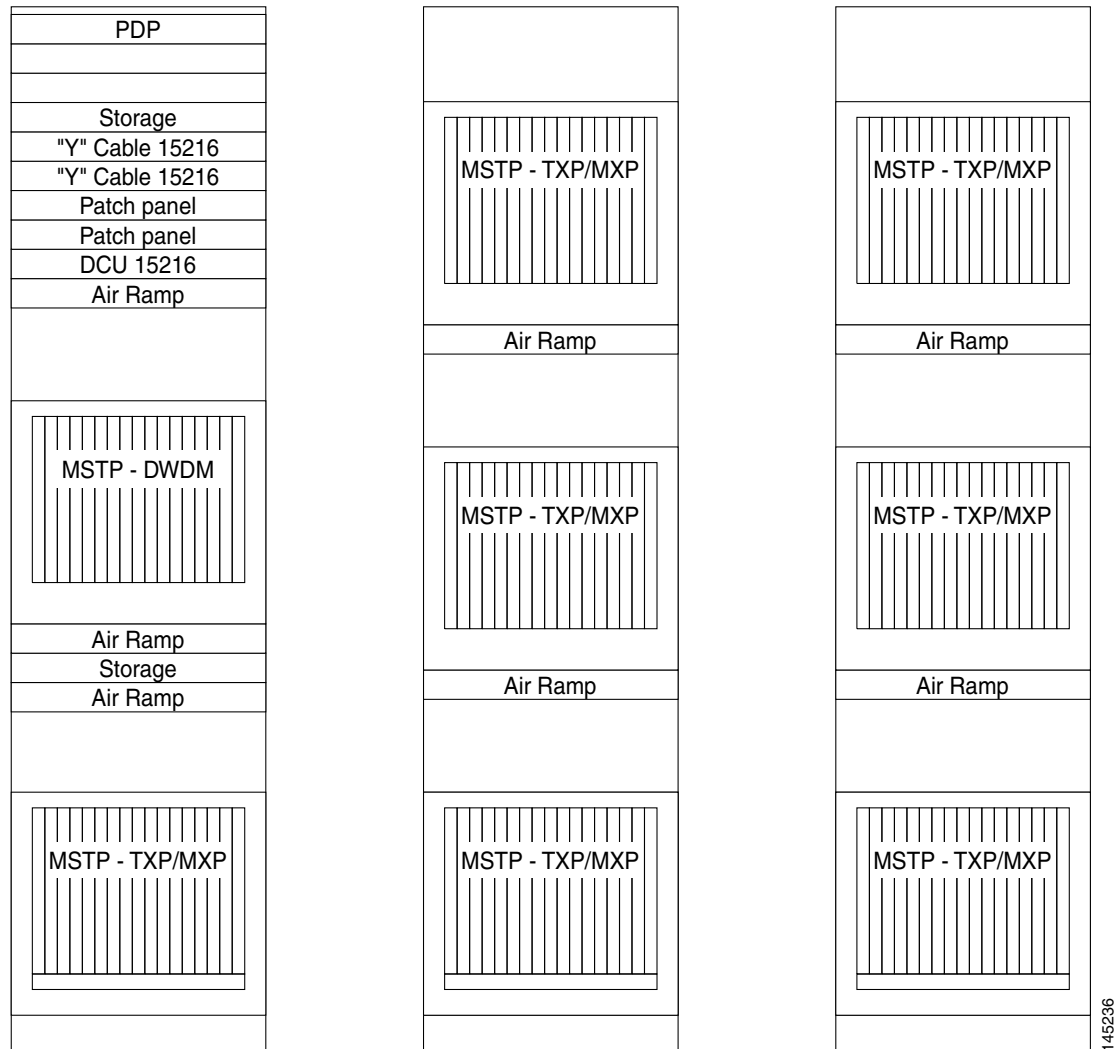
3.1.8 Multishelf Node

An ONS 15454 node provisioned as a multishelf node can manage up to 8 subtending shelves as a single entity. The node controller is the main shelf; its TCC2/TCC2P cards run multishelf functions. Each subtending shelf must be equipped with TCC2/TCC2P cards, which run the shelf functions. For internal data exchange between the node controller shelf and subtending shelves, the node controller shelf must

be equipped with redundant MS-ISC-100T cards or, as an alternative, the Catalyst 2950 switch. Cisco recommends using the MS-ISC-100T cards. If using the Catalyst 2950, it is installed on one of multishelf racks. All subtending shelves must be located in the same site at maximum distance of 100 m (metric) from the Ethernet switches used to support the communication LAN.

Figure 3-15 shows an example of the multishelf node configuration.

Figure 3-15 Multishelf Node Configuration



A multishelf node has a single public IP address for all client interfaces (Cisco Transport Controller [CTC], Transaction Language One [TL1], Simple Network Management Protocol [SNMP], and HTTP); a client can only connect to the node controller shelf, not to the subtending shelves. The user interface and subtending shelves are connected to a patch panel using straight-through (CAT-5) LAN cables.

The node controller shelf has the following functions:

- IP packet routing and network topology discovery occur at the node controller level.
- Open Shortest Path First (OSPF) is centralized on the node controller shelf.

The subtending shelves have the following functions:

- Overhead circuits are not routed within a multishelf node but are managed at the subtending controller shelf only. To use overhead bytes, the AIC-I must be installed on the subtending shelf where it is terminated.
- Each subtending shelf will act as a single shelf node that can use as timing source line, TCC/TCC2P clock, or building integrated timing supply (BITS) source lines.

3.1.8.1 Multishelf Node Layout

The recommended multishelf configurations follow. These configurations are supported by Cisco Metroplanner and are automatically discovered by the software.

- Typical installation—All optical units are equipped on the node controller shelf and TXP/MXP cards are equipped in the aggregated subtended shelves. In addition, all empty slots in the node controller shelf can be equipped with TXP/MXP cards.
- East/west protected—All optical cards facing west are equipped in one shelf; all the optical cards facing east are equipped in another shelf.



Note

Patchcords are automatically created only if the TXP/MXP cards have been previously tuned on one of the supported wavelengths.

3.1.8.2 DCC/GCC/OSC Terminations

A multishelf node provides the same communication channels as a single shelf node:

- OSC links terminate on OSCM/OSC-CSM cards. Two links between each ONS 15454 node are required. An OSC link between two nodes cannot be substituted by an equivalent generic communications channel/data communications channel (GCC/DCC) link terminated on the same couple of nodes. OSC links are mandatory and they can be used to connect a node to a gateway network element (GNE).
- GCC/DCC links terminate on TXP/MXP cards.

The maximum number of DCC/GCC/OSC terminations that are supported in a multishelf node is 48.

3.2 DWDM Node Cabling

DWDM node cabling is specified by the Cisco MetroPlanner Internal Connections table. This section provides examples of the cabling you will typically install for each DWDM node types.

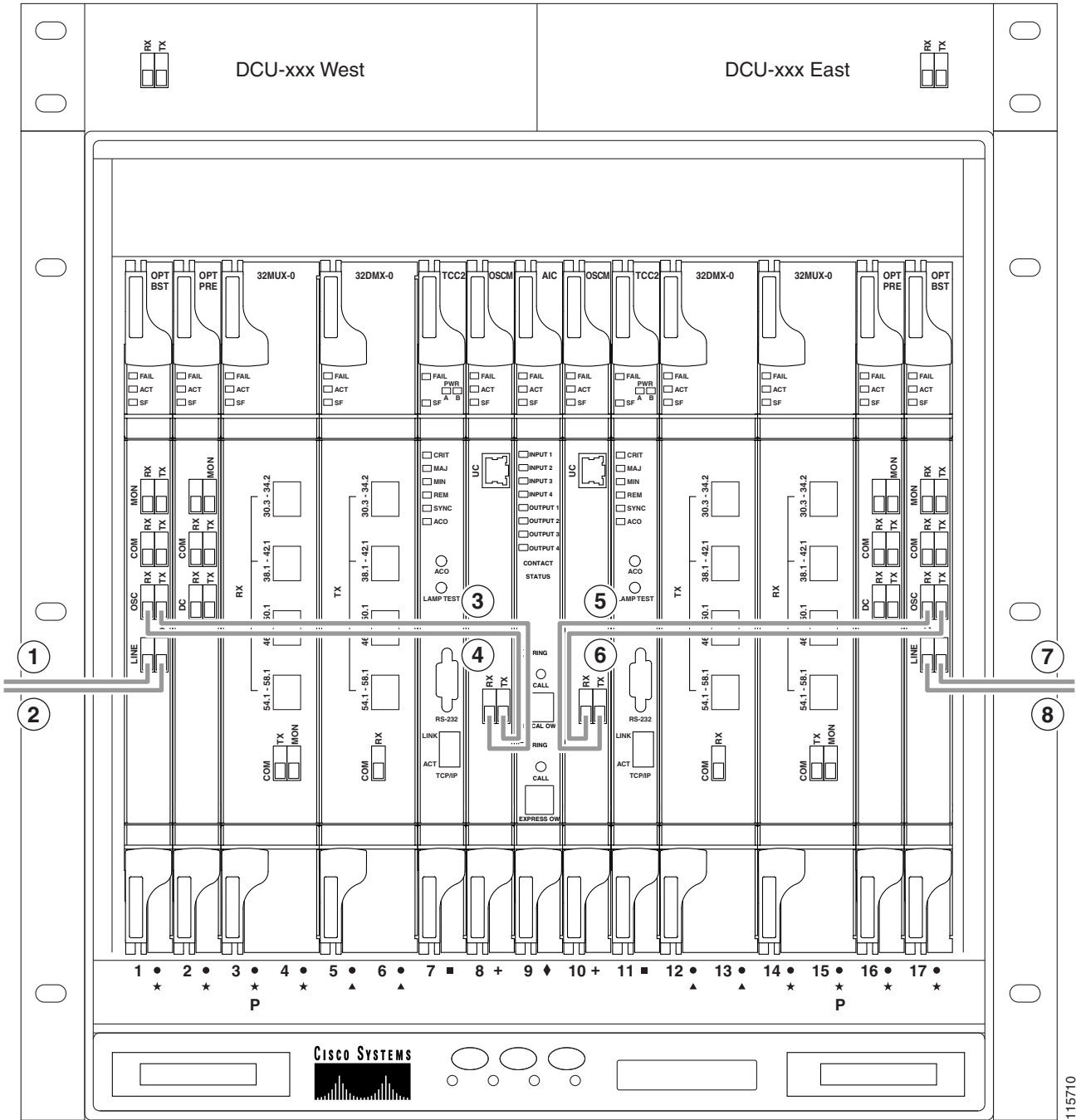
3.2.1 OSC Link Termination Fiber-Optic Cabling

- The OPT-BST and OSC-CSM cards are the only cards that directly interface with the line (span) fiber.
- The OSCM card only carries optical service channels, not DWDM channels.
- The OSCM and OSC-CSM cards cannot both be installed on the same side of the shelf (east or west). You can have different cards on each side, for example an OSCM card on the west side and an OSC-CSM card on the east side.

- When an OPT-BST card and an OSC-CSM card are both used on the same side of the node, the OPT-BST card combines the supervision channel with the DWDM channels and the OSC-CSM card acts as an OSCM card; it does not carry DWDM traffic.
- If an OPT-BST and OSCM card are installed on the east side, the east OPT-BST OSC RX port is connected to the east OSCM TX port, and the east OPT-BST OSC TX port is connected to the east OSCM RX port.
- If you have an OPT-BST and OSC-CSM card are installed on the east side, the east OPT-BST OSC RX port is connected to the east OSC-CSM LINE TX port, and the east OPT-BST OSC TX port is connected to the east OSC-CSM LINE RX port.
- If an OPT-BST and OSCM card are installed on the west side, The west OPT-BST OSC TX port is connected to the west OSCM RX port, and the west OPT-BST OSC RX port is connected to the west OSCM TX port.
- If an OPT-BST and OSC-CSM card are installed on the west side, the west OPT-BST OSC TX port is connected to the west OSC-CSM LINE RX port, and the west OPT-BST OSC RX port is connected to the west OSC-CSM LINE TX port.

Figure 3-16 shows an example of OSC fibering for a hub node with OSCM cards installed.

Figure 3-16 Fiberizing OSC Terminations—Hub Node with OSCM Cards



1	West OPT-BST LINE RX to east OPT-BST or OSC-CSM LINE TX on adjacent node	5	East OSCM TX to east OPT-BST OSC RX
---	--	---	-------------------------------------

2	West OPT-BST LINE TX to east OPT-BST or OSC-CSM LINE RX on adjacent node	6	East OSCM RX to east OPT-BST OSC TX
3	West OPT-BST OSC TX to west OSCM RX	7	East OPT-BST LINE TX to west OPT-BST or OSC-CSM LINE RX on adjacent node
4	West OPT-BST OSC RX to west OSCM TX	8	East OPT-BST LINE RX to west OPT-BST or OSC-CSM LINE TX on adjacent node

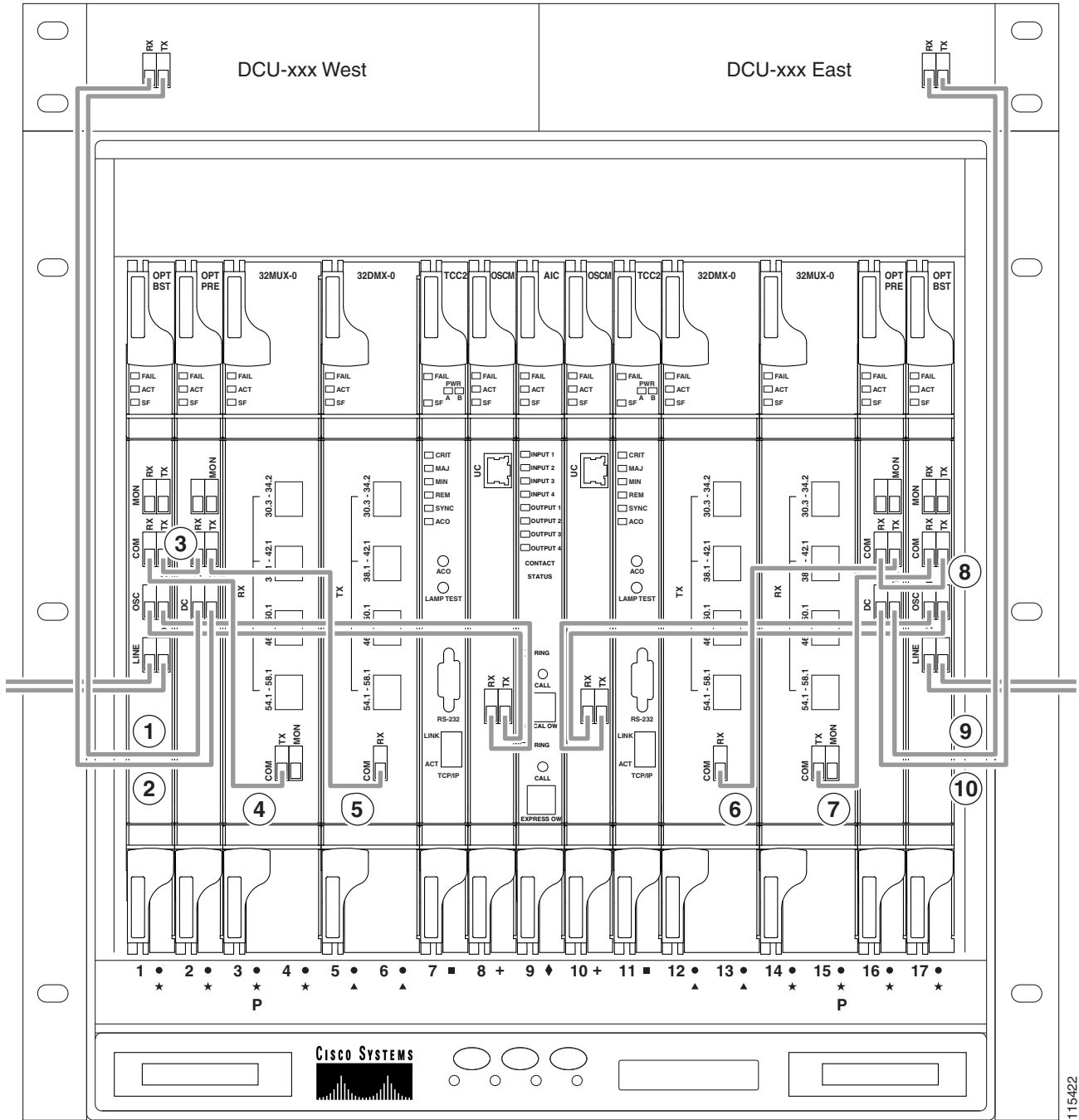
3.2.2 Hub Node Fiber-Optic Cabling

The following rules generally apply to hub node cabling:

- The west OPT-BST or OSC-CSM card common (COM) TX port is connected to the west OPT-PRE COM RX port or the west 32DMX-O COM RX port.
- The west OPT-PRE COM TX port is connected to the west 32DMX-O COM RX port.
- The west 32MUX-O COM TX port is connected to the west OPT-BST or west OSC-CSM COM RX port.
- The east 32MUX-O COM TX port is connected to the east OPT-BST or east OSC-CSM COM RX port.
- The east OPT-BST or east OSC-CSM COM TX port is connected to the east OPT-PRE COM RX port or the east 32DMX-O COM RX port.
- The east OPT-PRE COM TX port is connected to the east 32DMX-O COM RX port.

Figure 3-17 shows an example of a hub node with cabling. In the example, OSCM cards are installed. If OSC-CSM are installed, they are usually installed in Slots 1 and 17.

Figure 3-17 Fiberizing a Hub Node



115422

1	West DCU TX to west OPT-PRE DC RX ¹	6	East 32DMX-O COM RX to east OPT-PRE COM TX
2	West DCU RX to west OPT-PRE DC TX ¹	7	East 32MUX-O COM TX to east OPT-BST COM RX
3	West OPT-BST COM TX to west OPT-PRE COM RX	8	East OPT-PRE COM RX to east OPT-BST COM TX
4	West OPT-BST COM RX to west 32MUX-O COM TX	9	East DCU TX to east OPT-PRE DC RX ¹
5	West OPT-PRE COM TX to west 32DMX-O COM RX	10	East DCU RX to east OPT-PRE DC TX ¹

1. If a DCU is not installed, a 4-dB attenuator loop, +/- 1 dB must be installed between the OPT-PRE DC ports.

3.2.3 Terminal Node Fiber-Optic Cabling

The following rules generally apply to terminal node cabling:

- A terminal site has only one side (as compared to a hub node, which has two sides). The terminal side can be either east or west.
- The terminal side OPT-BST or OSC-CSM card COM TX port is connected to the terminal side OPT-PRE COM RX port or the 32DMX-O COM RX port.
- The terminal side OPT-PRE COM TX port is connected to the terminal side 32DMX-O COM RX port.
- The terminal side 32MUX-O COM TX port is connected to the terminal side OPT-BST or OSC-CSM COM RX port.

3.2.4 Line Amplifier Node Fiber-Optic Cabling

The following rules generally apply to line amplifier node cabling:

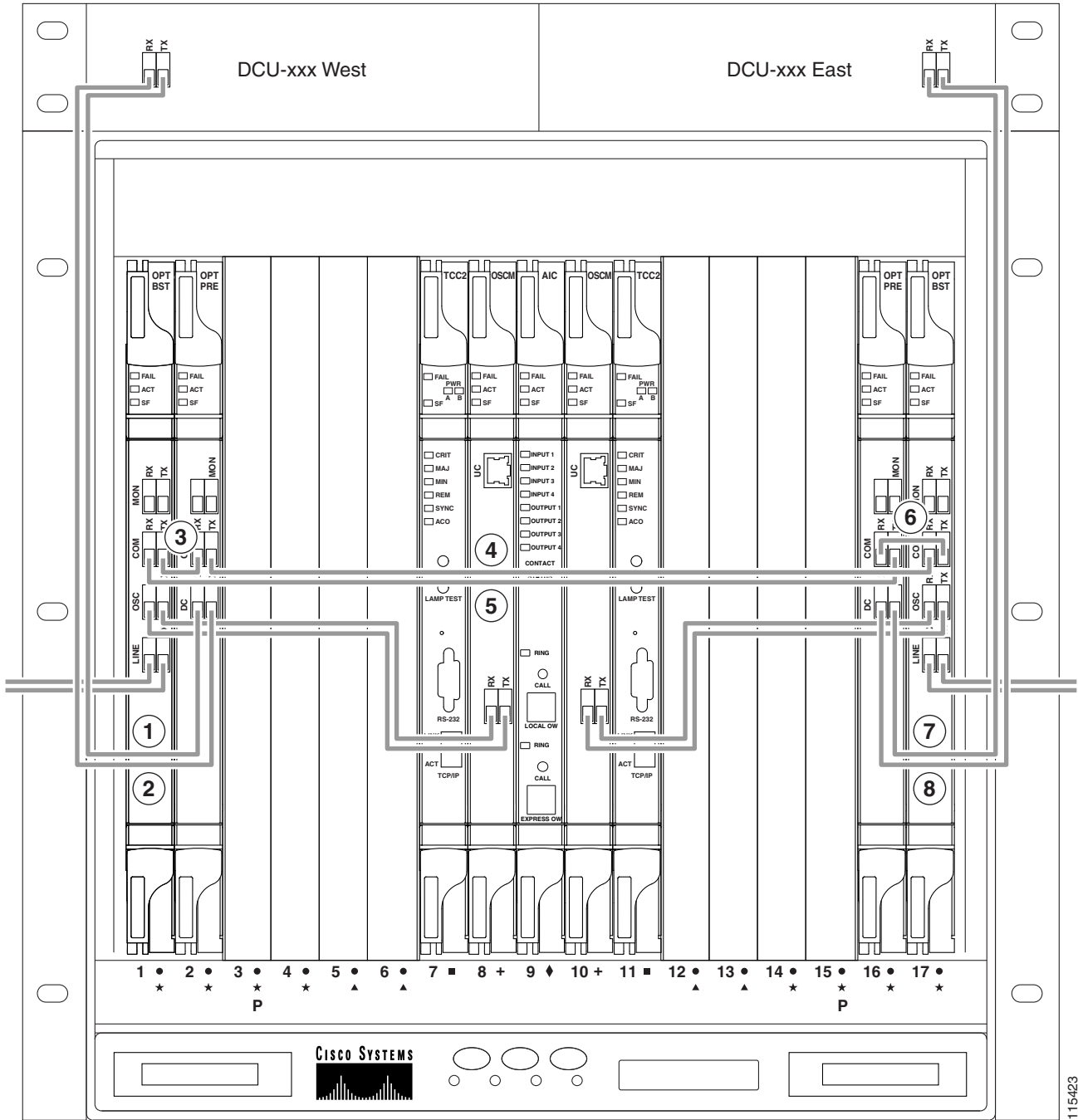
- Line amplifier node layout allows all combinations of OPT-PRE and OPT-BST cards and allows you to use asymmetrical card choices in west-to-east and east-to-west configurations. For a given line direction, you can configure the four following possibilities:
 - Only preamplification (OPT-PRE)
 - Only booster amplification (OPT-BST)
 - Both preamplification and booster amplification (where a line amplifier node has amplification in at least one direction)
 - Neither preamplification nor booster amplification
- If a west OPT-PRE card is installed:
 - The west OSC-CSM or OPT-BST COM TX is connected to the west OPT-PRE COM RX port.
 - The west OPT-PRE COM TX port is connected to the east OSC-CSM or OPT-BST COM RX port.
- If a west OPT-PRE card is not installed, the west OSC-CSM or the OPT-BST COM TX port is connected to the east OSC-CSM or OPT-BST COM RX port.
- If an east OPT-PRE card is installed:
 - The east OSC-CSM or OPT-BST COM TX port is connected to the east OPT-PRE COM RX port.
 - The east OPT-PRE COM TX port is connected to the west OSC-CSM or OPT-BST COM RX port.
- If an east OPT-PRE card is not installed, the east OSC-CSM or OPT-BST COM TX port is connected to the west OSC-CSM or OPT-BST COM RX port.

Figure 3-18 shows an example of a line amplifier node with cabling.



Note Figure 3-18 is an example. Always install fiber-optic cables based on the Cisco MetroPlanner Internal Connections table for your site.

Figure 3-18 Fiberizing a Line Amplifier Node



115423

1	West DCU TX to west OPT-PRE DC RX ¹	5	West OPT-BST COM RX to east OPT-PRE COM TX
2	West DCU RX to west OPT-PRE DC TX ¹	6	West OPT-BST COM RX to east OPT-PRE COM TX
3	West OPT-BST COM TX to west OPT-PRE COM RX	7	East DCU TX to east OPT-PRE DC RX ¹
4	West OPT-PRE COM TX to east OPT-BST COM RX	8	East DCU RX to east OPT-PRE DC TX ¹

1. If a DCU is not installed, a 4-dB attenuator loop, +/- 1dB must be installed between the OPT-PRE DC ports.

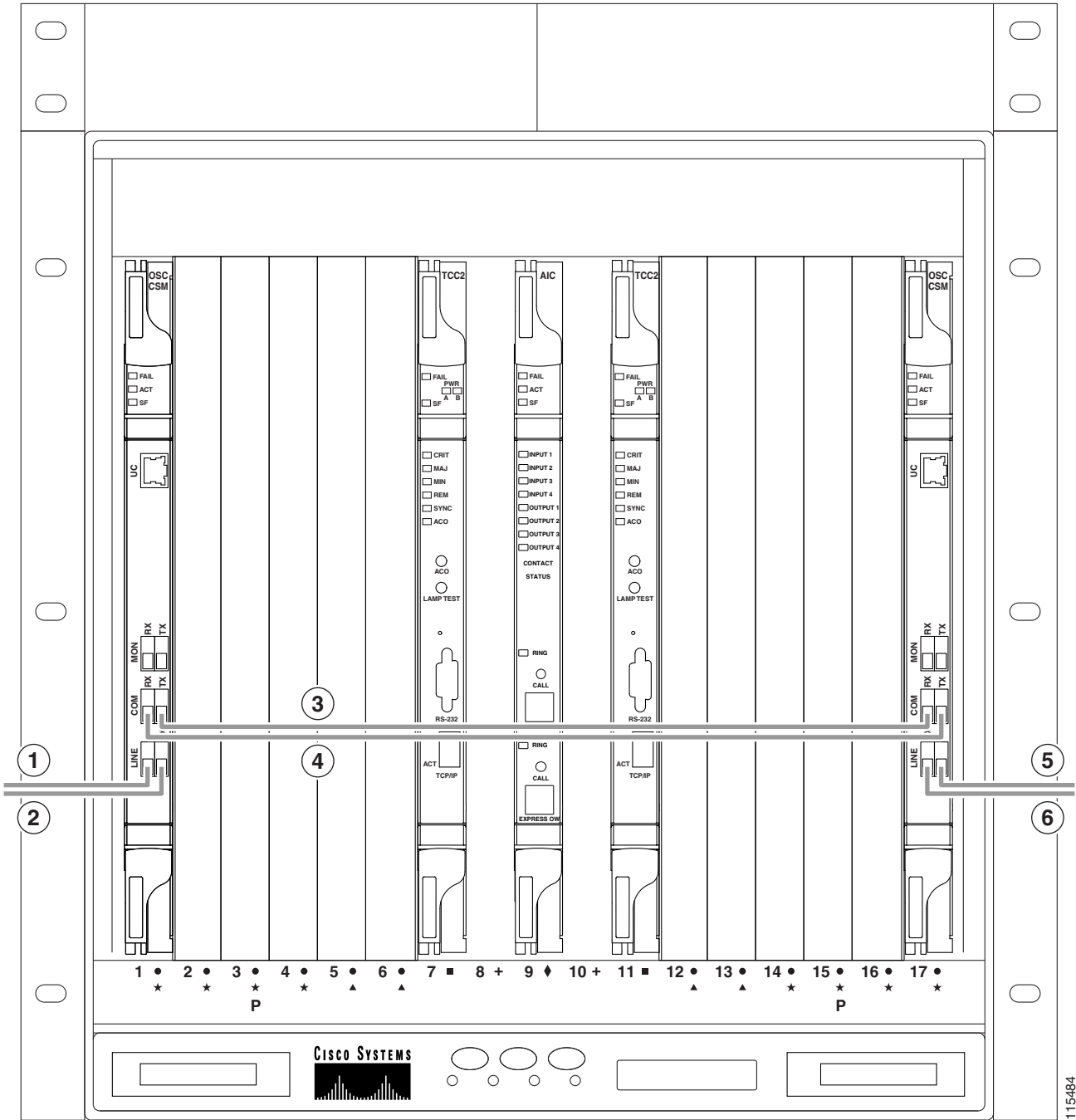
3.2.5 OSC Regeneration Node Fiber-Optic Cabling

The following rules generally apply to OSC regeneration node cabling:

- The west OSC-CSM COM TX port connects to the east OSC-CSM COM RX port.
- The west OSC-CSM COM RX port connects to the east OSC-CSM COM TX port.
- Slots 2 through 5 and 12 through 16 can be used for TXP and MXP cards.

[Figure 3-19](#) shows an example of an OSC regeneration node with cabling.

Figure 3-19 Fiberizing an OSC Regeneration Node



1	West OSC-CSM LINE RX to east OSC-CSM or OPT-BST LINE TX on adjacent node	4	West OSC-CSM COM RX to east OSC-CSM COM TX
2	West OSC-CSM LINE TX to east OSC-CSM or OPT-BST LINE RX on adjacent node	5	East OSC-CSM LINE RX to west OSC-CSM or OPT-BST LINE TX on adjacent node
3	West OSC-CSM COM TX to east OSC-CSM COM RX	6	East OSC-CSM LINE TX to west OSC-CSM or OPT-BST LINE RX on adjacent node

3.2.6 Amplified or Passive OADM Node Fiber-Optic Cabling

The two sides of the OADM node do not need to be symmetrical. On each side, Cisco MetroPlanner can create one of the following four configurations:

- OPT-BST and OPT-PRE
- OSC-CSM and OPT-PRE
- Only OSC-CSM
- Only OPT-BST



Note

Amplified OADM nodes contain OPT-PRE cards and/or OPT-BST cards. Passive OADM nodes do not. Both contain add/drop channel or band cards.

The following rules generally apply for OADM node express path cabled connections:

- TX ports should only be connected to RX ports.
- EXP ports are connected only to COM ports in between AD-xC-xx.x or AD-xB-xx.x cards that all belong to the east side (that is, they are daisy-chained).
- EXP ports are connected only to COM ports in between AD-xC-xx.x or AD-xB-xx.x cards that all belong to the west side (that is, they are daisy-chained).
- The EXP port of the last AD-xC-xx.x or AD-xB-xx.x card on the west side is connected to the EXP port of the first AD-xC-xx.x or AD-xB-xx.x card on the east side.
- The OPT-BST COM RX port is connected to the nearest (in slot position) AD-xC-xx.x or AD-xB-xx.x COM TX port.
- The OPT-PRE COM TX port is connected to the nearest (in slot position) AD-xC-xx.x or AD-xB-xx.x COM RX port.
- If OADM cards are located in adjacent slots, the TCC2/TCC2P card assumes that they are connected in a daisy-chain between the EXP ports and COM ports as noted previously.
- The first west AD-xC-xx.x or AD-xB-xx.x card COM RX port is connected to the west OPT-PRE or OSC-CSM COM TX port.
- The first west AD-xC-xx.x or AD-xB-xx.x card COM TX port is connected to the west OPT-BST or OSC-CSM COM RX port.
- The first east AD-xC-xx.x or AD-xB-xx.x card COM RX port is connected to the east OPT-PRE or OSC-CSM COM TX port.
- The first east AD-xC-xx.x or AD-xB-xx.x card COM TX port is connected to the east OPT-BST or OSC-CSM RX port.
- If a west OPT-PRE is present, the west OPT-BST or OSC-CSM COM TX port is connected to the west OPT-PRE COM RX port.
- If an east OPT-PRE is present, the east OPT-BST or OSC-CSM COM TX port is connected to the east OPT-PRE COM RX port.

The following rules generally apply for OADM node add/drop path cabled connections:

- AD-xB-xx.x add/drop (RX or TX) ports are only connected to the following ports:
 - 4MD-xx.x COM TX or 4MD-xx.x COM RX ports
 - Another AD-xB-xx.x add/drop port (a pass-through configuration)

- An AD-xB-xx.x add/drop band port is only connected to a 4MD-xx.x card belonging to the same band.
- For each specific AD-xB-xx.x card, the add and drop ports for that band card are connected to the COM TX and COM RX ports of the same 4MD-xx.x card.
- The AD-xB-xx.x and 4MD-xx.x cards are located in the same side (the connected ports all have the same line direction).

The following rules generally apply for OADM node pass-through path cabled connections:

- Pass-through connections are only established between add and drop ports on the same band or channel and in the same line direction.
- Only connect AD-xC-xx.x or AD-xB-xx.x add/drop ports to other AD-xC-xx.x or AD-xB-xx.x add/drop ports (as pass-through configurations).
- An add (RX) port is only connected to a drop (TX) port.
- Only connect 4MD-xx.x client input/output ports to other 4MD-xx.x client input/output ports.
- A west AD-xB-xx.x drop (TX) port is connected to the corresponding west 4MD-xx.x COM RX port.
- A west AD-xB-xx.x add (RX) port is connected to the corresponding west 4MD-xx.x COM TX port.
- An east AD-xB-xx.x drop (TX) port is connected to the corresponding east 4MD-xx.x COM RX port.
- An east AD-xB-xx.x add (RX) port is connected to the corresponding east 4MD-xx.x COM TX port.

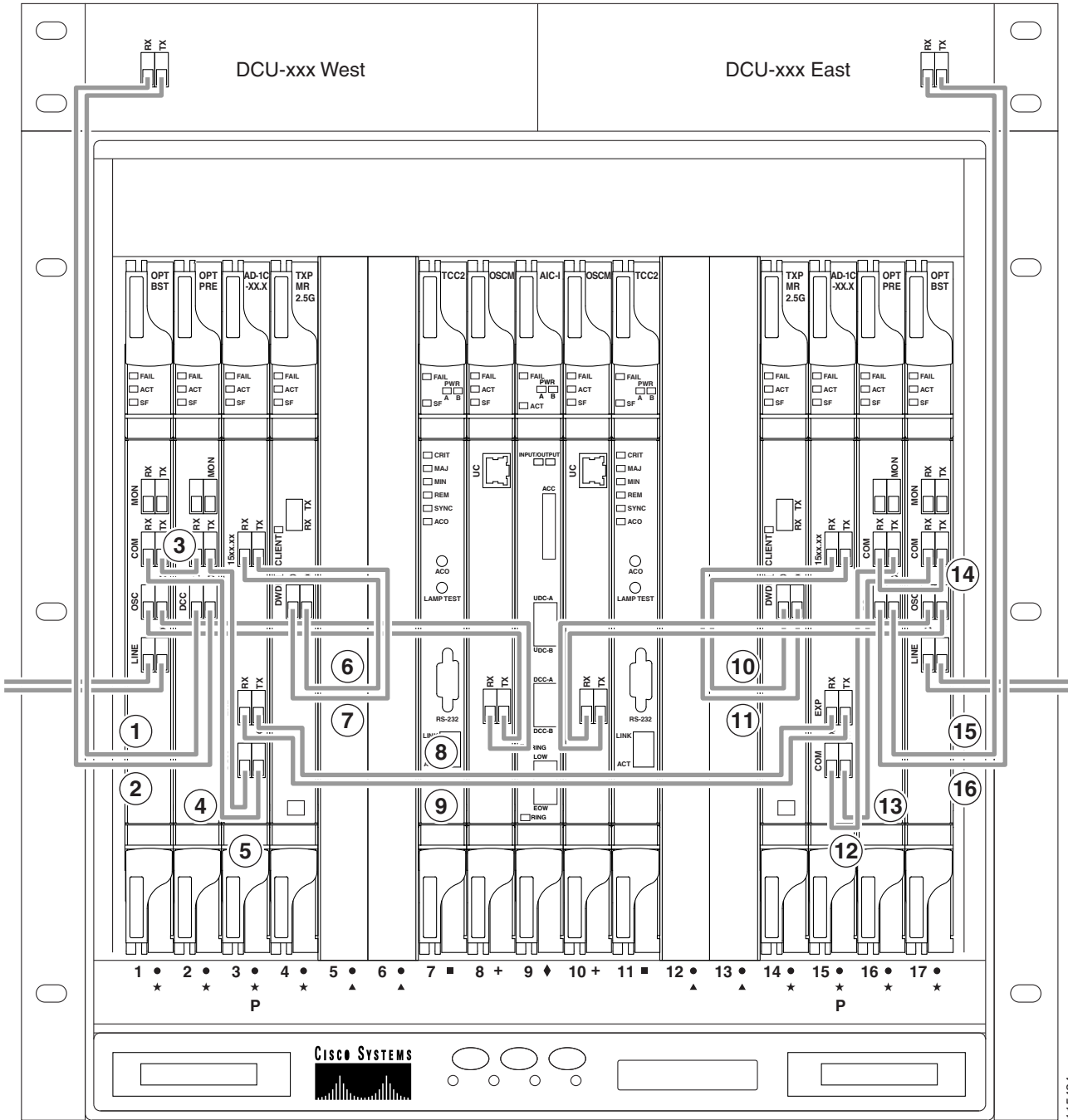
Figure 3-20 shows an example of an amplified OADM node with AD-1C-xx.x cards installed.



Note Figure 3-20 is an example. Always install fiber-optic cables based on the Cisco MetroPlanner Internal Connections table for your site.

3.2.6 Amplified or Passive OADM Node Fiber-Optic Cabling

Figure 3-20 Fiberling an Amplified OADM Node



1	West DCU TX to west OPT-PRE DC RX ¹	9	West AD-1C-xx.x EXP RX to east AD-1C-xx.x EXP TX
2	West DCU RX to west OPT-PRE DC TX ¹	10	East TXP_MR_2.5G DWDM RX to east AD-1C-xx.x (15xx.xx) TX
3	West OPT-BST COM TX to west OPT-PRE COM RX	11	East TXP_MR_2.5G DWDM TX to east AD-1C-xx.x (15xx.xx) RX

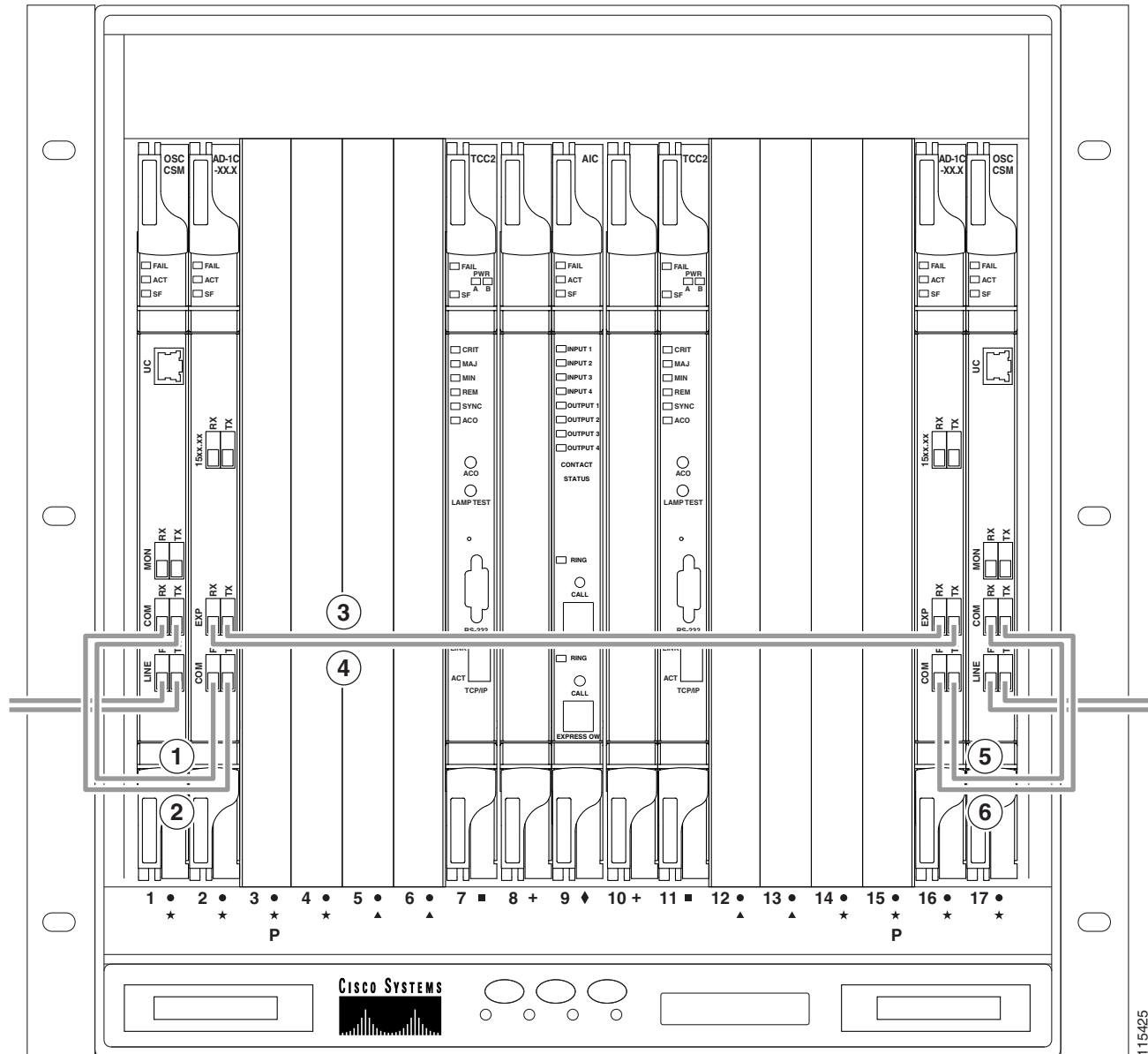
4	West OPT-BST COM RX to west AD-1C-xx.x COM TX	12	East AD-1C-xx.x COM RX to OPT-PRE COM TX
5	West OPT-PRE COM TX to west AD-1C-xx.x COM RX	13	East AD-1C-xx.x COM TX to OPT-BST COM RX
6	West AD-1C-xx.x (15xx.xx) RX to west TXP_MR_2.5G DWDM TX	14	East OPT-PRE COM RX to east OPT-BST COM TX
7	West AD-1C-xx.x (15xx.xx) TX to west TXP_MR_2.5G DWDM RX	15	East DCU TX to east OPT-PRE DC RX ¹
8	West AD-1C-xx.x EXP TX to east AD-1C-xx.x EXP RX	16	East DCU RX to east OPT-PRE DC TX ¹

1. If a DCU is not installed, a 4-dB attenuator loop, +/-1 dB must be installed between the OPT-PRE DC ports.

Figure 3-21 shows an example of a passive OADM node with two AD-1C-xx.x cards installed.

3.2.7 ROADM Node Fiber-Optic Cabling

Figure 3-21 Fiberng a Passive OADM Node



115425

1	West OSC-CSM COM TX to west AD-1C-xx.x COM RX	4	West OSC-CSM EXP RX to east AD-1C-xx.x EXP TX
2	West OSC-CSM COM RX to west AD-1C-xx.x COM TX	5	East AD-1C-xx.x COM TX to east OSC-CSM COM RX
3	West OSC-CSM EXP TX to east AD-1C-xx.x EXP RX	6	East AD-1C-xx.x COM RX to east OSC-CSM COM TX

3.2.7 ROADM Node Fiber-Optic Cabling

The following rules generally apply to ROADM node cabling:

- The west OPT-BST or OSC-CSM COM TX port is connected to the west OPT-PRE COM RX port.
- The west OPT-PRE COM TX port is connected to the west 32WSS COM RX port.
- The west OPT-BST or OSC-CSM COM RX port is connected to the west 32WSS COM TX port.
- The west OPT-BST (if installed) OSC TX port is connected to the west OSCM RX port.
- The west OPT-BST (if installed) OSC RX port is connected to the west OSCM TX port.
- The west 32WSS EXP TX port is connected to the east 32WSS EXP RX port.
- The west 32WSS EXP RX port is connected to the east 32WSS EXP TX port.
- The west 32WSS DROP TX port is connected to the west 32DMX COM RX port.
- The east OPT-BST or OSC-CSM COM TX port is connected to the east OPT-PRE COM RX port.
- The east OPT-PRE COM TX port is connected to the east 32WSS COM RX port.
- The east OPT-BST or OSC-CSM COM RX port is connected to the east 32WSS COM TX port.
- The east OPT-BST (if installed) OSC TX port is connected to the east OSCM RX port.
- The east OPT-BST (if installed) OSC RX port is connected to the east OSCM TX port.
- The east 32WSS DROP TX port is connected to the east 32DMX COM RX port.

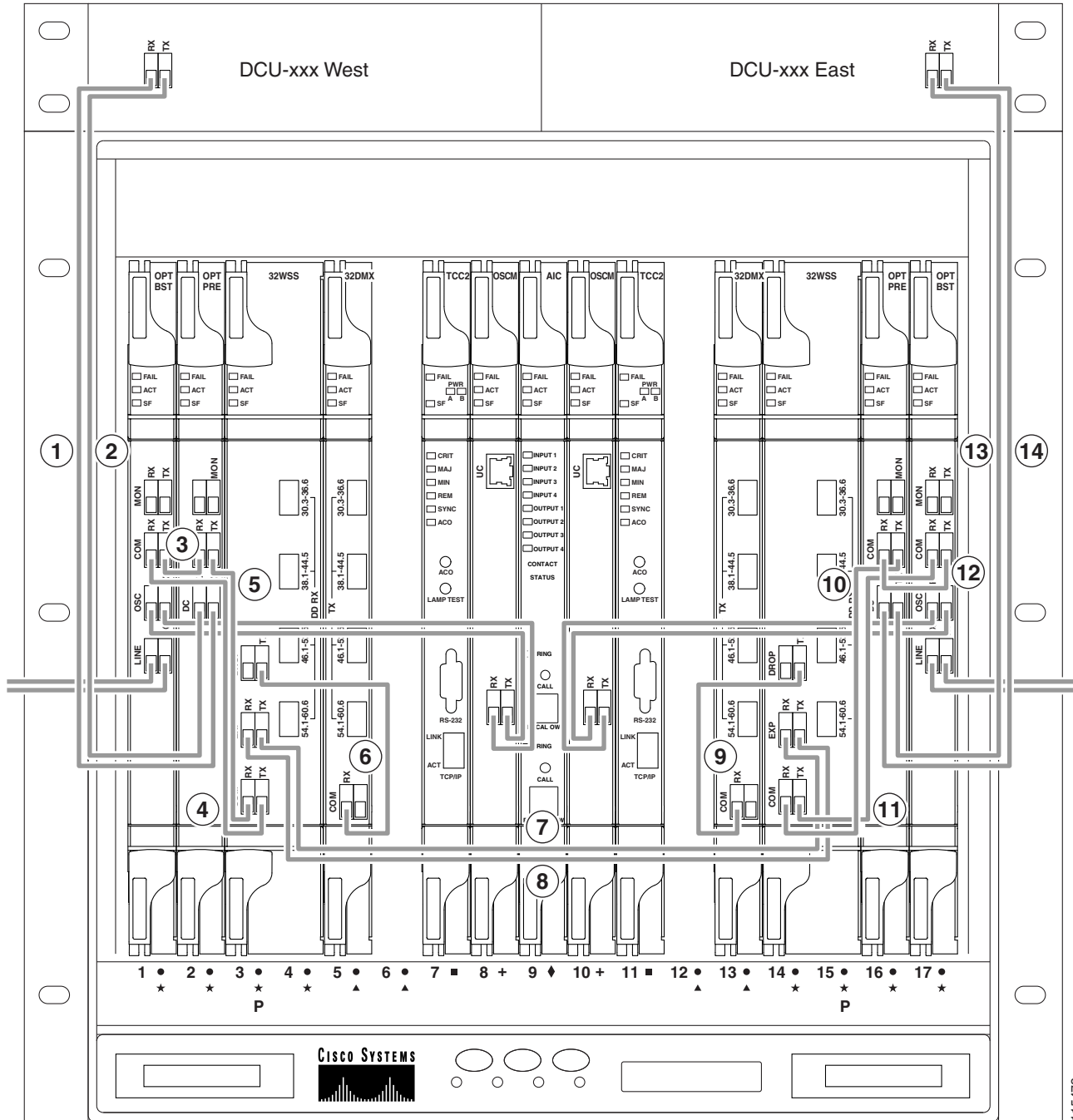
Figure 3-22 shows an example of an amplified ROADM node with cabling.



Note Figure 3-22 is an example. Always install fiber-optic cables based on the Cisco MetroPlanner Internal Connections table for your site.

3.2.7 ROADM Node Fiber-Optic Cabling

Figure 3-22 Fiber-ing an ROADM Node



115473

1	West DCU TX to west OPT-PRE DC RX ¹	8	West 32WSS EXP RX to east 32WSS EXP TX
2	West DCU RX to west OPT-PRE DC TX ¹	9	East 32DMX COM RX to east 32WSS DROP TX
3	West OPT-BST COM TX to west OPT-PRE COM RX	10	East 32WSS COM RX to east OPT-PRE COM TX
4	West 32WSS COM TX to west OPT-BST COM RX	11	East 32WSS COM TX to east OPT-BST COM RX

5	West 32WSS COM RX to west OPT-PRE COM TX	12	East OPT-BST COM TX to east OPT-PRE COM RX
6	West 32DMX COM RX to west 32WSS DROP TX	13	East DCU RX to east OPT-PRE DC TX ¹
7	West 32WSS EXP TX to east 32WSS EXP RX	14	East DCU TX to east OPT-PRE DC RX ¹

1. If a DCU is not installed, a 4-dB attenuator loop, +/-1 dB must be installed between the OPT-PRE DC ports.

3.3 DWDM and TDM Hybrid Node Types

The node type in a network configuration is determined by the type of card that is installed in an ONS 15454 hybrid node. The ONS 15454 supports the following hybrid DWDM and TDM node types: 1+1 protected flexible terminal, scalable terminal, hybrid terminal, hybrid OADM, hybrid line amplifier, and amplified TDM.



Note

The Cisco MetroPlanner tool creates a plan for amplifier placement and proper equipment for DWDM node configurations. Although TDM cards can be used with DWDM node configuration, the Cisco MetroPlanner tool does not create a plan for TDM card placement. Cisco MetroPlanner will support TDM configurations in a future release.

3.3.1 1+1 Protected Flexible Terminal Node

The 1+1 protected flexible terminal node is a single ONS 15454 node equipped with a series of OADM cards acting as a hub node configuration. This configuration uses a single hub or OADM node connected directly to the far-end hub or OADM node through four fiber links. This node type is used in a ring configured with two point-to-point links. The advantage of the 1+1 protected flexible terminal node configuration is that it provides path redundancy for 1+1 protected TDM networks (two transmit paths and two receive paths) using half of the DWDM equipment that is usually required. In the following example (Figure 3-23), one node transmits traffic to the other node on both east and west sides of the ring for protection purposes. If the fiber is damaged on one side of the ring, traffic still arrives safely through fiber on the other side of the ring.

Figure 3-23 Double Terminal Protection Configuration

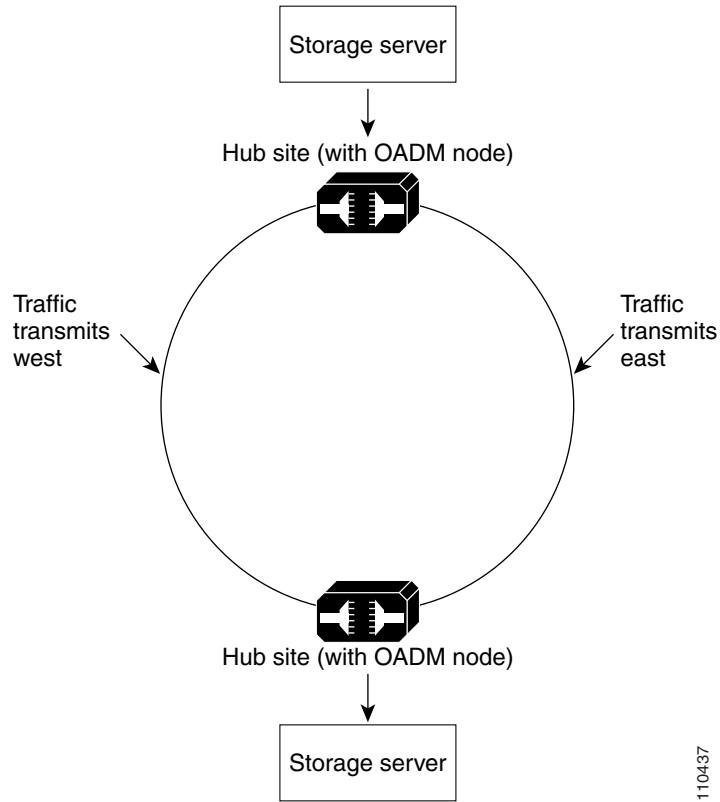


Figure 3-24 shows a 1+1 protected single-span link with hub nodes. This node type cannot be used in a hybrid configuration.

Figure 3-24 1+1 Protected Single-Span Link with Hub Nodes

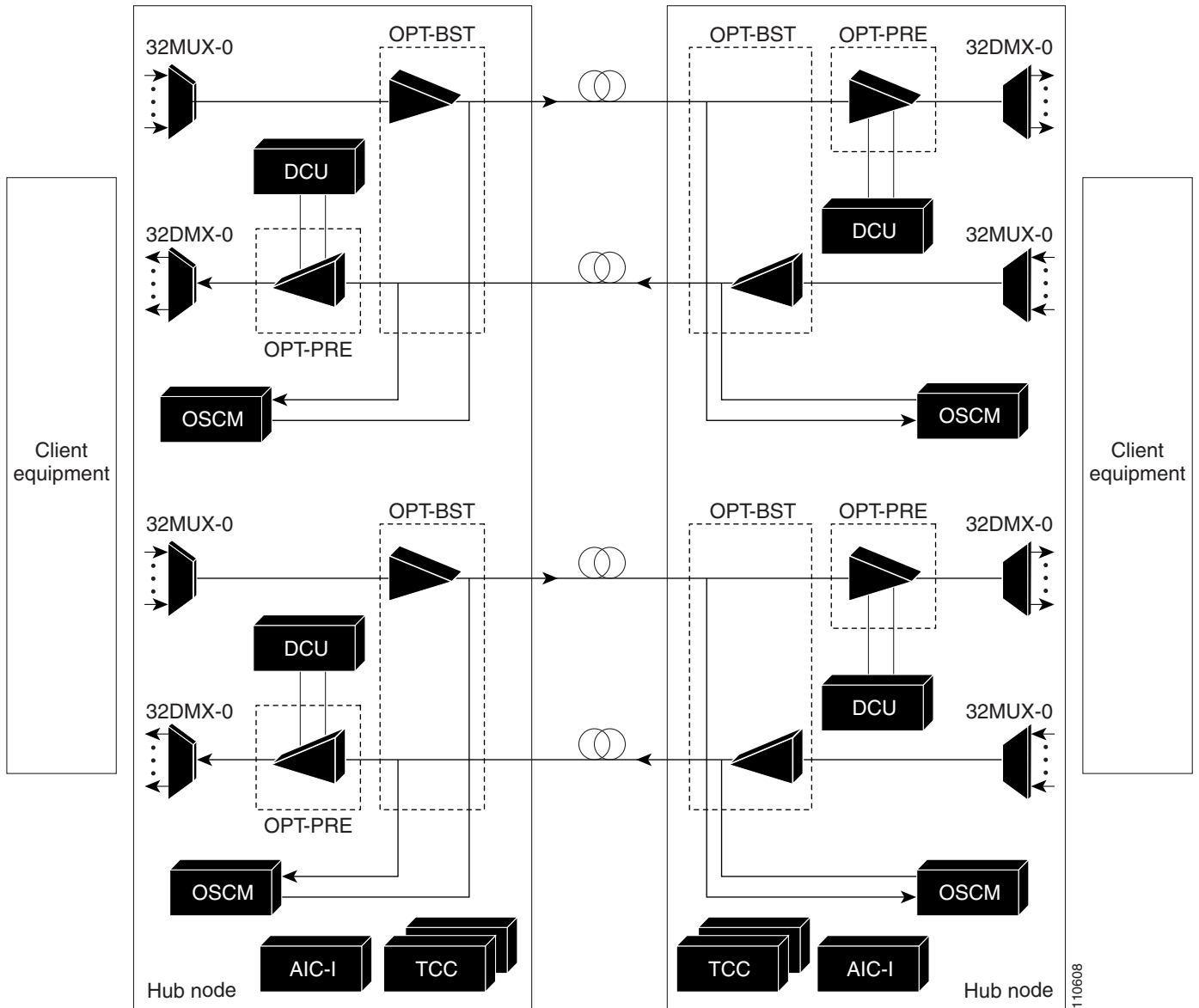
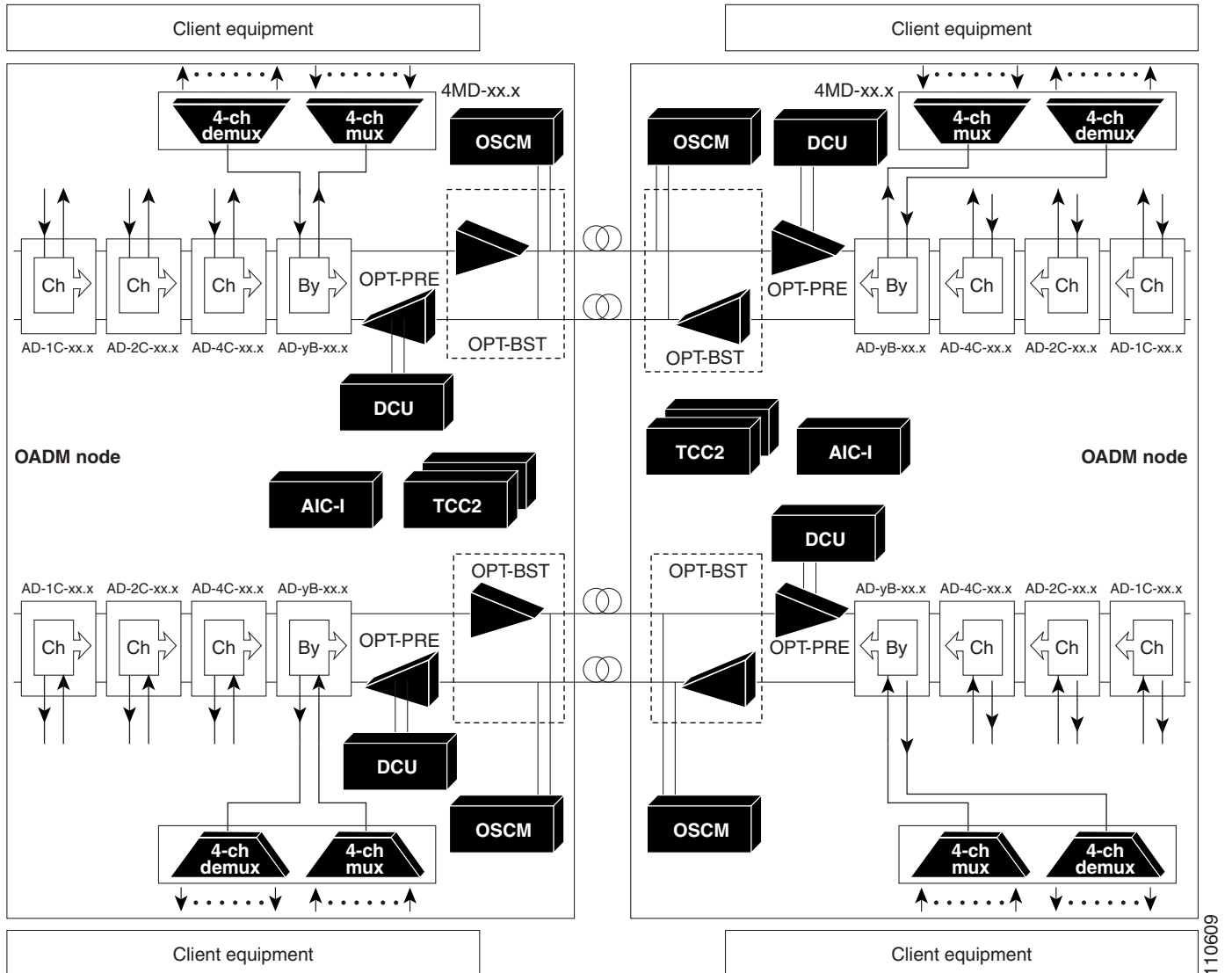


Figure 3-25 shows a 1+1 protected single-span link with active OADM nodes. This node type can be used in a hybrid configuration.

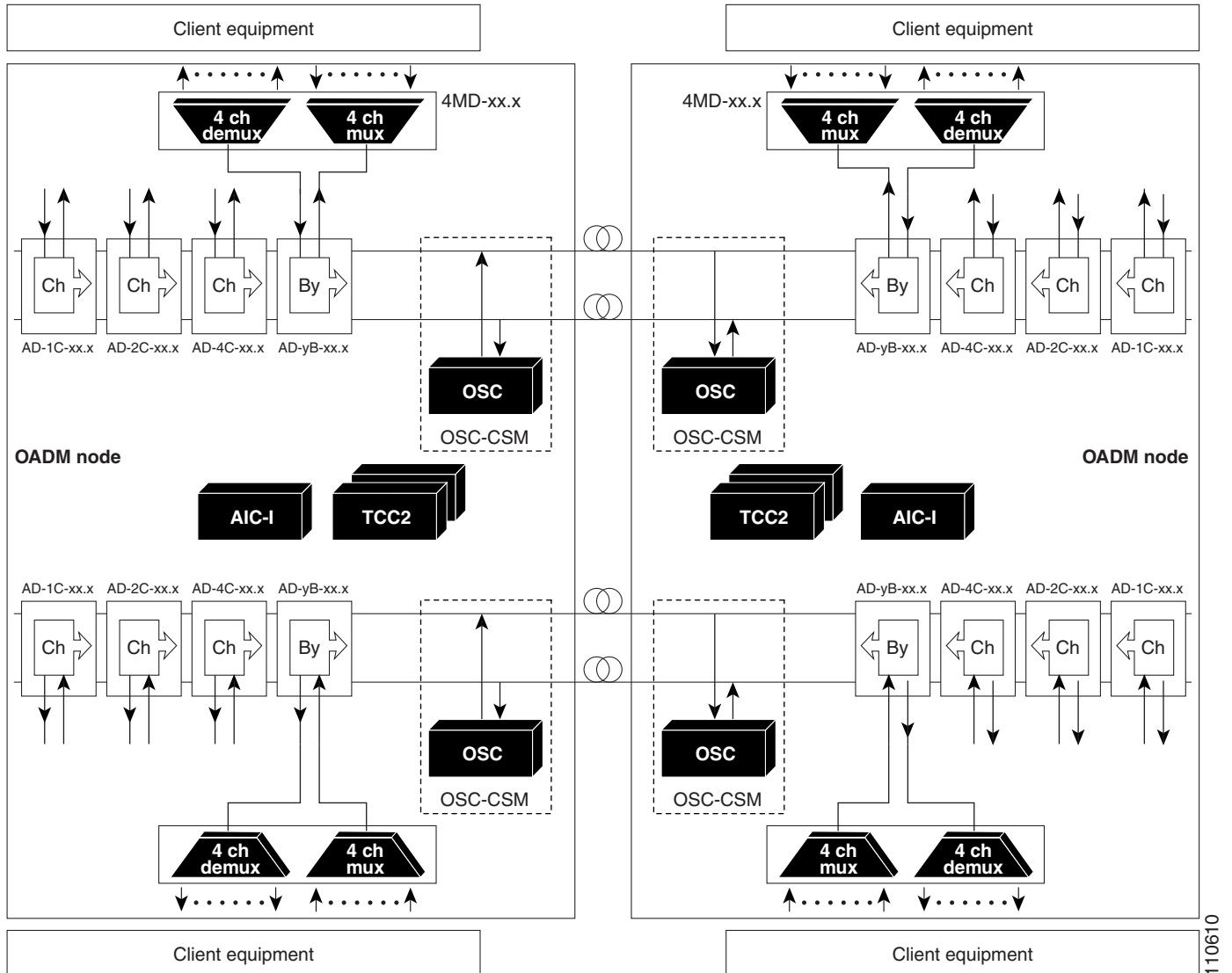
Figure 3-25 1+1 Protected Single-Span Link with Active OADM Nodes



110609

Figure 3-26 shows a 1+1 protected single-span link with passive OADM nodes. This node type can be used in a hybrid configuration.

Figure 3-26 1+1 Protected Single-Span Link with Passive OADM Nodes



3.3.2 Scalable Terminal Node

The scalable terminal node is a single ONS 15454 node equipped with a series of OADM cards and amplifier cards. This node type is more cost effective if a maximum of 16 channels are used (Table 3-1). This node type does not support a terminal configuration exceeding 16 channels because the 32-channel terminal site is more cost effective for 17 channels and beyond.

Note

The dash (—) in the following table below means not applicable.

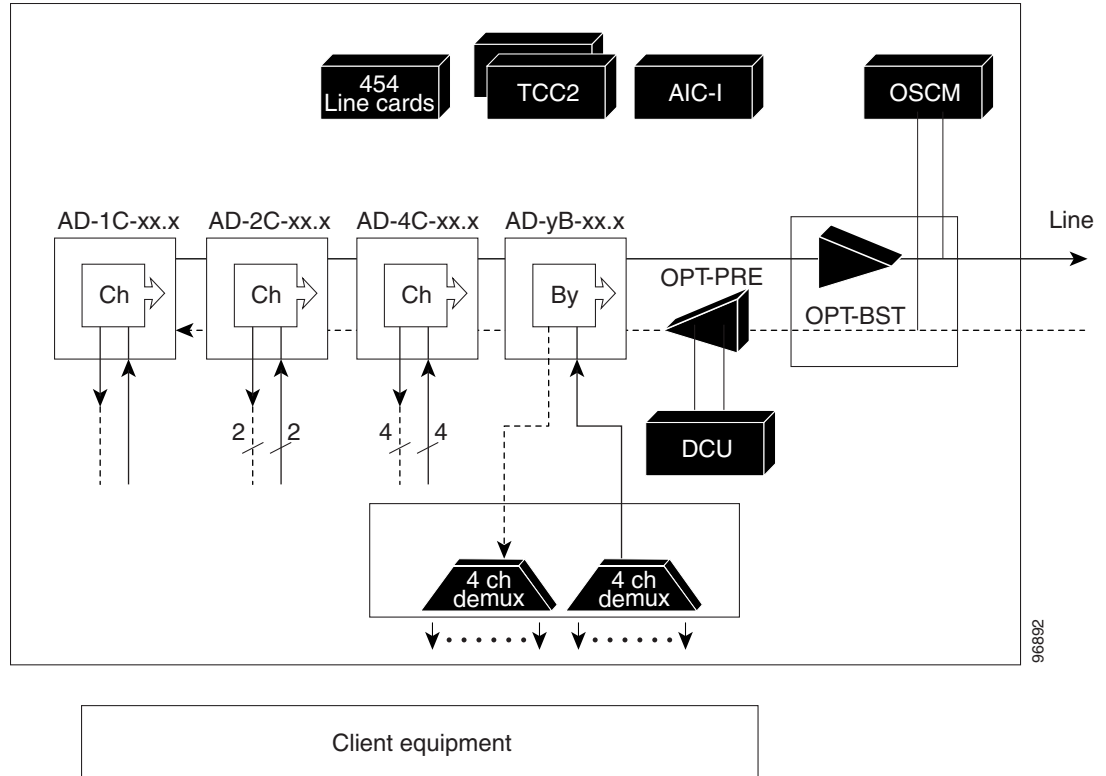
110610

Table 3-1 Typical Add/Drop Configurations for Scalable Terminal Nodes

Number of Channels	Terminal Configuration	
	Add/Drop Configuration Example 1	Add/Drop Configuration Example 2
1	AD-1C-xx.x	—
2	AD-2C-xx.x	—
3	AD-4C-xx.x	AD-1B-xx.x + 4MD-xx.x
4	AD-4C-xx.x	AD-1B-xx.x + 4MD-xx.x
5	AD-1C-xx.x + AD-4C-xx.x	AD-1C-xx.x + AD-1B-xx.x + 4MD-xx.x
6	AD-2C-xx.x + AD-4C-xx.x	AD-2C-xx.x + AD-1B-xx.x + 4MD-xx.x
7	2 x AD-4C-xx.x	2 x (AD-1B-xx.x + 4MD-xx.x)
8	2 x AD-4C-xx.x	2 x (AD-1B-xx.x + 4MD-xx.x)
9	AD-1C-xx.x + (2 x AD-4C-xx.x)	AD-1C-xx.x + 2 x (AD-1B-xx.x + 4MD-xx.x)
10	AD-2C-xx.x + (2 x AD-4C-xx.x)	AD-2C-xx.x + 2 x (AD-1B-xx.x + 4MD-xx.x)
11	3 x AD-4C-xx.x	AD-4B-xx.x + (3 x 4MD-xx.x)
12	3 x AD-4C-xx.x	AD-4B-xx.x + (3 x 4MD-xx.x)
13	AD-4B-xx.x + (3 x 4MD-xx.x) + AD-1C-xx.x	AD-4B-xx.x + (4 x 4MD-xx.x)
14	AD-4B-xx.x + (3 x 4MD-xx.x) + AD-1C-xx.x	AD-4B-xx.x + (4 x 4MD-xx.x)
15	—	AD-4B-xx.x + (4 x 4MD-xx.x)
16	—	AD-4B-xx.x + (4 x 4MD-xx.x)

The OADM cards that can be used in this type of node are: AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, and AD-1B-xx.x. You can also use AD-4B-xx.x and up to four 4MD-xx.x cards. The OPT-PRE and/or OPT-BST amplifiers can be used. The OPT-PRE or OPT-BST configuration depends on the node loss and the span loss. When the OPT-BST is not installed, the OSC-CSM must be used instead of the OSCM card. [Figure 3-27 on page 3-37](#) shows a channel flow example of a scalable terminal node configuration.

Figure 3-27 Scalable Terminal Channel Flow Example



A scalable terminal node can be created by using band and/or channel OADM filter cards. This node type is the most flexible of all node types because the OADM filter cards can be configured to accommodate node traffic. If the node does not contain amplifiers, it is considered a passive hybrid terminal node.

Figure 3-28 shows an example of a scalable terminal node configuration. This node type can be used without add or drop cards.

Figure 3-29 Amplified Hybrid Terminal Example

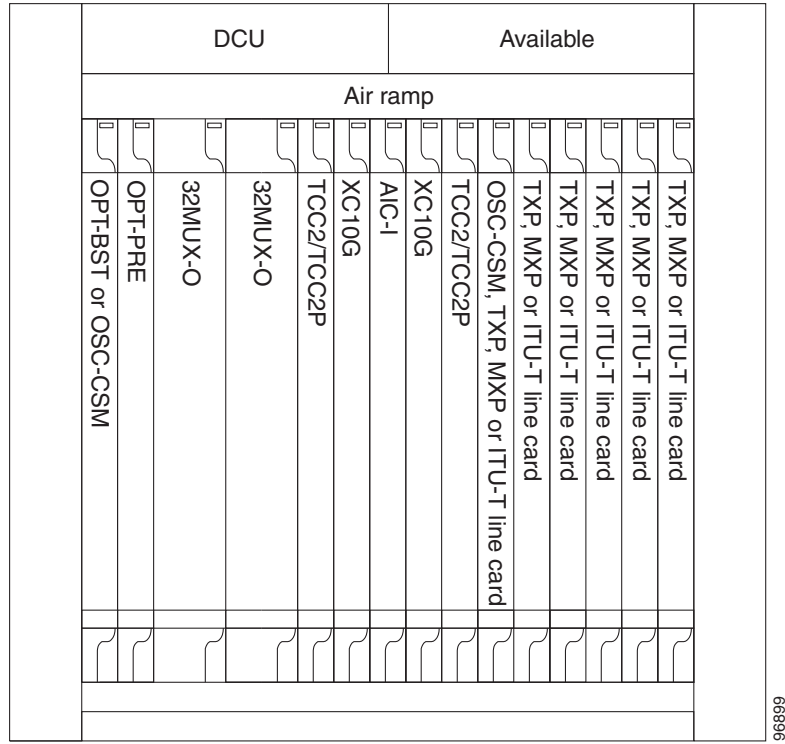
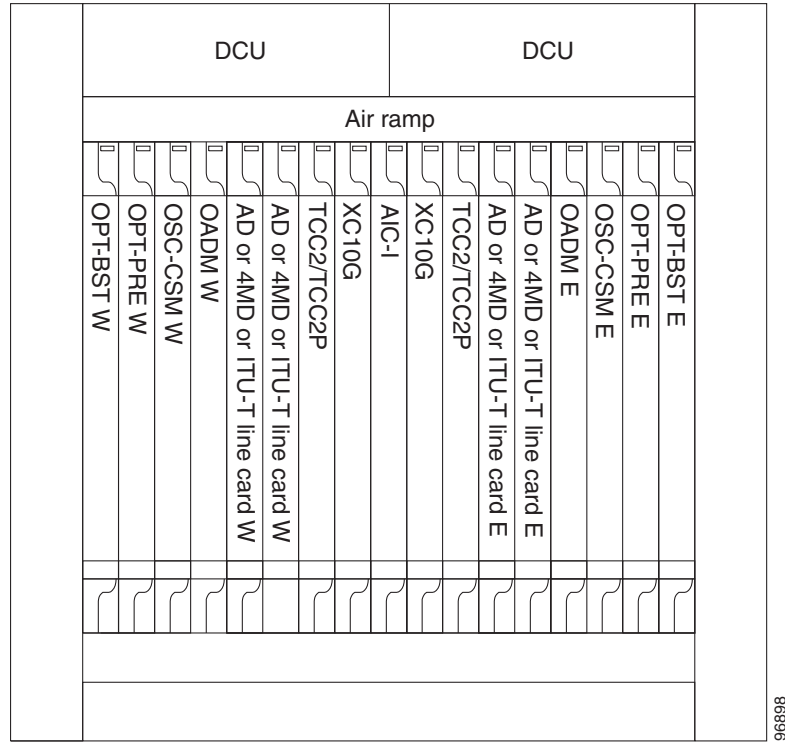


Figure 3-30 shows an example of a passive hybrid terminal node configuration.

Figure 3-31 Hybrid Amplified OADM Example



3.3.5 Hybrid Line Amplifier Node

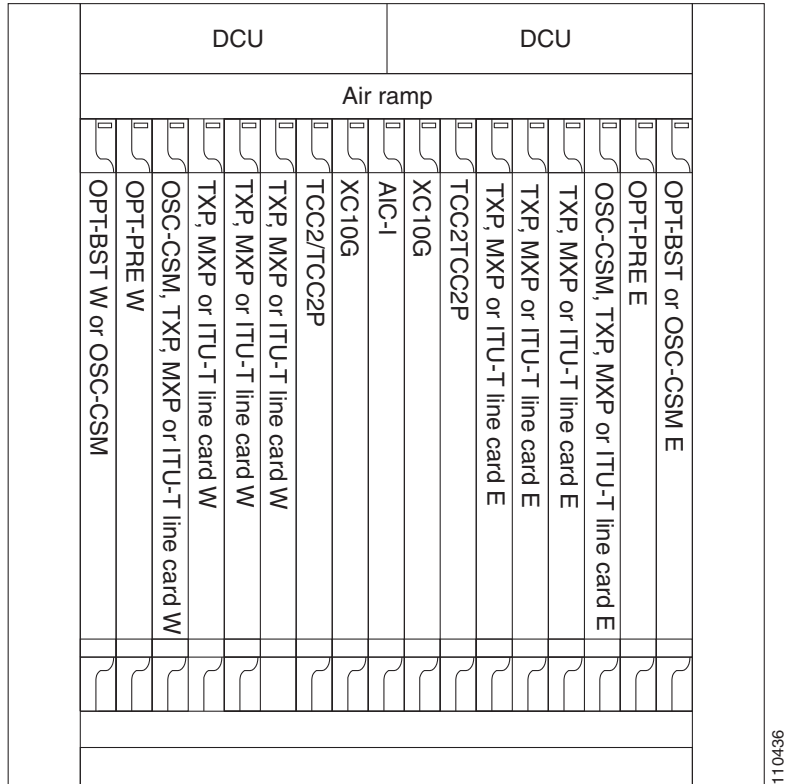
A hybrid line amplifier node is a single ONS 15454 node with open slots for both TDM and DWDM cards. [Figure 3-32](#) shows an example of a hybrid line amplifier node configuration. [Figure 3-33 on page 3-43](#) shows a channel flow example of a hybrid line node configuration. Since this node contains both TDM and DWDM rings, both TDM and DWDM rings should be terminated even if no interactions are present between them.



Note

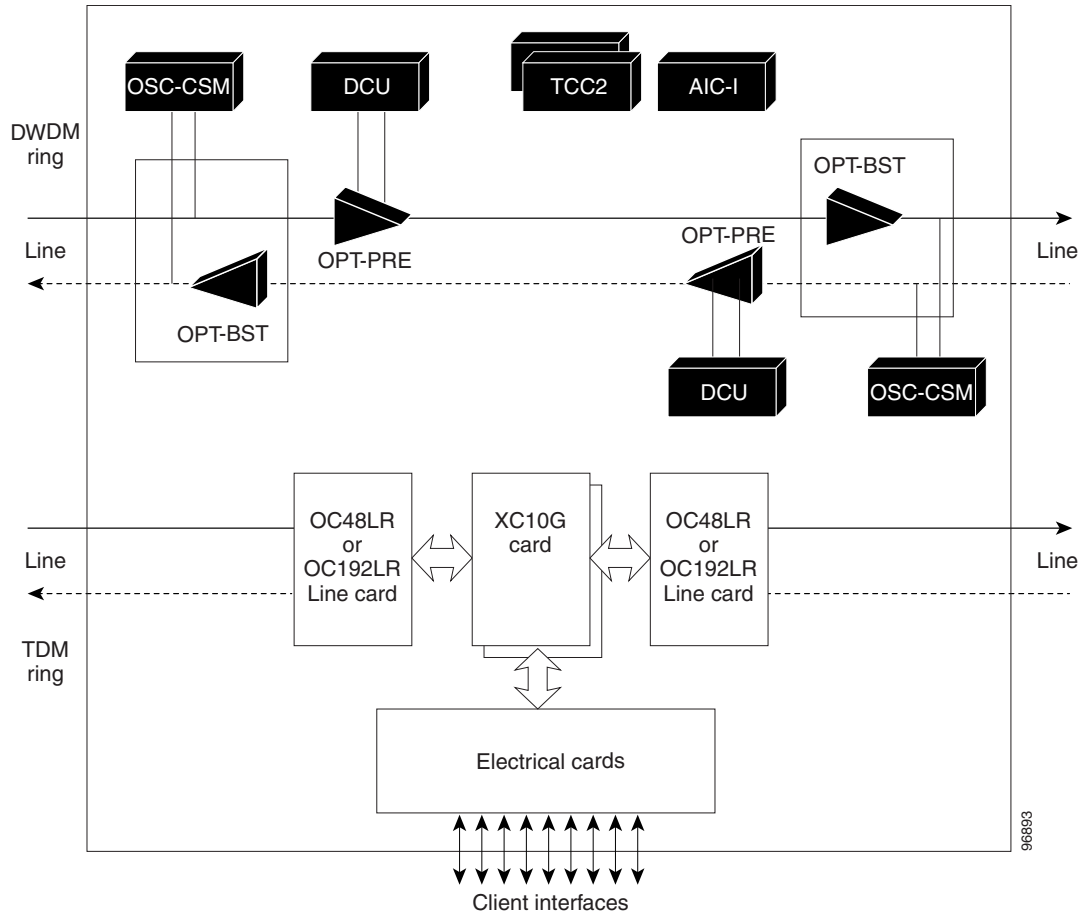
For DWDM applications, if the OPT-BST card is not installed within the node, the OSC-CSM card must be used instead of the OSCM card.

Figure 3-32 Hybrid Line Amplifier Example



110436

Figure 3-33 Hybrid Line Amplifier Channel Flow Example



A hybrid line node is another example of the hybrid line amplifier OADM node. A hybrid line node is single ONS 15454 node equipped with OPT-PRE amplifiers, OPT-BST amplifiers, and TCC2/TCC2P cards for each line direction. Both types of amplifiers can be used or just one type of amplifier. Attenuators might also be required between each preamplifier and booster amplifier to match the optical input power value and to maintain the amplifier gain tilt value. TDM cards can be installed in any available slot. Review the plan produced by Cisco MetroPlanner to determine slot availability.

3.3.6 Amplified TDM Node

An amplified TDM node is a single ONS 15454 node that increases the span length between two ONS 15454 nodes that contain TDM cards and optical amplifiers. There are three possible installation configurations for an amplified TDM node. Scenario 1 uses client cards and OPT-BST amplifiers. Scenario 2 uses client cards, OPT-BST amplifiers, OPT-PRE amplifiers, and FlexLayer filters. Scenario 3 uses client cards, OPT-BST amplifiers, OPT-PRE amplifiers, AD-1C-xx.x cards, and OSC-CSM cards.

The client cards that can be used in an amplified TDM node are: TXP_MR_10G, MXP_2.5G_10G, TXP_MR_2.5G, TXPP_MR_2.5G, OC-192 LR/STM 64 ITU 15xx.xx, and OC-48 ELR/STM 16 EH 100 GHz.

Figure 3-34 shows the first amplified TDM node scenario with an OPT-BST amplifier.

Figure 3-34 Amplified TDM Example with an OPT-BST Amplifier

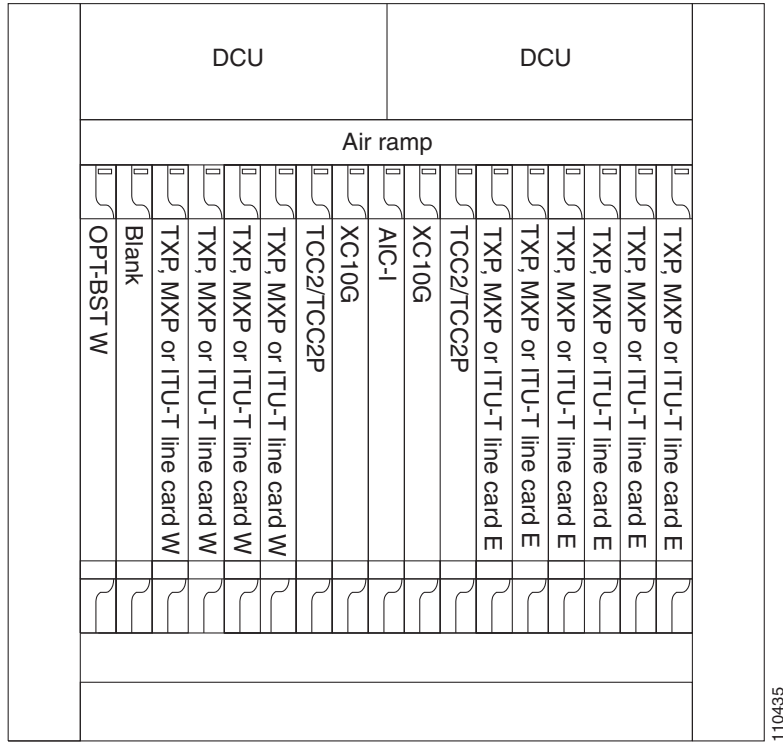


Figure 3-35 shows the first amplified TDM node channel flow scenario configured with OPT-BST amplifiers.

Figure 3-35 Amplified TDM Channel Flow Example With OPT-BST Amplifiers

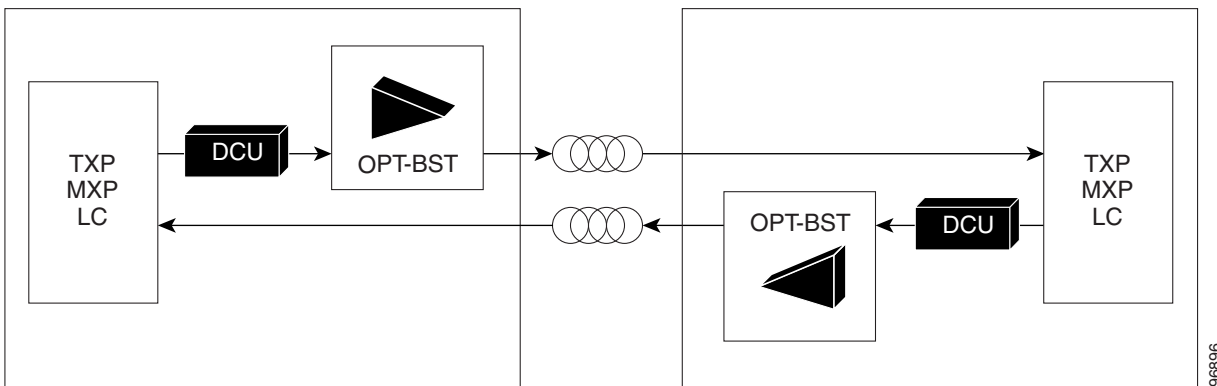


Figure 3-36 shows the second amplified TDM node configuration scenario with client cards, AD-1C-xx.x cards, OPT-BST amplifiers, OPT-PRE amplifiers, and FlexLayer filters.

Figure 3-36 Amplified TDM Example with FlexLayer Filters

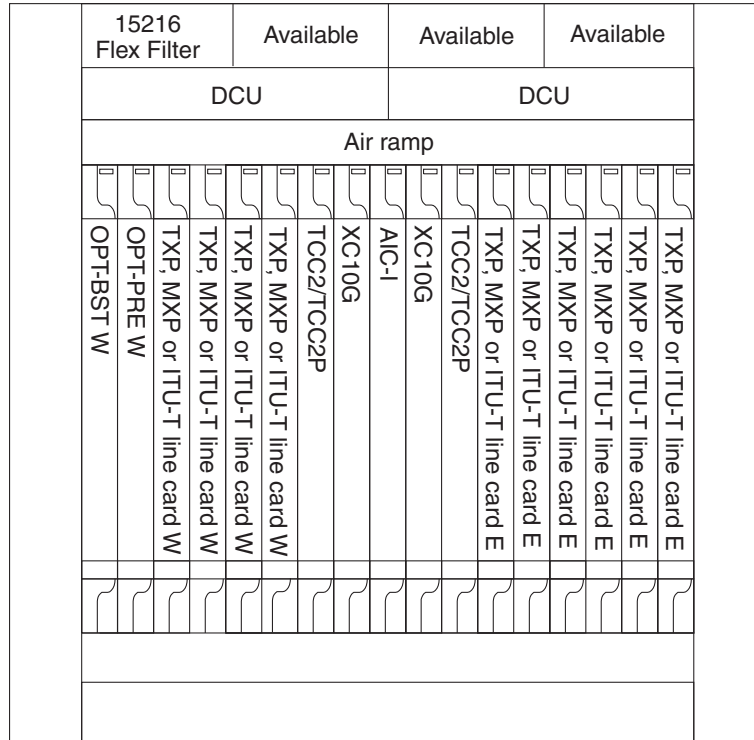


Figure 3-37 shows the second amplified TDM node channel flow configuration scenario with client cards, OPT-BST amplifiers, OPT-PRE amplifiers, and FlexLayer filters.

Figure 3-37 Amplified TDM Channel Flow Example With FlexLayer Filters

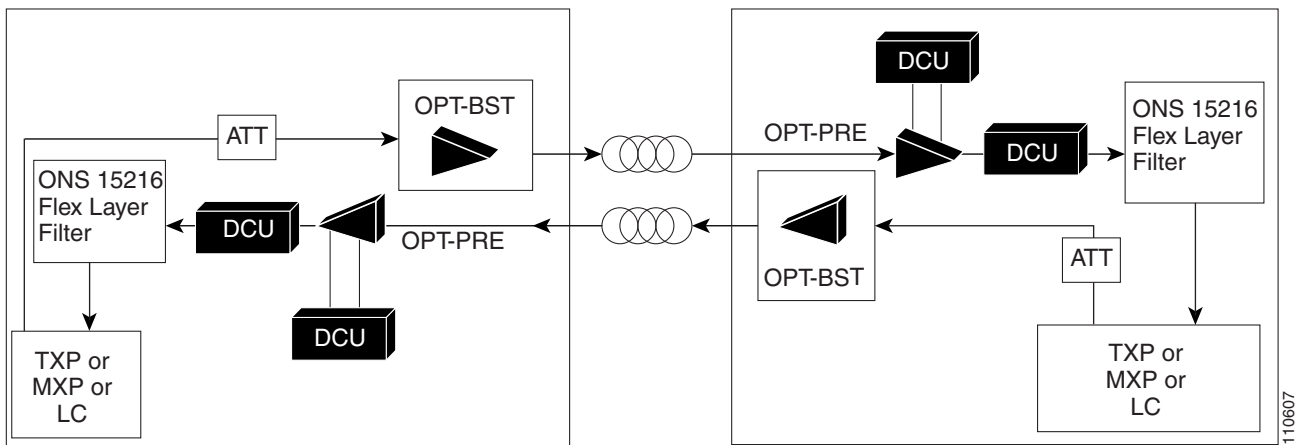
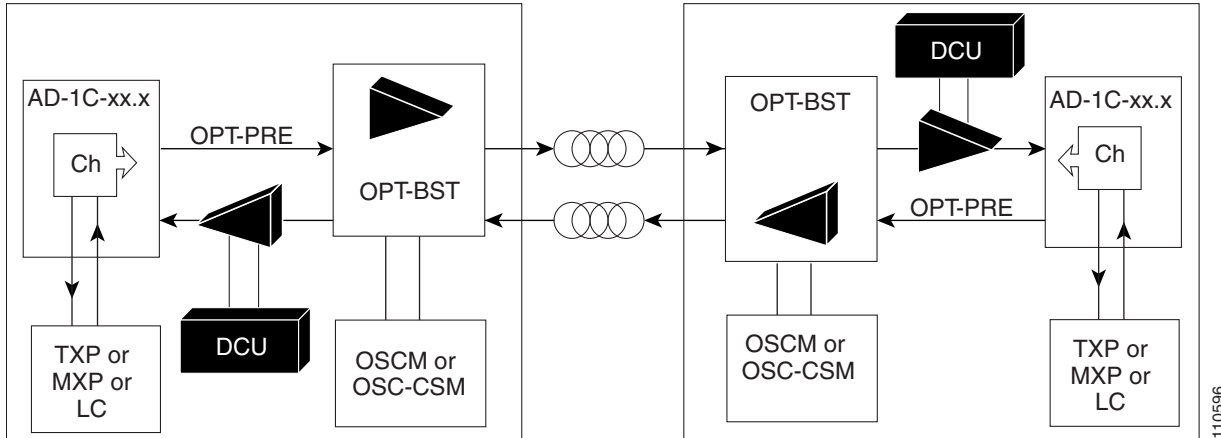


Figure 3-38 shows the third amplified TDM channel flow configuration scenario with client cards, OPT-BST amplifiers, OPT-PRE amplifiers, AD-1C-xx.x cards, and OSC-CSM cards.

Figure 3-38 Amplified TDM Channel Flow Example With Amplifiers, AD-1C-xx.x Cards, and OSC-CSM Cards



3.4 Automatic Node Setup

Automatic node setup (ANS) is a TCC2/TCC2P function that adjusts values of the variable optical attenuators (VOAs) on the DWDM channel paths to equalize the per-channel power at the amplifier input. This power equalization means that at launch, all the channels have the same amplifier power level, independent from the input signal on the client interface and independent from the path crossed by the signal inside the node. This equalization is needed for two reasons:

- Every path introduces a different penalty on the signal that crosses it.
- Client interfaces add their signal to the ONS 15454 DWDM ring with different power levels.

To support ANS, the integrated VOAs and photodiodes are provided in the following ONS 15454 DWDM cards:

- AD-xB-xx.x card express and drop paths
- AD-xC-xx.x card express and add paths
- 4MD-xx.x card input ports
- 32MUX-O card input ports
- 32WSS card input ports
- 32DMX-O and 32DMX card output ports

Optical power is equalized by regulating the VOAs. Based on the expected per-channel power, ANS automatically calculates the VOA values by:

- Reconstructing the different channels paths
- Retrieving the path insertion loss (stored in each DWDM transmission element)

VOAs operate in one of three working modes:

- Automatic VOA Shutdown—In this mode, the VOA is set at maximum attenuation value. Automatic VOA shutdown mode is set when the channel is not provisioned to ensure system reliability in the event that power is accidentally inserted.

- **Constant Attenuation Value**—In this mode, the VOA is regulated to a constant attenuation independent from the value of the input signal. Constant attenuation value mode is set on the following VOAs:
 - OADM band card VOAs on express and drop paths (as operating mode)
 - OADM channel card VOAs during power insertion startup
 - Multiplexer/Demultiplexer card VOAs during power insertion startup
- **Constant Power Value**—In this mode, the VOA values are automatically regulated to keep a constant output power when changes occur to the input power signal. This working condition is set on OADM channel card VOAs as “operating” and on 32MUX-O, 32WSS, 32DMX-O, and 32DMX card VOAs as “operating mode.”

In the normal operating mode, OADM band card VOAs are set to a constant attenuation, while OADM channel card VOAs are set to a constant power. ANS requires the following VOA provisioning parameters to be specified:

- Target attenuation (OADM band card VOA and OADM channel card startup)
- Target power (channel VOA)

To allow you to modify ANS values based on your DWDM deployment, provisioning parameters are divided into two contributions:

- **Reference Contribution**— (Display only) Set by ANS.
- **Calibration Contribution**—Set by user.

The ANS equalization algorithm requires the following knowledge of the DWDM transmission element layout:

- The order in which the DWDM elements are connected together on the express paths
- Channels that are dropped and added
- Channels or bands that have been configured as pass-through

ANS assumes that every DWDM port has a line direction parameter that is either west to east (W-E) or east to west (E-W). ANS automatically configures the mandatory optical connections according to following main rules:

- Cards equipped in Slots 1 to 6 have a drop section facing west.
- Cards equipped in Slots 12 to 17 have a drop section facing east.
- Contiguous cards are cascaded on the express path.
- 4MD-xx.x and AD-xB-xx.x are always optically coupled.
- A 4MD-xx.x absence forces an optical pass-through connection.
- Transmit (Tx) ports are always connected to receive (Rx) ports.

Optical patchcords are passive devices that are not autodiscovered by ANS. However, optical patchcords are used to build the alarm correlation graph. From CTC or TL1 you can:

- Calculate the default connections on the NE.
- Retrieve the list of existing connections.
- Retrieve the list of free ports.
- Create new connections or modify existing ones.
- Launch ANS.

After you launch ANS, the following status are provided for each ANS parameter:

- Success - Changed—The parameter setpoint was recalculated successfully.
- Success - Unchanged—The parameter setpoint did not need recalculation.
- Not Applicable—The parameter setpoint does not apply to this node type.
- Fail - Out of Range—The calculated setpoint is outside the expected range.
- Fail - Port in IS State—The parameter could not be calculated because the port is in service.

Optical connections are identified by the two termination points, each with an assigned slot and port. ANS checks that a new connection is feasible (according to embedded connection rules) and returns a denied message in the case of a violation.

ANS requires provisioning of the expected wavelength. When provisioning the expected wavelength, the following rules apply:

- The card name is generically characterized by the card family, and not the particular wavelengths supported (for example, AD-2C for all 2-channel OADMs).
- At the provisioning layer, you can provision a generic card for a specific slot using CTC or TL1.
- Wavelength assignment is done at the port level.
- An equipment mismatch alarm is raised when a mismatch between the identified and provisioned value occurs. The default value for the provisioned attribute is AUTO.

3.4.1 Automatic Node Setup Parameters

All ONS 15454 ANS parameters are calculated by Cisco MetroPlanner for nodes configured for metro core networks. (Parameters must be configured manually for metro access nodes.) Cisco MetroPlanner exports the calculated parameters to an ASCII file called “NE Update.” In CTC, you can import the NE Update file to automatically provision the node. [Table 3-2](#) shows ANS parameters arranged in east and west, transmit and receive groups.

Table 3-2 ANS Parameters

Direction	ANS Parameters
West Side - Receive	<ul style="list-style-type: none"> • West Side Rx Max Expected Span Loss • West Side Rx Min Expected Span Loss • West Side Rx Amplifier Working Mode • West Side Rx Amplifier Ch Power • West Side Rx Amplifier Gain • West Side Rx Amplifier Tilt • West Side OSC LOS Threshold • West Side Channel LOS Threshold • West Side Rx Amplifier Input Power Fail Th • West Side Add and Drop Stage Input Power • West Side Add and Drop Stage Drop Power • West Side Add and Drop Stage Band (<i>n</i>) Drop Power (<i>n</i> = 1 to 8) • West Side Add and Drop Stage Channel (<i>n</i>) Drop Power (<i>n</i> = 1 to 32)
East Side - Receive	<ul style="list-style-type: none"> • East Side Rx Max Expected Span Loss • East Side Rx Min Expected Span Loss • East Side Rx Amplifier Working Mode • East Side Rx Amplifier Ch Power • East Side Rx Amplifier Gain • East Side Rx Amplifier Tilt • East Side OSC LOS Threshold • East Side Channel LOS Threshold • East Side Rx Amplifier Input Power Fail Th • East Side Add and Drop Stage Input Power • East Side Add and Drop Stage Drop Power • East Side Add and Drop Stage Band (<i>n</i>) Drop Power (<i>n</i> = 1 to 8) • East Side Add and Drop Stage Channel (<i>n</i>) Drop Power (<i>n</i> = 1 to 32)

Table 3-2 ANS Parameters (continued)

Direction	ANS Parameters
West Side - Transmit	<ul style="list-style-type: none"> • West Side Tx Amplifier Working Mode • West Side Tx Amplifier Ch Power • West Side Tx Amplifier Gain • West Side Tx Amplifier Tilt • West Side Fiber Stage Input Threshold • West Side Add and Drop Stage Output Power • West Side Add and Drop Stage By-Pass Power
East Side - Transmit	<ul style="list-style-type: none"> • East Side Tx Amplifier Working Mode • East Side Tx Amplifier Ch Power • East Side Tx Amplifier Gain • East Side Tx Amplifier Tilt • East Side Fiber Stage Input Threshold • East Side Add and Drop Stage Output Power • East Side Add and Drop Stage By-Pass Power

3.4.2 View and Provision ANS Parameters

All ANS parameters can be viewed and provisioned from the node view Provisioning > WDM-ANS > Provisioning tabs, shown in [Figure 3-39 on page 3-51](#). The WDM-ANS > Provisioning > Provisioning tabs presents the parameters in the following tree view:

```

root
+/- East
  +/- Receiving
    +/- Amplifier
    +/- Power
    +/- Threshold
  +/- Transmitting
    +/- Amplifier
    +/- Power
    +/- Threshold
+/- West
  +/- Receiving
    +/- Amplifier
    +/- Power
    +/- Threshold
  +/- Transmitting

```


- +/- Amplifier
- +/- Power
- +/- Threshold

Figure 3-39 WDM-ANS Provisioning

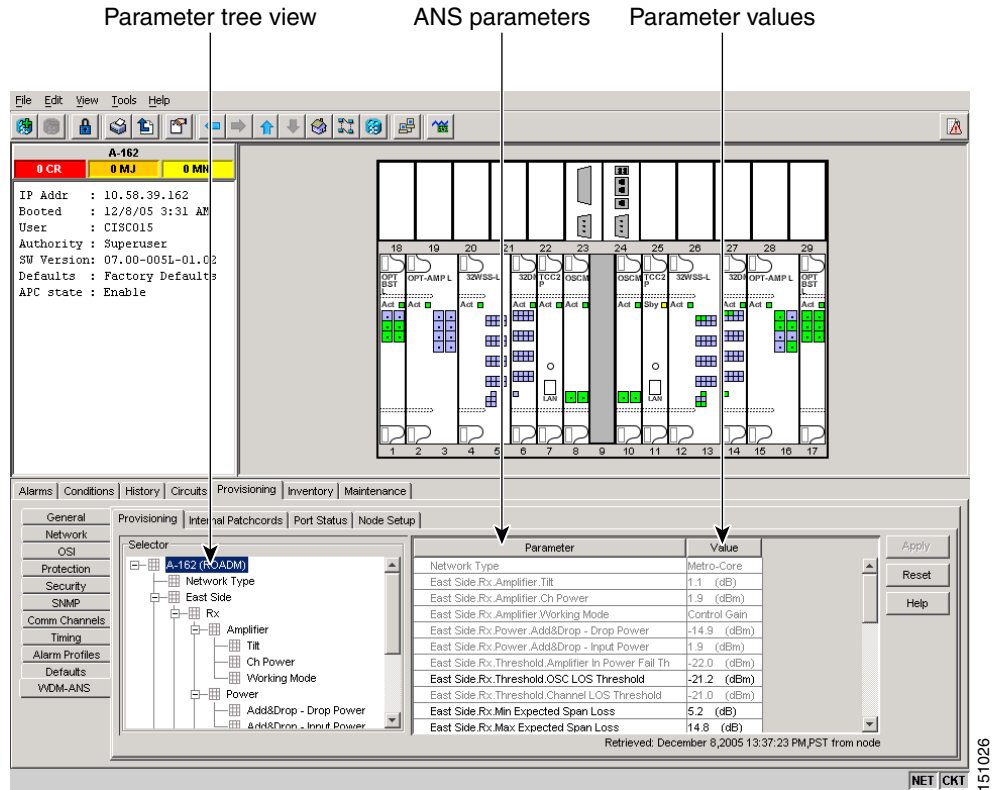


Table 3-3 shows the parameter IDs based on platform, line direction, and functional group.

Table 3-3 ANS-WDM > Provisioning Subtab Parameters

Tree Element	Parameters
root	Network Type (dwdm)
root +/- East +/- Receiving	East Side Rx Max Expected Span Loss East Side Rx Min Expected Span Loss
root +/- East +/- Receiving +/- Amplifier	East Side Rx Amplifier Working Mode East Side Rx Amplifier Ch Power East Side Rx Amplifier Gain East Side Rx Amplifier Tilt

Table 3-3 ANS-WDM > Provisioning Subtab Parameters (continued)

Tree Element	Parameters
root +/- East +/- Receiving +/- Power	East Side Add&Drop - Input Power East Side Add&Drop - Drop Power East Side Band n Drop Power ($n = 1-8$) East Side Channel n Drop Power East ($n = 1-32$)
root +/- East +/- Receiving +/- Thresholds	East Side OSC LOS Threshold East Side Channel LOS Threshold East Side Rx Amplifier In Power Fail Th
root +/- East +/- Transmitting +/- Amplifier	East Side Tx Amplifier Working Mode East Side Tx Amplifier Ch Power East Side Tx Amplifier Gain East Side Tx Amplifier Tilt
root +/- East +/- Transmitting +/- Power	East Side Add&Drop - Output Power East Side Add&Drop - By-Pass Power
root +/- East +/- Transmitting +/- Thresholds	East Side Fiber Stage Input Threshold
root +/- West +/- Receiving	West Side Rx Max Expected Span Loss West Side Rx Min Expected Span Loss
root +/- West +/- Receiving +/- Amplifier	West Side Rx Amplifier Working Mode West Side Rx Amplifier Ch Power West Side Rx Amplifier Gain West Side Rx Amplifier Tilt
root +/- West +/- Receiving +/- Power	West Side Add&Drop - Input Power West Side Add&Drop - Drop Power West Side Band n Drop Power ($n = 1-8$) West Side Channel n Drop Power ($n = 1-32$)
root +/- West +/- Receiving +/- Thresholds	West Side OSC LOS Threshold West Side Channel LOS Threshold West Side Rx Amplifier In Power Fail Th
root +/- West +/- Transmitting +/- Amplifier	West Side Tx Amplifier Working Mode West Side Tx Amplifier Ch Power West Side Tx Amplifier Gain West Side Tx Amplifier Tilt
root +/- East +/- Transmitting +/- Power	West Side Add&Drop - Output Power West Side Add&Drop - By-Pass Power
root +/- West +/- Transmitting +/- Thresholds	West Side Fiber Stage Input Threshold

The ANS parameters that appear in the WDM-ANS > Provisioning tabs depend on the node type. Table 3-4 shows the DWDM node types and their ANS parameters.

Table 3-4 ANS Parameters By Node Type

Node Type	Parameter Group	Parameters
Hub	Network	Network Type
	Span Loss	East and West Expected Span Loss
	Amplifier Tx	East and West Side Transmit Amplifier Working Mode East and West Side Transmit Amplifier Channel Power East and West Side Transmit Amplifier Gain East and West Side Transmit Amplifier Tilt
	Amplifier Rx	East and West Side Receive Amplifier Working Mode East and West Side Receive Amplifier Channel Power East and West Side Receive Amplifier Gain East and West Side Receive Amplifier Tilt
	Thresholds Tx	East and West Side Fiber Stage Input Threshold
	Thresholds Rx	East and West Side Osc Los Threshold East and West Side Channel Los Threshold East and West Side Receive Amplifier Input Power Fail
	Power	East and West Side Add&Drop - Input Power East and West Side Add&Drop - Output Power East and West Side Add&Drop - By-Pass Power East and West Side Channel (n) Drop Power where $n = 1-32$

Table 3-4 ANS Parameters By Node Type (continued)

Node Type	Parameter Group	Parameters
Terminal	Network	Network Type
	Span Loss	East or West Expected Span Loss
	Amplifier Tx	East or West Side Transmit Amplifier Working Mode East or West Side Transmit Amplifier Channel Power East or West Side Transmit Amplifier Gain East or West Side Transmit Amplifier Tilt
	Amplifier Rx	East or West Side Receive Amplifier Working Mode East or West Side Receive Amplifier Channel Power East or West Side Receive Amplifier Gain East or West Side Receive Amplifier Tilt
	Thresholds Tx	East or West Side Fiber Stage Input Threshold
	Thresholds Rx	East or West Side Osc Los Threshold East or West Side Channel Los Threshold East or West Side Receive Amplifier Input Power Fail
	Power	East or West Side Add&Drop - Input Power East or West Side Add&Drop - Output Power East or West Side Channel (n) Drop Power ($n = 1-32$)
Flexible Channel Count Terminal	Network	Network Type
	Span Loss	East and West Expected Span Loss
	Amplifier Tx	East and West Side Transmit Amplifier Working Mode East and West Side Transmit Amplifier Channel Power East and West Side Transmit Amplifier Gain East and West Side Transmit Amplifier Tilt
	Amplifier Rx	East and West Side Receive Amplifier Working Mode East and West Side Receive Amplifier Channel Power East and West Side Receive Amplifier Gain East and West Side Receive Amplifier Tilt
	Thresholds Tx	East and West Side Fiber Stage Input Threshold
	Thresholds Rx	East and West Side Osc Los Threshold East and West Side Channel Los Threshold East and West Side Receive Amplifier Input Power Fail
	Power	East and West Side Add&Drop - Input Power East and West Side Add&Drop - Output Power East and West Side Band (n) Drop Power ($n = 1-8$)

Table 3-4 ANS Parameters By Node Type (continued)

Node Type	Parameter Group	Parameters
OADM	Network	Network Type
	Span Loss	East and West Expected Span Loss
	Amplifier Tx	East and West Side Transmit Amplifier Working Mode East and West Side Transmit Amplifier Channel Power East and West Side Transmit Amplifier Gain East and West Side Transmit Amplifier Tilt
	Amplifier Rx	East and West Side Receive Amplifier Working Mode East and West Side Receive Amplifier Channel Power East and West Side Receive Amplifier Gain East and West Side Receive Amplifier Tilt
	Thresholds Tx	East and West Side Fiber Stage Input Threshold
	Thresholds Rx	East and West Side Osc Los Threshold East and West Side Channel Los Threshold East and West Side Receive Amplifier Input Power Fail
	Power	East and West Side Add&Drop - Input Power East and West Side Add&Drop - Output Power East and West Side Band (<i>n</i>) Drop Power (<i>n</i> = 1–8)
Line Amplifier	Network	Network Type
	Span Loss	East and West Expected Span Loss
	Amplifier Tx	East and West Side Transmit Amplifier Working Mode East and West Side Transmit Amplifier Channel Power East and West Side Transmit Amplifier Gain East and West Side Transmit Amplifier Tilt
	Amplifier Rx	East and West Side Receive Amplifier Working Mode East and West Side Receive Amplifier Channel Power East and West Side Receive Amplifier Gain East and West Side Receive Amplifier Tilt
	Thresholds Tx	East and West Side Fiber Stage Input Threshold
	Thresholds Rx	East and West Side Osc Los Threshold East and West Side Channel Los Threshold East and West Side Receive Amplifier Input Power Fail

Table 3-4 ANS Parameters By Node Type (continued)

Node Type	Parameter Group	Parameters
ROADM	Network	Network Type
	Span Loss	East and West Expected Span Loss
	Amplifier Tx	East and West Side Transmit Amplifier Working Mode East and West Side Transmit Amplifier Channel Power East and West Side Transmit Amplifier Gain East and West Side Transmit Amplifier Tilt
	Amplifier Rx	East and West Side Receive Amplifier Working Mode East and West Side Receive Amplifier Channel Power East and West Side Receive Amplifier Gain East and West Side Receive Amplifier Tilt
	Thresholds Tx	East and West Side Fiber Stage Input Threshold
	Thresholds Rx	East and West Side Osc Los Threshold East and West Side Channel Los Threshold East and West Side Receive Amplifier Input Power Fail
	Power	East and West Side Add&Drop - Input Power (if a 32DMX east/west card is installed) East and West Side Add&Drop - Output Power East and West Side Add&Drop - Drop Power (if a 32DMX east/west card is installed) East and West Side Channel (n) Drop Power (if a 32DMX-O east/west card is installed) ($n = 1-32$)

Table 3-5 shows the following information for all ONS 15454 ANS parameters:

- Min—Minimum value in decibels.
- Max—Maximum value in decibels.
- Def—Default value in decibels. Other defaults include MC (metro core), CG (control gain), U (unknown).
- Group—Group(s) to which the parameter belongs: ES (east side), WS (west side), Rx (receive), Tx (transmit), Amp (amplifier), P (power), DB (drop band), DC (drop channel), A (attenuation), Th (threshold).
- Network Type—Parameter network type: MC (metro core), MA (metro access), ND (not DWDM)
- Optical Type—Parameter optical type: TS (32 channel terminal), FC (flexible channel count terminal), O (OADM), H (hub), LS (line amplifier), R (ROADM), U (unknown)

Table 3-5 ANS Parameters Summary

General Name	Min	Max	Def	Group	Network Type	Optical Type
Network Type	—	—	MC	Root	MC, MA, ND	U, TS, FC, O, H, LS, R
West Side Rx Max Expected Span Loss	0	60	60	WS, Rx	MC, MA	TS, FC, O, H, LS, R

Table 3-5 ANS Parameters Summary (continued)

General Name	Min	Max	Def	Group	Network Type	Optical Type
East Side Rx Max Expected Span Loss	0	60	60	ES, Rx	MC, MA	TS, FC, O, H, LS, R
West Side Rx Min Expected Span Loss	0	60	60	WS, Rx	MC, MA	TS, FC, O, H, LS, R
East Side Rx Min Expected Span Loss	0	60	60	ES, Rx	MC, MA	TS, FC, O, H, LS, R
West Side Tx Amplifier Working Mode	—	—	CG	WS, Tx, Amp	MC, MA, ND	TS, FC, O, H, LS, R
East Side Tx Amplifier Working Mode	—	—	CG	ES, Rx	MC, MA	TS, FC, O, H, LS, R
West Side Rx Amplifier Working Mode	—	—	CG	WS, Tx, Amp	MC, MA, ND	TS, FC, O, H, LS, R
East Side Rx Amplifier Working Mode	—	—	CG	ES, Rx	MC, MA	TS, FC, O, H, LS, R
West Side Tx Amplifier Ch Power	-10	17	2	WS, Tx, Amp	MC, MA, ND	TS, FC, O, H, LS, R
East Side Tx Amplifier Ch Power	-10	17	2	WS, Tx, Amp	MC, MA, ND	TS, FC, O, H, LS, R
West Side Rx Amplifier Ch Power	-10	17	2	WS, Tx, Amp	MC, MA, ND	TS, FC, O, H, LS, R
East Side Rx Amplifier Ch Power	-10	17	2	WS, Tx, Amp	MC, MA, ND	TS, FC, O, H, LS, R
West Side Tx Amplifier Gain	0	30	0	WS, Tx, Amp	MA	TS, FC, O, H, LS, R
East Side Tx Amplifier Gain	0	30	0	WS, Tx, Amp	MA	TS, FC, O, H, LS, R
West Side Rx Amplifier Gain	0	30	0	WS, Tx, Amp	MA	TS, FC, O, H, LS, R
East Side Rx Amplifier Gain	0	30	0	WS, Tx, Amp	MA	TS, FC, O, H, LS, R
West Side Tx Amplifier Tilt	0	30	0	WS, Tx, Amp	MC, MA	TS, FC, O, H, LS, R
East Side Tx Amplifier Tilt	0	30	0	WS, Tx, Amp	MC, MA	TS, FC, O, H, LS, R
West Side Rx Amplifier Tilt	0	30	0	WS, Rx, Amp	MC, MA	TS, FC, O, H, LS, R
East Side Rx Amplifier Tilt	0	30	0	WS, Rx, Amp	MC, MA	TS, FC, O, H, LS, R
West Side OSC LOS Threshold	-50	30	U	WS, Rx, Th	MC, MA	TS, FC, O, H, LS, R
East Side OSC LOS Threshold	-50	30	U	WS, Rx, Th	MC, MA	TS, FC, O, H, LS, R
West Side Channel LOS Threshold	-50	30	U	WS, Rx, Th	MC, MA	TS, FC, O, H, LS, R
East Side Channel LOS Threshold	-50	30	U	ES, Rx, Th	MC, MA, ND	TS, FC, O, H, LS, R
West Side Fiber State Input Threshold	-50	30	U	WS, Tx, Th	MC, MA, ND	TS, FC, O, H, LS, R
East Side Fiber State Input Threshold	-50	30	U	ES, Tx, Th	MC, MA, ND	TS, FC, O, H, LS, R
West Side Add&Drop - Output Power	-50	30	-14	WS, Tx, P	MC	TS, FC, O, H, R
East Side Add&Drop - Output Power	-50	30	-14	ES, Tx, P	MC	TS, FC, O, H, R
West Side Add&Drop - Input Power	-50	30	-14	WS, Rx, P	MC	TS, FC, O, H, R
East Side Add&Drop - Input Power	-50	30	-14	ES, Rx, P	MC	TS, FC, O, H, R
West Side Add&Drop - By-Pass Power	-50	30	-14	WS, Tx, P	MC	H
East Side Add&Drop - By-Pass Power	-50	30	-14	ES, Tx, P	MC	H
West Side Add&Drop - Drop Power	-50	30	-14	WS, Tx, P	MC	R
East Side Add&Drop - Drop Power	-50	30	-14	ES, Tx, P	MC	R
West Side Band 1...8 Drop Power	-50	30	-14	WS, Rx, P, DB	MC	FC, O
East Side Band 1...8 Drop Power	-50	30	-14	ES, Rx, P, DB	MC	FC, O

Table 3-5 ANS Parameters Summary (continued)

General Name	Min	Max	Def	Group	Network Type	Optical Type
West Side Channel 1...32 Drop Power	-50	30	-14	WS, Rx, P, DC, B1	MC, MA	TS, H, R
East Side Channel 1...32 Drop Power	-50	30	-14	ES, Rx, P, DC, B1	MC, MA	TS, H, R



Network Reference

This chapter explains the ONS 15454 dense wavelength division multiplexing (DWDM) network applications and topologies. The chapter also provides network-level optical performance references.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.



Note

Unless otherwise specified, OPT-BST refers to the OPT-BST, OPT-BST-E, and OPT-BST-L cards, 32WSS refers to the 32WSS and 32WSS-L cards, and 32DMX refers to the 32DMX and 32DMX-L cards (not including the 32DMX-O card). OPT-PRE refers to both the OPT-PRE card and the OPT-AMP-L card provisioned in OPT-Line mode.



Note

OPT-BST-L, 32WSS-L, 32DMX-L, and OPT-AMP-L cards can only be installed in L-band compatible nodes and networks. OPT-BST, OPT-BST-E, 32WSS, and 32DMX, cards can only be installed in C-band compatible nodes and networks.

Chapter topics include:

- [4.1 Network Applications, page 4-2](#)
- [4.2 Network Topologies, page 4-2](#)
- [4.3 Optical Performance, page 4-7](#)
- [4.4 Automatic Power Control, page 4-8](#)
- [4.5 ROADM Power Equalization Monitoring, page 4-12](#)
- [4.6 Span Loss Verification, page 4-13](#)
- [4.7 Network Optical Safety—Automatic Laser Shutdown, page 4-14](#)
- [4.8 Network-Level Gain—Tilt Management of Optical Amplifiers, page 4-23](#)
- [4.9 Optical Channel Circuits, page 4-29](#)

4.1 Network Applications

Cisco ONS 15454s can be provisioned for metro access and metro core DWDM network applications. Metro access networks are 60 km or less in size. Channels are not equalized and dispersion compensation is not applied. Metro access networks have few spans and very low span loss, so the signal link budget is the limiting factor for performance. Metro core networks can be up to 400 km in size. The channel power is equalized and dispersion compensation is applied. Metro core networks often include multiple spans and amplifiers, so the optical signal-to-noise ratio (OSNR) is the limiting factor for channel performance in metro core networks.

Within DWDM networks, the ONS 15454 uses a communications protocol, called node services protocol (NSP), to communicate with other nodes. NSP automatically updates nodes whenever a change in the network occurs. Each ONS 15454 DWDM node can:

- Identify other ONS 15454 DWDM nodes in the network.
- Identify the different types of DWDM networks.
- Identify when the DWDM network is complete and when it is incomplete.

4.2 Network Topologies

The ONS 15454 DWDM network topologies include hubbed, multihubbed, and meshed rings, and linear and single-span networks.

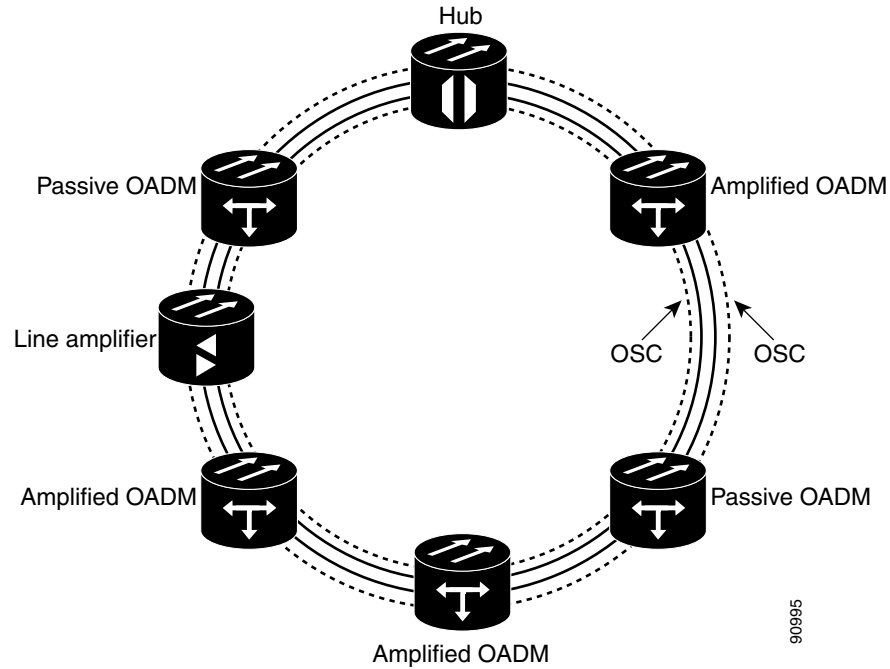
4.2.1 Hubbed Rings

In the hubbed ring topology ([Figure 4-1](#)), a hub node terminates all the DWDM channels. A channel can be provisioned to support protected traffic between the hub node and any node in the ring. Both working and protected traffic use the same wavelength on both sides of the ring. Protected traffic can also be provisioned between any pair of optical add/drop multiplexing (OADM) nodes, except that either the working or the protected path must be regenerated in the hub node.

Protected traffic saturates a channel in a hubbed ring, that is, no channel reuse is possible. However, the same channel can be reused in different sections of the ring by provisioning unprotected multihop traffic. From a transmission point of view, this network topology is similar to two bidirectional point-to-point links with OADM nodes.

For more information about hub nodes, see the [“3.1.1 Hub Node”](#) section on page 3-2.

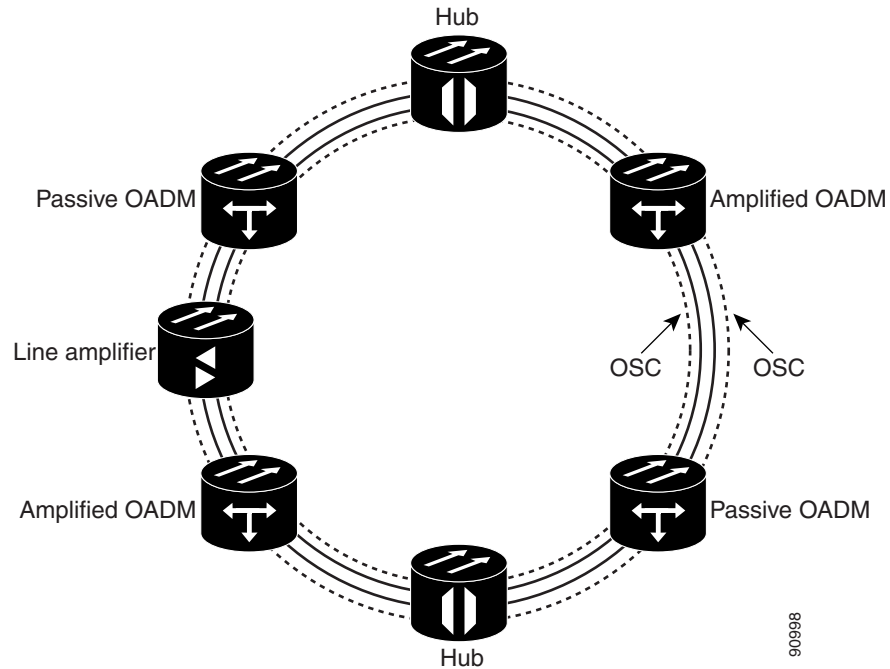
Figure 4-1 Hubbed Ring



4.2.2 Multihubbed Rings

A multihubbed ring (Figure 4-2) is based on the hubbed ring topology, except that two or more hub nodes are added. Protected traffic can only be established between the two hub nodes. Protected traffic can be provisioned between a hub node and any OADM node only if the allocated wavelength channel is regenerated through the other hub node. Multihop traffic can be provisioned on this ring. From a transmission point of view, this network topology is similar to two or more point-to-point links with OADM nodes.

Figure 4-2 Multihubbed Ring

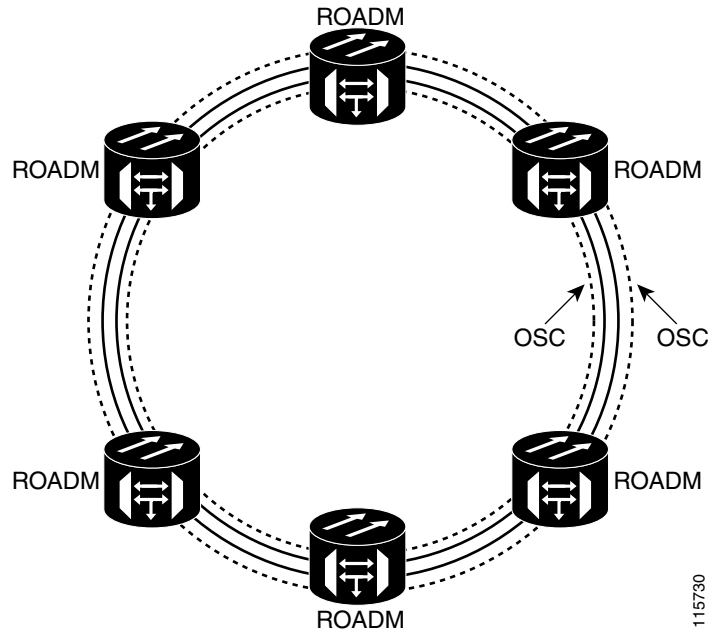


4.2.3 Any-to-Any Rings

The any-to-any ring topology (Figure 4-3) contains only reconfigurable OADM (ROADM) nodes, or ROADM nodes with optical service channel (OSC) regeneration or amplifier nodes. This topology potentially allows you to route every wavelength from any source to any destination node inside the network.

See the “3.1.4 ROADM Node” section on page 3-8 for more information.

Figure 4-3 Any-to-Any Ring



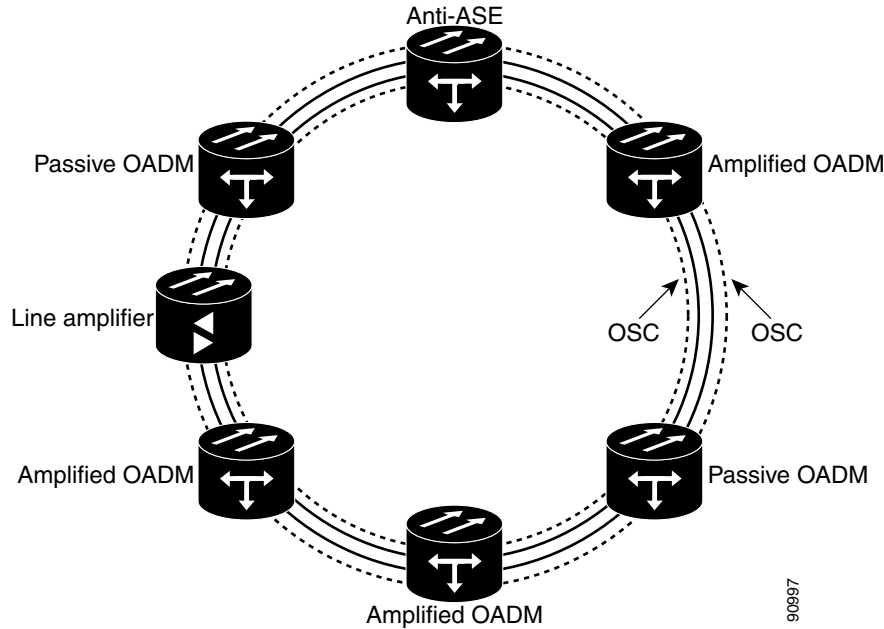
4.2.4 Meshed Rings

The meshed ring topology (Figure 4-4) does not use hubbed nodes; only amplified and passive OADM nodes are present. Protected traffic can be provisioned between any two nodes; however, the selected channel cannot be reused in the ring. Unprotected multihop traffic can be provisioned in the ring. A meshed ring must be designed to prevent amplified spontaneous emission (ASE) lasing. This is done by configuring a particular node as an anti-ASE node. An anti-ASE node can be created in two ways:

- Equip an OADM node with 32MUX-O cards and 32DMX-O cards. This solution is adopted when the total number of wavelengths deployed in the ring is higher than ten. OADM nodes equipped with 32MUX-O cards and 32DMX-O cards are called full OADM nodes.
- When the total number of wavelengths deployed in the ring is lower than ten, the anti-ASE node is configured by using an OADM node where all the channels that are not terminated in the node are configured as “optical pass-through.” In other words, no channels in the anti-ASE node can travel through the express path of the OADM node.

For more information about OADM nodes, see the “3.1.3 OADM Node” section on page 3-4. For more information about anti-ASE nodes, see the “3.1.5 Anti-ASE Node” section on page 3-11.

Figure 4-4 Meshed Ring



4.2.5 Linear Configurations

Linear configurations are characterized by the use of two terminal nodes (west and east). The terminal nodes can be equipped with a 32MUX-O card and a 32DMX-O card, or a 32WSS card with a 32DMX or 32DMX-O card. OADM or line amplifier nodes can be installed between the two terminal nodes. Only unprotected traffic can be provisioned in a linear configuration. Figure 4-5 shows five ONS 15454 nodes in a linear configuration with an amplified and a passive OADM node.

Figure 4-5 Linear Configuration with an OADM Node

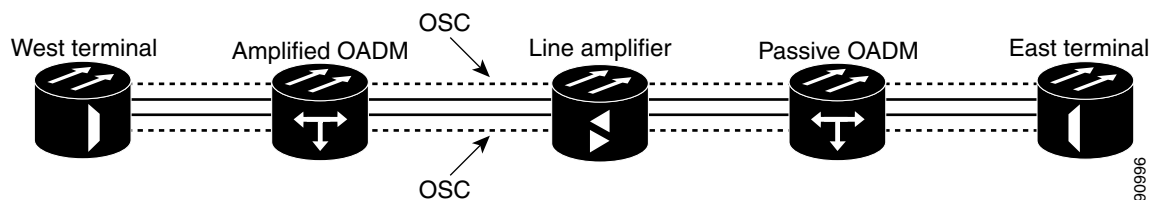
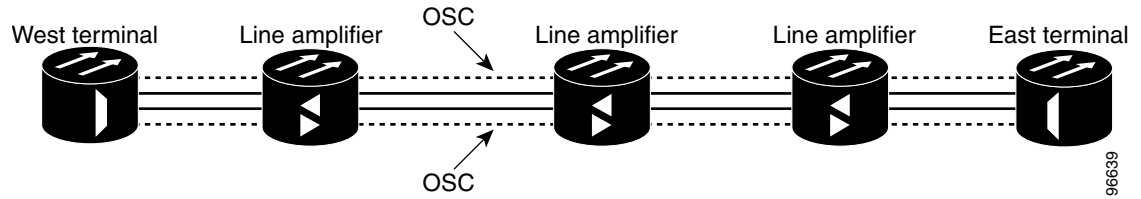


Figure 4-6 shows five ONS 15454 nodes in a linear configuration without an OADM node.

See the “3.1.2 Terminal Node” section on page 3-3 for more information.

Figure 4-6 Linear Configuration without an OADM Node

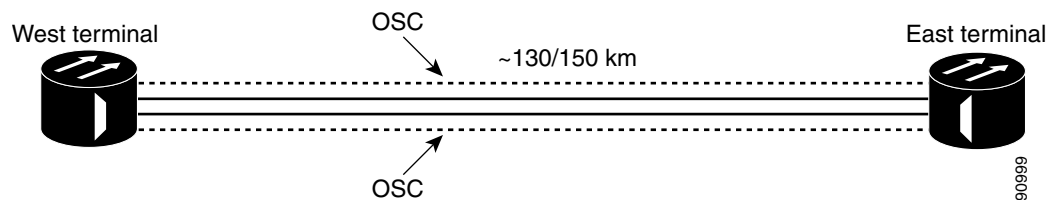


4.2.6 Single-Span Link

Single-span link is a type of linear configuration characterized by a single-span link with pre-amplification and post-amplification. A single-span link is also characterized by the use of two terminal nodes (west and east). The terminal nodes are usually equipped with a 32MUX-O card and a 32DMX-O card. However, a 32WSS card and a 32DMX or a 32DMX-O card can be installed. Software Release 4.7 and later also supports single-span links with AD-4C-xx.x cards. Only unprotected traffic can be provisioned on a single-span link.

Figure 4-7 shows ONS 15454s in a single-span link. Eight channels are carried on one span. Single-span link losses apply to OC-192 LR ITU cards. The optical performance values are valid assuming that the sum of the OADM passive node insertion losses and the span losses does not exceed 35 dB.

Figure 4-7 Single-Span Link



4.3 Optical Performance

This section provides optical performance information for ONS 15454 DWDM networks. The performance data is a general guideline based upon the network topology, node type, client cards, fiber type, number of spans, and number of channels. The maximum number of nodes that can be in an ONS 15454 DWDM network is 16. The DWDM topologies and node types that are supported are shown in Table 4-1.

Table 4-1 Supported Topologies and Node Types

Number of Channels	Fiber	Topologies	Node Type
32 channels	SMF-28 ¹	Ring	Hub
	E-LEAF ²	Linear	Active OADM
	TW-RS ³	Linear without OADM	Passive OADM Terminal Line OSC regeneration
16 channels	SMF-28	Ring	Hub
		Linear	Active OADM
		Linear without OADM	Passive OADM Terminal Line OSC regeneration
8 channels	SMF-28	Linear without OADM	Terminal Line

1. SMF-28 = single-mode fiber 28

2. E-LEAF = enhanced large effective area fiber

3. TW-RS = TrueWave reduced slope fiber

4.4 Automatic Power Control

The ONS 15454 automatic power control (APC) feature performs the following functions:

- Maintains constant per-channel power when changes to the number of channels occur.
- Compensates for optical network degradation (aging effects).
- Simplifies the installation and upgrade of DWDM optical networks by automatically calculating the amplifier setpoints.



Note

APC functions are performed by software algorithms on the OPT-BST, OPT-PRE, and TCC2/TCC2P cards.

Amplifier software uses a control gain loop with fast transient suppression to keep the channel power constant regardless of any changes in the number of channels. Amplifiers monitor the changes to the input power and change the output power according to the calculated gain setpoint. The shelf controller software emulates the control output power loop to adjust for fiber degradation. To perform this function, the TCC2/TCC2P needs to know the channel distribution, which is provided by a signaling protocol, and the expected per-channel power, which you can provision. The TCC2/TCC2P compares the actual amplifier output power with the expected amplifier output power and modifies the setpoints if any discrepancies occur.

4.4.1 APC at the Amplifier Card Level

In constant gain mode, the amplifier power out control loop performs the following input and output power calculations, where G represents the gain and t represents time.

$$P_{out}(t) = G * P_{in}(t) \text{ (mW)}$$

$$P_{out}(t) = G + P_{in}(t) \text{ (dB)}$$

In a power-equalized optical system, the total input power is proportional to the number of channels. The amplifier software compensates for any variation of the input power due to changes in the number of channels carried by the incoming signal.

Amplifier software identifies changes in the read input power in two different instances, t_1 and t_2 , as a change in the carried traffic. The letters m and n in the following formula represent two different channel numbers. P_{in}/ch represents the per-channel input power:

$$P_{in}(t_1) = nP_{in}/ch$$

$$P_{in}(t_2) = mP_{in}/ch$$

Amplifier software applies the variation in the input power to the output power with a reaction time that is a fraction of a millisecond. This keeps the power constant on each channel at the output amplifier, even during a channel upgrade or a fiber cut.

Amplifier parameters are configured using east and west conventions for ease of use. Selecting west provisions parameters for the preamplifier receiving from the west and the booster amplifier transmitting to the west. Selecting east provisions parameters for the preamplifier receiving from the east and the booster amplifier transmitting to the east.

Starting from the expected per-channel power, the amplifiers automatically calculate the gain setpoint after the first channel is provisioned. An amplifier gain setpoint is calculated in order to make it equal to the loss of the span preceding the amplifier itself. After the gain is calculated, the setpoint is no longer changed by the amplifier. Amplifier gain is recalculated every time the number of provisioned channels returns to zero. If you need to force a recalculation of the gain, move the number of channels back to zero.

4.4.2 APC at the Node and Network Levels

The amplifier adjusts the gain to compensate for span loss. Span loss changes due to aging fiber and components, or changes in operating conditions. To correct the gain or express variable optical attenuator (VOA) setpoints, APC calculates the difference between the power value read by the photodiodes and the expected power value. The expected power values are calculated using:

- Provisioned per-channel power value
- Channel distribution (the number of express, add, and drop channels in the node)
- ASE estimation

Channel distribution is determined by the sum of the provisioned and failed channels. Information about provisioned wavelengths is sent to APC on the applicable nodes during circuit creation. Information about failed channels is collected through a signaling protocol that monitors alarms on ports in the applicable nodes and distributes that information to all the other nodes in the network.

ASE calculations purify the noise from the power level reported from the photodiode. Each amplifier can compensate for its own noise, but cascaded amplifiers cannot compensate for ASE generated by preceding nodes. The ASE effect increases when the number of channels decreases; therefore, a correction factor must be calculated in each amplifier of the ring to compensate for ASE build-up.

APC is a network-level feature. The APC algorithm designates a master node that is responsible for starting APC hourly or every time a new circuit is provisioned or removed. Every time the master node signals for APC to start, gain and VOA setpoints are evaluated on all nodes in the network. If corrections are needed in different nodes, they are always performed sequentially following the optical paths starting from the master node.

APC corrects the power level only if the variation exceeds the hysteresis thresholds of ± 0.5 dB. Any power level fluctuation within the threshold range is skipped since it is considered negligible. Because APC is designed to follow slow time events, it skips corrections greater than 3 dB. This is the typical total aging margin that is provisioned during the network design phase. After you provision the first channel or the amplifiers are turned up for the first time, APC does not apply the 3 dB rule. In this case, APC corrects all the power differences to turn up the node.

To avoid large power fluctuations, APC adjusts power levels incrementally. The maximum power correction is ± 0.5 dB. This is applied to each iteration until the optimal power level is reached. For example, a gain deviation of 2 dB is corrected in four steps. Each of the four steps requires a complete APC check on every node in the network. APC can correct up to a maximum of 3 dB on an hourly basis. If degradation occurs over a longer time period, APC will compensate for it by using all margins that you provision during installation.

When no margin is available, adjustments cannot be made because setpoints exceed ranges. APC communicates the event to CTC, CTM, and TL1 through an APC Fail condition. APC will clear the APC fail condition when the setpoints return to the allowed ranges.

APC automatically disables itself when:

- A HW FAIL alarm is raised by any card in any of the network nodes.
- A Mismatch Equipment Alarm (MEA) is raised by any card in any of the network nodes.
- An Improper Removal (IMPROPRMVL) alarm is raised by any card in any of the network nodes.
- Gain Degrade (GAIN-HDEG), Power Degrade (OPWR-HDEG), and Power Fail (PWR-FAIL) alarms are raised by the output port of any amplifier card in any of the network nodes.
- A VOA degrade or fail alarm is raised by any of the cards in any of the network nodes.

The APC state (Enable/Disable) is located on every node and can be retrieved by the CTC or TL1 interfaces. If an event that disables APC occurs in one of the network nodes, APC is disabled on all the others and the APC state changes to DISABLE - INTERNAL. The disabled state is raised only by the node where the problem occurred to simplify troubleshooting.

APC raises the following standing conditions at the port level in CTC, TL1, and Simple Network Management Protocol (SNMP):

- APC Out of Range—APC cannot assign a new setpoint for a parameter this is allocated to a port because the new setpoint exceeds the parameter range.
- APC Correction Skipped—APC skipped a correction to one parameter allocated to a port because the difference between the expected and current values exceeds the ± 3 dB security range.

After the error condition is cleared, signaling protocol enables APC on the network and the APC DISABLE - INTERNAL condition is cleared. Because APC is required after channel provisioning to compensate for ASE effects, all optical channel network connection (OCHNC) and optical channel client connection (OCHCC) circuits that you provision during the disabled APC state are kept in the Out-of-Service and Autonomous, Automatic In-Service (OOS-AU,AINS) (ANSI) or Unlocked-disabled,automaticInService (ETSI) service state until APC is enabled. OCHNCs and OCHCCs automatically go into the In-Service and Normal (IS-NR) (ANSI) or Unlocked-enabled (ETSI) service state only after APC is enabled.

4.4.3 Managing APC

The automatic power control status is indicated by four APC states shown in the node view status area:

- Enable—APC is enabled.
- Disable - Internal—APC has been automatically disabled for an internal cause.
- Disable - User—APC was disabled manually by a user.
- Not Applicable—The node is provisioned to Metro Access or Not DWDM, which do not support APC.

You can view the automatic power control information and disable and enable APC manually on the Maintenance > DWDM > APC tab (Figure 4-8).



Caution

When APC is disabled, aging compensation is not applied and circuits cannot be activated. Do not disable APC unless it is required for specific maintenance or troubleshooting tasks. Always enable APC as soon as the tasks are completed.

Figure 4-8 Automatic Power Control

APC State

Database	APC	WDM Span Check	ROADM Power Monitoring
Network	Position	Last Check	Parameter
OSI	Slot 14 (32 DMX L),Port 33 (COM-RX)	12/08/05 12:48:53 PST	Voa Target Attenuation
Protection	Slot 15 (OPT-AMP L),Port 6 (LINE-TX)	12/08/05 12:48:53 PST	Gain
Software	Slot 17 (OPT-BST L),Port 6 (LINE-TX)	12/08/05 12:48:51 PST	Gain
Overhead XConnect			
Diagnostic			
Timing			
Audit			
Test Access			
DWDM			

The APC subtab provides the following information:

- Slot ID—The ONS 15454 slot number for which APC information is shown.
- Port—The port number for which APC information is shown.

- Card—The card for which power control information is shown.
- Last Modification—Date and time APC last modified a setpoint for the parameters shown in [Table 4-2](#).
- Last Check—Date and time APC last verified the setpoints for the parameters shown in [Table 4-2](#).

Table 4-2 APC-Managed Parameters

Card	Port	Parameters
OPT-BST	LINE-3-TX	<ul style="list-style-type: none"> • Gain • Total Signal Output Power
OPT-PRE	LINE-1-TX	<ul style="list-style-type: none"> • Gain • Total Signal Output Power
AD-xB-xx.x	LINE-1-TX BAND- n^1 -TX	VOA Target Attenuation
AD-1C-xx.x AD-2C-xx.x	LINE-1-TX	VOA Target Attenuation
AD-4C-xx.x	LINE-1-TX CHAN- n^2 -TX	VOA Target Attenuation
32DMX	LINE-1-TX	VOA Target Attenuation

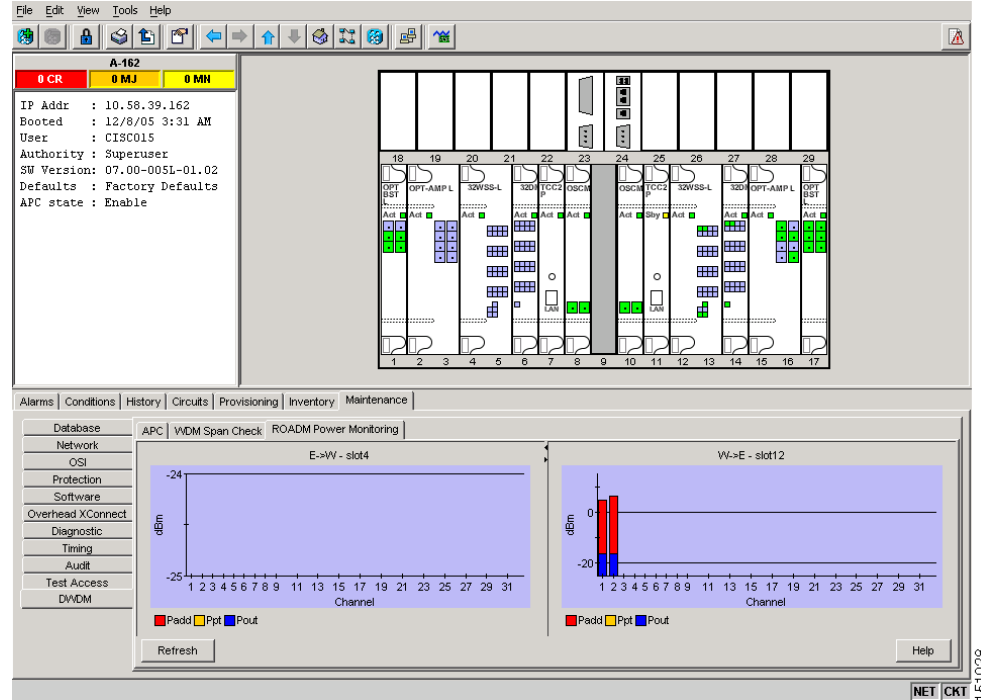
1. $n = 1 - 8$

2. $n = 1 - 32$

4.5 ROADM Power Equalization Monitoring

ROADM nodes allow you to monitor the 32WSS card equalization functions on the Maintenance > DWDM > Power Monitoring tab ([Figure 4-9](#)). The tab shows the input channel power (Padd), the express or pass-through (Ppt) power and the power level at output (Pout).

Figure 4-9 Power Monitoring Subtab



4.6 Span Loss Verification

Span loss measurements can be performed from the Maintenance > DWDM > WDM Span Check tab (Figure 4-10). The CTC span check compares the far-end OSC power with the near-end OSC power. A Span Loss Out of Range condition is raised when the measured span loss is higher than the maximum expected span loss. It is also raised when the measured span loss is lower than the minimum expected span loss and the difference between the minimum and maximum span loss values is greater than 1 dB. The minimum and maximum expected span loss values are calculated by Cisco MetroPlanner for the network and imported into CTC. However, you can manually change the minimum and expected span loss values.

CTC span loss measurements provide a quick span loss check and are useful whenever changes to the network occur, for example after you install equipment or repair a broken fiber. CTC span loss measurement resolutions are:

- +/- 1.5 dB for measured span losses between 0 and 25 dB
- +/- 2.5 dB for measured span losses between 25 and 38 dB

For ONS 15454 span loss measurements with higher resolutions, an optical time domain reflectometer (OTDR) must be used.

Figure 4-10 Span Loss Verification

The screenshot shows the Cisco CTC interface for card A-162. The top left pane displays system information:

```

A-162
0 CR 0 MJ 0 MN
IP Addr : 10.58.39.162
Booted : 12/8/05 3:31 AM
User : CISCO15
Authority : Superuser
SW Version: 07.00-005L-01.02
Defaults : Factory Defaults
APC state : Enable

```

The main pane shows a rack diagram with 17 slots. Slots 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, and 28 contain optical cards: OPT-BST, OPT-AMP-L, 32WSS-L, OSCM, OSC-CSM, 32WSS-L, 32WSS-L, OPT-AMP-L, and OPT-BST. Slots 1-17 contain other cards like LAM and OSCM.

The bottom pane shows the 'Database' tab with 'VDM Span Check' selected. The table below shows span loss data:

Side	Min Exp. Span Loss (dB)	Max Exp. Span Loss (dB)	Meas. Span Loss (dB)	Result
West	5.1	14.9	9.0	1.5
East	5.2	14.8	12.4	1.5

Buttons at the bottom include 'Retrieve Span Loss values', 'Reset', 'Apply', and 'Help'. The bottom right corner shows 'NET CKT' and '151029'.

4.7 Network Optical Safety—Automatic Laser Shutdown

If a fiber break occurs on the network, automatic laser shutdown (ALS) automatically shuts down the OSCM and OSC-CSM OSC laser output power and the optical amplifiers contained in the OPT-BST, OPT-BST-E, OPT-BST-L, and OPT-AMP-L cards. The Maintenance > ALS tabs in CTC card view provide the following ALS management options for OSCM, OSC-CSM, OPT-BST, OPT-BST-E, OPT-BST-L, and OPT-AMP-L cards:

- **Disable**—ALS is off. The OSC laser transmitter and optical amplifiers are not automatically shut down when a traffic outage loss of signal (LOS) occurs.
- **Auto Restart**—ALS is on. The OSC laser transmitter and optical amplifiers automatically shut down when traffic outages (LOS) occur. It automatically restarts when the conditions that caused the outage are resolved. Auto Restart is the default ALS provisioning for OSCM, OSC-CSM, OPT-BST, OPT-BST-E, OPT-BST-L, and OPT-AMP-L cards.
- **Manual Restart**—ALS is on. The OSC laser transmitter and optical amplifiers automatically shut down when traffic outages (LOS) occur. However, the laser must be manually restarted when conditions that caused the outage are resolved.
- **Manual Restart for Test**—Manually restarts the OSC laser transmitter and optical amplifiers for testing.

4.7.1 Automatic Laser Shutdown on TXP and MXP Cards

When ALS is enabled on OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OSCM, and OSC-CSM cards, a network safety mechanism will occur in the event of a system failure. ALS provisioning is also provided on the transponder (TXP) and muxponder (MXP) cards. However, if a network uses ALS-enabled OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OSCM, and OSC-CSM cards, ALS does not need to be enabled on the TXP cards or MXP cards. ALS is disabled on TXP and MXP cards by default and the network optical safety is not impacted.

If TXP and MXP cards are connected directly to each other without passing through a DWDM layer, ALS should be enabled on them. The ALS protocol goes into effect when a fiber is cut, enabling some degree of network point-to-point bidirectional traffic management between the cards.

If ALS is disabled on the OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OSCM, and OSC-CSM cards (the DWDM network), ALS can be enabled on the TXP and MXP cards to provide laser management in the event of a fiber break in the network between the cards.

4.7.2 Automatic Power Reduction

Automatic power reduction (APR) is controlled by the software and is not user configurable. During amplifier restart after a system failure, the amplifier (OPT-BST, for example) operates in pulse mode and an automatic power reduction level is activated so that the Hazard Level 1 power limit is not exceeded. This is done to ensure personnel safety.

When a system failure occurs (cut fiber or equipment failure, for example) and ALS Auto Restart is enabled, a sequence of events is placed in motion to shut down the amplifier laser power, then automatically restart the amplifier after the system problem is corrected. As soon as a loss of optical payload and OSC is detected at the far end, the far-end amplifier shuts down. The near-end amplifier then shuts down because in similar fashion, it detects a loss of payload and OSC due to the far-end amplifier shutdown. At this point, the near end attempts to establish communication to the far end using the OSC laser transmitter. To do this, the OSC emits a two-second pulse at very low power (maximum of 0 dB) and waits for a similar two-second pulse in response from the far-end OSC laser transmitter. If no response is received within 100 seconds, the near end tries again. This process continues until the near end receives a two-second response pulse from the far end. This is an indication that the system failure has been corrected and that there is full continuity in the fiber between the two ends.

After the OSC communication has been established, the near-end amplifier is configured by the software to operate in pulse mode at a reduced power level. It emits a nine-second laser pulse with an automatic power reduction to +8 dB. This level assures that Hazard Level 1 is not exceeded, for personnel safety, even though the establishment of successful OCS communication has assured that any broken fiber has been fixed. If the far-end amplifier responds with a nine-second pulse within 100 seconds, both amplifiers are changed from pulse mode at reduced power to normal operating power mode.

For a direct connection between TXP or MXP cards, when ALS Auto Restart is enabled and the connections do not pass through a DWDM layer, a similar process takes place. However, because the connections do not go through any amplifier or OSC cards, the TXP or MXP cards attempt to establish communication directly between themselves after a system failure. This is done using a two-second restart pulse, in a manner similar to that previously described between OSCs at the DWDM layer. The power emitted during the pulse is below Hazard Level 1.

**Note**

In the event that ALS is disabled, a larger amount of invisible laser radiation might be emitted from the end of the unterminated fiber cable or connector. Do not view the end of the fiber directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.

**Note**

If you must disable ALS, ensure that all fibers are installed in a restricted location. Enable ALS immediately after finishing the maintenance or installation process.

**Note**

For the line amplifier to start up automatically, disable the ALS on the terminal node that is unidirectional.

4.7.3 Fiber Cut Scenarios

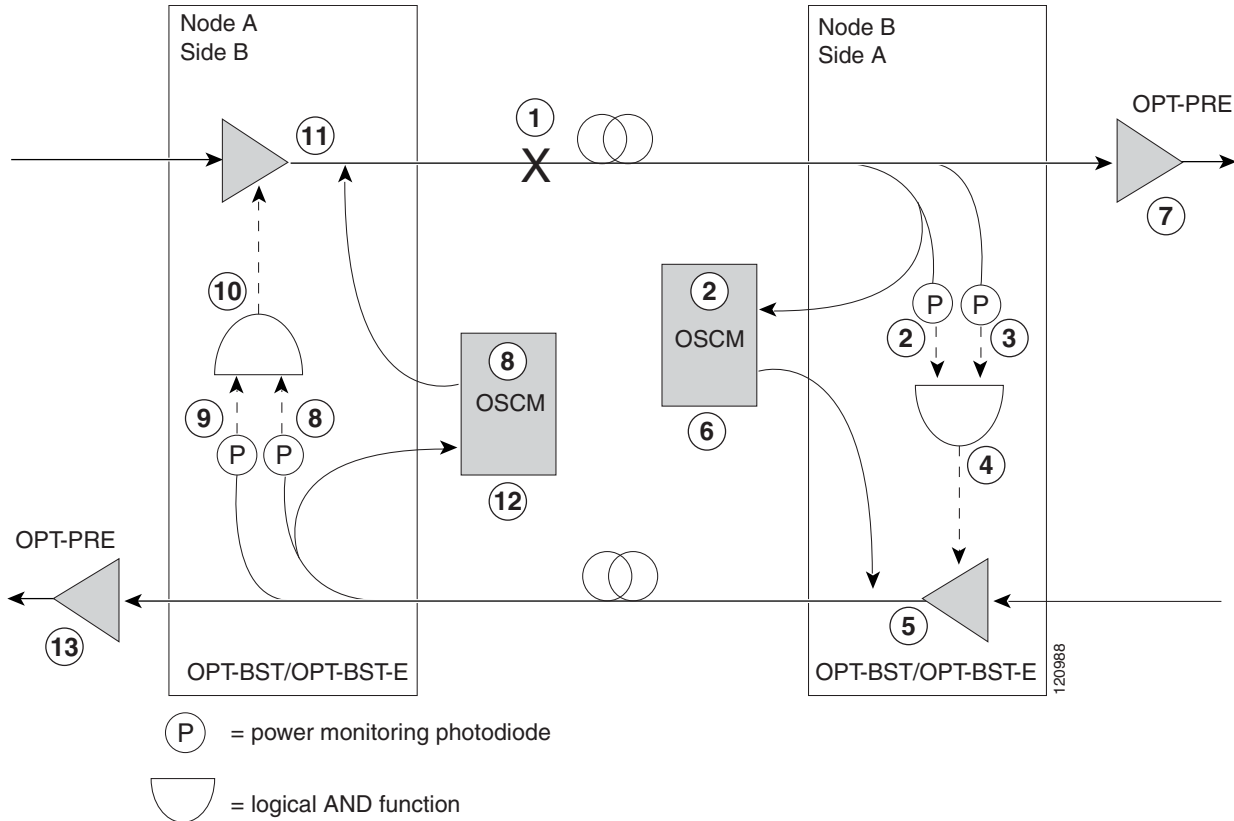
In the following paragraphs, four ALS scenarios are given:

- Nodes using OPT-BST/OPT-BST-E cards (amplified nodes)
- Nodes using OSC-CSM cards (passive nodes)
- Nodes using OPT-BST-L cards (amplified nodes)
- Nodes using OPT-AMP-L cards (amplified nodes)

4.7.3.1 Scenario 1: Fiber Cut in Nodes Using OPT-BST/OPT-BST-E Cards

Figure 4-11 shows nodes using OPT-BST/OPT-BST-E cards with a fiber cut between them.

Figure 4-11 Nodes Using OPT-BST/OPT-BST-E Cards



Two photodiodes at Node B monitor the received signal strength for the optical payload and OSC signals. When the fiber is cut, an LOS is detected at both of the photodiodes. The AND function then indicates an overall LOS condition, which causes the OPT-BST/OPT-BST-E transmitter, OPT-PRE transmitter, and OSCM lasers to shut down. This in turn leads to a LOS for both the optical payload and OSC at Node A, which causes Node A to turn off the OSCM, OPT-PRE transmitter, and OPT-BST/OPT-BST-E transmitter lasers. The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 4-11):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects a Loss of Incoming Payload (LOS-P) on the OPT-BST/OPT-BST-E card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-BST/OPT-BST-E card, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. The OPT-BST/OPT-BST-E card amplifier is shut down within three seconds.
5. The OSCM laser is shut down.
6. The OPT-PRE card automatically shuts down due to a loss of incoming optical power.
7. The Node A power monitoring photodiode detects a LOS-O on the OPT-BST/OPT-BST-E card and the OSCM card detects a LOS (OC3) at the SONET layer. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
8. The Node A power monitoring photodiode detects a LOS-P on the OPT-BST/OPT-BST-E card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

9. On the OPT-BST/OPT-BST-E, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
10. The OPT-BST/OPT-BST-E card amplifier is shut down within three seconds.
11. The OSCM laser is shut down.
12. The Node A OPT-PRE card automatically shuts down due to a loss of incoming optical power.

When the fiber is repaired, either an automatic or manual restart at the Node A OPT-BST/OPT-BST-E transmitter or at the Node B OPT-BST/OPT-BST-E transmitter is required. A system that has been shut down is reactivated through the use of a restart pulse. The pulse is used to signal that the optical path has been restored and transmission can begin. For example, when the far end, Node B, receives a pulse, it signals to the Node B OPT-BST/OPT-BST-E transmitter to begin transmitting an optical signal. The OPT-BST/OPT-BST-E receiver at Node A receives that signal and signals the Node A OPT-BST/OPT-BST-E transmitter to resume transmitting.

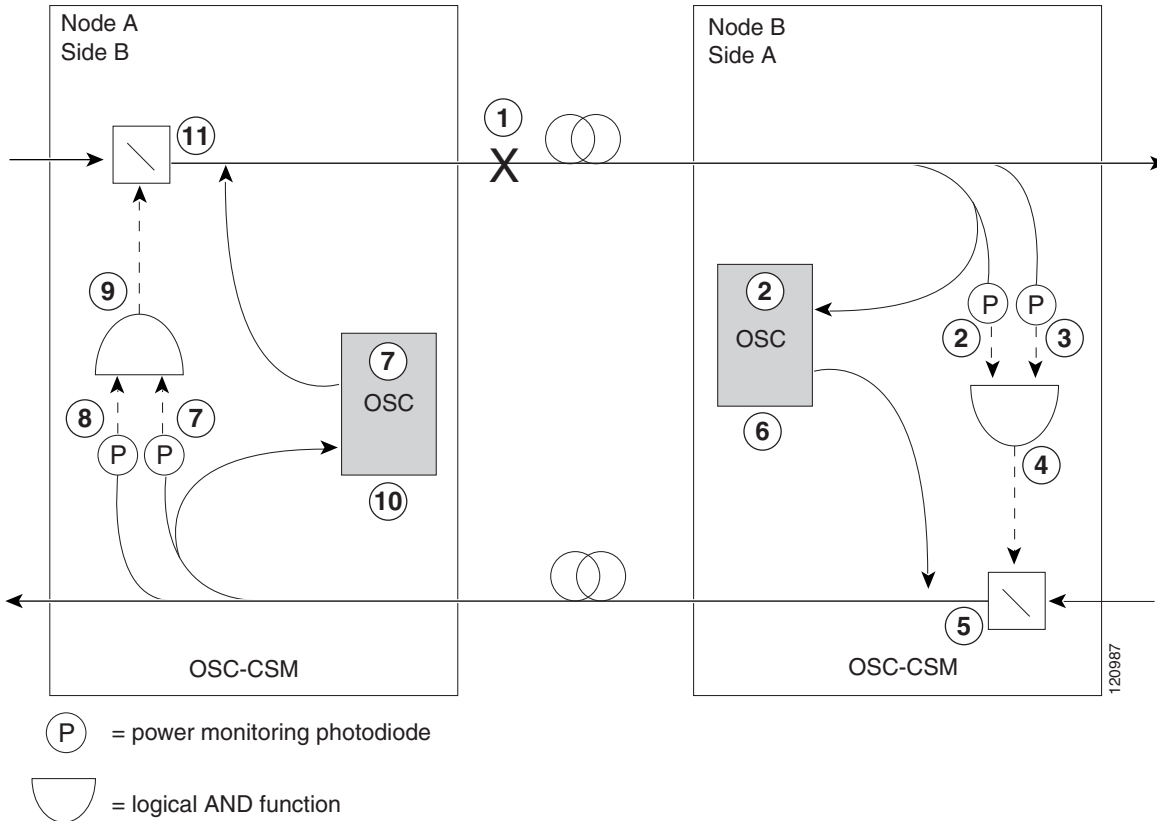
**Note**

During a laser restart pulse, APR (see the “[4.7.2 Automatic Power Reduction](#)” section on page 4-15) ensures that the laser power does not exceed Class 1 limits.

4.7.3.2 Scenario 2: Fiber Cut in Nodes Using OSC-CSM Cards

[Figure 4-12](#) shows nodes using OSC-CSM cards with a fiber cut between them.

Figure 4-12 Nodes Using OSC-CSM Cards



Two photodiodes at the Node B OSC-CSM card monitor the received signal strength for the received optical payload and OSC signals. When the fiber is cut, LOS is detected at both of the photodiodes. The AND function then indicates an overall LOS condition, which causes the Node B OSC laser to shut down and the optical switch to block traffic. This in turn leads to LOS for both the optical payload and OSC signals at Node A, which causes Node A to turn off the OSC laser and the optical switch to block outgoing traffic. The sequence of events after a fiber cut is as follows (refer to the numbered circles in Figure 4-12):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects a LOS-P on the OSC-CSM card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OSC-CSM, the simultaneous LOS-O and LOS-P detection triggers a change in the position of the optical switch. CTC reports a LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. The optical switch blocks outgoing traffic.
5. The OSC laser is shut down.
6. The Node A power monitoring photodiode detects a LOS-O on the OSC-CSM card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
7. The Node A power monitoring photodiode detects a LOS-P on the OSC-CSM card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

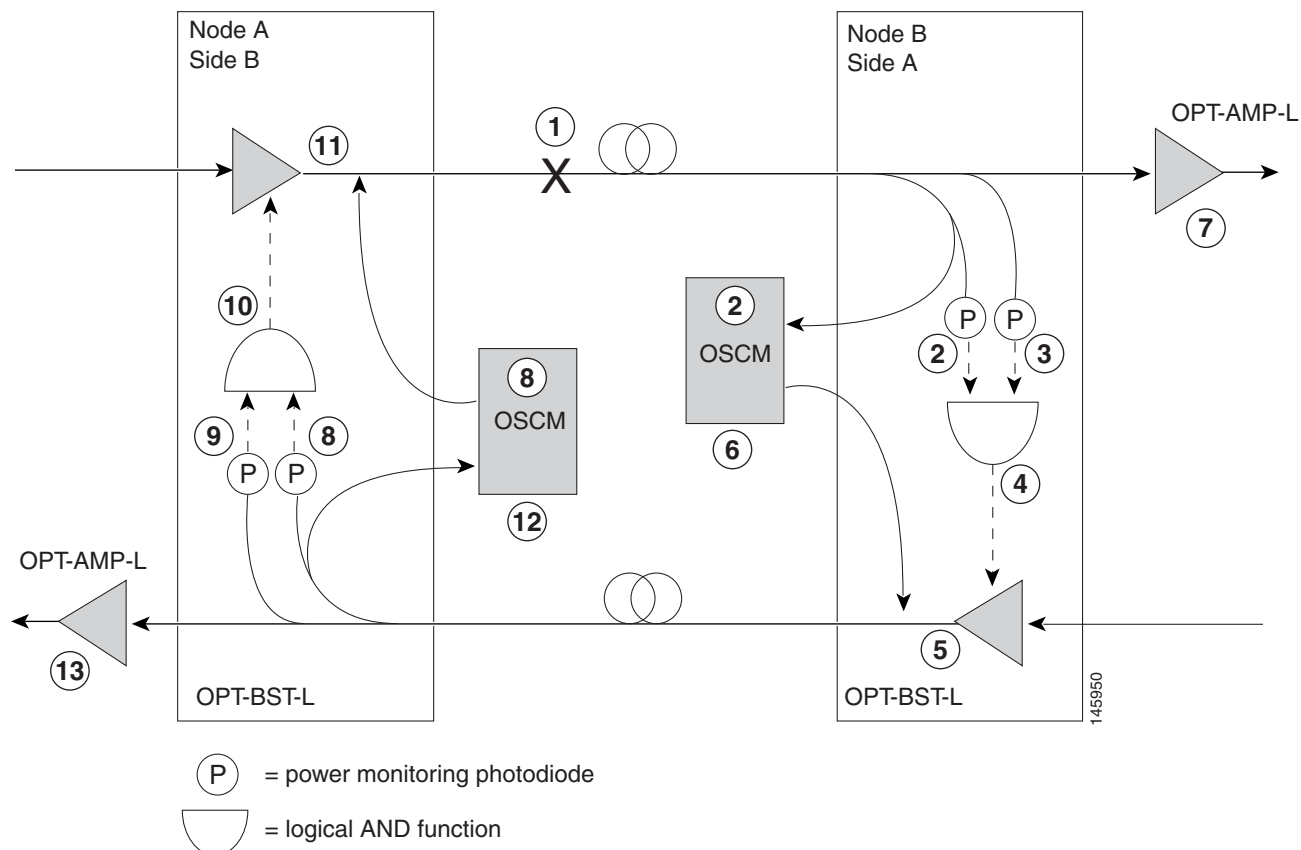
8. On the OSC-CSM, the simultaneous LOS-O and LOS-P detection triggers a change in the position of the optical switch. CTC reports a LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
9. The OSC laser is shut down.
10. The optical switch blocks outgoing traffic.

When the fiber is repaired, either an automatic or manual restart at the Node A OSC-CSM OSC or at the Node B OSC-CSM OSC is required. A system that has been shut down is reactivated through the use of a restart pulse. The pulse is used to signal that the optical path has been restored and transmission can begin. For example, when the far-end Node B receives a pulse, it signals to the Node B OSC to begin transmitting its optical signal and for the optical switch to pass incoming traffic. The OSC-CSM at Node A then receives the signal and tells the Node A OSC to resume transmitting and for the optical switch to pass incoming traffic.

4.7.3.3 Scenario 3: Fiber Cut in Nodes Using OPT-BST-L Cards

Figure 4-13 shows nodes using OPT-BST-L cards with a fiber cut between them.

Figure 4-13 Nodes Using OPT-BST-L Cards



Two photodiodes at Node B monitor the received signal strength for the optical payload and OSC signals. When the fiber is cut, an LOS is detected at both of the photodiodes. The AND function then indicates an overall LOS condition, which causes the OPT-BST-L transmitter and OSCM lasers to shut down. This

in turn leads to a LOS for both the optical payload and OSC at Node A, which causes Node A to turn off the OSCM OSC transmitter and OPT-BST-L amplifier lasers. The sequence of events after a fiber cut is as follows (refer to the numbered circles in [Figure 4-13](#)):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects a LOS-P on the OPT-BST-L card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-BST-L card, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. The OPT-BST-L card amplifier is shut down within three seconds.
5. The OSCM laser is shut down.
6. The OPT-AMP-L card automatically shuts down due to a loss of incoming optical power.
7. The Node A power monitoring photodiode detects a LOS-O on the OPT-BST-L card and the OSCM card detects a LOS (OC3) at the SONET layer. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
8. The Node A power monitoring photodiode detects a LOS-P on the OPT-BST-L card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
9. On the OPT-BST-L, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
10. The OPT-BST-L card amplifier is shut down within three seconds.
11. The OSCM laser is shut down.
12. The Node A OPT-AMP-L card automatically shuts down due to a loss of incoming optical power.

When the fiber is repaired, either an automatic or manual restart at the Node A OPT-BST-L transmitter or at the Node B OPT-BST-L transmitter is required. A system that has been shut down is reactivated through the use of a restart pulse. The pulse is used to signal that the optical path has been restored and transmission can begin. For example, when the far end, Node B, receives a pulse, it signals to the Node B OPT-BST-L transmitter to begin transmitting an optical signal. The OPT-BST-L receiver at Node A receives that signal and signals the Node A OPT-BST-L transmitter to resume transmitting.

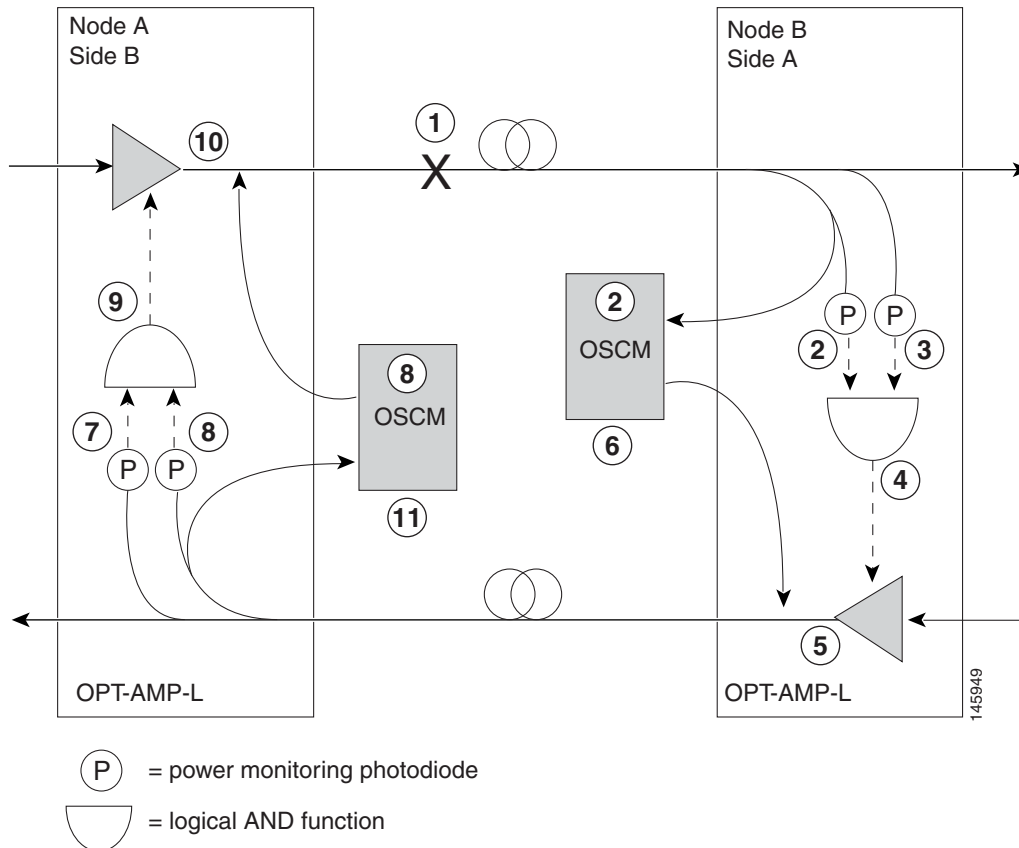
**Note**

During a laser restart pulse, APR (see the [“4.7.2 Automatic Power Reduction”](#) section on page 4-15) ensures that the laser power does not exceed Class 1 limits.

4.7.3.4 Scenario 4: Fiber Cut in Nodes Using OPT-AMP-L (OPT-BST mode) Cards

[Figure 4-14](#) shows nodes using OPT-AMP-L (in OPT-BST mode) cards with a fiber cut between them.

Figure 4-14 Nodes Using OPT-AMP-L Cards



Two photodiodes at Node B monitor the received signal strength for the optical payload and OSC signals. When the fiber is cut, an LOS is detected at both of the photodiodes. The AND function then indicates an overall LOS condition, which causes the OPT-AMP-L amplifier transmitter and OSCM OSC lasers to shut down. This in turn leads to a LOS for both the optical payload and OSC at Node A, which causes Node A to turn off the OSCM OSC and OPT-AMP-L amplifier lasers. The sequence of events after a fiber cut is as follows (refer to the numbered circles in [Figure 4-14](#)):

1. Fiber is cut.
2. The Node B power monitoring photodiode detects an LOS-P on the OPT-AMP-L card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
3. On the OPT-AMP-L card, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
4. The OPT-AMP-L card amplifier is shut down within three seconds.
5. The OSCM laser is shut down.
6. The Node A power monitoring photodiode detects a LOS-O on the OPT-AMP-L card and the OSCM card detects a LOS (OC3) at the SONET layer. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
7. The Node A power monitoring photodiode detects a LOS-P on the OPT-AMP-L card. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.

8. On the OPT-AMP-L, the simultaneous LOS-O and LOS-P detection triggers a command to shut down the amplifier. CTC reports an LOS alarm (loss of continuity), while LOS-O and LOS-P are demoted. Refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.
9. The OPT-AMP-L card amplifier is shut down within three seconds.
10. The OSCM laser is shut down.

When the fiber is repaired, either an automatic or manual restart at the Node A OPT-AMP-L transmitter or at the Node B OPT-AMP-L transmitter is required. A system that has been shut down is reactivated through the use of a restart pulse. The pulse is used to signal that the optical path has been restored and transmission can begin. For example, when the far end, Node B, receives a pulse, it signals to the Node B OPT-AMP-L transmitter to begin transmitting an optical signal. The OPT-AMP-L receiver at Node A receives that signal and signals the Node A OPT-AMP-L transmitter to resume transmitting.

**Note**

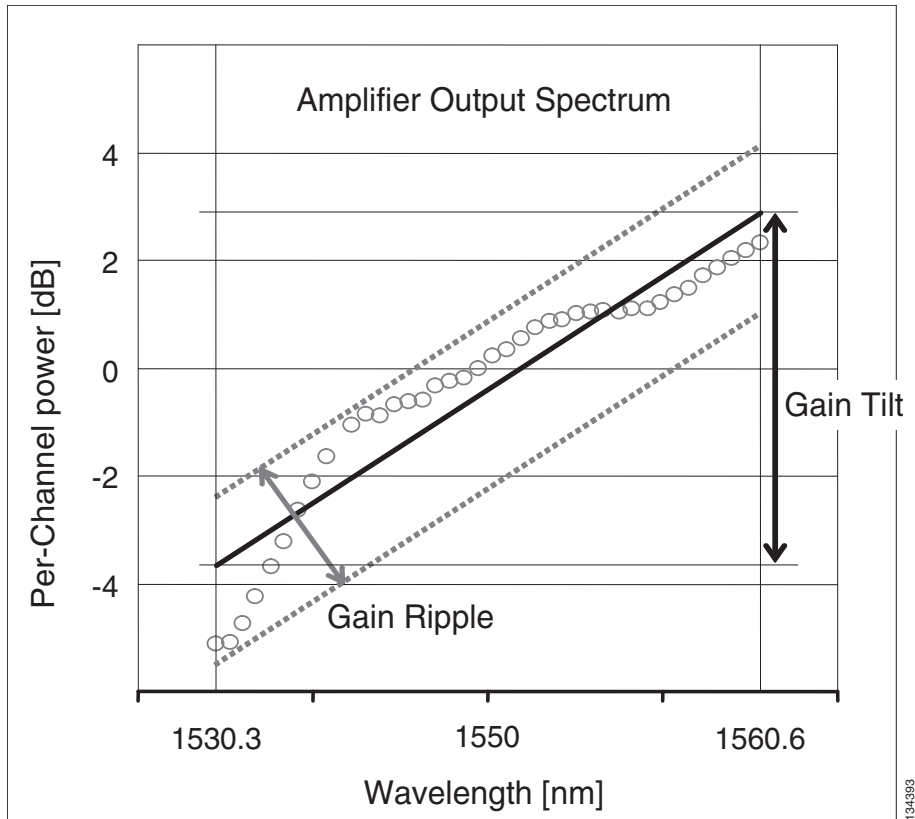
During a laser restart pulse, APR (see the “[4.7.2 Automatic Power Reduction](#)” section on page 4-15) ensures that the laser power does not exceed Class 1 limits.

4.8 Network-Level Gain—Tilt Management of Optical Amplifiers

The ability to control and adjust per-channel optical power equalization is a principal feature of ONS 15454 DWDM Metro Core network applications. A critical parameter to assure optical spectrum equalization throughout the DWDM system is the gain flatness of Erbium-doped fiber amplifiers (EDFAs).

Two items, gain tilt and gain ripple, are factors in the power equalization of optical amplifier cards such as the OPT-BST and OPT-PRE. [Figure 4-15](#) shows a graph of the amplifier output power spectrum and how it is affected by gain tilt and gain ripple.

Figure 4-15 Effect of Gain Ripple and Gain Tilt on Amplifier Output Power



Gain ripple and gain tilt are defined as follows:

- Gain ripple is random and depends on the spectral shape of the amplifier optical components.
- Gain tilt is systematic and depends on the gain setpoint (G_{stp}) of the optical amplifier, which is a mathematical function $F(G_{stp})$ that relates to the internal amplifier design.

Gain tilt is the only contribution to the power spectrum disequalization that can be compensated at the card level. A VOA internal to the amplifier can be used to compensate for gain tilt.

An optical spectrum analyzer (OSA) is used to acquire the output power spectrum of an amplifier. The OSA shows the peak-to-peak difference between the maximum and minimum power levels, and takes into account the contributions of both gain tilt and gain ripple.



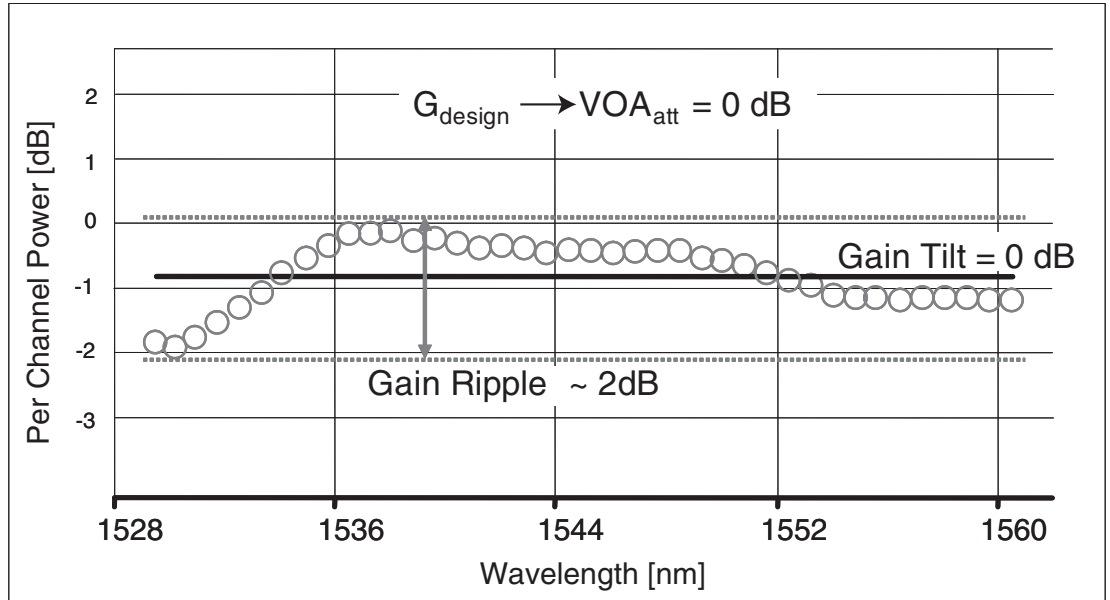
Note

Peak-to-peak power acquisition using an OSA cannot be used to “measure” the gain tilt, because gain ripple itself is a component of the actual measurement.

4.8.1 Gain Tilt Control at the Card Level

The OPT-BST and OPT-PRE amplifier cards have a flat output (gain tilt = 0 dB) for only a specific gain value (G_{design}), based on the internal optical design (see [Figure 4-16](#)).

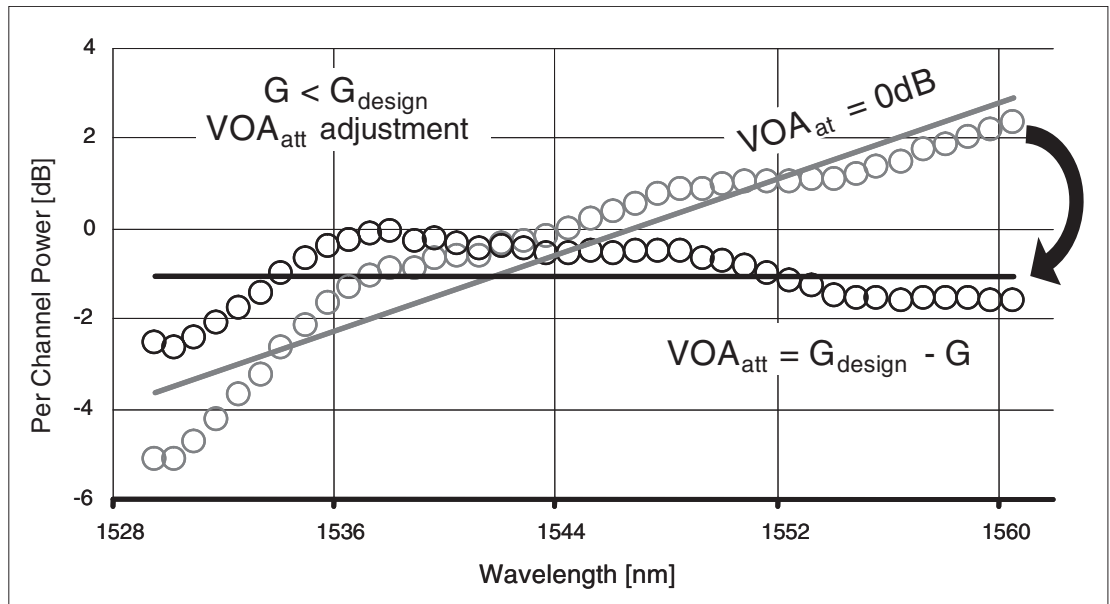
Figure 4-16 Flat Gain (Gain Tilt = 0 dB)



If the working gain setpoint of the amplifier is different from G_{design} , the output spectrum begins to suffer a gain tilt variation.

In order to compensate for the absolute value of the increase of the spectrum tilt, the OPT-BST and OPT-PRE cards automatically adjust the attenuation of the VOA to maintain a flat power profile at the output, as shown in Figure 4-17.

Figure 4-17 Effect of VOA Attenuation on Gain Tilt



The VOA attenuator automatic regulation guarantees (within limits) a zero tilt condition in the EDFA for a wide range of possible gain setpoint values.

Table 4-3 shows the flat output gain range limits for the OPT-BST and OPT-PRE cards, as well as the maximum (worst case) values of gain tilt and gain ripple expected in the specific gain range.

Table 4-3 Flat Output Gain Range Limits

Amplifier Card Type	Flat Output Gain Range	Gain Tilt (Maximum)	Gain Ripple (Maximum)
OPT-BST	$G < 20$ dB	0.5 dB	1.5 dB
OPT-PRE	$G < 21$ dB	0.5 dB	1.5 dB

If the operating gain value is outside of the range shown in Table 4-3, the EDFA introduces a tilt contribution for which the card itself cannot directly compensate. This condition is managed in different ways, depending on the amplifier card type:

- OPT-BST—The OPT-BST amplifier is, by card design, not allowed to work outside the zero tilt range. The Cisco MetroPlanner tool validates network designs using the OPT-BST amplifier card only when the gain is less than or equal to 20 dB.
- OPT-PRE—The Cisco MetroPlanner tool allows network designs even if the operating gain value is equal to or greater than 21 dB. In this case, a system-level tilt compensation strategy is adopted by the DWDM system. A more detailed explanation is given in Section 4.8.2 [System Level Gain Tilt Control](#).

4.8.2 System Level Gain Tilt Control

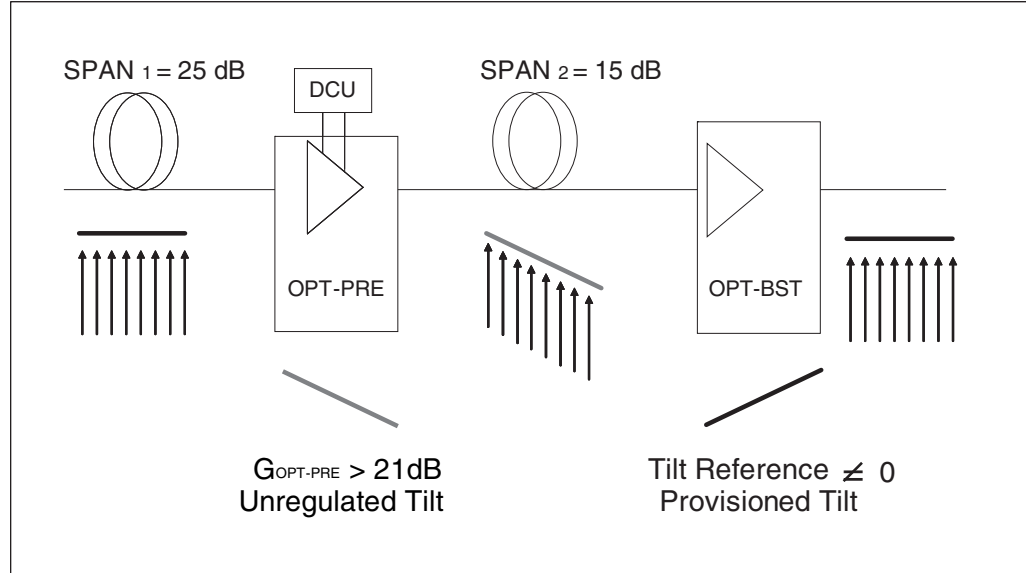
System level gain tilt control for OPT-PRE cards is achievable with two main scenarios:

- Without an ROADM node
- With an ROADM node

4.8.2.1 System Gain Tilt Compensation Without ROADM Nodes

When an OPT-PRE card along a specific line direction (west-to-east or east-to-west) is working outside the flat output gain range ($G > 21$ dB), the unregulated tilt is compensated for in spans not connected to ROADM nodes by configuring an equal but opposite tilt on one or more of the amplifiers in the downstream direction. The number of downstream amplifiers involved depends on the amount of tilt compensation needed and the gain setpoint of the amplifiers that are involved. See Figure 4-18.

Figure 4-18 System Tilt Compensation Without an ROADM Node



The proper Tilt Reference value is calculated by Cisco MetroPlanner and inserted in the Installation Parameter List imported during the node turn-up process (see the “Turn Up a Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*). For both OPT-PRE and OPT-BST cards, the provisionable Gain Tilt Reference range is between -3 dB and $+3$ dB.

During the Automatic Node Setup (ANS) procedure, the Tilt value for the OPT-BST or OPT-PRE card is provisioned by the TCC2/TCC2P card (see [Figure 4-19](#)). The provisioned Tilt Reference Value is reported in the CTC OPT-PRE or OPT-BST card view (in the Provisioning > Opt. Ampli. Line > Parameters > Tilt Reference tab).

Figure 4-19 Cisco MetroPlanner Installation Parameters

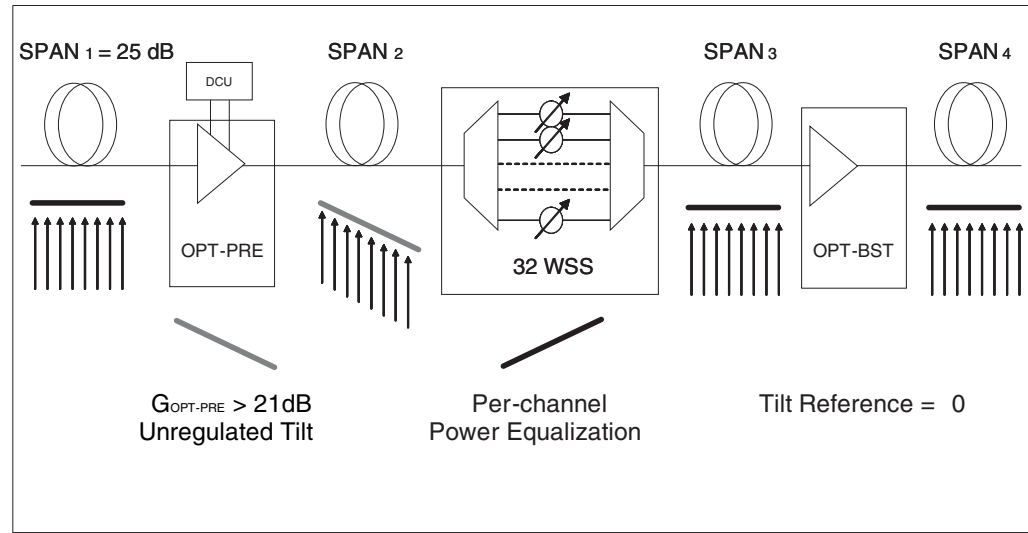
Side	Position	Unit	Port#	Port ID	Port Label	Parameter	Value	Measurement Unit	Manual Set
N/A						NetworkType	Metro-Core	string	No
SideEast	Rack #1 Main Shelf 16	15454E-OPT-PRE	2	LINE-16-1-TX	COM-TX	dwdm:Rc:SideEast:Amplifier:ChPower	2.0	dBm	No
SideEast	Rack #1 Main Shelf 16	15454E-OPT-PRE	2	LINE-16-1-TX	COM-TX	dwdm:Rc:SideEast:Amplifier:Tilt	-3.0	dB	No
SideEast	Rack #1 Main Shelf 16	15454E-OPT-PRE	2	LINE-16-1-TX	COM-TX	dwdm:Rc:SideEast:Amplifier:WorkingMode	Control Gain	string	No
SideEast						dwdm:Rc:SideEast:MaxExpectedSpanLoss	25.0	dB	No
SideEast						dwdm:Rc:SideEast:MinExpectedSpanLoss	25.0	dB	No
SideEast						dwdm:Rc:SideEast:Power:Add-and-DropInputPower	2.0	dBm	No
SideEast	Rack #1 Main Shelf 16	15454E-OPT-PRE	2	LINE-16-1-TX	COM-TX	dwdm:Rc:SideEast:Threshold:AmplifierInPowerFail	-30.6	dBm	No
SideEast						dwdm:Rc:SideEast:Threshold:ChannelLOS	-29.6	dBm	No
SideEast						dwdm:Rc:SideEast:Threshold:OSC-LOS	-36.3	dBm	No
SideEast	Rack #1 Main Shelf 17	15454E-OPT-BST	6	LINE-17-3-TX	LINE-TX	dwdm:Tx:SideEast:Amplifier:ChPower	2.0	dBm	No
SideEast	Rack #1 Main Shelf 17	15454E-OPT-BST	6	LINE-17-3-TX	LINE-TX	dwdm:Tx:SideEast:Amplifier:Tilt	3.0	dB	No
SideEast	Rack #1 Main Shelf 17	15454E-OPT-BST	6	LINE-17-3-TX	LINE-TX	dwdm:Tx:SideEast:Amplifier:WorkingMode	Control Gain	string	No
SideEast						dwdm:Tx:SideEast:Power:Add-and-DropOutputPo...	-8.0	dBm	No
SideEast						dwdm:Tx:SideEast:Threshold:FiberStageInput	-13.0	dBm	No
SideWest	Rack #1 Main Shelf 02	15454E-OPT-PRE	2	LINE-2-1-TX	COM-TX	dwdm:Rc:SideWest:Amplifier:ChPower	2.0	dBm	No
SideWest	Rack #1 Main Shelf 02	15454E-OPT-PRE	2	LINE-2-1-TX	COM-TX	dwdm:Rc:SideWest:Amplifier:Tilt	-3.0	dB	No
SideWest	Rack #1 Main Shelf 02	15454E-OPT-PRE	2	LINE-2-1-TX	COM-TX	dwdm:Rc:SideWest:Amplifier:WorkingMode	Control Gain	string	No
SideWest						dwdm:Rc:SideWest:MaxExpectedSpanLoss	25.0	dB	No
SideWest						dwdm:Rc:SideWest:MinExpectedSpanLoss	25.0	dB	No
SideWest						dwdm:Rc:SideWest:Power:Add-and-DropInputPow...	2.0	dBm	No
SideWest	Rack #1 Main Shelf 02	15454E-OPT-PRE	2	LINE-2-1-TX	COM-TX	dwdm:Rc:SideWest:Threshold:AmplifierInPowerFail	-29.8	dBm	No
SideWest						dwdm:Rc:SideWest:Threshold:ChannelLOS	-28.8	dBm	No
SideWest						dwdm:Rc:SideWest:Threshold:OSC-LOS	-36.3	dBm	No
SideWest	Rack #1 Main Shelf 01	15454E-OPT-BST	6	LINE-1-3-TX	LINE-TX	dwdm:Tx:SideWest:Amplifier:ChPower	2.0	dBm	No
SideWest	Rack #1 Main Shelf 01	15454E-OPT-BST	6	LINE-1-3-TX	LINE-TX	dwdm:Tx:SideWest:Amplifier:Tilt	3.0	dB	No
SideWest	Rack #1 Main Shelf 01	15454E-OPT-BST	6	LINE-1-3-TX	LINE-TX	dwdm:Tx:SideWest:Amplifier:WorkingMode	Control Gain	string	No
SideWest						dwdm:Tx:SideWest:Power:Add-and-DropOutputPo...	-8.0	dBm	No
SideWest						dwdm:Tx:SideWest:Threshold:FiberStageInput	-13.0	dBm	No

4.8.2.2 System Gain Tilt Compensation With ROADM Nodes

When an ROADM node is present in the network, as shown in Figure 4-20, a per-channel dynamic gain equalization can be performed. Both gain tilt and gain ripple are completely compensated using the following techniques:

- Implementing the per-channel VOAs present inside the 32WSS
- Operating in Power Control Mode with the specific power setpoint designed by Cisco MetroPlanner.

Figure 4-20 System Tilt Compensation With an ROADM Node



194397

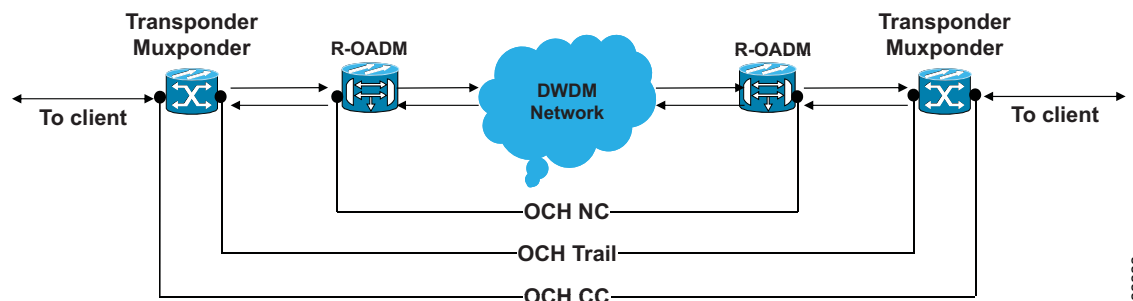
4.9 Optical Channel Circuits

The ONS 15454 DWDM optical circuits provide end-to-end connectivity using three OCH circuit types:

- Optical Channel Network Connections (OCHNC)
- Optical Channel Client Connections (OCHCC)
- Optical Channel Trails (OCH Trails)

A graphical representation of OCH circuits is shown in Figure 4-21.

Figure 4-21 Optical Channel Circuits



393933

4.9.1 OCHNC Circuits

OCHNC circuits establish connectivity between two optical nodes on a specified C-band wavelength. The connection is made through the ports present on the wavelength selective switches, multiplexers, demultiplexer, and add/drop cards. In an OCHNC circuit, the wavelength from a source OCH port ingresses to a DWDM system and then egresses from the DWDM system to the destination OCH port.

4.9.2 OCHCC Circuits

OCHCC circuits extend the OCHNC to create an optical connection from the source client port to the destination client port of the TXP/MXP cards. An OCHCC circuit represents the actual end-to-end client service passing through the DWDM system.

Each OCHCC circuit is associated to a pair of client or trunk ports on the TXP/MXP card.

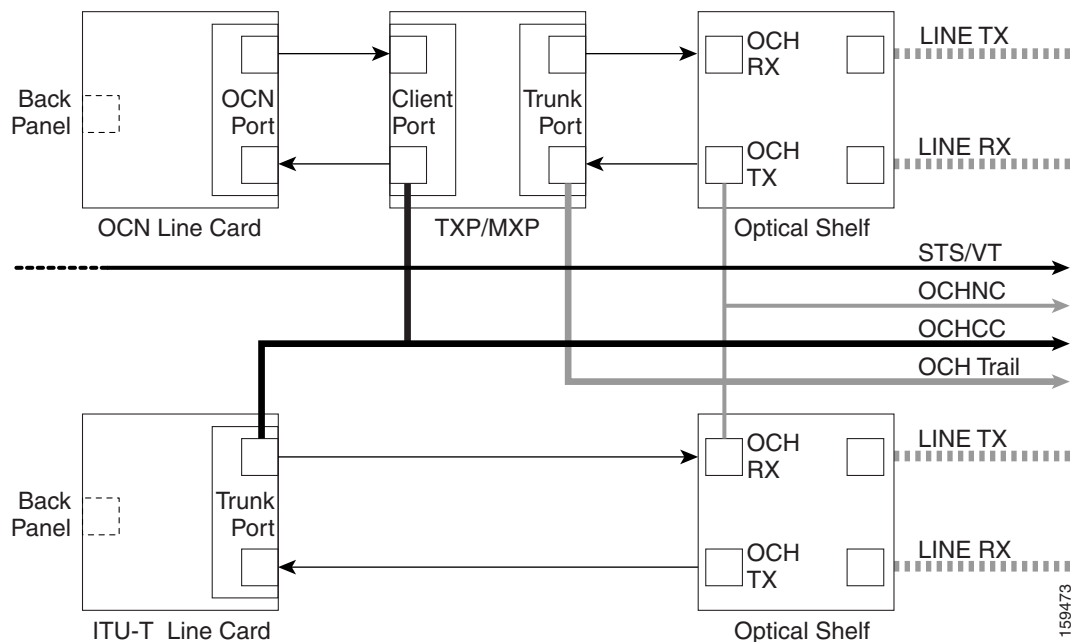
The OCHCCs can manage splitter protection as a single protected circuit. However, for the Y-Cable protection, two OCHCC circuits and two protection groups are required.

4.9.3 OCH Trail Circuits

OCH trail circuits transport the OCHCCs. The OCH trail circuit creates an optical connection from the source trunk port to the destination trunk port of the TXP/MXP card. The OCH trail represents the common connection between the two cards, over which all the client OCHCC circuits, SVLAN circuits or STS circuits are carried.

Figure 4-22 shows the relationships and optical flow between the OCHCC, OCH trail, and OCHNC circuits.

Figure 4-22 Optical Channel Management





Cisco Transport Controller Operation

This chapter describes Cisco Transport Controller (CTC), the software interface for the Cisco ONS 15454. For CTC setup and login information, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- [5.1 CTC Software Delivery Methods, page 5-1](#)
- [5.2 CTC Installation Overview, page 5-4](#)
- [5.3 PC and UNIX Workstation Requirements, page 5-4](#)
- [5.4 ONS 15454 Connections, page 5-6](#)
- [5.5 CTC Window, page 5-7](#)
- [5.6 TCC2/TCC2P Card Reset, page 5-18](#)
- [5.7 TCC2/TCC2P Card Database, page 5-19](#)
- [5.8 Software Revert, page 5-19](#)

5.1 CTC Software Delivery Methods

ONS 15454 provisioning and administration is performed using the CTC software. CTC is a Java application that is installed in two locations: it is stored on the TCC2 or TCC2P card and it is downloaded to your workstation the first time you log into the ONS 15454 with a new software release.

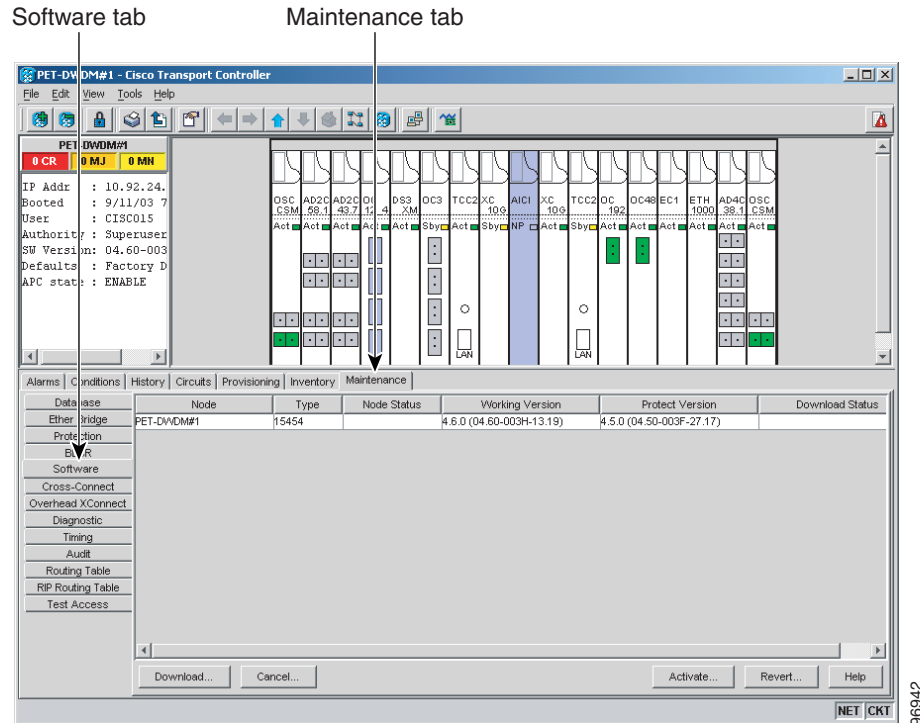
5.1.1 CTC Software Installed on the TCC2/TCC2P Card

CTC software is preloaded on the ONS 15454 TCC2/TCC2P cards; therefore, you do not need to install software on the TCC2/TCC2P cards. When a new CTC software version is released, use the release-specific software upgrade document to upgrade the ONS 15454 software on the TCC2/TCC2P card.

5.1.1 CTC Software Installed on the TCC2/TCC2P Card

When you upgrade CTC software, the TCC2/TCC2P cards store the new CTC version as the protect CTC version. When you activate the new CTC software, the TCC2/TCC2P cards store the older CTC version as the protect CTC version, and the newer CTC release becomes the working version. You can view the software versions that are installed on an ONS 15454 by selecting the Maintenance > Software tabs in node view (single-shelf mode) or multishelf view (multishelf mode) (Figure 5-1).

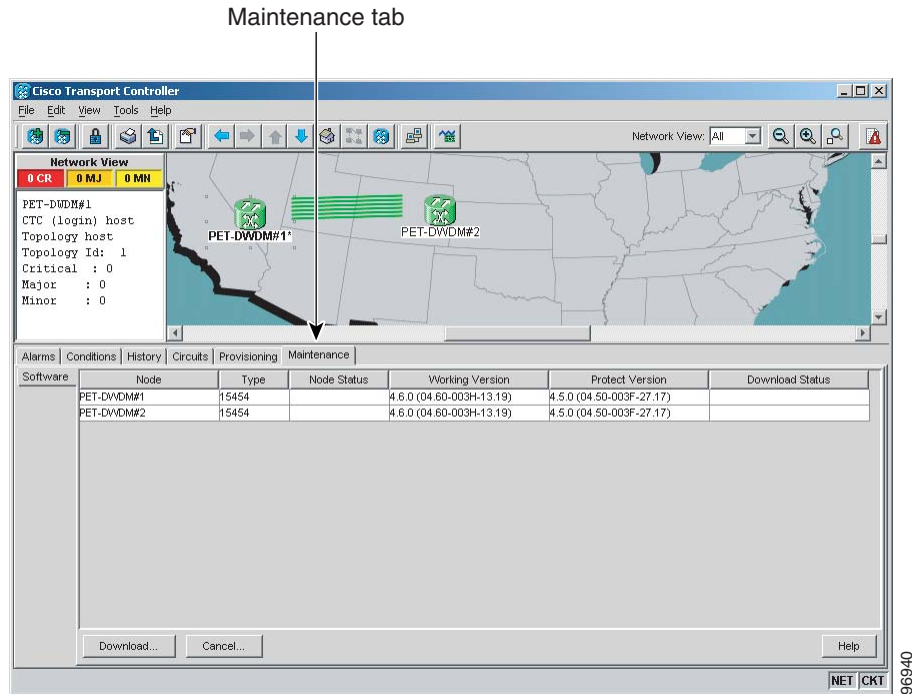
Figure 5-1 CTC Software Versions, Node View (Single-Shelf Mode)



Select the Maintenance > Software tabs in network view to display the software versions installed on all the network nodes (Figure 5-2).

96942

Figure 5-2 CTC Software Versions, Network View



5.1.2 CTC Software Installed on the PC or UNIX Workstation

CTC software is downloaded from the TCC2/TCC2P cards and installed on your computer automatically after you connect to the ONS 15454 with a new software release for the first time. Downloading the CTC software files automatically ensures that your computer is running the same CTC software version as the TCC2/TCC2P cards you are accessing. The CTC files are stored in the temporary directory designated by your computer operating system. You can use the Delete CTC Cache button to remove files stored in the temporary directory. If the files are deleted, they download the next time you connect to an ONS 15454. Downloading the Java archive (JAR) files for CTC takes several minutes depending on the bandwidth of the connection between your workstation and the ONS 15454. For example, JAR files downloaded from a modem or a data communications channel (DCC) network link require more time than JAR files downloaded over a LAN connection.

During network topology discovery, CTC polls each node in the network to determine which one contains the most recent version of the CTC software. If CTC discovers a node in the network that has a more recent version of the CTC software than the version you are currently running, CTC generates a message stating that a later version of the CTC has been found in the network and offers to install the CTC software upgrade. After the node view appears, you can upgrade CTC by using the **Tools > Update CTC** menu option. If you have network discovery disabled, CTC will not seek more recent versions of the software. Unreachable nodes are not included in the upgrade discovery.



Note

Upgrading the CTC software will overwrite your existing software. You must restart CTC after the upgrade is complete.

5.2 CTC Installation Overview

To connect to an ONS 15454 using CTC, you enter the ONS 15454 IP address in the URL field of Netscape Navigator or Microsoft Internet Explorer. After connecting to an ONS 15454, the following occurs automatically:

1. A CTC launcher applet is downloaded from the TCC2/TCC2P card to your computer.
2. The launcher determines whether your computer has a CTC release matching the release on the ONS 15454 TCC2/TCC2P card.
3. If the computer does not have CTC installed, or if the installed release is older than the TCC2/TCC2P card's version, the launcher downloads the CTC program files from the TCC2/TCC2P card.
4. The launcher starts CTC. The CTC session is separate from the web browser session, so the web browser is no longer needed. Always log into nodes having the latest software release. If you log into an ONS 15454 that is connected to ONS 15454s with older versions of CTC, or to Cisco ONS 15327s or Cisco ONS 15600s, CTC files are downloaded automatically to enable you to interact with those nodes. The CTC file download occurs only when necessary, such as during your first login. You cannot interact with nodes on the network that have a software version later than the node that you used to launch CTC.

Each ONS 15454 can handle up to five concurrent CTC sessions. CTC performance can vary, depending upon the volume of activity in each session, network bandwidth, and TCC2/TCC2P card load.



Note

You can also use TL1 commands to communicate with the Cisco ONS 15454 through VT100 terminals and VT100 emulation software, or you can telnet to an ONS 15454 using TL1 port 3083. Refer to the *Cisco ONS SONET TL1 Command Guide* or *Cisco ONS 15454 SDH TL1 Command Guide* for a comprehensive list of TL1 commands.

5.3 PC and UNIX Workstation Requirements

To use CTC for the ONS 15454, your computer must have a web browser with the correct Java Runtime Environment (JRE) installed. The correct JRE for each CTC software release is included on the Cisco ONS 15454 software CD. If you are running multiple CTC software releases on a network, the JRE installed on the computer must be compatible with the different software releases.

When you change the JRE version on the JRE tab, you must exit and restart CTC for the new JRE version to take effect. [Table 5-1](#) shows JRE compatibility with ONS 15454 software releases.

Table 5-1 JRE Compatibility

ONS Software Release	JRE 1.2.2 Compatible	JRE 1.3 Compatible	JRE 1.4 Compatible	JRE 5.0 Compatible
ONS 15454 Release 4.5	No	Yes	No	No
ONS 15454 Release 4.6	No	Yes	Yes	No
ONS 15454 Release 4.7	No	No	Yes	No
ONS 15454 Release 5.0	No	No	Yes	No
ONS 15454 Release 6.0	No	No	Yes	No

Table 5-1 JRE Compatibility (continued)

ONS Software Release	JRE 1.2.2 Compatible	JRE 1.3 Compatible	JRE 1.4 Compatible	JRE 5.0 Compatible
ONS 15454 Release 7.0	No	No	Yes	Yes ¹
ONS 15454 Release 7.2	No	No	Yes	Yes ²

1. JRE 1.4.2 is the preferred version, which is included in the software CD

2. JRE 1.4.2 is the preferred version, which is included in the software CD

**Note**

To avoid network performance issues, Cisco recommends managing a maximum of 50 nodes concurrently with CTC. The 50 nodes can be on a single DCC or split across multiple DCCs. Cisco does not recommend running multiple CTC sessions when managing two or more large networks. To manage more than 50 nodes, Cisco recommends using Cisco Transport Manager (CTM). If you do use CTC to manage more than 50 nodes, you can improve performance by adjusting the heap size; see the “General Troubleshooting” chapter of the *Cisco ONS 15454 DWDM Troubleshooting Guide*. You can also create login node groups; see the “Connect the PC and Log Into the GUI” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.

Table 5-2 lists the requirements for PCs and UNIX workstations. In addition to the JRE, the Java plug-in is also included on the ONS 15454 software CD.

Table 5-2 Computer Requirements for CTC

Area	Requirements	Notes
Processor	Pentium III 700 MHz, UltraSPARC, or equivalent	700 MHz is the recommended processor speed. You can use computers with a lower processor speed; however, you might experience longer response times and slower performance.
RAM	384 MB RAM recommended, 512 MG RAM optimum	—
Hard drive	20 GB hard drive with 50 MB of space available	—
Operating System	<ul style="list-style-type: none"> PC: Windows 98 (1st and 2nd editions), Windows ME, Windows NT 4.0 with Service Pack 6a, Windows 2000 with Service Pack 3, or Windows XP with Service Pack 1 Workstation: Solaris versions 8 or 9 	—

Table 5-2 Computer Requirements for CTC (continued)

Area	Requirements	Notes
Java Runtime Environment	JRE 1.4.2 or JRE 5.0	JRE 1.4.2 is installed by the CTC Installation Wizard included on the Cisco ONS 15454 software and CD. JRE 1.4.2 and JRE 5.0 provide enhancements to CTC performance, especially for large networks with numerous circuits. If CTC must be launched directly from nodes running software earlier than Software Release 4.6, uninstall JRE 1.4.2 and reinstall JRE 1.3.1_02. Then, to run Software R7.2, uninstall JRE 1.3.1_02 and reinstall JRE 1.4.2 or JRE 5.0.
Web browser	PC: Internet Explorer 6.x or Netscape 7.x UNIX: Mozilla 1.7 or Netscape 7.x	For the PC, Cisco recommends Internet Explorer 6.x. Internet Explorer 6.x is available at the following site: http://www.microsoft.com Netscape 7.x is available at the following site: http://channels.netscape.com/ns/browsers/default.jsp
Cable	User-supplied CAT-5 straight-through cable with RJ-45 connectors on each end to connect the computer to the ONS 15454 directly or through a LAN. User-supplied cross-over CAT-5 cable to the DCN port on the ONS 15454 patch panel or to the Catalyst 2950 (multishelf mode).	—

5.4 ONS 15454 Connections

You can connect to the ONS 15454 in multiple ways. You can connect your PC directly to the ONS 15454 (local craft connection) using the RJ-45 port on the TCC2/TCC2P card or, for the ANSI shelf, using the LAN pins on the backplane (the ETSI shelf provides a LAN connection via the RJ-45 jack on the MIC-T/C/P Front Mount Electrical Connection [FMEC]). Alternatively, you can connect your PC to a hub or switch that is connected to the ONS 15454, connect to the ONS 15454 through a LAN or modem, or establish TL1 connections from a PC or TL1 terminal. [Table 5-3](#) lists the ONS 15454 connection methods and requirements.

Table 5-3 ONS 15454 Connection Methods

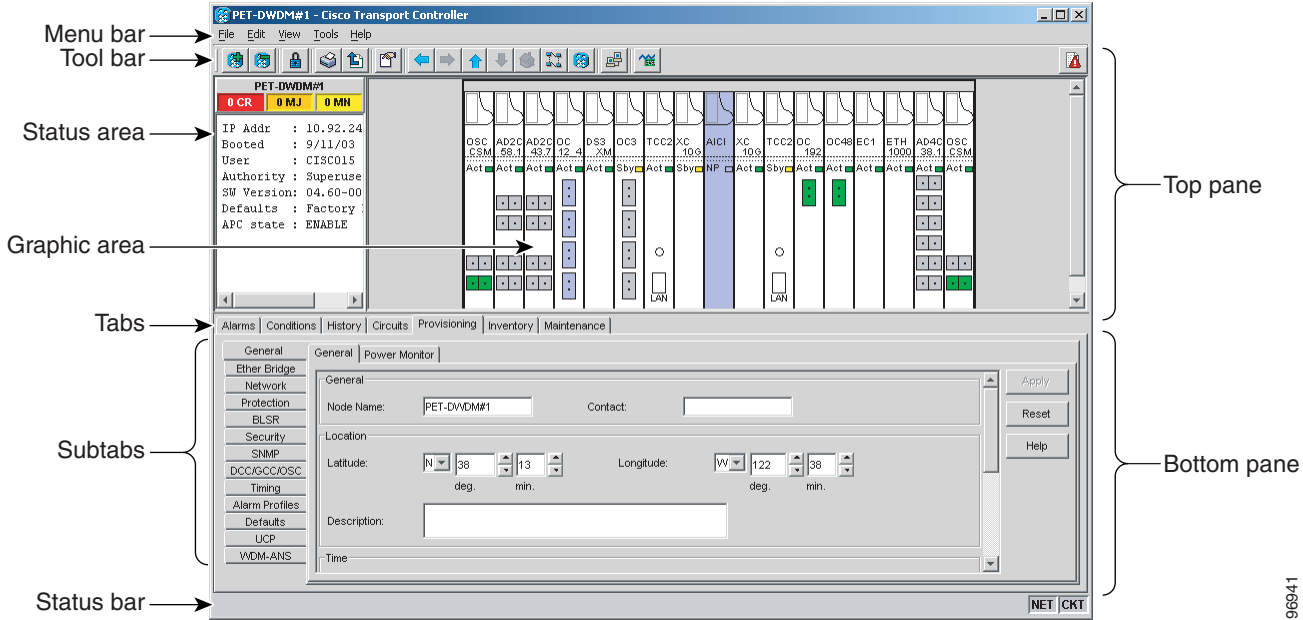
Method	Description	Requirements
Local craft	Refers to onsite network connections between the CTC computer and the ONS 15454 using one of the following: <ul style="list-style-type: none"> The RJ-45 (LAN) port on the TCC2/TCC2P card The RJ-45 (LAN) port on the patch panel (multishelf mode) Port 23 or 24 of the Catalyst 2950 (multishelf mode) The LAN pins on the ONS 15454 backplane (ANSI) The RJ-45 jack on the MIC-T/C/P FMEC (ETSI) A hub or switch to which the ONS 15454 is connected 	If you do not use Dynamic Host Configuration Protocol (DHCP), you must change the computer IP address, subnet mask, and default router, or use automatic host detection.
Corporate LAN	Refers to a connection to the ONS 15454 through a corporate or network operations center (NOC) LAN.	<ul style="list-style-type: none"> The ONS 15454 must be provisioned for LAN connectivity, including IP address, subnet mask, and default gateway. The ONS 15454 must be physically connected to the corporate LAN. The CTC computer must be connected to the corporate LAN that has connectivity to the ONS 15454.
TL1	Refers to a connection to the ONS 15454 using TL1 rather than CTC. TL1 sessions can be started from CTC, or you can use a TL1 terminal. The physical connection can be a craft connection, corporate LAN, or a TL1 terminal.	Refer to the <i>Cisco ONS SONET TL1 Reference Guide</i> or the <i>Cisco ONS 15454 SDH TL1 Reference Guide</i> .
Remote	Refers to a connection made to the ONS 15454 using a modem.	<ul style="list-style-type: none"> A modem must be connected to the ONS 15454. The modem must be provisioned for the ONS 15454. To run CTC, the modem must be provisioned for Ethernet access.

5.5 CTC Window

When you log into a single-shelf ONS 15454, the CTC window appears in node view (Figure 5-3). When you log into a multishelf ONS 15454, meaning that two or more ONS 15454 shelves are configured to operate as one node, the multishelf view (Figure 5-4) appears in the CTC window. The window includes

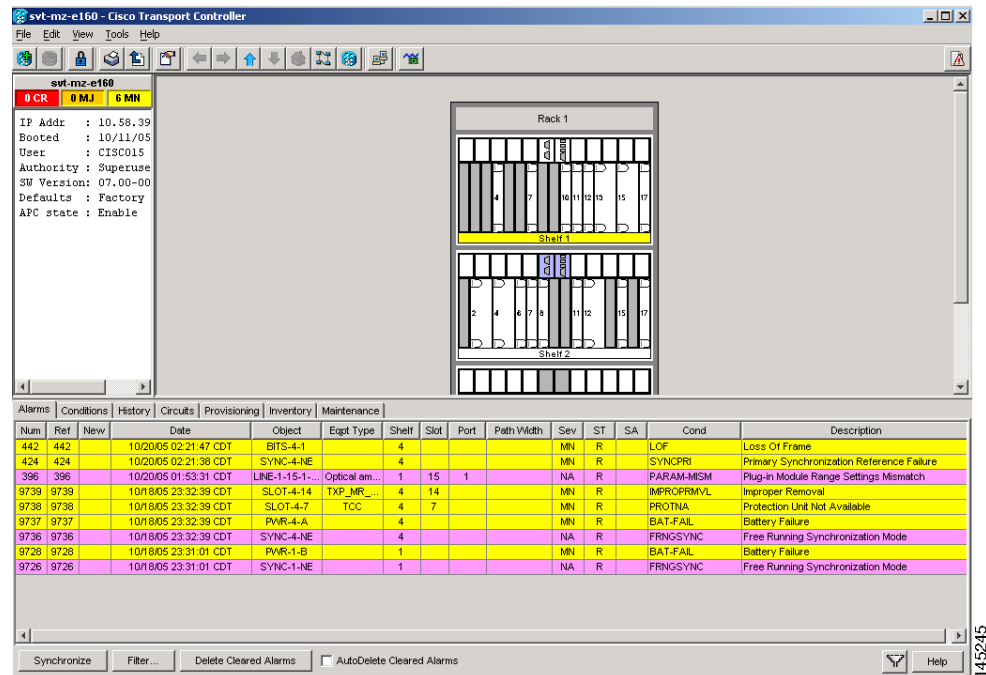
a menu bar, a toolbar, and a top and bottom pane. The top pane provides status information about the selected objects and a graphic of the current view. The bottom pane provides tabs and subtabs to view ONS 15454 information and perform ONS 15454 provisioning and maintenance tasks. From the CTC window, you can display the other ONS 15454 views. In single-shelf mode, these are the network, node, and card views. In multishelf mode, these are the network, multishelf, shelf, and card views.

Figure 5-3 Node View (Default Login View for Single-Shelf Mode)



96941

Figure 5-4 Multishelf View (Default Login View for Multishelf Mode)



5.5.1 Summary Pane

The Summary pane on the left has the following fields:

- Node Addr—IP address of the node.
- Booted—The Booted field indicates one of the following:
 - Date and time of the node reboot. The node reboot is caused by complete power cycle, software upgrade, or software downgrade.
 - Date and time of reset of the control cards one after the other.
- User—Login user name.
- Authority—Security level of users. The possible security levels are Retrieve, Maintenance, Provisioning, and Superuser.
- SW Version—CTC software version.
- Defaults—Name provided to identify the defaults list.

5.5.2 Node View (Multishelf Mode), Node View (Single-Shelf Mode), and Shelf View (Multishelf Mode)

Node view, shown in Figure 5-3, is the first view that appears after you log into a single-shelf ONS 15454. Multishelf view, shown in Figure 5-4, is the first view that appears after you log into a multishelf ONS 15454. The login node is the first node shown, and it is the “home view” for the session. Multishelf view and node view allow you to manage one ONS 15454 node. The status area shows the

node name; IP address; session boot date and time; number of Critical (CR), Major (MJ), and Minor (MN) alarms; name and security level of the current logged-in user; software version; and network element default setup.

In a multishelf mode, up to eight shelves operate as a single node. When you open a shelf from multishelf view, shelf view appears, which looks similar to node view but does not contain the tabs and subtabs that are used for node-level operations.

5.5.2.1 CTC Card Colors

The graphic area of the CTC window depicts the ONS 15454 shelf assembly. The colors of the cards in the graphic reflect the real-time status of the physical card and slot ([Table 5-4](#)).

Table 5-4 *Multishelf View (Multishelf Mode), Node View (Single-Shelf Mode), and Shelf View (Multishelf Mode) Card Colors*

Card Color	Status
Gray	Slot is not provisioned; no card is installed.
Violet	Slot is provisioned; no card is installed.
White	Slot is provisioned; a functioning card is installed.
Yellow	Slot is provisioned; a Minor alarm condition exists.
Orange	Slot is provisioned; a Major alarm condition exists.
Red	Slot is provisioned; a Critical alarm exists.

On the ONS 15454 ETSI, the colors of the FMEC cards reflect the real-time status of the physical FMEC cards. [Table 5-5](#) lists the FMEC card colors. The FMEC ports shown in CTC do not change color.



Note

You cannot preprovision FMECs.

Table 5-5 *Multishelf View (Multishelf Mode) and Node View (Single-Shelf Mode) FMEC Color*

Upper Shelf FMEC Color	Status
White	Functioning card is installed.
Yellow	Minor alarm condition exists.
Orange (Amber)	Major alarm condition exists.
Red	Critical alarm exists.

The wording on a card in node view (single-shelf mode) or shelf view (multishelf mode) shows the status of a card (Active, Standby, Loading, or Not Provisioned). [Table 5-6](#) lists the card statuses.

Table 5-6 *Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Card Statuses*

Card Status	Description
Act	Card is active.
Sty	Card is in standby mode.

Table 5-6 Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Card Statuses

Ldg	Card is resetting.
NP	Card is not present.

Port color in card view, node view (single-shelf mode), and shelf view (multishelf mode) indicates the port service state. [Table 5-7](#) lists the port colors and their service states. For more information about port service states, refer to [Appendix B, “Administrative and Service States.”](#)

Table 5-7 Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Card Port Colors and Service States

Port Color	Service State	Description
Cyan (blue)	Out-of-Service and Management, Loopback (OOS-MA,LPBK) (ANSI) Locked-enabled,loopback (ETSI)	Port is in a loopback state. On the card in node or shelf view, a line between ports indicates that the port is in terminal or facility loopback (see Figure 5-5 and Figure 5-6). Traffic is carried and alarm reporting is suppressed. Raised fault conditions, whether or not their alarms are reported, can be retrieved on the CTC Conditions tab or by using the TL1 RTRV-COND command.
Cyan (blue)	Out-of-Service and Management, Maintenance (OOS-MA,MT) (ANSI) Locked-enabled,maintenance (ETSI)	Port is out-of-service for maintenance. Traffic is carried and loopbacks are allowed. Alarm reporting is suppressed. Raised fault conditions, whether or not their alarms are reported, can be retrieved on the CTC Conditions tab or by using the TL1 RTRV-COND command. Use this service state for testing or to suppress alarms temporarily. Change the state to IS-NR/Unlocked-enabled; OOS-MA,DSBLD/Locked-enabled,disabled; or OOS-AU,AINS/Unlocked-disabled,automaticInService when testing is complete.
Gray	Out-of-Service and Management, Disabled (OOS-MA,DSBLD) (ANSI) Locked-enabled,disabled (ETSI)	The port is out-of-service and unable to carry traffic. Loopbacks are not allowed in this service state.
Green	In-Service and Normal (IS-NR) (ANSI) Unlocked-enabled (ETSI)	The port is fully operational and performing as provisioned. The port transmits a signal and displays alarms; loopbacks are not allowed.
Violet	Out-of-Service and Autonomous, Automatic In-Service (OOS-AU,AINS) (ANSI) Unlocked-disabled,automaticInService (ETSI)	The port is out-of-service, but traffic is carried. Alarm reporting is suppressed. The node monitors the ports for an error-free signal. After an error-free signal is detected, the port stays in this service state for the duration of the soak period. After the soak period ends, the port service state changes to IS-NR/Unlocked-enabled. Raised fault conditions, whether or not their alarms are reported, can be retrieved on the CTC Conditions tab or by using the TL1 RTRV-COND command. The AINS port will automatically transition to IS-NR/Unlocked-enabled when a signal is received for the length of time provisioned in the soak field.

Figure 5-5 Terminal Loopback Indicator**Figure 5-6 Facility Loopback Indicator**

5.5.2.2 Multishelf View Card Shortcuts

If you move your mouse over cards in the multishelf view graphic, popups display additional information about the card including the card type; the card status (active or standby); the type of alarm, such as Critical, Major, or Minor (if any); the alarm profile used by the card; and for transponder (TXP) or muxponder (MXP) cards, the wavelength of the dense wavelength division multiplexing (DWDM) port.

5.5.2.3 Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Card Shortcuts

If you move your mouse over cards in the node view (single-shelf mode) or shelf view (multishelf mode) graphic, popups display additional information about the card including the card type; the card status (active or standby); the type of alarm, such as Critical, Major, or Minor (if any); the alarm profile used by the card; and for TXP or MXP cards, the wavelength of the DWDM port. Right-click a card to reveal a shortcut menu, which you can use to open, reset, delete, or change a card. Right-click a slot to preprovision a card (that is, provision a slot before installing the card).

5.5.2.4 Multishelf View Tabs

Table 5-8 lists the tabs and subtabs available in the multishelf view. The actions on these tabs apply to the multishelf node and its subtending shelves.

Table 5-8 Multishelf View Tabs and Subtabs

Tab	Description	Subtabs
Alarms	Lists current alarms (CR, MJ, MN) for the multishelf node and updates them in real time.	—
Conditions	Displays a list of standing conditions on the multishelf node.	—
History	Provides a history of multishelf node alarms including the date, type, and severity of each alarm. The Session subtab displays alarms and events for the current session. The Node subtab displays alarms and events retrieved from a fixed-size log on the node.	Session, Node
Circuits	Creates, deletes, edits, and maps circuits.	Circuits, Rolls
Provisioning	Provisions the ONS 15454 multishelf node.	General, Network, OSI, Security, SNMP, Comm Channels, Alarm Profiles, Defaults, WDM-ANS

Table 5-8 Multishelf View Tabs and Subtabs (continued)

Tab	Description	Subtabs
Inventory	Provides inventory information (part number, serial number, and Common Language Equipment Identification [CLEI] codes) for cards installed on all shelves in the multishelf node. Allows you to delete and reset cards and change the card service state.	—
Maintenance	Performs maintenance tasks for the multishelf node.	Database, Network, OSI, Software, Diagnostic, Audit, DWDM

5.5.2.5 Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Tabs

Table 5-9 lists the tabs and subtabs available in node view (single-shelf mode) or shelf view (multishelf mode).

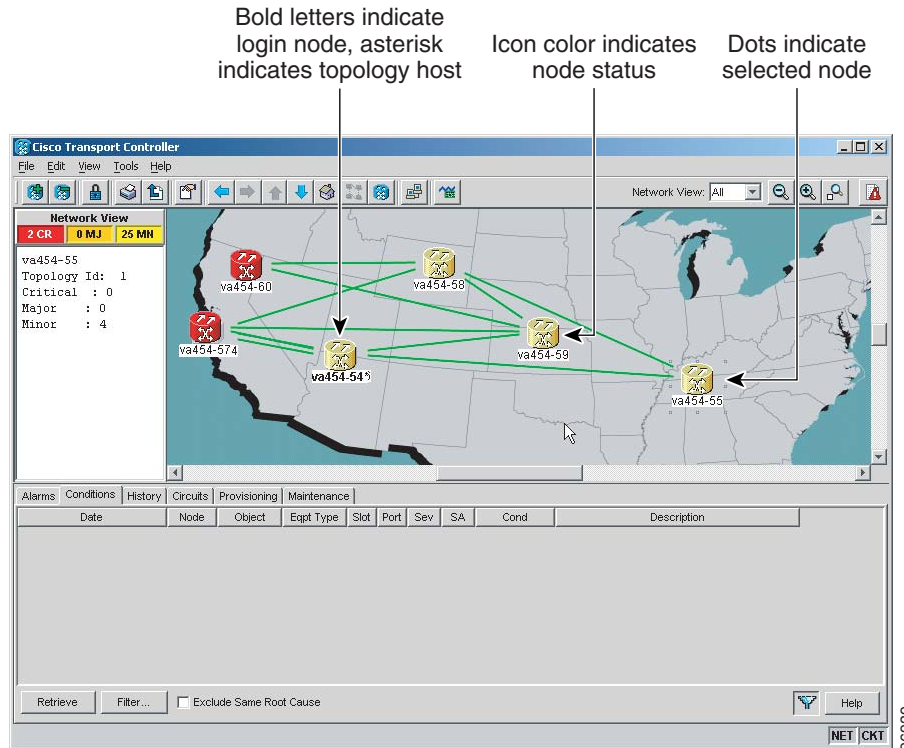
Table 5-9 Node View (Single-Shelf Mode) or Shelf View (Multishelf Mode) Tabs and Subtabs

Tab	Description	Subtabs
Alarms	Lists current alarms (CR, MJ, MN) for the node or shelf and updates them in real time.	—
Conditions	Displays a list of standing conditions on the node or shelf.	—
History	Provides a history of node or shelf alarms including the date, type, and severity of each alarm. The Session subtab displays alarms and events for the current session. The Node subtab displays alarms and events retrieved from a fixed-size log on the node.	Session, Node
Circuits	Creates, deletes, edits, and maps circuits.	Circuits, Rolls
Provisioning	Provisions the ONS 15454 single-shelf or multishelf node.	Single-shelf mode: General, Network, OSI, Security, SNMP, Comm Channels, Alarm Profiles, Defaults, WDM-ANS Multishelf mode: General, Protection, Timing, Alarm Profiles
Inventory	Provides inventory information (part number, serial number, and CLEI codes) for cards installed in the single-shelf or multishelf node. Allows you to delete and reset cards and change the card service state.	—
Maintenance	Performs maintenance tasks for the single-shelf or multishelf node.	Single-shelf mode: Database, Network, OSI, Software, Diagnostic, Audit, DWDM Multishelf mode: Protection, Overhead XConnect, Diagnostic, Timing

5.5.3 Network View

Network view allows you to view and manage ONS 15454s that have DCC connections to the node that you logged into and any login node groups you have selected (Figure 5-7).

Figure 5-7 Network in CTC Network View



Note

Nodes with DCC connections to the login node do not appear if you checked the Disable Network Discovery check box in the Login dialog box.

The graphic area displays a background image with colored ONS 15454 icons. A Superuser can set up the logical history view feature, which enables each user to see the same network view.

5.5.3.1 Network View Tabs

Table 5-10 lists the tabs and subtabs available in network view.

Table 5-10 Network View Tabs and Subtabs

Tab	Description	Subtabs
Alarms	Lists current alarms (CR, MJ, MN) for the network and updates them in real time.	—
Conditions	Displays a list of standing conditions on the network.	—

Table 5-10 Network View Tabs and Subtabs (continued)

Tab	Description	Subtabs
History	Provides a history of network alarms including date, type, and severity of each alarm.	—
Circuits	Creates, deletes, edits, filters, and searches for network circuits.	—
Provisioning	Provisions security, alarm profiles, bidirectional line switched rings (BLSRs) (ANSI), multiplex section-shared protection rings (MS-SPRing) (ETSI), and overhead circuits.	Security, Alarm Profiles, BLSR (ANSI), MS-SPRing (ETSI), Overhead Circuits, Provisionable Patchcords
Maintenance	Displays the type of equipment and the status of each node in the network; displays working and protect software versions; and allows software to be downloaded.	Software

5.5.3.2 CTC Node Colors

The color of a node in network view, shown in [Table 5-11](#), indicates the node alarm status.

Table 5-11 Node Status Shown in Network View

Color	Alarm Status
Green	No alarms
Yellow	Minor alarms
Orange	Major alarms
Red	Critical alarms
Gray with Unknown#	Node initializing for the first time (CTC displays Unknown# because CTC has not discovered the name of the node yet)

5.5.3.3 DCC Links

The lines show DCC connections between the nodes ([Table 5-12](#)). DCC connections can be green (active) or gray (fail). The lines can also be solid (circuits can be routed through this link) or dashed (circuits cannot be routed through this link). Circuit provisioning uses active/routable links. Selecting a node or span in the graphic area displays information about the node and span in the status area.





Table 5-12 DCC Colors Indicating State in Network View

Color and Line Style	State
Green and solid	Active/Routable
Green and dashed	Active/Nonroutable
Gray and solid	Failed/Routable
Gray and dashed	Failed/Nonroutable

5.5.3.4 Link Consolidation

CTC provides the ability to consolidate the DCC, generic communications channel (GCC), optical transmission section (OTS), and PPC links shown in the network view into a more streamlined view. Link consolidation allows you to condense multiple inter-nodal links into a single link. The link consolidation sorts links by class, meaning that all DCC links are consolidated together, for example. You can access individual links within consolidated links using the right-click shortcut menu. Each link has an associated icon (Table 5-13).

Table 5-13 **Link Icons**

Icon	Description
	DCC icon
	GCC icon
	OTS icon
	PPC icon



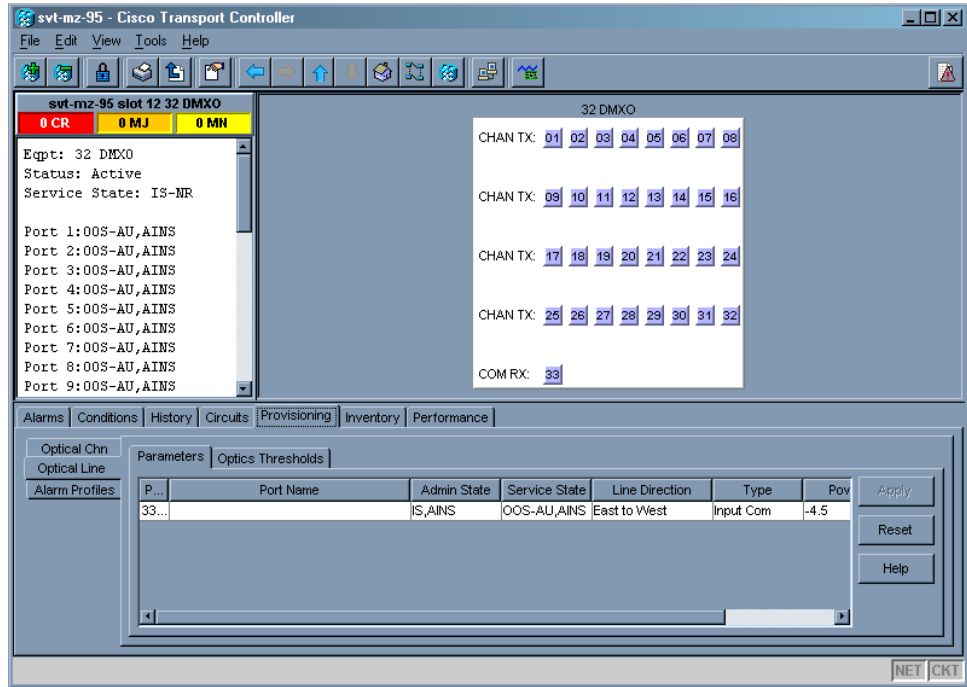
Note

Link consolidation is only available on non-detailed maps. Non-detailed maps display nodes in icon form instead of detailed form, meaning that the nodes appear as rectangles with ports on the sides. Refer to the *Cisco ONS 15454 DWDM Procedure Guide* for more information about consolidated links.

5.5.4 Card View

The card view provides information about individual ONS 15454 cards. Use this window to perform card-specific maintenance and provisioning (Figure 5-8). A graphic showing the ports on the card is shown in the graphic area. The status area displays the node name, slot, number of alarms, card type, equipment type, card status (active or standby), card service state if the card is present, and port service state (described in Table 5-7 on page 5-11). The information that appears and the actions that you can perform depend on the card. For more information about card service states, refer to Appendix B, “Administrative and Service States.”

Figure 5-8 CTC Card View Showing a 32DMX-O Card



Note

CTC provides a card view for all ONS 15454 cards except the TCC2/TCC2P card.

Use the card view tabs and subtabs shown in Table 5-14 to provision and manage the ONS 15454. The subtabs, fields, and information shown under each tab depend on the card type selected.

Table 5-14 Card View Tabs and Subtabs

Tab	Description	Subtabs
Alarms	Lists current alarms (CR, MJ, MN) for the card and updates them in real time.	—
Conditions	Displays a list of standing conditions on the card.	—
History	Provides a history of card alarms including date, object, port, and severity of each alarm.	Session (displays alarms and events for the current session), Card (displays alarms and events retrieved from a fixed-size log on the card)
Circuits	Creates, deletes, edits, and search circuits.	—

Table 5-14 Card View Tabs and Subtabs (continued)

Tab	Description	Subtabs
Provisioning	Provisions an ONS 15454 card.	DS-N and OC-N cards: Line, Line Thresholds (different threshold options are available for DS-N and OC-N cards), Elect Path Thresholds, SONET Thresholds, SONET STS, Alarm Profiles TXP and MXP cards: Card, Line, Line Thresholds, Optics Thresholds, OTN, Alarm Profiles DWDM cards (subtabs depend on card type): Optical Line, Optical Chn, Optical Amplifier, Parameters, Optics Thresholds, Alarm Profiles
Maintenance	Performs maintenance tasks for the card.	Loopback, Info, Protection, J1 Path Trace, AINS Soak (options depend on the card type), Automatic Laser Shutdown
Performance (Not available for the AIC-I cards)	Performs performance monitoring for the card.	DS-N and OC-N cards: no subtabs TXP and MXP cards: Optics PM, Payload PM, OTN PM DWDM cards (subtabs depend on card type): Optical Line, Optical Chn, Optical Amplifier Line, OC3 Line, Parameters, Optics Thresholds
Inventory	(OPT-PRE and OPT-BST cards) Displays an Inventory screen of the ports.	—

5.6 TCC2/TCC2P Card Reset

You can reset the ONS 15454 TCC2/TCC2P card by using CTC (a soft reset) or by physically reseating the card (a hard reset). A soft reset reboots the TCC2/TCC2P card and reloads the operating system and the application software. Additionally, a hard reset temporarily removes power from the TCC2/TCC2P card and clears all buffer memory.

You can apply a soft reset from CTC to either an active or standby TCC2/TCC2P card without affecting traffic. If you need to perform a hard reset on an active TCC2/TCC2P card, put the TCC2/TCC2P card into standby mode first by performing a soft reset.



Note

When a CTC reset is performed on an active TCC2/TCC2P card, the AIC-I card goes through an initialization process and also resets because it is controlled by the active TCC2/TCC2P card.

5.7 TCC2/TCC2P Card Database

When dual TCC2/TCC2P cards are installed in the ONS 15454, each TCC2/TCC2P card hosts a separate database; therefore, the protect card database is available if the database on the working TCC2/TCC2P fails. You can also store a backup version of the database on the workstation running CTC. This operation should be part of a regular ONS 15454 maintenance program at approximately weekly intervals, and should also be completed when preparing an ONS 15454 for a pending natural disaster, such as a flood or fire.

**Note**

The following parameters are not backed up and restored: node name, IP address, mask and gateway, and Internet Inter-ORB Protocol (IIOP) port. If you change the node name and then restore a backed up database with a different node name, the circuits map to the new node name. Cisco recommends keeping a record of the old and new node names.

5.8 Software Revert

When you click the Activate button after a software upgrade, the TCC2/TCC2P card copies the current working database and saves it in a reserved location in the TCC2/TCC2P card flash memory. If later during the upgrade you need to revert to the original working software load from the protect software load, the saved database installs automatically. You do not need to restore the database manually or recreate circuits.

The revert feature is useful if the maintenance window in which you were performing an upgrade closes while you are still upgrading CTC software. You can revert to the protect software load without losing traffic. During the next maintenance window, you can complete the upgrade and activate the new software load.

Circuits created or provisioning done after you activate a new software load (upgrade to a higher release) will be lost with a revert. The database configuration at the time of activation is reinstated after a revert. (This does not apply to maintenance reverts, such as Software R5.0.1 to Software R5.0.2, because maintenance releases retain the database during activation.)

**Caution**

Cisco does not recommend reverting after changing provisioning on the node. Depending upon the particular provisioning, reverting in this case can be traffic affecting.

To perform a supported (non-service-affecting) revert from a software release that you have just activated, the release you revert to must have been working at the time you first activated the new software on that node. Because a supported revert automatically restores the node configuration at the time of the previous activation, any configuration changes made after activation will be lost when you revert the software. Downloading the software release that you are upgrading to a second time after you have activated the new load ensures that no actual revert to a previous load can take place (the TCC2/TCC2P will reset, but will not be traffic affecting and will not change your database).

**Note**

To perform a supported software upgrade or revert, you must consult the specific upgrade document and release notes for the release you are upgrading to (or reverting from).



Security Reference

This chapter provides information about Cisco ONS 15454 users and security.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- [6.1 User IDs and Security Levels, page 6-1](#)
- [6.2 User Privileges and Policies, page 6-2](#)
- [6.3 Audit Trail, page 6-6](#)
- [6.4 RADIUS Security, page 6-7](#)

6.1 User IDs and Security Levels

The Cisco Transport Controller (CTC) ID is provided with the ONS 15454 system, but the system does not display the user ID when you sign into CTC. This ID can be used to set up other ONS 15454 users.

You can have up to 500 user IDs on one ONS 15454. Each CTC or TL1 user can be assigned one of the following security levels:

- **Retrieve**—Users can retrieve and view CTC information but cannot set or modify parameters.
- **Maintenance**—Users can access only the ONS 15454 maintenance options.
- **Provisioning**—Users can access provisioning and maintenance options.
- **Superusers**—Users can perform all of the functions of the other security levels as well as set names, passwords, and security levels for other users.

See [Table 6-3 on page 6-6](#) for idle user timeout information for each security level.

By default, multiple concurrent user ID sessions are permitted on the node, that is, multiple users can log into a node using the same user ID. However, you can provision the node to allow only a single login per user and prevent concurrent logins for all users.



Note

You must add the same user name and password to each node the user accesses.

6.2 User Privileges and Policies

This section lists user privileges for each CTC task and describes the security policies available to Superusers for provisioning.

6.2.1 User Privileges by CTC Task

Table 6-1 shows the actions that each user privilege level can perform in node view.

Table 6-1 ONS 15454 Security Levels—Node View

CTC Tab	Subtab	[Subtab]:Actions	Retrieve	Maintenance	Provisioning	Superuser
Alarms	—	Synchronize/Filter/Delete Cleared Alarms	X	X	X	X
Conditions	—	Retrieve/Filter	X	X	X	X
History	Session	Filter	X	X	X	X
	Node	Retrieve/Filter	X	X	X	X
Circuits	Circuits	Create/Delete	—	—	X	X
		Edit/Filter/Search	X	X	X	X
	Rolls	Complete/ Force Valid Signal/ Finish	—	—	X	X
Provisioning	General	General: Edit	—	—	Partial ¹	X
		Multishelf Config: Edit	X	X	—	X
	EtherBridge	Spanning trees: Edit	—	—	X	X
	Network	General: Edit	—	—	—	X
		Static Routing: Create/Edit/ Delete	—	—	X	X
		OSPF: Create/Edit/Delete	—	—	X	X
		RIP: Create/Edit/Delete	—	—	X	X
		Proxy: Create/Edit/Delete	—	—	—	X
		Firewall: Create/Edit/Delete	—	—	—	X
	OSI	Main Setup:Edit	—	—	—	X
		TARP: Config: Edit	—	—	—	X
		TARP: Static TDC: Add/Edit/Delete	—	—	X	X
		TARP: MAT: Add/Edit/Remove	—	—	X	X
		Routers: Setup: Edit	—	—	—	X
Routers: Subnets: Edit/Enable/Disable		—	—	X	X	
Tunnels: Create/Edit/Delete	—	—	X	X		

Table 6-1 ONS 15454 Security Levels—Node View (continued)

CTC Tab	Subtab	[Subtab]:Actions	Retrieve	Maintenance	Provisioning	Superuser
	Security	Users: Create/Delete/Clear Security Intrusion Alarm	—	—	—	X
		Users: Change	Same user	Same user	Same user	All users
		Active Logins: View/Logout/Retrieve Last Activity Time	—	—	—	X
		Policy: Edit/View	—	—	—	X
		Access: Edit/View	—	—	—	X
		RADIUS Server: Create/Edit/Delete/Move Up/Move Down/View	—	—	—	X
		Legal Disclaimer: Edit	—	—	—	X
	SNMP	Create/Edit/Delete	—	—	X	X
		Browse trap destinations	X	X	X	X
	Comm Channels	RS-DCC: Create/Edit/Delete	—	—	X	X
		MS-DCC: Create/Edit/Delete	—	—	X	X
		GCC: Create/Edit/Delete	—	—	X	X
		OSC: OSC Terminations: Create/Edit/Delete	—	—	X	X
		OSC: DWDM Ring ID: Create/Edit/Delete	—	—	—	X
		PPC: Create/Edit/Delete	—	—	X	X
	Alarm Profiles	Load/Store/Delete ²	—	—	X	X
		New/Compare/Available/Usage	X	X	X	X
	Defaults	Edit/Import	—	—	—	X
		Reset/Export	X	X	X	X
	WDM-ANS	Provisioning: Edit	—	—	—	X
		Provisioning: Reset	X	X	X	X
Internal Patchcords: Create/Edit/Delete/Commit/Default Patchcords		—	—	X	X	
Port Status: Launch ANS		—	—	—	X	
Node Setup: Setup/Edit		X	X	X	X	
Inventory	—	Delete	—	—	X	X
	—	Reset	—	X	X	X

Table 6-1 ONS 15454 Security Levels—Node View (continued)

CTC Tab	Subtab	[Subtab]:Actions	Retrieve	Maintenance	Provisioning	Superuser
Maintenance	Database	Backup	—	X	X	X
		Restore	—	—	—	X
	Network	Routing Table: Retrieve	X	X	X	X
		RIP Routing Table: Retrieve	X	X	X	X
	OSI	IS-IS RIB: Refresh	X	X	X	X
		ES-IS RIB: Refresh	X	X	X	X
		TDC: TID to NSAP/Flush Dynamic Entries	—	X	X	X
		TDC: Refresh	X	X	X	X
	Software	Download/Cancel	—	X	X	X
		Activate/Revert	—	—	—	X
	Diagnostic	Retrieve Tech Support Log	—	—	X	X
	Audit	Retrieve	—	—	—	X
		Archive	—	—	X	X
	DWDM	APC: Run/Disable/Refresh	—	X	X	X
		WDM Span Check: Retrieve Span Loss values/ Reset	X	X	X	X
		ROADM Power Monitoring: Refresh	X	X	X	X

1. A Provisioning user cannot change node name, contact, or AIS-V insertion on STS-1 signal degrade (SD) parameters.
2. The action buttons in the subtab are active for all users, but the actions can be completely performed only by the users assigned with the required security levels.

Table 6-2 shows the actions that each user privilege level can perform in network view.

Table 6-2 ONS 15454 Security Levels—Network View

CTC Tab	Subtab	[Subtab]: Actions	Retrieve	Maintenance	Provisioning	Superuser
Alarms	—	Synchronize/Filter/Delete cleared alarms	X	X	X	X
Conditions	—	Retrieve/Filter	X	X	X	X
History	—	Filter	X	X	X	X
Circuits	Circuits	Create/Edit/Delete	—	—	X	X
		Filter/Search	X	X	X	X
	Rolls	Complete/ Force Valid Signal/ Finish	—	—	X	X

Table 6-2 ONS 15454 Security Levels—Network View (continued)

CTC Tab	Subtab	[Subtab]: Actions	Retrieve	Maintenance	Provisioning	Superuser
Provisioning	Security	Users: Create/Delete/Clear Security Intrusion Alarm	—	—	—	X
		Users: Change	Same User	Same User	Same User	All Users
		Active logins: Logout/Retrieve Last Activity Time	—	—	—	X
		Policy: Change	—	—	—	X
	Alarm Profiles	New/Load/Store/Delete ¹	—	—	X	X
		Compare/Available/Usage	X	X	X	X
	BLSR (ANSI) MS-SPRing (ETSI)	Create/Edit/Delete/Upgrade	—	—	X	X
	Overhead Circuits	Create/Delete/Edit/Merge	—	—	X	X
		Search	X	X	X	X
	Provisionable Patchcords (PPC)	Create/Edit/Delete	—	—	X	X
Server Trails	Create/Edit/Delete	—	—	X	X	
Maintenance	Software	Download/Cancel	—	X	X	X
	Diagnostic	OSPF Node Information: Retrieve/Clear	X	X	X	X

1. The action buttons in the subtab are active for all users, but the actions can be completely performed only by the users assigned with the required security levels.

6.2.2 Security Policies

Superusers can provision security policies on the ONS 15454. These security policies include idle user timeouts, password changes, password aging, and user lockout parameters. In addition, Superusers can access the ONS 15454 through the TCC2/TCC2P RJ-45 port, the backplane LAN connection, or both.

6.2.2.1 Superuser Privileges for Provisioning Users

Superusers can grant permission to Provisioning users to perform a set of tasks. The tasks include retrieving audit logs, restoring databases, clearing PMs, and activating and reverting software loads. These privileges can be set only through CTC network element (NE) defaults, except the PM clearing privilege, which can be granted to Provisioning users using CTC Provisioning> Security > Access tabs. For more information on setting up Superuser privileges, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

6.2.2.2 Idle User Timeout

Each ONS 15454 CTC or TL1 user can be idle during his or her login session for a specified amount of time before the CTC window is locked. The lockouts prevent unauthorized users from making changes. Higher-level users have shorter default idle periods and lower-level users have longer or unlimited default idle periods, as shown in [Table 6-3](#).

Table 6-3 ONS 15454 Default User Idle Times

Security Level	Idle Time
Superuser	15 minutes
Provisioning	30 minutes
Maintenance	60 minutes
Retrieve	Unlimited

6.2.2.3 User Password, Login, and Access Policies

Superusers can view real-time lists of users who are logged into CTC or TL1 user logins by node. Superusers can also provision the following password, login, and node access policies:

- Password expirations and reuse—Superusers can specify when users must change their passwords and when they can reuse them.
- Locking out and disabling users—Superusers can provision the number of invalid logins that are allowed before locking out users and the length of time before inactive users are disabled. The number of allowed lockout attempts is set to the number of allowed login attempts.
- Node access and user sessions—Superusers can limit the number of CTC sessions one user can have, and they can prohibit access to the ONS 15454 using the LAN or TCC2/TCC2P RJ-45 connections.

In addition, a Superuser can select secure shell (SSH) instead of Telnet at the CTC Provisioning > Security > Access tabs. SSH is a terminal-remote host Internet protocol that uses encrypted links. It provides authentication and secure communication over unsecure channels. Port 22 is the default port and cannot be changed.

6.3 Audit Trail

The Cisco ONS 15454 maintains a Telcordia GR-839-CORE-compliant audit trail log that resides on the TCC2/TCC2P card. Audit trails are useful for maintaining security, recovering lost transactions and enforcing accountability. Accountability refers to tracing user activities; that is, associating a process or action with a specific user. This record shows who has accessed the system and what operations were performed during a given period of time. The log includes authorized Cisco logins and logouts using the operating system command line interface, CTC, and TL1; the log also includes FTP actions, circuit creation/deletion, and user/system generated actions.

Event monitoring is also recorded in the audit log. An event is defined as the change in status of an element within the network. External events, internal events, attribute changes, and software upload/download activities are recorded in the audit trail.

The audit trail is stored in persistent memory and is not corrupted by processor switches, resets or upgrades. However, if a user pulls both TCC2/TCC2P cards, the audit trail log is lost.

6.3.1 Audit Trail Log Entries

Table 6-4 contains the columns listed in Audit Trail window.

Table 6-4 **Audit Trail Window Columns**

Heading	Explanation
Date	Date when the action occurred
Num	Incrementing count of actions
User	User ID that initiated the action
P/F	Pass/Fail (whether or not the action was executed)
Operation	Action that was taken

Audit trail records capture the following activities:

- User—Name of the user performing the action
- Host—Host from where the activity is logged
- Device ID—IP address of the device involved in the activity
- Application—Name of the application involved in the activity
- Task—Name of the task involved in the activity (view a dialog box, apply configuration, and so on)
- Connection Mode—Telnet, Console, Simple Network Management Protocol (SNMP)
- Category—Type of change: Hardware, Software, Configuration
- Status—Status of the user action: Read, Initial, Successful, Timeout, Failed
- Time—Time of change
- Message Type—Denotes whether the event is Success/Failure type
- Message Details—Description of the change

6.3.2 Audit Trail Capacities

The system is able to store 640 log entries. When this limit is reached, the oldest entries are overwritten with new events. When the log server is 80 percent full, an AUD-LOG-LOW condition is raised and logged (by way of Common Object Request Broker Architecture [CORBA]/CTC).

When the log server reaches a maximum capacity of 640 entries and begins overwriting records that were not archived, an AUD-LOG-LOSS condition is raised and logged. This event indicates that audit trail records have been lost. Until the user off-loads the file, this event occurs only once regardless of the amount of entries that are overwritten by the system.

6.4 RADIUS Security

Superusers can configure nodes to use Remote Authentication Dial In User Service (RADIUS) authentication. RADIUS uses a strategy known as authentication, authorization, and accounting (AAA) for verifying the identity of, granting access to, and tracking the actions of remote users. To configure RADIUS authentication, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

6.4.1 RADIUS Authentication

RADIUS is a system of distributed security that secures remote access to networks and network services against unauthorized access. RADIUS comprises three components:

- A protocol with a frame format that utilizes User Datagram Protocol (UDP)/IP
- A server
- A client

The server runs on a central computer typically at the customer's site, while the clients reside in the dial-up access servers and can be distributed throughout the network.

An ONS 15454 node operates as a client of RADIUS. The client is responsible for passing user information to designated RADIUS servers, and then acting on the response that is returned. RADIUS servers are responsible for receiving user connection requests, authenticating the user, and returning all configuration information necessary for the client to deliver service to the user. The RADIUS servers can act as proxy clients to other kinds of authentication servers. Transactions between the client and RADIUS server are authenticated through the use of a shared secret, which is never sent over the network. In addition, any user passwords are sent encrypted between the client and RADIUS server. This eliminates the possibility that someone snooping on an unsecured network could determine a user's password.

6.4.2 Shared Secrets

A shared secret is a text string that serves as a password between:

- A RADIUS client and RADIUS server
- A RADIUS client and a RADIUS proxy
- A RADIUS proxy and a RADIUS server

For a configuration that uses a RADIUS client, a RADIUS proxy, and a RADIUS server, the shared secret that is used between the RADIUS client and the RADIUS proxy can be different than the shared secret used between the RADIUS proxy and the RADIUS server.

Shared secrets are used to verify that RADIUS messages, with the exception of the Access-Request message, are sent by a RADIUS-enabled device that is configured with the same shared secret. Shared secrets also verify that the RADIUS message has not been modified in transit (message integrity). The shared secret is also used to encrypt some RADIUS attributes, such as User-Password and Tunnel-Password.

When creating and using a shared secret:

- Use the same case-sensitive shared secret on both RADIUS devices.
- Use a different shared secret for each RADIUS server-RADIUS client pair.
- To ensure a random shared secret, generate a random sequence at least 22 characters long.
- You can use any standard alphanumeric and special characters.
- You can use a shared secret of up to 128 characters in length. To protect your server and your RADIUS clients from brute force attacks, use long shared secrets (more than 22 characters).
- Make the shared secret a random sequence of letters, numbers, and punctuation and change it often to protect your server and your RADIUS clients from dictionary attacks. Shared secrets should contain characters from each of the three groups listed in [Table 6-5](#).

Table 6-5 Shared Secret Character Groups

Group	Examples
Letters (uppercase and lowercase)	A, B, C, D and a, b, c, d
Numerals	0, 1, 2, 3
Symbols (all characters not defined as letters or numerals)	Exclamation point (!), asterisk (*), colon (:)

The stronger your shared secret, the more secure the attributes (for example, those used for passwords and encryption keys) that are encrypted with it. An example of a strong shared secret is 8d#>9fq4bV)H7%a3-zE13sW\$hIa32M#m<PqAa72(.



Timing Reference

This chapter provides information about Cisco ONS 15454 users and node timing. To provision timing, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- [7.1 Node Timing Parameters, page 7-1](#)
- [7.2 Network Timing, page 7-2](#)
- [7.3 Synchronization Status Messaging, page 7-3](#)

7.1 Node Timing Parameters

SONET timing parameters must be set for each ONS 15454. Each ONS 15454 independently accepts its timing reference from one of three sources:

- The building integrated timing supply (BITS) pins on the ONS 15454 backplane (ANSI) or MIC-C/T/P coaxial connectors (ETSI).
- An OC-N/STM-N card installed in the ONS 15454. The card is connected to a node that receives timing through a BITS source.
- The internal ST3 clock on the TCC2/TCC2P card.

You can set ONS 15454 timing to one of three modes: external, line, or mixed. If timing is coming from the BITS pins, set ONS 15454 timing to external. If the timing comes from an OC-N/STM-N card, set the timing to line. In typical ONS 15454 networks:

- One node is set to external. The external node derives its timing from a BITS source wired to the BITS backplane pins. The BITS source, in turn, derives its timing from a primary reference source (PRS) such as a Stratum 1 clock or global positioning satellite (GPS) signal.
- The other nodes are set to line. The line nodes derive timing from the externally timed node through the OC-N trunk (span) cards. The DWDM node normally derives timing from the line using the OSCM or OSC-CSM card that are inside an OC-3/STM-1 channel.

You can set three timing references for each ONS 15454. The first two references are typically two BITS-level sources, or two line-level sources optically connected to a node with a BITS source. The third reference is usually assigned to the internal clock provided on every ONS 15454 TCC2/TCC2P card.

However, if you assign all three references to other timing sources, the internal clock is always available as a backup timing reference. The internal clock is a Stratum 3 (ST3), so if an ONS 15454 node becomes isolated, timing is maintained at the ST3 level.

The CTC Maintenance > Timing > Report tabs show current timing information for an ONS 15454, including the timing mode, clock state and status, switch type, and reference data.

**Caution**

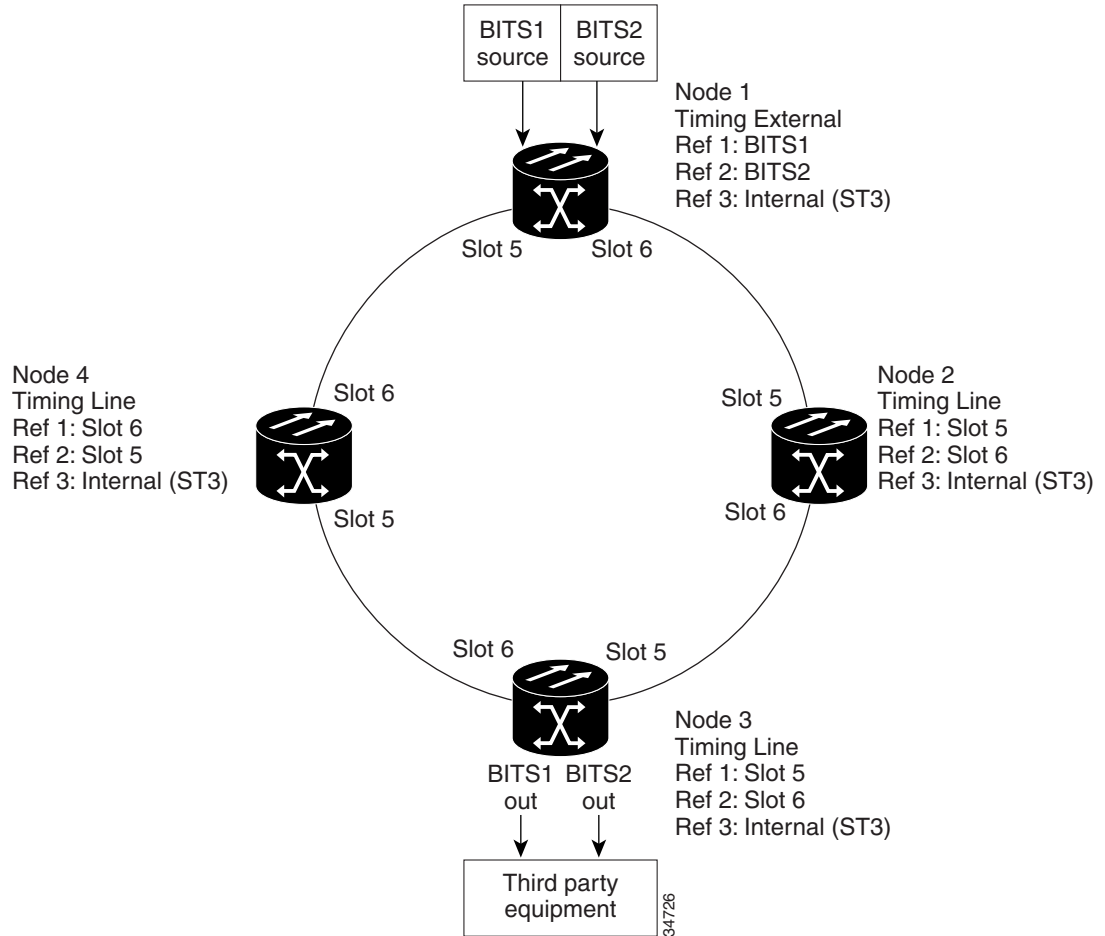
Mixed timing allows you to select both external and line timing sources. However, Cisco does not recommend its use because it can create timing loops. Use this mode with caution.

7.2 Network Timing

Figure 7-1 shows an ONS 15454 network timing setup example. Node 1 is set to external timing. Two timing references are set to BITS. These are Stratum 1 timing sources wired to the BITS input pins on the Node 1 backplane. The third reference is set to internal clock. The BITS output pins on the backplane of Node 3 are used to provide timing to outside equipment, such as a digital access line access multiplexer.

In the example, Slots 5 and 6 contain the trunk (span) cards. Timing at Nodes 2, 3, and 4 is set to line, and the timing references are set to the trunk cards based on distance from the BITS source. Reference 1 is set to the trunk card closest to the BITS source. At Node 2, Reference 1 is Slot 5 because it is connected to Node 1. At Node 4, Reference 1 is set to Slot 6 because it is connected to Node 1. At Node 3, Reference 1 could be either trunk card because they are equal distance from Node 1.

Figure 7-1 ONS 15454 Timing Example



7.3 Synchronization Status Messaging

Synchronization status messaging (SSM) is a SONET protocol that communicates information about the quality of the timing source. SSM messages are carried on the S1 byte of the SONET Line layer. They enable SONET devices to automatically select the highest quality timing reference and to avoid timing loops.

SSM messages are either Generation 1 or Generation 2. Generation 1 is the first and most widely deployed SSM message set. Generation 2 is a newer version. If you enable SSM for the ONS 15454, consult your timing reference documentation to determine which message set to use. [Table 7-1](#) and [Table 7-2 on page 7-4](#) show the Generation 1 and Generation 2 message sets.

Table 7-1 SSM Generation 1 Message Set

Message	Quality	Description
PRS	1	Primary reference source—Stratum 1
STU	2	Synchronization traceability unknown

Table 7-1 SSM Generation 1 Message Set (continued)

Message	Quality	Description
ST2	3	Stratum 2
ST3	4	Stratum 3
SMC	5	SONET minimum clock
ST4	6	Stratum 4
DUS	7	Do not use for timing synchronization
RES	—	Reserved; quality level set by user

Table 7-2 SSM Generation 2 Message Set

Message	Quality	Description
PRS	1	Primary reference source—Stratum 1
STU	2	Synchronization traceability unknown
ST2	3	Stratum 2
TNC	4	Transit node clock
ST3E	5	Stratum 3E
ST3	6	Stratum 3
SMC	7	SONET minimum clock
ST4	8	Stratum 4
DUS	9	Do not use for timing synchronization
RES	—	Reserved; quality level set by user



Management Network Connectivity

This chapter provides an overview of ONS 15454 data communications network (DCN) connectivity. Cisco Optical Networking System (ONS) network communication is based on IP, including communication between Cisco Transport Controller (CTC) computers and ONS 15454 nodes, and communication among networked ONS 15454 nodes. The chapter provides scenarios showing Cisco ONS 15454 nodes in common IP network configurations as well as information about provisionable patchcords, the IP routing table, external firewalls, and open gateway network element (GNE) networks.

Although ONS 15454 DCN communication is based on IP, ONS 15454 nodes can be networked to equipment that is based on the Open System Interconnection (OSI) protocol suites. This chapter also describes the ONS 15454 OSI implementation and provides scenarios that show how the ONS 15454 can be networked within a mixed IP and OSI environment.

This chapter does not provide a comprehensive explanation of IP networking concepts and procedures, nor does it provide IP addressing examples to meet all networked scenarios. For ONS 15454 networking setup instructions, refer to the “Turn Up a Node” chapter of the *Cisco ONS 15454 DWDM Procedure Guide*.



Note

Unless otherwise specified, in this chapter “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- [8.1 IP Networking Overview, page 8-2](#)
- [8.2 IP Addressing Scenarios, page 8-2](#)
- [8.3 Provisionable Patchcords, page 8-23](#)
- [8.4 Routing Table, page 8-24](#)
- [8.5 External Firewalls, page 8-26](#)
- [8.6 Open GNE, page 8-28](#)
- [8.7 TCP/IP and OSI Networking, page 8-30](#)
- [8.8 Link Management Protocol, page 8-34](#)



Note

To connect ONS 15454s to an IP network, you must work with a LAN administrator or other individual at your site who has IP networking training and experience.

8.1 IP Networking Overview

ONS 15454s can be connected in many different ways within an IP environment:

- They can be connected to LANs through direct connections or a router.
- IP subnetting can create ONS 15454 node groups that allow you to provision non-data communication channel (DCC) connected nodes in a network.
- Different IP functions and protocols can be used to achieve specific network goals. For example, Proxy Address Resolution Protocol (ARP) enables one LAN-connected ONS 15454 to serve as a gateway for ONS 15454s that are not connected to the LAN.
- Static routes can be created to enable connections among multiple Cisco Transport Controller (CTC) sessions with ONS 15454s that reside on the same subnet with multiple CTC sessions.
- ONS 15454s can be connected to Open Shortest Path First (OSPF) networks so ONS 15454 network information is automatically communicated across multiple LANs and WANs.
- The ONS 15454 proxy server can control the visibility and accessibility between CTC computers and ONS 15454 element nodes.

8.2 IP Addressing Scenarios

ONS 15454 IP addressing generally has eight common scenarios or configurations. Use the scenarios as building blocks for more complex network configurations. [Table 8-1](#) provides a general list of items to check when setting up ONS 15454s in IP networks.

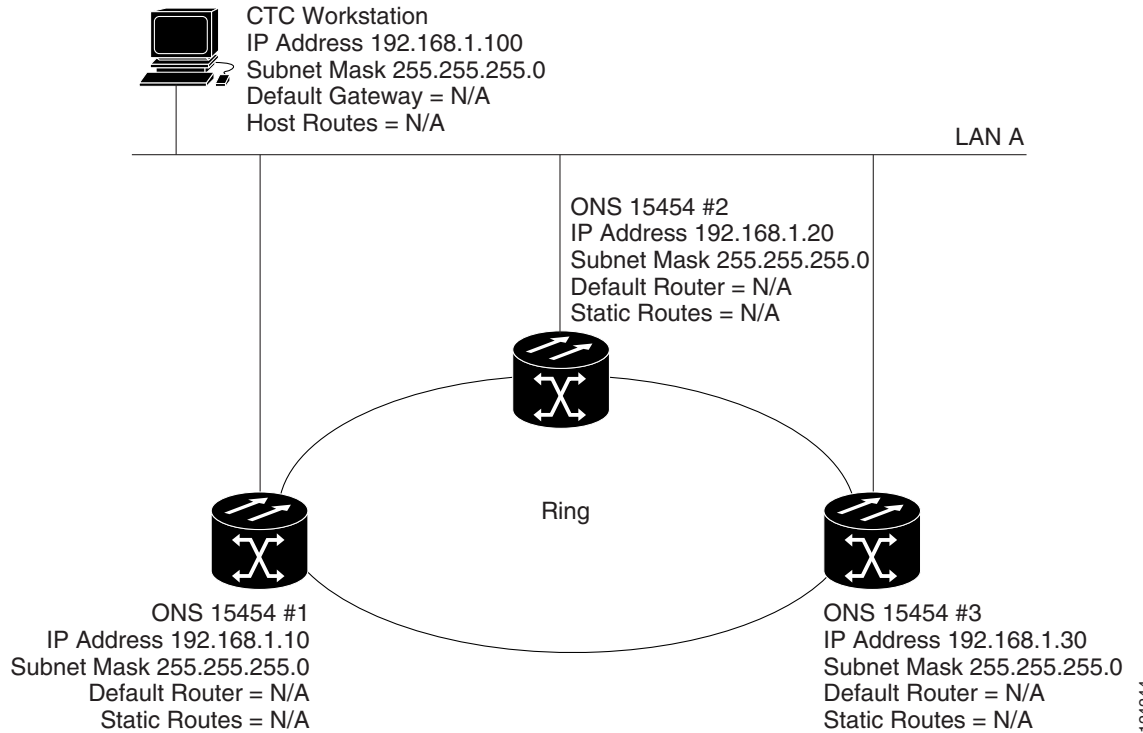
Table 8-1 **General ONS 15454 IP Troubleshooting Checklist**

Item	What to Check
Link integrity	Verify that link integrity exists between: <ul style="list-style-type: none"> • CTC computer and network hub/switch • ONS 15454s (backplane [ANSI] or MIC-C/T/P [ETSI] wire-wrap pins or RJ-45 port) and network hub/switch • Router ports and hub/switch ports
ONS 15454 hub/switch ports	If connectivity problems occur, set the hub or switch port that is connected to the ONS 15454 to 10 Mbps half-duplex.
Ping	Ping the node to test connections between computers and ONS 15454s.
IP addresses/subnet masks	Verify that ONS 15454 IP addresses and subnet masks are set up correctly.
Optical connectivity	Verify that ONS 15454 optical trunk ports are in service and that a DCC is enabled on each trunk port.

8.2.1 Scenario 1: CTC and ONS 15454s on Same Subnet

Scenario 1 shows a basic ONS 15454 LAN configuration ([Figure 8-1](#)). The ONS 15454s and CTC computer reside on the same subnet. All ONS 15454s connect to LAN A, and all ONS 15454s have DCC connections.

Figure 8-1 Scenario 1: CTC and ONS 15454s on Same Subnet (ANSI and ETSI)

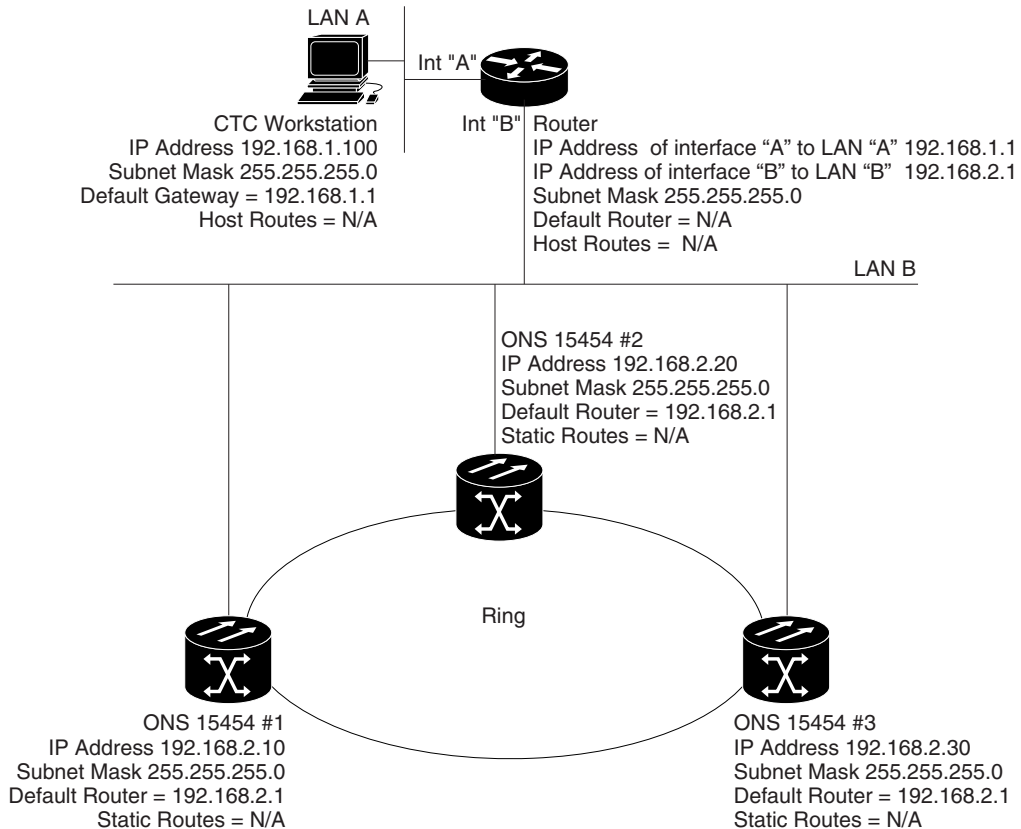


8.2.2 Scenario 2: CTC and ONS 15454s Connected to a Router

In Scenario 2, the CTC computer resides on a subnet (192.168.1.0) and attaches to LAN A (Figure 8-2). The ONS 15454s reside on a different subnet (192.168.2.0) and attach to LAN B. A router connects LAN A to LAN B. The IP address of router interface A is set to LAN A (192.168.1.1), and the IP address of router interface B is set to LAN B (192.168.2.1). The routers each have a subnet mask of 255.255.255.0.

On the CTC computer, the default gateway is set to router interface A. If the LAN uses DHCP (Dynamic Host Configuration Protocol), the default gateway and IP address are assigned automatically. In the Figure 8-2 example, a DHCP server is not available.

Figure 8-2 Scenario 2: CTC and ONS 15454s Connected to Router (ANSI and ETSI)



8.2.3 Scenario 3: Using Proxy ARP to Enable an ONS 15454 Gateway

ARP matches higher-level IP addresses to the physical addresses of the destination host. It uses a lookup table (called ARP cache) to perform the translation. When the address is not found in the ARP cache, a broadcast is sent out on the network with a special format called the ARP request. If one of the machines on the network recognizes its own IP address in the request, it sends an ARP reply back to the requesting host. The reply contains the physical hardware address of the receiving host. The requesting host stores this address in its ARP cache so that all subsequent datagrams (packets) to this destination IP address can be translated to a physical address.

Proxy ARP enables one LAN-connected ONS 15454 to respond to the ARP request for ONS 15454s not connected to the LAN. (ONS 15454 proxy ARP requires no user configuration.) For this to occur, the DCC-connected ONS 15454s must reside on the same subnet as the LAN-connected (gateway) ONS 15454. When a LAN device sends an ARP request to an ONS 15454 that is not connected to the LAN, the gateway ONS 15454 (the one connected to the LAN) returns its MAC address to the LAN

device. The LAN device then sends the datagram for the remote ONS 15454 to the MAC address of the proxy ONS 15454. The proxy ONS 15454 uses its routing table to forward the datagram to the non-LAN ONS 15454.

Scenario 3 is similar to Scenario 1, but only one ONS 15454 (Node 1) connects to the LAN (Figure 8-3). Two ONS 15454s (Node 2 and Node 3) connect to ONS 15454 Node 1 through the section DCC. Because all three ONS 15454s are on the same subnet, proxy ARP enables ONS 15454 Node 1 to serve as a gateway for ONS 15345 Node 2 and Node 3.

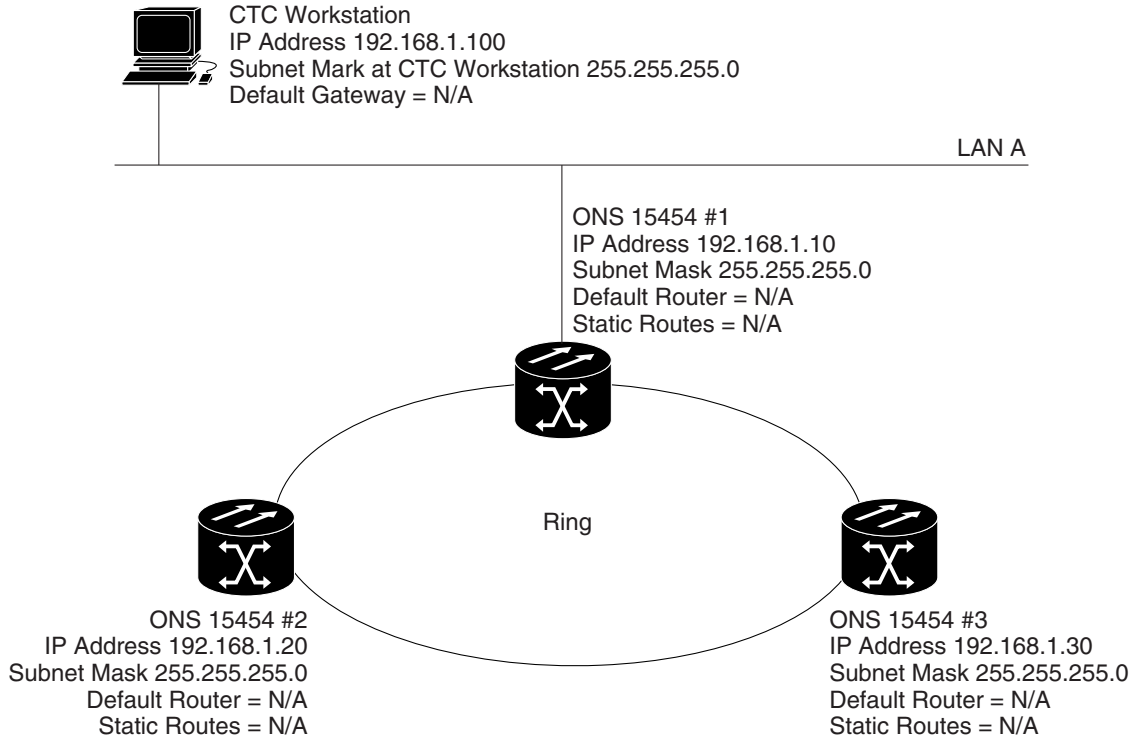
**Note**

This scenario assumes all CTC connections are to Node 1. If you connect a laptop to either ONS 15454 Node 2 or Node 3, network partitioning occurs; neither the laptop or the CTC computer can see all nodes. If you want laptops to connect directly to end network elements, you must create static routes (see Scenario 5) or enable the ONS 15454 proxy server (see Scenario 7).

Be aware that:

- GNE and ENE 15454 proxy ARP is disabled.
- There is exactly one proxy ARP server on any given Ethernet segment; however, there may be more than one server in an ANSI or ETSI topology.
- The proxy ARP server does not perform the proxy ARP function for any node or host that is on the same Ethernet segment.
- It is important in Figure 8-3 that the CTC workstation be located within the same subnet and on the same Ethernet segment as the proxy ARP server.

Figure 8-3 Scenario 3: Using Proxy ARP (ANSI and ETSI)

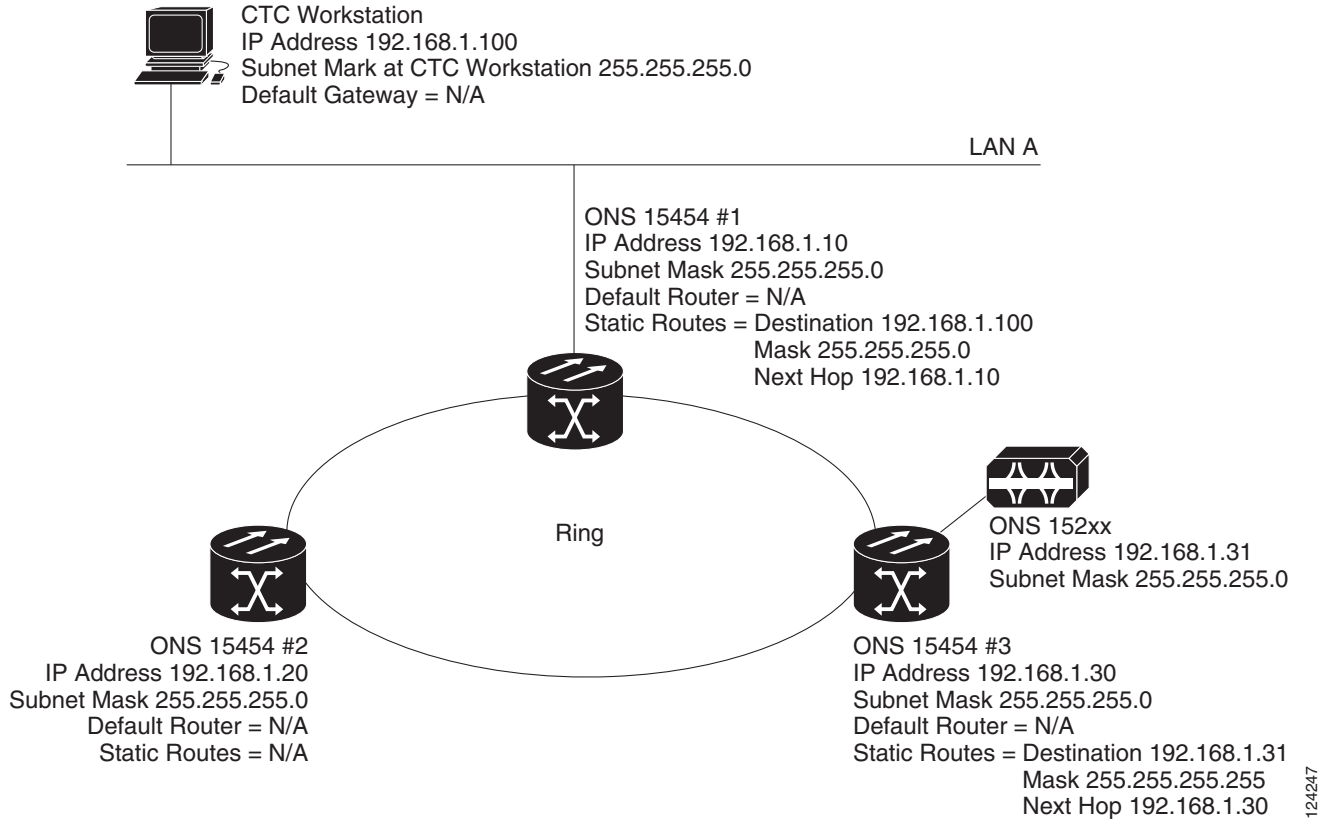


You can also use proxy ARP to communicate with hosts attached to the craft Ethernet ports of DCC-connected nodes (Figure 8-4). The node with an attached host must have a static route to the host. Static routes are propagated to all DCC peers using OSPF. The existing proxy ARP node is the gateway for additional hosts. Each node examines its routing table for routes to hosts that are not connected to the DCC network but are within the subnet. The existing proxy server replies to ARP requests for these additional hosts with the node MAC address. The existence of the host route in the routing table ensures that the IP packets addressed to the additional hosts are routed properly. Other than establishing a static route between a node and an additional host, no provisioning is necessary. The following restrictions apply:

- Only one node acts as the proxy ARP server for any given additional host.
- A node cannot be the proxy ARP server for a host connected to its Ethernet port.

In Figure 8-4, Node 1 announces to Node 2 and 3 that it can reach the CTC host. Similarly, Node 3 announces that it can reach the ONS 152xx. The ONS 152xx is shown as an example; any network element can be set up as an additional host.

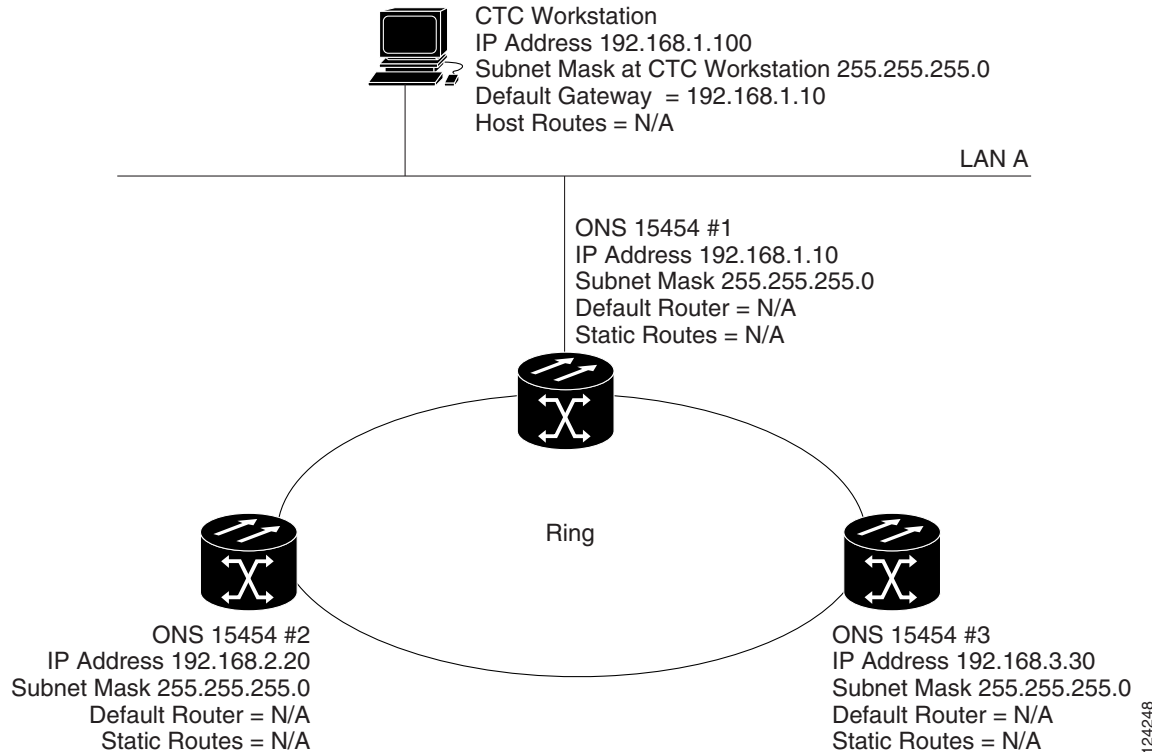
Figure 8-4 Scenario 3: Using Proxy ARP with Static Routing (ANSI and ETSI)



8.2.4 Scenario 4: Default Gateway on CTC Computer

Scenario 4 is similar to Scenario 3, but Nodes 2 and 3 reside on different subnets, 192.168.2.0 and 192.168.3.0, respectively (Figure 8-5). Node 1 and the CTC computer are on subnet 192.168.1.0. Proxy ARP is not used because the network includes different subnets. For the CTC computer to communicate with Nodes 2 and 3, Node 1 is entered as the default gateway on the CTC computer.

Figure 8-5 Scenario 4: Default Gateway on a CTC Computer (ANSI and ETSI)



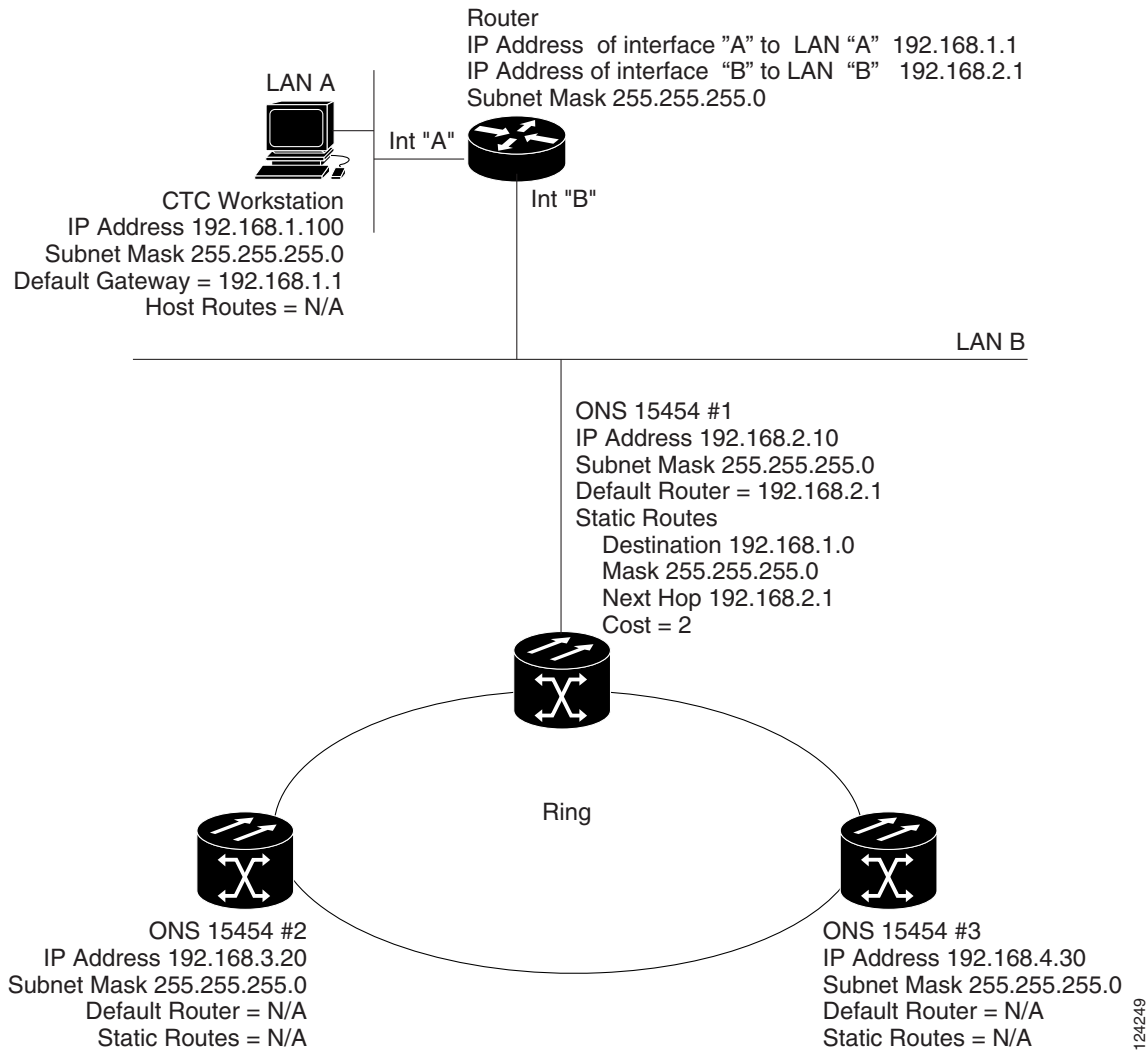
8.2.5 Scenario 5: Using Static Routes to Connect to LANs

Static routes are used for two purposes:

- To connect ONS 15454s to CTC sessions on one subnet connected by a router to ONS 15454s residing on another subnet. (These static routes are not needed if OSPF is enabled. Scenario 6 shows an OSPF example.)
- To enable multiple CTC sessions among ONS 15454s residing on the same subnet.

In [Figure 8-6](#), one CTC residing on subnet 192.168.1.0 connects to a router through interface A (the router is not set up with OSPF). ONS 15454s residing on different subnets are connected through Node 1 to the router through interface B. Because Nodes 2 and 3 are on different subnets, proxy ARP does not enable Node 1 as a gateway. To connect to CTC computers on LAN A, a static route is created on Node 1.

Figure 8-6 Scenario 5: Static Route With One CTC Computer Used as a Destination (ANSI and ETSI)

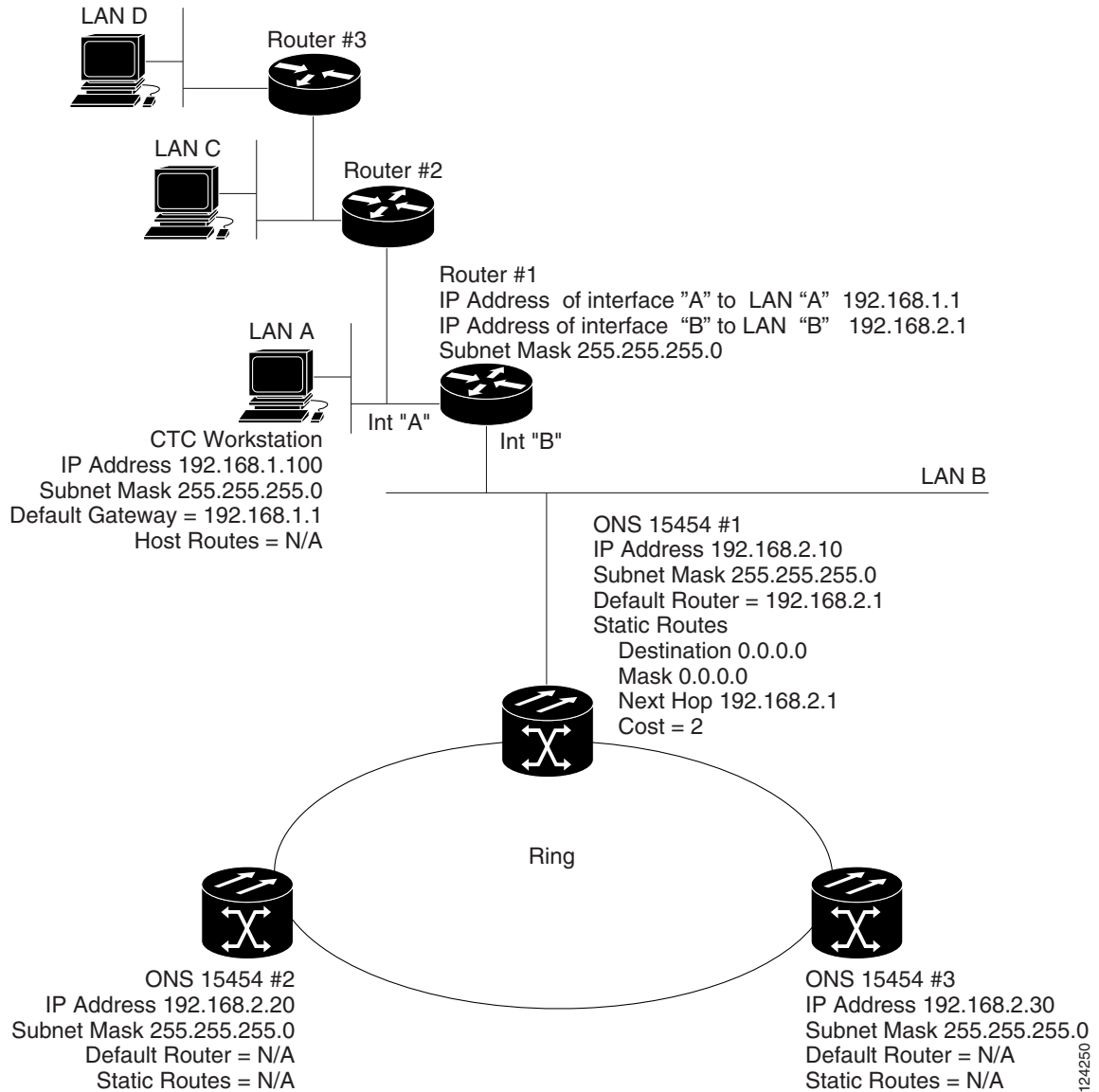


The destination and subnet mask entries control access to the ONS 15454s:

- If a single CTC computer is connected to a router, enter the complete CTC “host route” IP address as the destination with a subnet mask of 255.255.255.255.
- If CTC computers on a subnet are connected to a router, enter the destination subnet (in this example, 192.168.1.0) and a subnet mask of 255.255.255.0.
- If all CTC computers are connected to a router, enter a destination of 0.0.0.0 and a subnet mask of 0.0.0.0. [Figure 8-7](#) shows an example.

The IP address of router interface B is entered as the next hop, and the cost (number of hops from source to destination) is 2.

Figure 8-7 Scenario 5: Static Route With Multiple LAN Destinations (ANSI and ETSI)



8.2.6 Scenario 6: Using OSPF

Open Shortest Path First (OSPF) is a link state Internet routing protocol. Link state protocols use a “hello protocol” to monitor their links with adjacent routers and to test the status of their links to their neighbors. Link state protocols advertise their directly connected networks and their active links. Each link state router captures the link state “advertisements” and puts them together to create a topology of the entire network or area. From this database, the router calculates a routing table by constructing a shortest path tree. Routes are recalculated when topology changes occur.

ONS 15454s use the OSPF protocol in internal ONS 15454 networks for node discovery, circuit routing, and node management. You can enable OSPF on the ONS 15454s so that the ONS 15454 topology is sent to OSPF routers on a LAN. Advertising the ONS 15454 network topology to LAN routers

eliminates the need to manually enter static routes for ONS 15454 subnetworks. [Figure 8-8](#) shows a network enabled for OSPF. [Figure 8-9](#) shows the same network without OSPF. Static routes must be manually added to the router for CTC computers on LAN A to communicate with Nodes 2 and 3 because these nodes reside on different subnets.

OSPF divides networks into smaller regions, called areas. An area is a collection of networked end systems, routers, and transmission facilities organized by traffic patterns. Each OSPF area has a unique ID number, known as the area ID. Every OSPF network has one backbone area called “area 0.” All other OSPF areas must connect to area 0.

When you enable an ONS 15454 OSPF topology for advertising to an OSPF network, you must assign an OSPF area ID in decimal format to the ONS 15454 network. An area ID is a “dotted quad” value that appears similar to an IP address. Coordinate the area ID number assignment with your LAN administrator. All DCC-connected ONS 15454s should be assigned the same OSPF area ID.

**Note**

It is recommended that the number of 15454s in an OSPF area be limited, because this allows faster loading into a CTC and is less likely to incur any problems.

Figure 8-8 Scenario 6: OSPF Enabled (ANSI and ETSI)

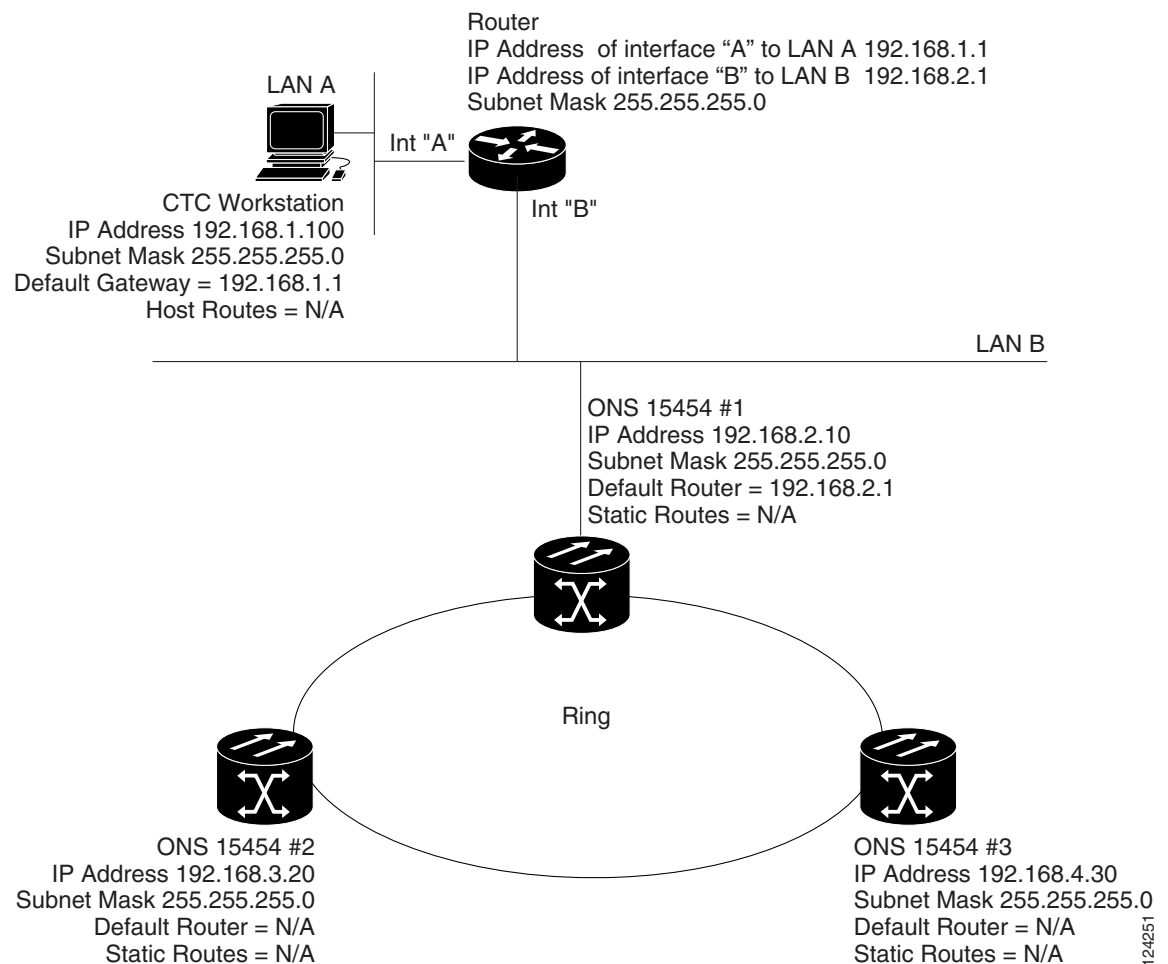
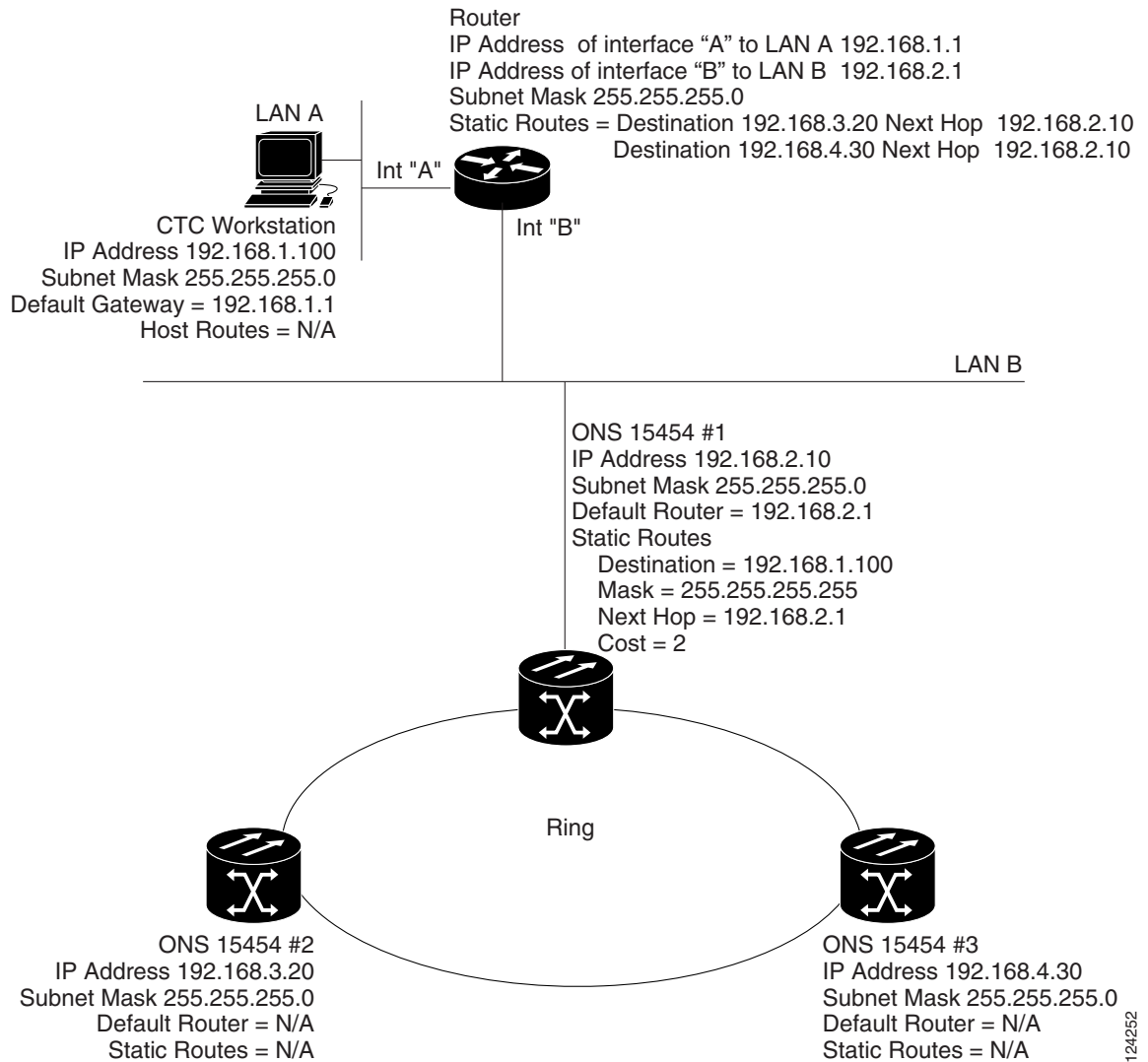


Figure 8-9 Scenario 6: OSPF Not Enabled (ANSI and ETSI)



124252

8.2.7 Scenario 7: Provisioning the ONS 15454 Proxy Server

The ONS 15454 proxy server is a set of functions that allows you to network ONS 15454s in environments where visibility and accessibility between ONS 15454s and CTC computers must be restricted. For example, you can set up a network so that field technicians and network operating center (NOC) personnel can both access the same ONS 15454s while preventing the field technicians from accessing the NOC LAN. To do this, one ONS 15454 is provisioned as a GNE and the other ONS 15454s are provisioned as end network elements (ENEs). The GNE ONS 15454 tunnels connections between CTC computers and ENE ONS 15454s, providing management capability while preventing access for non-ONS 15454 management purposes.

The ONS 15454 gateway setting performs the following tasks:

- Isolates DCC IP traffic from Ethernet (craft port) traffic and accepts packets based on filtering rules. The filtering rules (see [Table 8-3 on page 8-16](#) and [Table 8-4 on page 8-17](#)) depend on whether the packet arrives at the ONS 15454 DCC or TCC2/TCC2P Ethernet interface.
- Processes Simple Network Time Protocol (SNTP) and Network Time Protocol (NTP) requests. ONS 15454 ENEs can derive time-of-day from an SNTP/NTP LAN server through the GNE ONS 15454.
- Processes Simple Network Management Protocol version 1 (SNMPv1) traps. The GNE ONS 15454 receives SNMPv1 traps from the ENE ONS 15454s and forwards or relays the traps to SNMPv1 trap destinations or ONS 15454 SNMP relay nodes.

The ONS 15454 proxy server is provisioned using the Enable proxy server on port check box on the Provisioning > Network > General tab. If checked, the ONS 15454 serves as a proxy for connections between CTC clients and ONS 15454s that are DCC-connected to the proxy ONS 15454. The CTC client establishes connections to DCC-connected nodes through the proxy node. The CTC client can connect to nodes that it cannot directly reach from the host on which it runs. If not selected, the node does not proxy for any CTC clients, although any established proxy connections continue until the CTC client exits. In addition, you can set the proxy server as an ENE or a GNE:

- End Network Element (ENE)—If set as an ENE, the ONS 15454 neither installs nor advertises default or static routes that go through its Ethernet port. However, an ENE does install and advertise routes that go through the DCC. CTC computers can communicate with the ONS 15454 using the TCC2/TCC2P craft port, but they cannot communicate directly with any other DCC-connected ONS 15454.

In addition, firewall is enabled, which means that the node prevents IP traffic from being routed between the DCC and the LAN port. The ONS 15454 can communicate with machines connected to the LAN port or connected through the DCC. However, the DCC-connected machines cannot communicate with the LAN-connected machines, and the LAN-connected machines cannot communicate with the DCC-connected machines. A CTC client using the LAN to connect to the firewall-enabled node can use the proxy capability to manage the DCC-connected nodes that would otherwise be unreachable. A CTC client connected to a DCC-connected node can only manage other DCC-connected nodes and the firewall itself.

- Gateway Network Element (GNE)—If set as a GNE, the CTC computer is visible to other DCC-connected nodes and firewall is enabled.
- Proxy-only—If Proxy-only is selected, firewall is not enabled. CTC can communicate with any other DCC-connected ONS 15454s.



Note

If you launch CTC against a node through a Network Address Translation (NAT) or Port Address Translation (PAT) router and that node does not have proxy enabled, your CTC session starts and initially appears to be fine. However CTC never receives alarm updates and disconnects and reconnects every two minutes. If the proxy is accidentally disabled, it is still possible to enable the proxy during a reconnect cycle and recover your ability to manage the node, even through a NAT/PAT firewall.

[Figure 8-10](#) shows an ONS 15454 proxy server implementation. A GNE ONS 15454 is connected to a central office LAN and to ENE ONS 15454s. The central office LAN is connected to a NOC LAN, which has CTC computers. The NOC CTC computer and craft technicians must both be able to access the ONS 15454 ENEs. However, the craft technicians must be prevented from accessing or seeing the NOC or central office LANs.

In the example, the ONS 15454 GNE is assigned an IP address within the central office LAN and is physically connected to the LAN through its LAN port. ONS 15454 ENEs are assigned IP addresses that are outside the central office LAN and given private network IP addresses. If the ONS 15454 ENEs are collocated, the craft LAN ports could be connected to a hub. However, the hub should have no other network connections.

Figure 8-10 Scenario 7: ONS 15454 Proxy Server with GNE and ENEs on the Same Subnet (ANSI and ETSI)

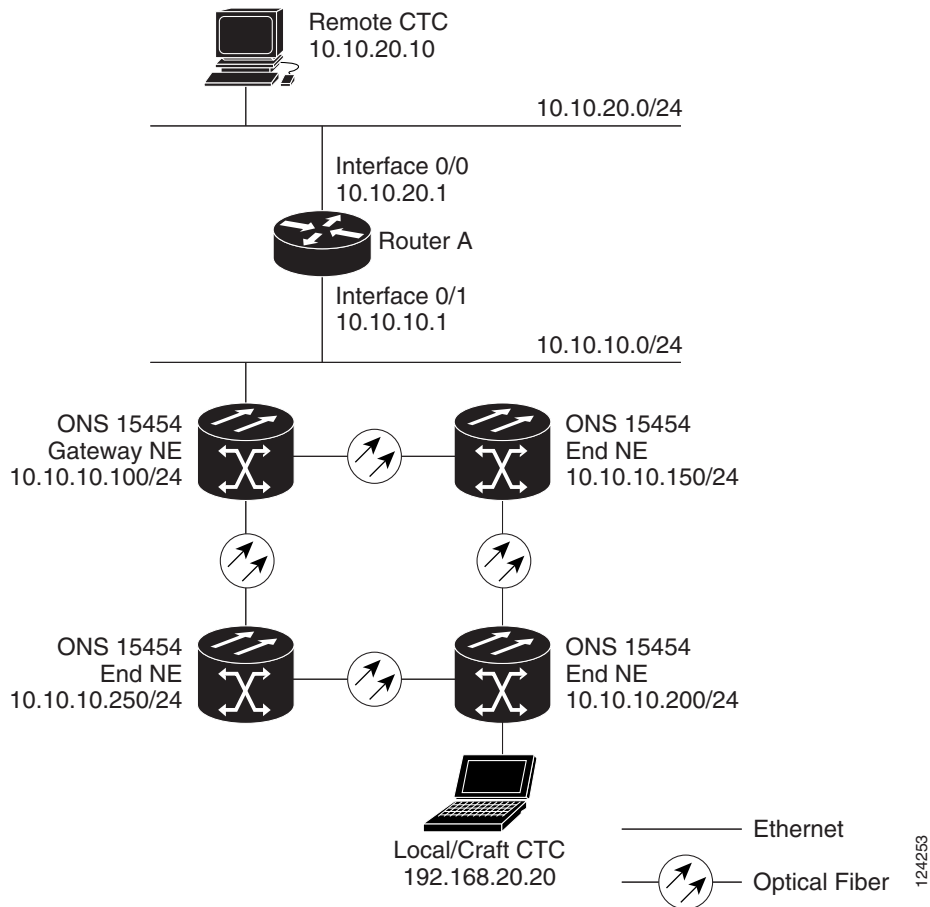


Table 8-2 shows recommended settings for ONS 15454 GNEs and ENEs in the configuration shown in Figure 8-10.

Table 8-2 ONS 15454 Gateway and End NE Settings

Setting	ONS 15454 Gateway NE	ONS 15454 End NE
OSPF	Off	Off
SNTP server (if used)	SNTP server IP address	Set to ONS 15454 GNE IP address
SNMP (if used)	SNMPv1 trap destinations	Set SNMPv1 trap destinations to ONS 15454 GNE, port 391

Figure 8-11 shows the same proxy server implementation with ONS 15454 ENEs on different subnets. The ONS 15454 GNEs and ENEs are provisioned with the settings shown in Table 8-2.

Figure 8-11 Scenario 7: ONS 15454 Proxy Server with GNE and ENEs on Different Subnets (ANSI and ETSI)

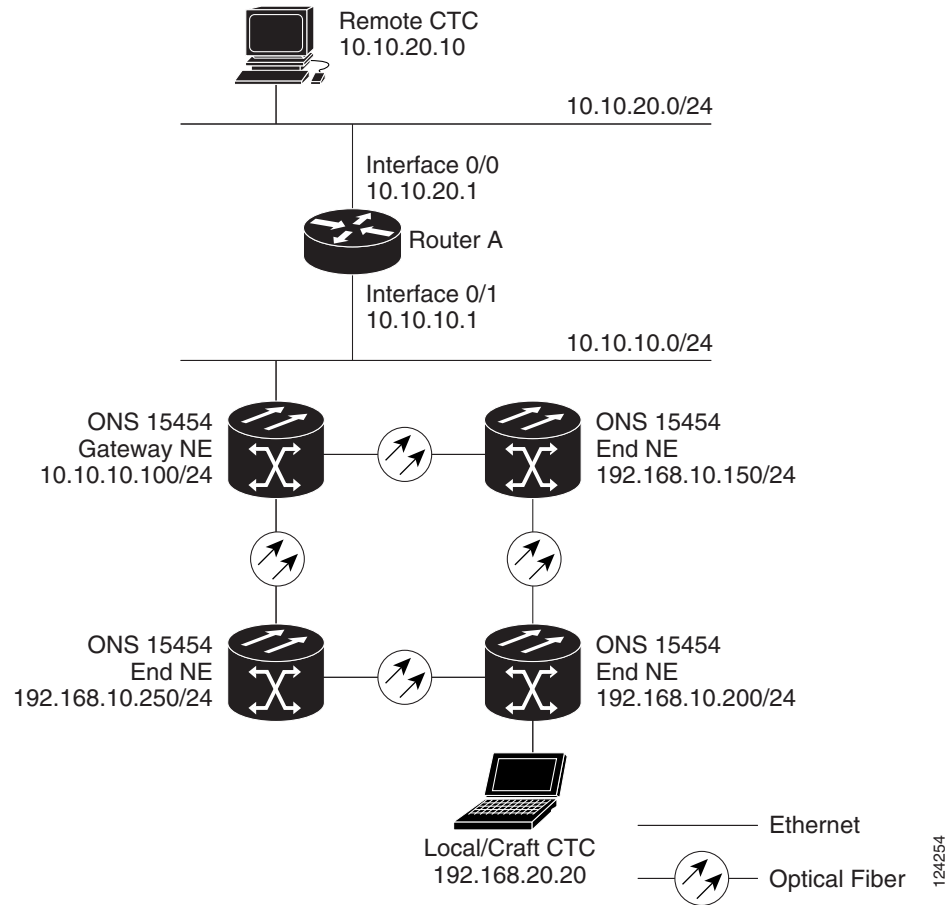


Figure 8-12 shows the same proxy server implementation with ONS 15454 ENEs in multiple rings.

Figure 8-12 Scenario 7: ONS 15454 Proxy Server With ENEs on Multiple Rings (ANSI and ETSI)

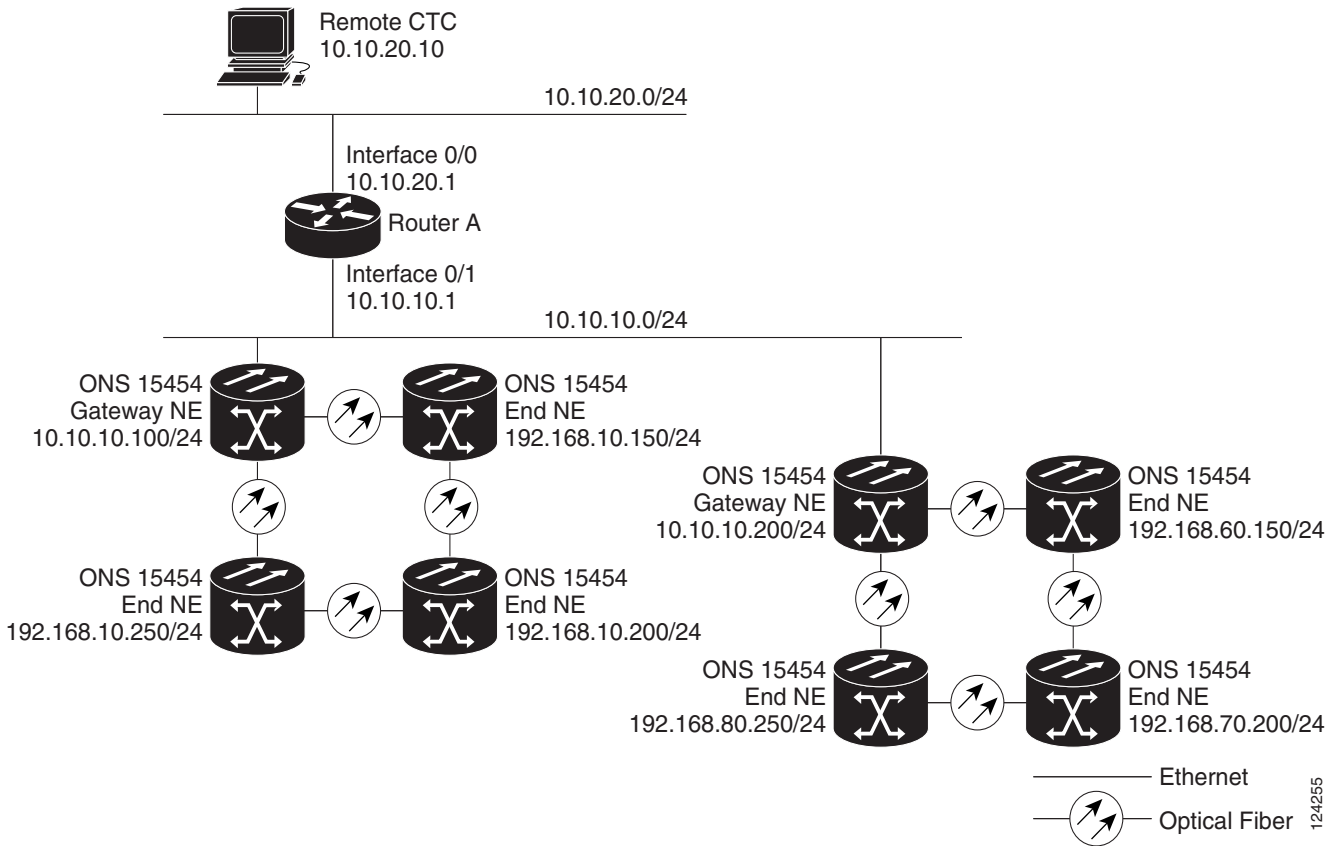


Table 8-3 shows the rules the ONS 15454 follows to filter packets for the firewall when nodes are configured as ENEs and GNEs. If the packet is addressed to the ONS 15454, additional rules (shown in Table 8-4) are applied. Rejected packets are silently discarded.

Table 8-3 Proxy Server Firewall Filtering Rules

Packets Arriving At:	Are Accepted if the Destination IP Address is:
TCC2/TCC2P Ethernet interface	<ul style="list-style-type: none"> The ONS 15454 itself The ONS 15454's subnet broadcast address Within the 224.0.0.0/8 network (reserved network used for standard multicast messages) Subnet mask = 255.255.255.255
DCC interface	<ul style="list-style-type: none"> The ONS 15454 itself Any destination connected through another DCC interface Within the 224.0.0.0/8 network

Table 8-4 Proxy Server Firewall Filtering Rules When Packet Addressed to ONS 15454

Packets Arriving At	Rejects
TCC2/TCC2P Ethernet interface	<ul style="list-style-type: none"> UDP (User Datagram Protocol) packets addressed to the SNMP trap relay port (391)
DCC interface	<ul style="list-style-type: none"> TCP (Transmission Control Protocol) packets addressed to the proxy server port (1080)

If you implement the proxy server, note that all DCC-connected ONS 15454s on the same Ethernet segment must have the same gateway setting. Mixed values produce unpredictable results, and might leave some nodes unreachable through the shared Ethernet segment.

If nodes become unreachable, correct the setting by performing one of the following:

- Disconnect the craft computer from the unreachable ONS 15454. Connect to the ONS 15454 through another network ONS 15454 that has a DCC connection to the unreachable ONS 15454.
- Disconnect all DCCs to the node by disabling them on neighboring nodes. Connect a CTC computer directly to the ONS 15454 and change its provisioning.

8.2.8 Scenario 8: Dual GNEs on a Subnet

The ONS 15454 provides GNE load balancing, which allows CTC to reach ENEs over multiple GNEs without the ENEs being advertised over OSPF. This feature allows a network to quickly recover from the loss of GNE, even if the GNE is on a different subnet. If a GNE fails, all connections through that GNE fail. CTC disconnects from the failed GNE and from all ENEs for which the GNE was a proxy, and then reconnects through the remaining GNEs. GNE load balancing reduces the dependency on the launch GNE and DCC bandwidth, both of which enhance CTC performance.



Note

Dual GNEs do not need special provisioning

Figure 8-13 shows a network with dual GNEs on the same subnet.

Figure 8-13 Scenario 8: Dual GNEs on the Same Subnet (ANSI and ETSI)

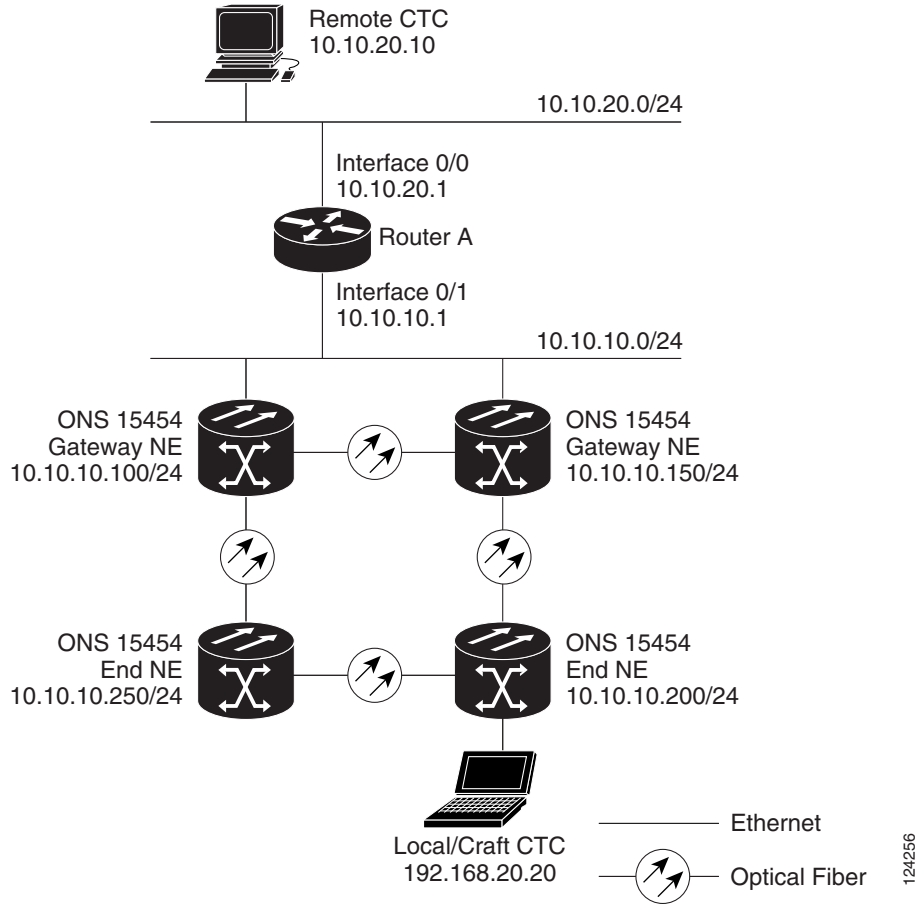
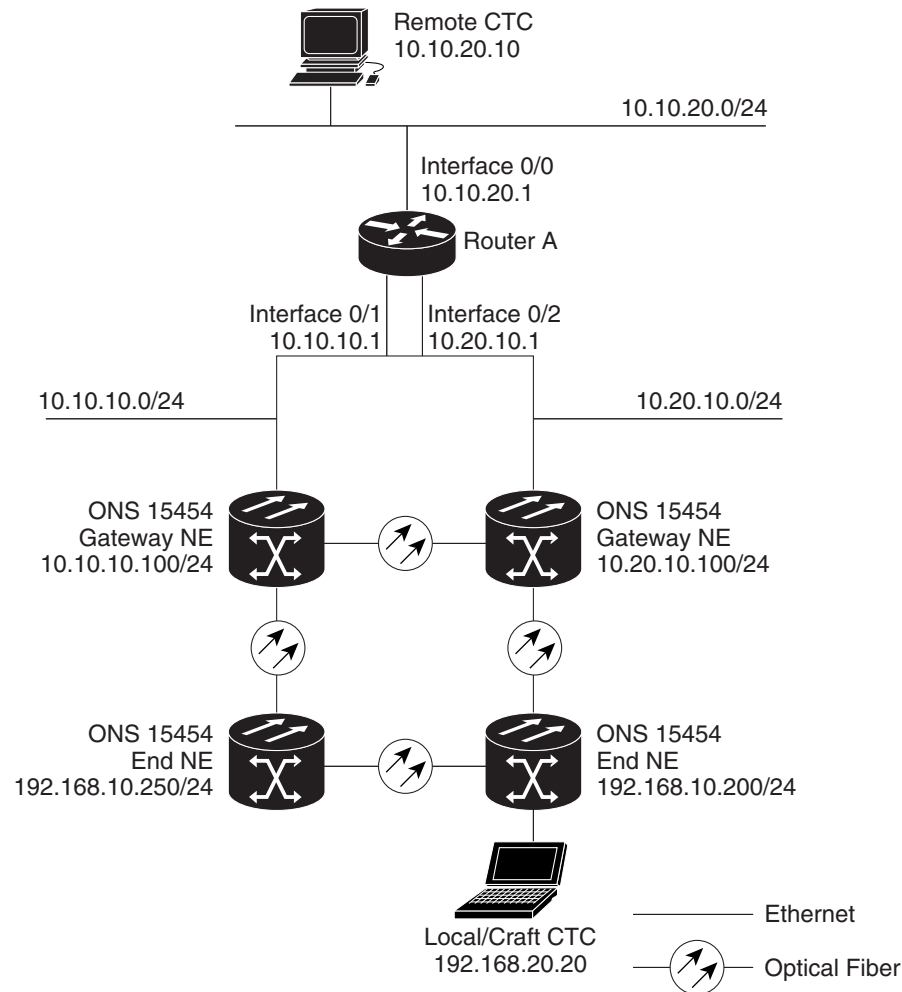


Figure 8-14 shows a network with dual GNEs on different subnets.

Figure 8-14 Scenario 8: Dual GNEs on Different Subnets (ANSI and ETSI)



8.2.9 Scenario 9: IP Addressing with Secure Mode Enabled

The TCC2 card and TCC2P card both default to nonsecure mode. In this mode, the front and back Ethernet (LAN) ports share a single MAC address and IP address. TCC2P cards allow you to place a node in secure mode, which prevents a front-access craft port user from accessing the LAN through the backplane port. Secure mode can be locked, which prevents the mode from being altered. To place a node in secure mode or to lock secure node, refer to the “Manage the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

8.2.9.1 Secure Mode Behavior

Changing a TCC2P node from nonsecure mode to secure mode allows you to provision two Ethernet addresses for the ONS 15454 and causes the node to assign the ports different MAC addresses. In secure mode, one IP address is provisioned for the ONS 15454 backplane LAN (Ethernet) port, and the other

IP address is provisioned for the TCC2P Ethernet port. Both addresses reside on different subnets, providing an additional layer of separation between the craft access port and the ONS 15454 LAN. If secure mode is enabled, the IP addresses provisioned for both TCC2P Ethernet ports must follow general IP addressing guidelines and must reside on different subnets from each other and the default router IP address.

In secure mode, the IP address assigned to the front LAN (Ethernet) port becomes a private address, while the backplane connects the node to an Operations Support System (OSS) through a central office LAN or private enterprise network. A superuser can configure the node to hide or reveal the backplane's LAN IP address in CTC, the routing table, or autonomous message reports.

In nonsecure mode, a node can be a GNE or ENE. Placing the node into secure mode automatically turns on SOCKS proxy and defaults the node to GNE status. However, the node can be changed back to an ENE. In nonsecure mode, an ENE's SOCKS proxy can be disabled—effectively isolating the node beyond the LAN firewall—but it cannot be disabled in secure mode. To change a node's GNE or ENE status and disable the SOCKS proxy, refer to the “Turn Up a Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

**Caution**

Enabling secure mode causes the TCC2P card to reboot; a TCC2P card reboot affects traffic.

**Note**

The secure mode option does not appear in CTC if TCC2 cards are installed. If one TCC2 and one TCC2P card are installed in a node, secure mode will appear in CTC but it cannot be modified.

**Note**

If both front and backplane access ports are disabled in an ENE and the node is isolated from DCC communication (due to user provisioning or network faults), the front and backplane ports are automatically reenabled.

Figure 8-15 shows an example of secure mode ONS 15454 nodes with front-access Ethernet port addresses that reside on the same subnet.

Figure 8-15 Scenario 9: ONS 15454 GNE and ENEs on the Same Subnet with Secure Mode Enabled

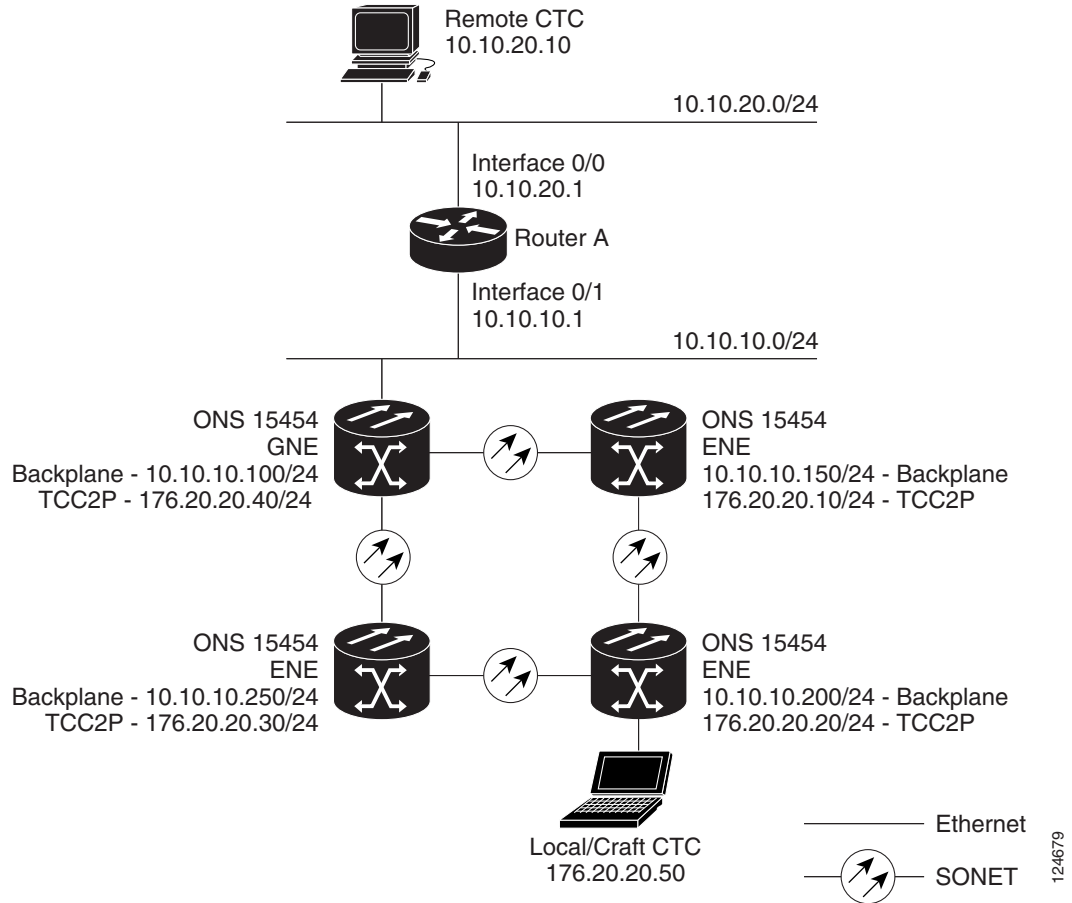
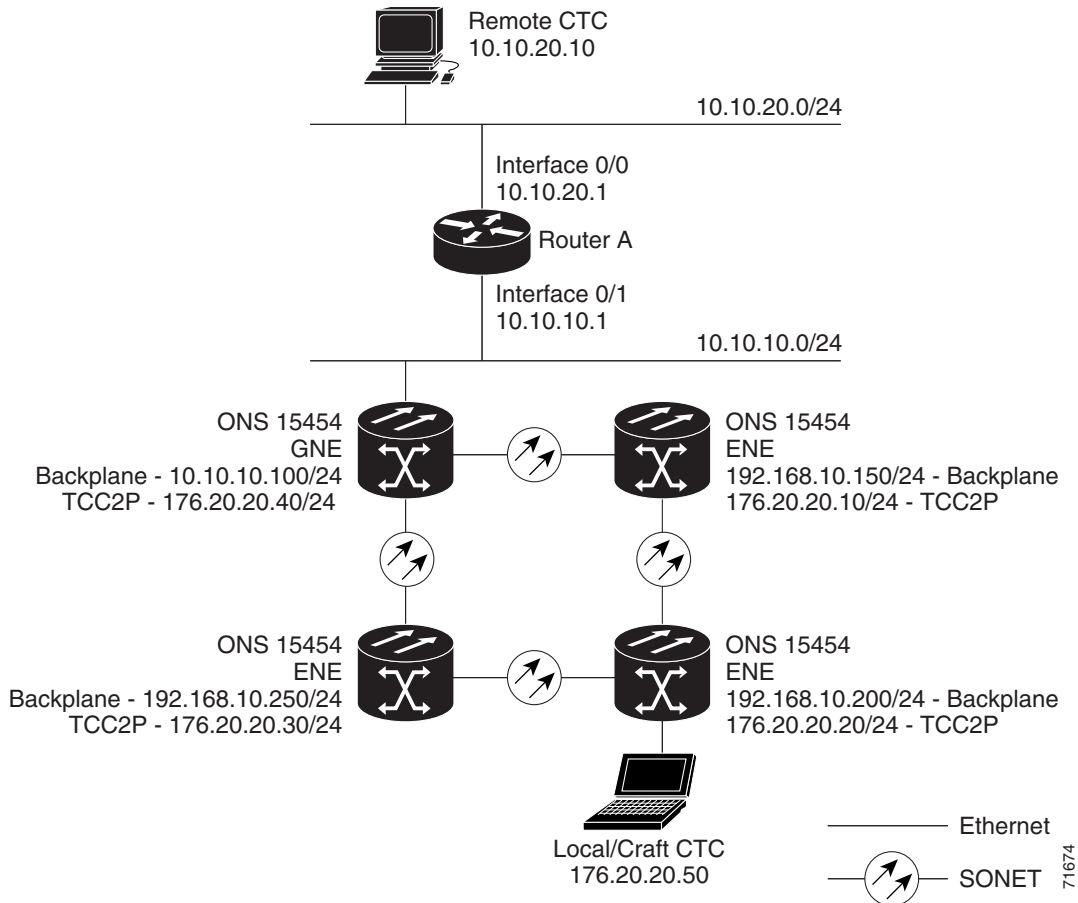


Figure 8-16 shows an example of ONS 15454 nodes connected to a router with secure mode enabled. In each example, the node's TCC2P port address (node address) resides on a different subnet from the node backplane addresses.

Figure 8-16 Scenario 9: ONS 15454 GNE and ENEs on Different Subnets with Secure Mode Enabled



8.2.9.2 Secure Node Locked and Unlocked Behavior

Secure mode can operate on a node in either locked or unlocked mode. By default, secure mode's status is unlocked; only a superuser can convert it to locked mode. Doing so permanently changes the hardware configuration on the active and standby TCC2P cards as well as the chassis.

Locked mode must be used carefully because the cards and shelf retain their locked status even if separated from each other. For example, if a node is in secure, locked mode and you perform a card pull on its standby TCC2P, then insert that as the active card into another node, the secure, locked mode is written to the new node's chassis and standby TCC2P. If you perform a card pull on a secure, locked node's active and standby TCC2Ps and insert both of them into a chassis that previously was in unlocked mode, the node becomes locked.

When it is secure and locked, a node's configuration, Ethernet port status, its secure mode, and the locked status cannot be changed by any network user—including a superuser. To have a secure node's lock removed, contact Cisco Technical Support to arrange a Return Material Authorization (RMA) for the chassis and for the TCC2Ps. Refer to the [“Obtaining Documentation and Submitting a Service Request”](#) section on page [xlvii](#) as needed.

**Caution**

It is necessary for the TCC2Ps and the chassis to be unlocked together. If only one component (such as the shelf) is unlocked, the system will return to locked mode.

8.3 Provisionable Patchcords

A provisionable patchcord is a user-provisioned link that is advertised by OSPF throughout the network. Provisionable patchcords, also called virtual links, are needed in the following situations:

- An optical port is connected to a transponder or muxponder client port provisioned in transparent mode.
- An optical ITU port is connected to a DWDM optical channel card.
- Two transponder or muxponder trunk ports are connected to a DWDM optical channel card and the generic control channel (GCC) is carried transparently through the ring.
- Transponder or muxponder client and trunk ports are in a regenerator group, the cards are in transparent mode, and DCC/GCC termination is not available.

Provisionable patchcords are required on both ends of a physical link. The provisioning at each end includes a local patchcord ID, slot/port information, remote IP address, and remote patchcord ID. Patchcords appear as dashed lines in CTC network view.

An optical patchcord must be provisioned between an OCH filter and an OCH trunk port. A manually provisioned patchcord automatically tunes the transponder (TXP) or muxponder (MXP) trunk as an OCH filter if the TXP or MXP is set to autoprovision at the first tunable wavelength. You can automatically tune internal and external (virtual link) patchcords in CTC. In TL1, only internal patchcords can be provisioned.

Table 8-5 lists the supported card combinations for client and trunk ports in a provisionable patchcord.

Table 8-5 Cisco ONS 15454 Client/Trunk Card Combinations for Provisionable Patchcords

Trunk Cards	Client Cards						
	MXP_2.5G_10G/ TXP_MR_10G	TXP_MR_2.5G/ TXPP_MR_2.5G	MXP_2.5G_10E/ TXP_MR_10E	32MUX-0 32DMX-0	32WSS/ 32DMX	AD-xC-xx.x	4MD-xx.x
MXP_2.5G_10G/ TXP_MR_10G	—	—	—	Yes	Yes	Yes	Yes
TXP_MR_2.5G/ TXPP_MR_2.5G	—	—	—	Yes	Yes	Yes	Yes
MXP_2.5G_10E/ TXP_MR_10E	—	—	—	Yes	Yes	Yes	Yes
MXP_MR_2.5G/ MXPP_MR_2.5G	—	—	—	Yes	Yes	Yes	Yes
OC-192	Yes	—	Yes	—	—	—	—
OC-48	Yes	Yes	Yes	—	—	—	—
OC-192 ITU	—	—	—	Yes	Yes	Yes	Yes
OC-48 ITU	—	—	—	Yes	Yes	Yes	Yes

Table 8-6 lists the supported card combinations for client-to-client ports in a patchcord.

Table 8-6 Cisco ONS 15454 Client/Client Card Combinations for Provisionable Patchcords

Client Cards	MXP_2.5G_10G/ TXP_MR_10G	TXP_MR_2.5G/ TXPP_MR_2.5G	MXP_2.5G_10E/ TXP_MR_10E
MXP_2.5G_10G/TXP_MR_10G	Yes	—	Yes
TXP_MR_2.5G/TXPP_MR_2.5G	—	Yes	—
MXP_2.5G_10E/TXP_MR_10E	Yes	—	Yes

Table 8-7 lists the supported card combinations for trunk-to-trunk ports in a patchcord.

Table 8-7 Cisco ONS 15454 Trunk/Trunk Card Combinations for Provisionable Patchcords

Trunk Cards	MXP_2.5G_10G/ TXP_MR_10G	TXP_MR_2.5G/ TXPP_MR_2.5G	MXP_2.5G_10E/ TXP_MR_10E
MXP_2.5G_10G/TXP_MR_10G	Yes	—	Yes
TXP_MR_2.5G/TXPP_MR_2.5G	—	Yes	—
MXP_2.5G_10E/TXP_MR_10E	Yes	—	Yes

Optical ports have the following requirements when used in a provisionable patchcord:

- An optical port connected to transponder/muxponder port or add/drop multiplexer or multiplexer/demultiplexer port requires section DCC/line DCC (SDCC/LDCC or RS-DCC/MS-DCC) termination.
- If the optical port is the protection port in a 1+1 group, the working port must have SDCC/LDCC or RS-DCC/MS-DCC termination provisioned.
- If the remote end of a patchcord is Y-cable protected or is an add/drop multiplexer or multiplexer/demultiplexer port, an optical port requires two patchcords.

Transponder and muxponder ports have the following requirements when used in a provisionable patchcord:

- Two patchcords are required when a transponder/muxponder port is connected to an add/drop multiplexer or multiplexer/demultiplexer port. CTC automatically prompts the user to set up the second patchcord.
- If a patchcord is on a client port in a regenerator group, the other end of the patchcord must be on the same node and on a port within the same regenerator group.
- A patchcord is allowed on a client port only if the card is in transparent mode.

DWDM cards support provisionable patchcords only on optical channel ports. Each DWDM optical channel port can have only one provisionable patchcord.

8.4 Routing Table

ONS 15454 routing information is displayed on the Maintenance > Routing Table tabs. The routing table provides the following information:

- Destination—Displays the IP address of the destination network or host.
- Mask—Displays the subnet mask used to reach the destination host or network.

- Gateway—Displays the IP address of the gateway used to reach the destination network or host.
- Usage—Shows the number of times the listed route has been used.
- Interface—Shows the ONS 15454 interface used to access the destination. Values are:
 - motfcc0—The ONS 15454 Ethernet interface, that is, the RJ-45 jack on the TCC2/TCC2P and, for ANSI shelves, the LAN 1 pins on the backplane or, for ETSI shelves, the LAN connection on the MIC-C/T/P.
 - pdcc0—An SDCC or RS-DCC interface, that is, an OC-N trunk card identified as the SDCC or RS-DCC termination.
 - lo0—A loopback interface.

Table 8-8 shows sample routing entries for an ONS 15454.

Table 8-8 Sample Routing Table Entries

Entry	Destination	Mask	Gateway	Usage	Interface
1	0.0.0.0	0.0.0.0	172.20.214.1	265103	motfcc0
2	172.20.214.0	255.255.255.0	172.20.214.92	0	motfcc0
3	172.20.214.92	255.255.255.255	127.0.0.1	54	lo0
4	172.20.214.93	255.255.255.255	0.0.0.0	16853	pdcc0
5	172.20.214.94	255.255.255.255	172.20.214.93	16853	pdcc0

Entry 1 shows the following:

- Destination (0.0.0.0) is the default route entry. All undefined destination network or host entries on this routing table are mapped to the default route entry.
- Mask (0.0.0.0) is always 0 for the default route.
- Gateway (172.20.214.1) is the default gateway address. All outbound traffic that cannot be found in this routing table or is not on the node's local subnet is sent to this gateway.
- Interface (motfcc0) indicates that the ONS 15454 Ethernet interface is used to reach the gateway.

Entry 2 shows the following:

- Destination (172.20.214.0) is the destination network IP address.
- Mask (255.255.255.0) is a 24-bit mask, meaning all addresses within the 172.20.214.0 subnet can be a destination.
- Gateway (172.20.214.92) is the gateway address. All outbound traffic belonging to this network is sent to this gateway.
- Interface (motfcc0) indicates that the ONS 15454 Ethernet interface is used to reach the gateway.

Entry 3 shows the following:

- Destination (172.20.214.92) is the destination host IP address.
- Mask (255.255.255.255) is a 32 bit mask, meaning only the 172.20.214.92 address is a destination.
- Gateway (127.0.0.1) is a loopback address. The host directs network traffic to itself using this address.
- Interface (lo0) indicates that the local loopback interface is used to reach the gateway.

Entry 4 shows the following:

- Destination (172.20.214.93) is the destination host IP address.
- Mask (255.255.255.255) is a 32 bit mask, meaning only the 172.20.214.93 address is a destination.
- Gateway (0.0.0.0) means the destination host is directly attached to the node.
- Interface (pdcc0) indicates that a DCC interface is used to reach the destination host.

Entry 5 shows a DCC-connected node that is accessible through a node that is not directly connected:

- Destination (172.20.214.94) is the destination host IP address.
- Mask (255.255.255.255) is a 32-bit mask, meaning only the 172.20.214.94 address is a destination.
- Gateway (172.20.214.93) indicates that the destination host is accessed through a node with IP address 172.20.214.93.
- Interface (pdcc0) indicates that a DCC interface is used to reach the gateway.

8.5 External Firewalls

This section provides sample access control lists for external firewalls. [Table 8-9](#) lists the ports that are used by the TCC2/TCC2P.

Table 8-9 Ports Used by the TCC2/TCC2P

Port	Function	Action ¹
0	Never used	D
20	FTP	D
21	FTP control	D
22	SSH	D
23	Telnet	D
80	HTTP	D
111	SUNRPC	NA
161	SNMP traps destinations	D
162	SNMP traps destinations	D
513	rlogin	D
683	CORBA IIOP	OK
1080	Proxy server (socks)	D
2001-2017	I/O card Telnet	D
2018	DCC processor on active TCC2/TCC2P	D
2361	TL1	D
3082	Raw TL1	D
3083	TL1	D
5001	BLSR server port	D
5002	BLSR client port	D
7200	SNMP alarm input port	D

Table 8-9 *Ports Used by the TCC2/TCC2P (continued)*

Port	Function	Action ¹
9100	EQM port	D
9401	TCC boot port	D
9999	Flash manager	D
10240-12287	Proxy client	D
57790	Default TCC listener port	OK

1. D = deny, NA = not applicable, OK = do not deny

The following access control list (ACL) example shows a firewall configuration when the proxy server gateway setting is not enabled. In the example, the CTC workstation's address is 192.168.10.10, and the ONS 15454 address is 10.10.10.100. The firewall is attached to the GNE, so inbound is CTC to the GNE and outbound is from the GNE to CTC. The CTC Common Object Request Broker Architecture (CORBA) Standard constant is 683 and the TCC CORBA Default is TCC Fixed (57790).

```
access-list 100 remark *** Inbound ACL, CTC -> NE ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 eq www
access-list 100 remark *** allows initial contact with ONS 15454 using http (port 80) ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 eq 57790
access-list 100 remark *** allows CTC communication with ONS 15454 GNE (port 57790) ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 established
access-list 100 remark *** allows ACKs back from CTC to ONS 15454 GNE ***

access-list 101 remark *** Outbound ACL, NE -> CTC ***
access-list 101 remark
access-list 101 permit tcp host 10.10.10.100 host 192.168.10.10 eq 683
access-list 101 remark *** allows alarms etc., from the 15454 (random port) to the CTC
workstation (port 683) ***
access-list 100 remark
access-list 101 permit tcp host 10.10.10.100 host 192.168.10.10 established
access-list 101 remark *** allows ACKs from the 15454 GNE to CTC ***
```

The following ACL example shows a firewall configuration when the proxy server gateway setting is enabled. As with the first example, the CTC workstation address is 192.168.10.10 and the ONS 15454 address is 10.10.10.100. The firewall is attached to the GNE, so inbound is CTC to the GNE and outbound is from the GNE to CTC. CTC CORBA Standard constant is 683 and TCC CORBA Default is TCC Fixed (57790).

```
access-list 100 remark *** Inbound ACL, CTC -> NE ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 eq www
access-list 100 remark *** allows initial contact with the 15454 using http (port 80) ***
access-list 100 remark
access-list 100 permit tcp host 192.168.10.10 host 10.10.10.100 eq 1080
access-list 100 remark *** allows CTC communication with the 15454 GNE (port 1080) ***
access-list 100 remark

access-list 101 remark *** Outbound ACL, NE -> CTC ***
access-list 101 remark
access-list 101 permit tcp host 10.10.10.100 host 192.168.10.10 established
access-list 101 remark *** allows ACKs from the 15454 GNE to CTC ***
```

8.6 Open GNE

The ONS 15454 can communicate with non-ONS nodes that do not support Point-to-Point Protocol (PPP) vendor extensions or OSPF type 10 opaque link-state advertisements (LSA), both of which are necessary for automatic node and link discovery. An open GNE configuration allows a GCC-based network to function as an IP network for non-ONS nodes.

To configure an open GNE network, you can provision GCC terminations to include a far-end, non-ONS node using either the default IP address of 0.0.0.0 or a specified IP address. You provision a far-end, non-ONS node by checking the “Far End is Foreign” check box during GCC creation. The default 0.0.0.0 IP address allows the far-end, non-ONS node to identify itself with any IP address; if you set an IP address other than 0.0.0.0, a link is established only if the far-end node identifies itself with that IP address, providing an extra level of security.

By default, the proxy server only allows connections to discovered ONS peers and the firewall blocks all IP traffic between the GCC network and LAN. You can, however, provision proxy tunnels to allow up to 12 additional destinations for SOCKS version 5 connections to non-ONS nodes. You can also provision firewall tunnels to allow up to 12 additional destinations for direct IP connectivity between the GCC network and LAN. Proxy and firewall tunnels include both a source and destination subnet. The connection must originate within the source subnet and terminate within the destination subnet before either the SOCKS connection or IP packet flow is allowed. A proxy connection is allowed if the CTC client is in a source subnet and the requested destination is in the destination subnet. Firewall tunnels allow IP traffic to route between the node Ethernet and pdcc interfaces. An inbound Ethernet packet is allowed through the firewall if its source address matches a tunnel source and its destination matches a tunnel destination. An inbound pdcc packet is allowed through the firewall if its source address matches a tunnel destination and its destination address matches a tunnel source. Tunnels only affect TCP and UDP packets.

The availability of proxy and/or firewall tunnels depends on the network access settings of the node:

- If the node is configured with the proxy server enabled in GNE or ENE mode, you must set up a proxy tunnel and/or a firewall tunnel.
- If the node is configured with the proxy server enabled in proxy-only mode, you can set up proxy tunnels. Firewall tunnels are not allowed.
- If the node is configured with the proxy server disabled, neither proxy tunnels or firewall tunnels are allowed.

Figure 8-17 shows an example of a foreign node connected to the GCC network. Proxy and firewall tunnels are useful in this example because the GNE would otherwise block IP access between the PC and the foreign node.

Figure 8-17 Proxy and Firewall Tunnels for Foreign Terminations

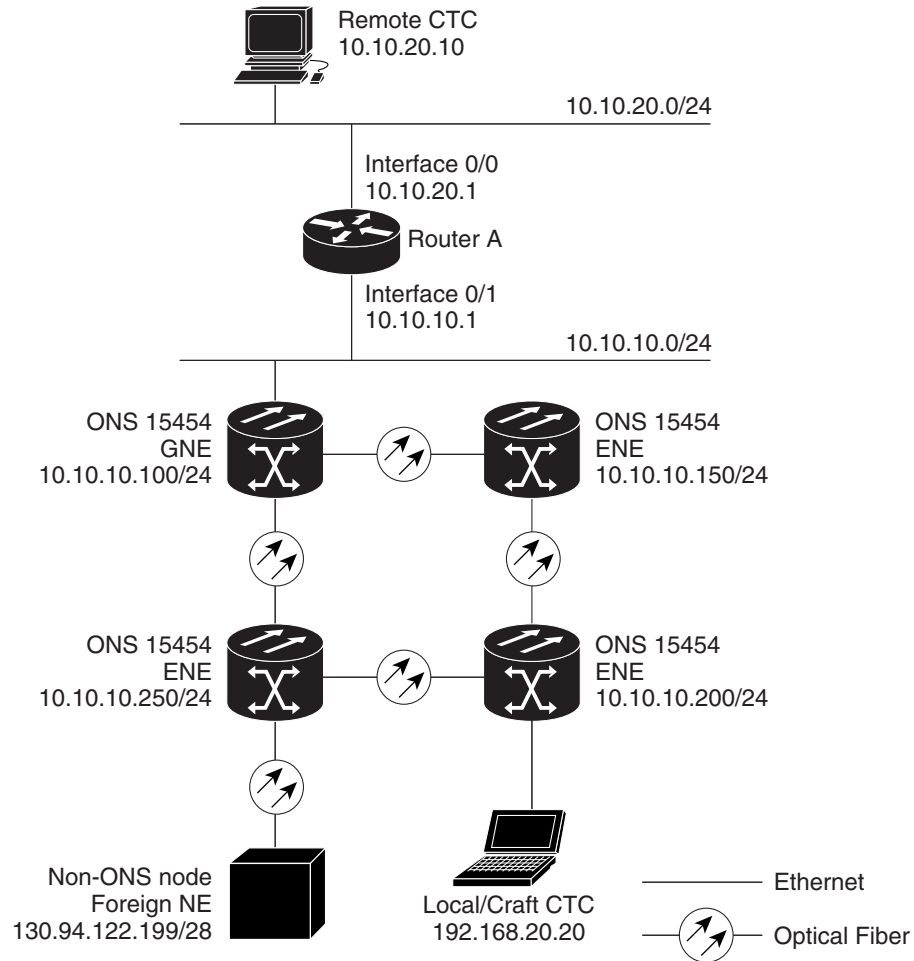
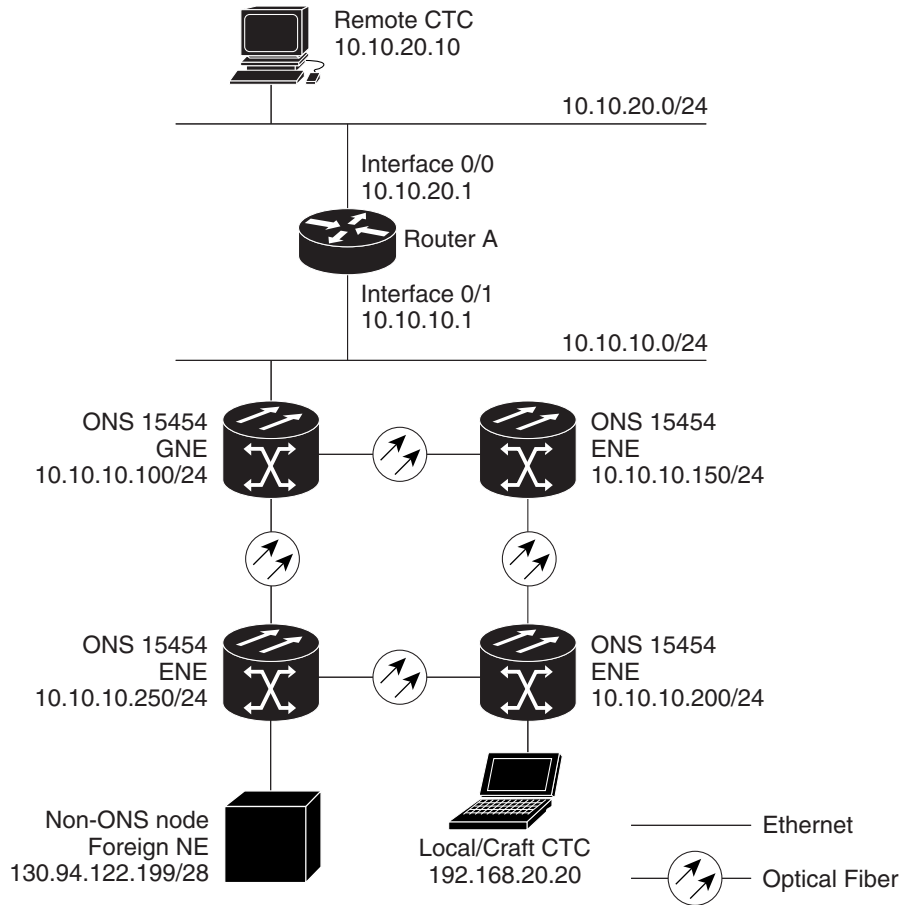


Figure 8-18 shows a remote node connected to an ENE Ethernet port. Proxy and firewall tunnels are useful in this example because the GNE would otherwise block IP access between the PC and foreign node. This configuration also requires a firewall tunnel on the ENE.

12/4261

Figure 8-18 Foreign Node Connection to an ENE Ethernet Port



8.7 TCP/IP and OSI Networking

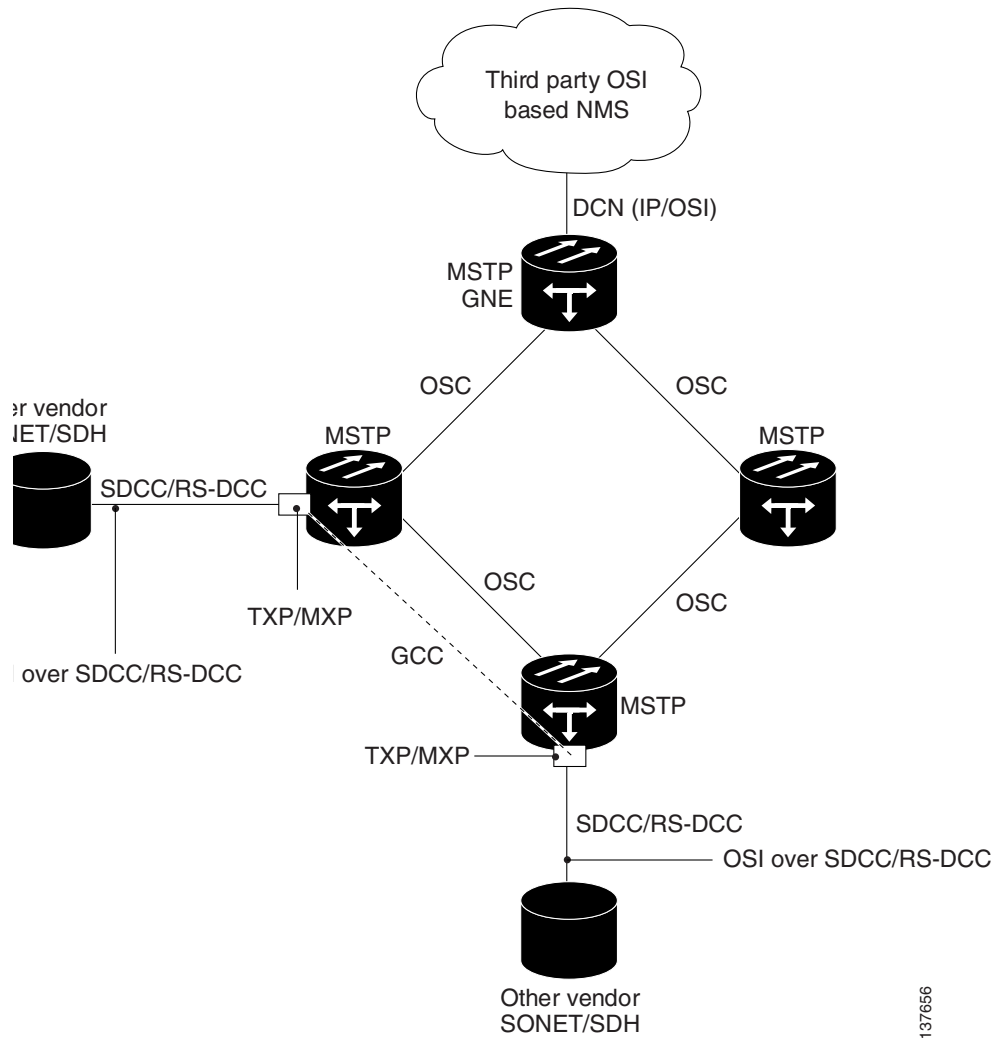
ONS 15454 DCN communication is based on the TCP/IP protocol suite. However, ONS 15454s can also be networked with equipment that uses the OSI protocol suite. While TCP/IP and OSI protocols are not directly compatible, they do have the same objectives and occupy similar layers of the OSI reference model. For detailed information about OSI protocols, processes, and scenarios, refer to the “Management Network Connectivity” chapter in the *ONS 15454 Reference Manual*. OSI/MSTP scenarios are provided in the following sections.

In OSI/MSTP Scenario 1 (Figure 8-19), an SDCC or RS-DCC carries an OC-N signal from an OSI-based third party NE to a TXP/MXP card on an ONS NE. It is carried by GCC to a TXP/MXP card on another MSTP NE and then by SDCC or RS-DCC to a second third party NE. This scenario requires TXPs/MXPs whose client interfaces can be provisioned in section or line termination mode. These include:

- TXP_MR_2.5 / TXPP_MR_2.5 (when equipped with OCn-N SFPs)
- TXP_MR_10G / TXP_MR_10E (when the client is configured as OC192)
- MXP_2.5_10G and MXP_2.5_10E

OSI has to be carried or tunnelled to the other TXP/MXP through an OSC termination, GCC termination, or both. The third party NMS has OSI connectivity to its NEs with the MSTP ONS NE serving as the GNE for third party vendor OSI-based SONET equipment.

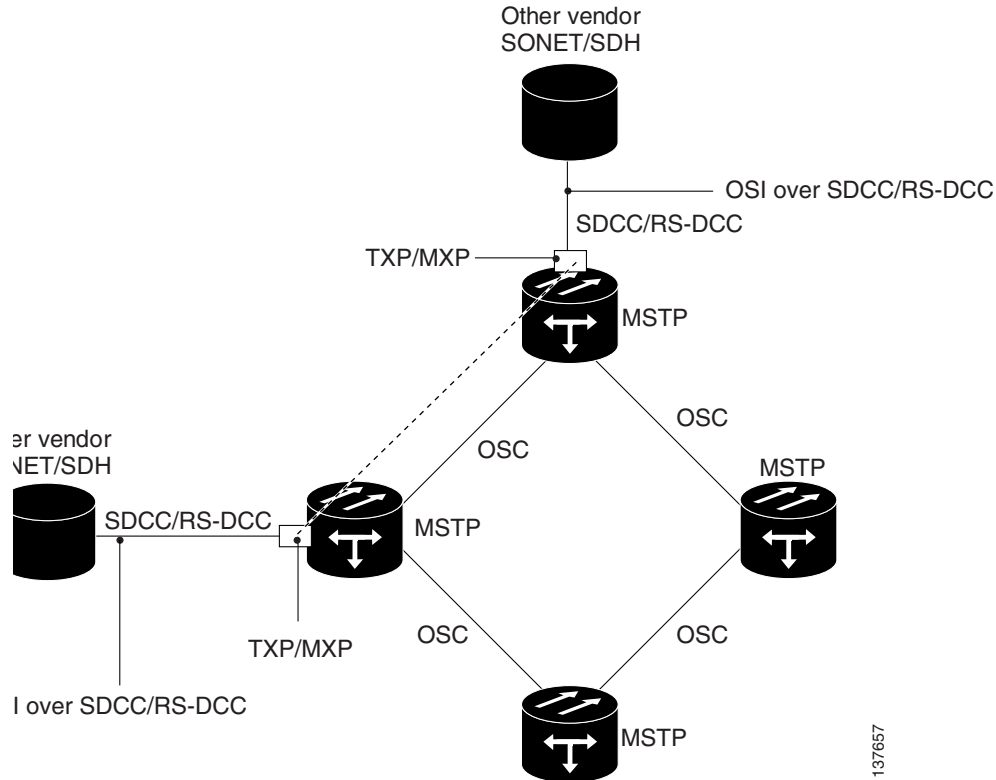
Figure 8-19 OSI/MSTP Scenario 1



OSI/MSTP Scenario 2 (Figure 8-20) is similar to Scenario 1, except the MSTP NEs do not have connectivity to an OSI NMS.

137656

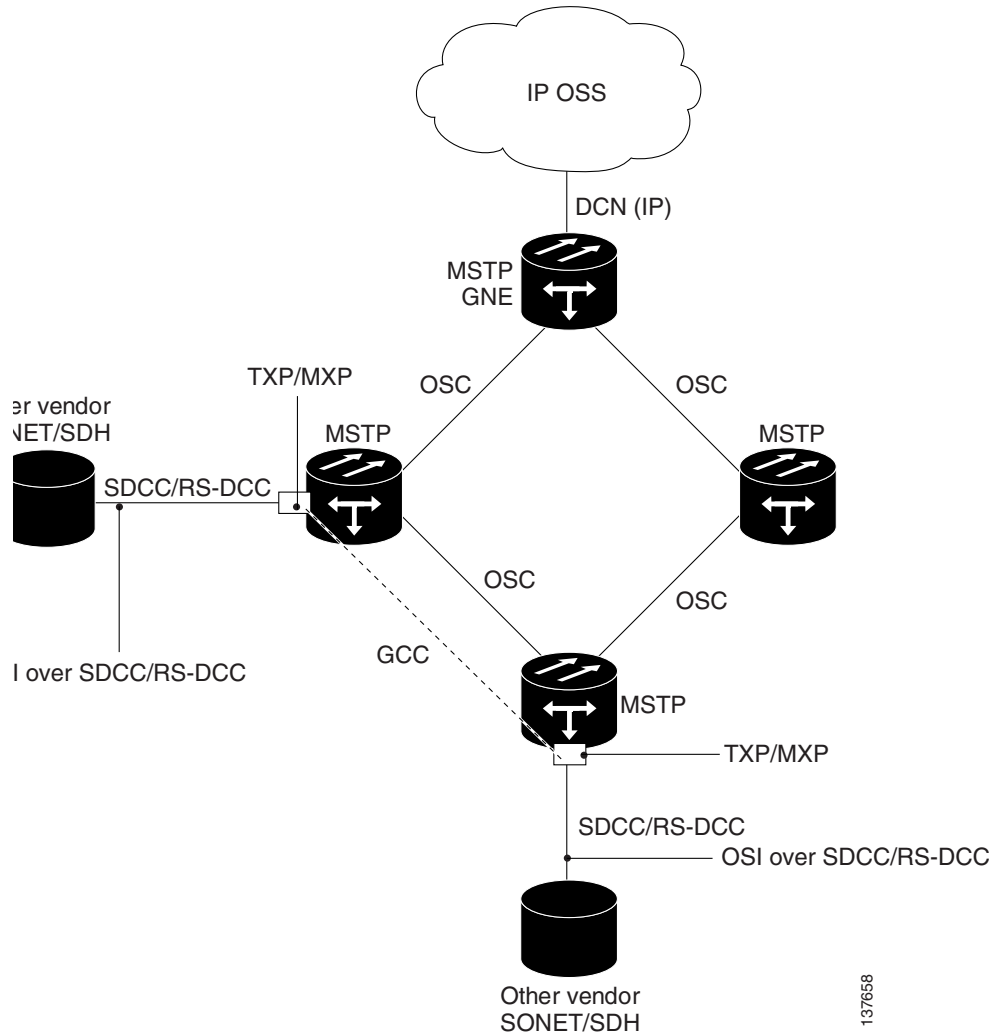
Figure 8-20 OSI/MSTP Scenario 2



OSI/MSTP Scenario 3 (Figure 8-21) shows the following:

- OSI is carried over an SDCC or RS-DCC termination.
- OSI has to be carried or tunneled to the other peer TXP/MXP through an OSC termination, GCC termination, or both
- An OSS has IP connectivity to all the NEs
- The MSTP NE is a GNE for the third party OSI-based SONET NEs. the MSTP NEs perform all mediation functions.

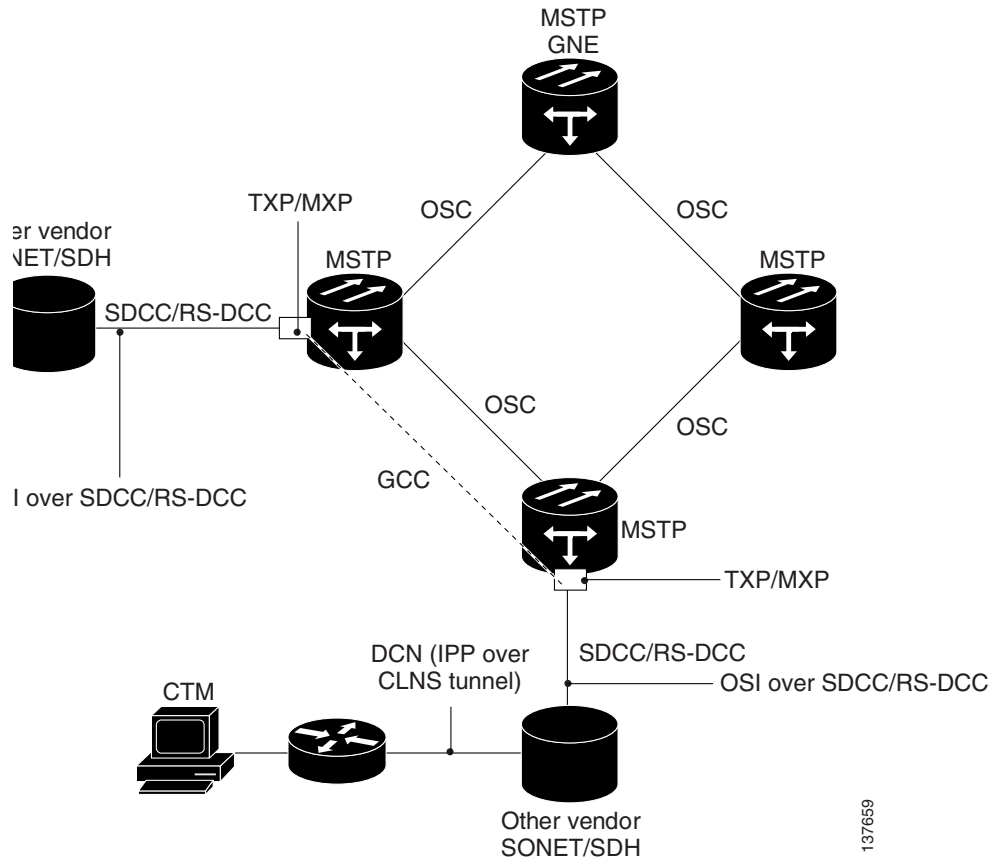
Figure 8-21 OSI/MSTP Scenario 3



OSI/MSTP Scenario 4 (Figure 8-22) shows the following:

- OSI is carried over an SDCC or RS-DCC termination.
- OSI has to be carried or tunneled to the other peer TXP/MXP through an OSC termination, GCC termination, or both
- An OSS has IP connectivity to all the NEs through third party NE network
- The MSTP NE is a GNE for the third party OSI-based SONET NEs. the MSTP NEs perform all mediation functions.
- The third party vendor NE is a GNE for the Cisco MSTP network.

Figure 8-22 OSI/IP Scenario 4



137659

8.8 Link Management Protocol

This section describes Link Management Protocol (LMP) management and configuration. To troubleshoot specific alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*. To configure LMP, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.



Note

Cisco Transport Manager (CTM) support is not required for LMP.

LMP is used to establish traffic engineering (TE) links between Cisco ONS 15454 nodes or between Cisco ONS 15454 nodes and selected non-Cisco nodes that use vendor-specific hardware.

8.8.1 Overview

LMP manages TE links between nodes through the use of control channels. TE links are designed to define the most efficient paths possible for traffic to flow over a network and through the Internet. Traffic engineering encompasses traffic management, capacity management, traffic measurement and modeling,

network modeling, and performance analysis. Traffic engineering methods include call routing, connection routing, quality of service (QoS) resource management, routing table management, and capacity management.

LMP manages TE links between peer nodes, such as two optical cross-connect (OXC) nodes. Peer nodes have equivalent signaling and routing. LMP also manages TE links between a node such as an OXC and an adjacent optical line system (OLS) node. An example of an OLS node is an ONS 15454 DWDM node.

Networks with routers, switches, OXC nodes, DWDM OLS nodes, and add/drop multiplexers (ADM) use a common control plane such as Generalized Multiprotocol Label Switching (GMPLS) to provision resources and provide network survivability using protection and restoration techniques. LMP is part of the GMPLS protocol suite.

A single TE link can be formed from several individual links. Management of TE links can be accomplished with in-band messaging, as well as with out-of-band methods. The following material describes the link management protocol between a pair of nodes that manages TE links. LMP accomplishes the following:

- Maintains control channel connectivity
- Verifies the physical connectivity of the data links
- Correlates the link property information
- Suppresses downstream alarms
- Localizes link failures for protection/restoration purposes in multiple types of networks

DWDM networks often use MPLS and GMPLS as common-control planes to control how packets are routed through the network.

LMP manages the control channel that must exist between nodes for routing, signaling, and link management. For a control channel to exist, each node must have an IP interface that is reachable from the other node. Together, the IP interfaces form a control channel. The interface for the control messages does not have to be the same interface as the one for the data.

The LMP protocol is specified by the IETF in an Internet-Draft, draft-ietf-ccamp-lmp-10.txt, which was published as a Proposed Standard, RFC 4204, (<http://www.ietf.org/rfc/rfc4204.txt>), on 2005-10-28.

8.8.1.1 MPLS

MPLS provides a mechanism for engineering network traffic patterns that is independent of routing tables and routing protocols. MPLS assigns short labels to network packets that describe how to forward the packets through the network. The traditional Layer 3 forwarding mechanism requires each hop to analyze the packet header and determine the next hop based on routing table lookup. With MPLS, the analysis of the packet header is performed just once, when a packet enters the MPLS cloud. The packet is then assigned to a stream known as a Label Switch Path (LSP), which is identified with a label. The short, fixed-length label is an index into a forwarding table, which is more efficient than the traditional routing table lookup at each hop. Using MPLS, both the control protocol (used to manage the LSPs) and user data can be carried over the same bearer interfaces.

8.8.1.2 GMPLS

GMPLS is based on MPLS, with protocol extensions to support additional technologies, including time division multiplexing (TDM) slots (such as SONET and SDH), wavelength division multiplexing (WDM) wavelengths at Layer 1, and fiber. For MPLS, the control traffic (signaling and routing) can run

over bearer interfaces. This is not the case with GMPLS, where a separate control channel is used. The GMPLS control channel is managed with LMP. With GMPLS, the control channels between two adjacent nodes do not need to use the same physical medium as the data links between those nodes.

8.8.2 Configuring LMP

Configuring LMP consists of the following four topics:

- Control channel management
- TE link management
- Link connectivity verification
- Fault management

8.8.2.1 Control Channel Management

Control channel management establishes and maintains control channels between adjacent nodes. Control channels use a Config message exchange and a fast keep-alive mechanism between the nodes. The latter is required if lower-level mechanisms are not available to detect control-channel failures. A maximum of four LMP control channels can be supported.

The nodes initially exchange configuration messages (Config, ConfigAck, and ConfigNack), which are used to exchange identifiers and negotiate parameters for the keep-alive protocol. The nodes then perform a continuous rapid exchange of Hello messages, which are used to monitor the health on the channel.



Note The identifiers are Local Node Id, Remote Node Id, Local Control Channel Id, and Remote Control Channel Id. The parameters are the HelloInterval and the HelloDeadInterval.

LMP out-of-fiber and LMP out-of-band control channels are supported and terminated on the shelf. An out-of-fiber control channel includes using the control plane network (Ethernet) for the control channel because Ethernet is separate from the fiber used for the data plane. An out-of-band control channel includes using overhead bytes, such as the SDCC and LDCC bytes, for the control channel because overhead bytes are separate from the payload. In-band means that the control messages are in the same channel as the data messages; therefore, out-of-band refers to overhead bytes in the same fiber, separate circuits dedicated to control messages in the same fiber (SONET/SDH circuits), or separate wavelengths in the same fiber (DWDM).



Note Overhead bytes are SDCC or LDCC for SONET networks, RS-DCC or MS-DCC for SDH networks, and GCC or OSC for DWDM networks.

Out-of-band implies in-fiber, but not in-band. In-fiber means that the control messages are in the same fiber as the data messages, and includes both in-band and out-of-band. Out-of-fiber means that the control messages take a path separate from the data plane. This includes separate fiber and Ethernet.

The control channel management for a peer node to OLS link is the same as that for a link between two peer nodes.

**Note**

The software supports gracefully taking a control channel down for administration purposes (refer to Section 3.2.3 of the IETF LMP document). However, there is no provision for a graceful restart (refer to Section 8 of RFC 4204).

- Graceful means that the nodes participating in the control channel agree that the link should go down. To gracefully take down a control channel, the node sets the ControlChannelDown flag in its messages to the other node until either the HelloDeadInterval expires or the other node sends a message back with the ControlChannelDown flag set. In either case, the node then stops sending messages for this control channel. Before a control channel is taken down, there should be a backup control channel in place that can be used to manage the data links.
- Non-graceful means that one of the nodes just stops sending messages. The other side would declare a failure after the HelloDeadInterval, but would continue to send Hello messages to see if the control channel will come back up.

8.8.2.2 TE Link Management

LMP ensures that links are grouped into TE links and that the properties of those links are the same at both endpoints. This is called TE link management, or link property correlation.

Link property correlation is used to synchronize the TE link properties and verify the TE link configuration. The link property correlation function of LMP aggregates one or more data links into a TE link and synchronizes the properties of the TE link with the neighbor node. The procedure starts by sending a LinkSummary message to the neighbor. The LinkSummary message includes the local and remote Link Identifier, a list of all data links that make up the TE link, and various link properties. It is mandatory that a LinkSummaryAck or LinkSummaryNack message be sent in response to the receipt of a LinkSummary message, indicating agreement or disagreement with the link properties.

**Note**

A maximum of 256 LMP TE links is supported.

8.8.2.3 Link Connectivity Verification

Link connectivity verification might be supported in future CTC software releases.

8.8.2.4 Fault Management

Fault management is particularly useful when the control channels are physically diverse from the data links. It is used for rapid notification regarding the status of one or more TE-link data channels. The use of fault management is negotiated as part of the TE link's LinkSummary exchange. Data links and TE link failures can be rapidly isolated and fault management supports both unidirectional and bidirectional LSPs. Transparent devices are useful because traditional methods for monitoring the health of allocated data links might no longer be appropriate. Instead, fault detection is delegated to the physical layer (for example, loss of light or optical monitoring of the data) instead of Layer 2 or Layer 3. Fault management uses the ChannelStatus, ChannelStatusAck, ChannelStatusRequest, and ChannelStatusResponse messages.

**Note**

The LMP Channel Activation/Deactivation Indication procedures are not supported; they are described in the IETF LMP document, Sections 6.4 and 6.5.

8.8.3 LMP WDM

LMP manages traffic engineering links between peer nodes (nodes that are peers in signaling and/or routing).

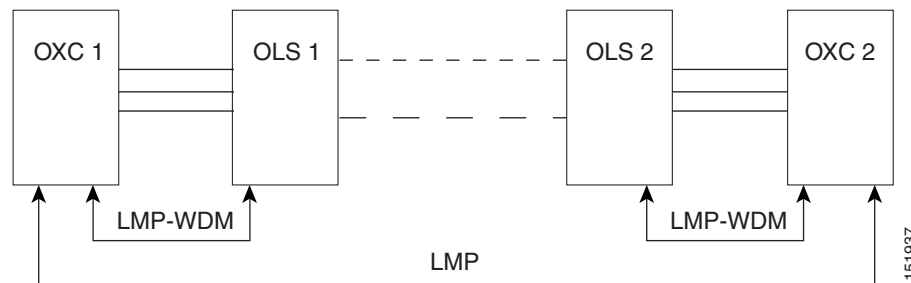


Note

LMP-WDM extensions that allow management of links between a peer node and an adjacent OLS node are described in the following IETF document: Internet-Draft, draft-ietf-ccamp-lmp-wdm-03.txt, published as a Proposed Standard, RFC 4209 (<http://www.ietf.org/rfc/rfc4209.txt>), 2005-11-1

The purpose of the LMP WDM extensions is to allow LMP to be used between an OXC node and an adjacent DWDM OLS node. [Figure 8-23](#) illustrates the relationship between LMP and LMP-WDM. OXC 1 and OXC 2 are peer nodes whose control channel is managed with LMP. LMP-WDM manages the control channel between an OXC node and an OLS node.

Figure 8-23 LMP and LMP-WDM Relationship



When the two OLS nodes can communicate their configuration and the current state of their optical link to the two peer nodes (OXC 1 and OXC 2) through LMP-WDM, network usability is improved through the reduction of manual configuration and enhanced fault detection and recovery.

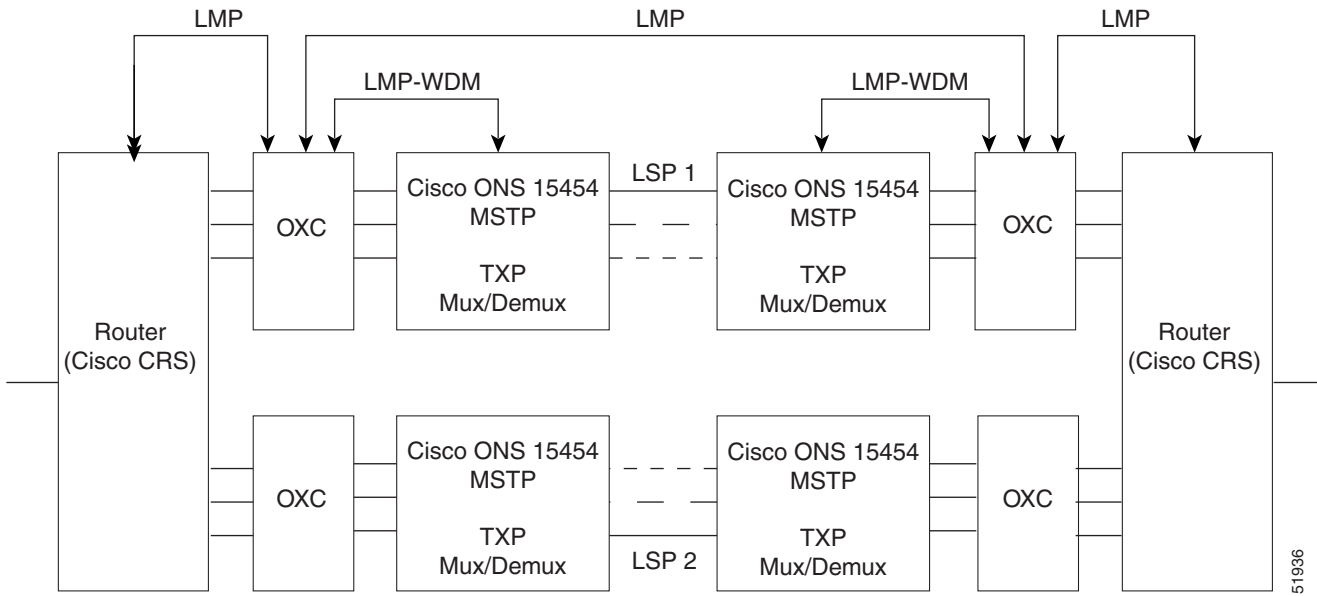
8.8.4 LMP Network Implementation

[Figure 8-24](#) shows a network-level LMP implementation. It is an IP-plus-optical network, with end-to-end routing based on MPLS and GMPLS. The primary network components are:

- Routers
 - Cisco Carrier Router System (CSR)
 - Cisco Gigabit Switch Router (GSR)
- An OXC node
- Ultra long-haul (ULH) DWDM equipment

LMP and other features allow the Cisco ONS 15454 DWDM node to fulfill the ultra long haul (ULH) DWDM role. [Figure 8-24](#) illustrates the relationship between the network components.

Figure 8-24 LMP System Implementation



151936



Alarm and TCA Monitoring and Management

This chapter describes Cisco Transport Controller (CTC) alarm and threshold crossing alert (TCA) monitoring and management. To troubleshoot specific alarms, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- [9.1 Overview, page 9-1](#)
- [9.2 Alarm Counts on the LCD for a Node, Slot, or Port, page 9-2](#)
- [9.3 Alarm Display, page 9-2](#)
- [9.4 Alarm Severities, page 9-8](#)
- [9.5 Alarm Profiles, page 9-9](#)
- [9.6 External Alarms and Controls, page 9-13](#)
- [9.7 Alarm Suppression, page 9-15](#)
- [9.8 Multishelf Configuration Alarming, page 9-15](#)
- [9.9 Threshold Crossing Alert Suppression, page 9-17](#)

9.1 Overview

CTC detects and reports alarms generated by the Cisco ONS 15454 and the larger network. You can use CTC to monitor and manage alarms at the card, node, or network level. Default alarm severities conform to the Telcordia GR-474-CORE standard, but you can set alarm severities in customized alarm profiles or suppress CTC alarm reporting. For a detailed description of the standard Telcordia categories employed by Optical Networking System (ONS) nodes, refer to the *Cisco ONS 15454 DWDM Troubleshooting Guide*.



Note

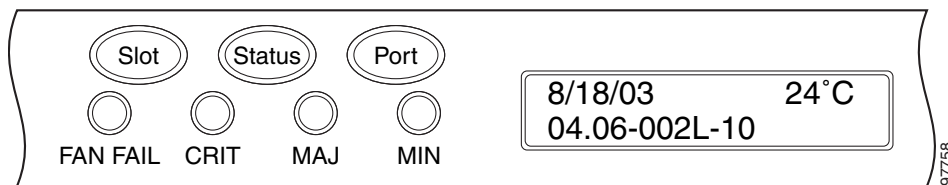
ONS 15454 alarms can also be monitored and managed through Transaction Language One (TL1) or a network management system (NMS).

9.2 Alarm Counts on the LCD for a Node, Slot, or Port

You can view node, slot, or port-level alarm counts and summaries using the buttons on the ONS 15454 LCD panel. The Slot and Port buttons toggle between display types; the Slot button toggles between node display and slot display, and the Port button toggles between slot and port views. Pressing the Status button after you choose the display mode changes the display from alarm count to alarm summary.

The ONS 15454 has a one-button update for some commonly viewed alarm counts. If you press the Slot button once and then wait eight seconds, the display automatically changes from a slot alarm count to a slot alarm summary. If you press the Port button to toggle to port-level display, you can use the Port button to toggle to a specific slot and to view each port's port-level alarm count. [Figure 9-1](#) shows the LCD panel layout.

Figure 9-1 Shelf LCD Panel



9.3 Alarm Display

In the card, node, or network CTC view, click the Alarms tab to display the alarms for that card, node, or network. The Alarms window shows alarms in compliance with Telcordia GR-253-CORE. This means that if a network problem causes two alarms, such as loss of frame (LOF) and loss of signal (LOS), CTC only shows the LOS alarm in this window because it supersedes the LOF and replaces it.

The Path Width column in the Alarms and Conditions tabs expands on the alarmed object information contained in the access identifier (AID) string (such as “STS-4-1-3”) by giving the number of STSs contained in the alarmed path. For example, the Path Width tells you whether a critical alarm applies to an STS1 or an STS48c. The column reports the width as a 1, 3, 6, 12, 48, etc. as appropriate, understood to be “STS-N.”

[Table 9-1](#) lists the column headings and the information recorded in each column.

Table 9-1 Alarm Column Descriptions

Column	Information Recorded
Num	Sequence number of the original alarm. (The column is hidden by default; to view it, right-click a column and choose Show Column > Num.)
Ref	Reference number of the original alarm. (The column is hidden by default; to view it, right-click a column and choose Show Column > Ref.)
New	Indicates a new alarm; to change this status, click either the Synchronize button or the Delete Cleared Alarms button.
Date	Date and time of the alarm.
Node	Shows the name of the node where the condition or alarm occurred. (Visible in network view.)

Table 9-1 Alarm Column Descriptions (continued)

Column	Information Recorded
Object	TL1 access identifier (AID) for the alarmed object; for an STSmon or VTmon, this is the monitored STS or VT.
Eqpt Type	If an alarm is raised on a card, the card type in this slot.
Slot	If an alarm is raised on a card, the slot where the alarm occurred [appears only in network and node view (single-shelf mode) or shelf view (multishelf mode)].
Port	If an alarm is raised on a card, the port where the alarm is raised; for STSTerm and VTTerm, the port refers to the upstream card it is partnered with.
Path Width	Indicates how many STSs are contained in the alarmed path. This information complements the alarm object notation, which is explained in the <i>Cisco ONS 15454 DWDM Troubleshooting Guide</i>
Sev	Severity level: CR (Critical), MJ (Major), MN (minor), NA (Not Alarmed), NR (Not Reported).
ST	Status: R (raised), C (clear), T (transient).
SA	When checked, indicates a service-affecting alarm.
Cond	The error message/alarm name; these names are alphabetically defined in the <i>Cisco ONS 15454 DWDM Troubleshooting Guide</i> .
Description	Description of the alarm.

Table 9-2 lists the color codes for alarm and condition severities.

Table 9-2 Color Codes for Alarms and Condition Severities

Color	Description
Red	Raised Critical (CR) alarm
Orange	Raised Major (MJ) alarm
Yellow	Raised Minor (MN) alarm
Magenta (pink)	Raised Not Alarmed (NA) condition
Blue	Raised Not Reported (NR) condition
White	Cleared (C) alarm or condition

9.3.1 Viewing Alarms by Time Zone

By default, alarms and conditions are displayed with the time stamp of the CTC workstation where you are viewing them. However, you can set the node to report alarms (and conditions) using the time zone where the node is located.

9.3.2 Controlling Alarm Display

You can control the display of the alarms shown on the Alarms window. Table 9-3 shows the actions you can perform in the Alarms window.

Table 9-3 Alarm Display

Button/Check Box/Tool	Action
Filter button	Allows you to change the display on the Alarms window to show only alarms that meet a certain severity level, occur in a specified time frame, or reflect specific conditions. For example, you can set the filter so that only critical alarms display in the window. If you enable the Filter feature by clicking the Filter button in one CTC view, such as node view (single-shelf mode) or shelf view (multishelf mode), it is enabled in the others as well (card view and network view).
Synchronize button	Updates the alarm display. Although CTC displays alarms in real time, the Synchronize button allows you to verify the alarm display. This is particularly useful during provisioning or troubleshooting.
Delete Cleared Alarms button	Deletes, from the view, alarms that have been cleared.
AutoDelete Cleared Alarms check box	If checked, CTC automatically deletes cleared alarms.
Filter tool	Enables or disables alarm filtering in the card, node, or network view. When enabled or disabled, this state applies to other views for that node and for all other nodes in the network. For example, if the Filter tool is enabled in the node (default login) view Alarms window, the network view Alarms window and card view Alarms window also show the tool enabled. All other nodes in the network also show the tool enabled.

9.3.3 Filtering Alarms

The alarm display can be filtered to prevent display of alarms with certain severities or alarms that occurred between certain dates and times. You can set the filtering parameters by clicking the Filter button at the bottom-left of the Alarms window. You can turn the filter on or off by clicking the Filter tool at the bottom-right of the window. CTC retains your filter activation setting. For example, if you turn the filter on and then log out, CTC keeps the filter active the next time you log in.

9.3.4 Conditions Tab

The Conditions window displays retrieved fault conditions. A condition is a fault or status detected by ONS 15454 hardware or software. When a condition occurs and continues for a minimum period, CTC raises a condition, which is a flag showing that this particular condition currently exists on the ONS 15454.

The Conditions window shows all conditions that occur, including those that are superseded. For instance, if a network problem causes two alarms, such as LOF and LOS, CTC shows both the LOF and LOS conditions in this window (even though LOS supersedes LOF). Having all conditions visible can be helpful when troubleshooting the ONS 15454. If you want to retrieve conditions that obey a root-cause hierarchy (that is, LOS supersedes and replaces LOF), you can exclude the same root causes by checking the “Exclude Same Root Cause” check box in the window.

Fault conditions include reported alarms and Not Reported or Not Alarmed conditions. Refer to the trouble notifications information in the *Cisco ONS 15454 DWDM Troubleshooting Guide* for more information about alarm and condition classifications.

9.3.5 Controlling the Conditions Display

You can control the display of the conditions on the Conditions window. [Table 9-4](#) shows the actions you can perform in the window.

Table 9-4 *Conditions Display*

Button	Action
Retrieve	Retrieves the current set of all existing fault conditions, as maintained by the alarm manager, from the ONS 15454.
Filter	Allows you to change the Conditions window display to only show the conditions that meet a certain severity level or occur in a specified time frame. For example, you can set the filter so that only critical conditions display on the window. There is a Filter button on the lower-right of the window that allows you to enable or disable the filter feature.
Exclude Same Root Cause	Retrieves conditions that obey a root-cause hierarchy (LOS supersedes and replaces LOF).

9.3.5.1 Retrieving and Displaying Conditions

The current set of all existing conditions maintained by the alarm manager can be seen when you click the Retrieve button. The set of conditions retrieved is relative to the CTC view. For example, if you click the button while displaying the node view (single-shelf mode) or shelf view (multishelf mode), node-specific conditions appear. If you click the button while displaying the network view, all conditions for the network (including ONS 15454 nodes and other connected nodes) appear, and the card view shows only card-specific conditions.

You can also set a node to display conditions using the time zone where the node is located, rather than the time zone of the PC where they are being viewed.

9.3.5.2 Conditions Column Descriptions

[Table 9-5](#) lists the Conditions window column headings and the information recorded in each column.

Table 9-5 *Conditions Column Description*

Column	Information Recorded
Date	Date and time of the condition.
Node	Shows the name of the node where the condition or alarm occurred. (Visible in network view.)
Object	TL1 AID for the condition object. For an STSmon or VTmon, the object.
Eqpt Type	Card type in this slot.
Slot	Slot where the condition occurred (appears only in network and node view).
Port	Port where the condition occurred. For STSTerm and VTTerm, the port refers to the upstream card it is partnered with.
Path Width	Width of the data path.

Table 9-5 Conditions Column Description (continued)

Column	Information Recorded
Sev ¹	Severity level: CR (Critical), MJ (Major), MN (Minor), NA (Not Alarmed), NR (Not Reported).
SA ¹	Indicates a service-affecting alarm (when checked).
Cond	The error message/alarm name; these names are alphabetically defined in the <i>Cisco ONS 15454 DWDM Troubleshooting Guide</i> .
Description	Description of the condition.

1. All alarms, their severities, and service-affecting statuses are also displayed in the Condition tab unless you choose to filter the alarm from the display using the Filter button.

9.3.5.3 Filtering Conditions

The condition display can be filtered to prevent display of conditions (including alarms) with certain severities or that occurred between certain dates. You can set the filtering parameters by clicking the Filter button at the bottom-left of the Conditions window. You can turn the filter on or off by clicking the Filter tool at the bottom-right of the window. CTC retains your filter activation setting. For example, if you turn the filter on and then log out, CTC keeps the filter active the next time your user ID is activated.

9.3.6 Viewing History

The History window displays historic alarm or condition data for the node or for your login session. You can choose to display only alarm history, only events, or both by checking check boxes in the History > Shelf window. You can view network-level alarm and condition history, such as for circuits, for all the nodes visible in network view. At the node level, you can see all port (facility), card, STS, and system-level history entries for that node. For example, protection-switching events or performance-monitoring threshold crossings appear here. If you double-click a card, you can view all port, card, and STS alarm or condition history that directly affects the card.



Note

In the Preference dialog General tab, the Maximum History Entries value only applies to the Session window.

Different views of CTC display different kinds of history:

- The History > Session window is shown in network view, node view (single-shelf mode) or shelf view (multishelf mode), and card view. It shows alarms and conditions that occurred during the current user CTC session.
- The History > Shelf window is only shown in node view (single-shelf mode) or shelf view (multishelf mode). It shows the alarms and conditions that occurred on the node since CTC software was operated on the node.
- The History > Card window is only shown in card view. It shows the alarms and conditions that occurred on the card since CTC software was installed on the node.

**Tip**

Double-click an alarm in the History window to display the corresponding view. For example, double-clicking a card alarm takes you to card view. In network view, double-clicking a node alarm takes you to node view (single-shelf mode) or shelf view (multishelf mode).

If you check the History window Alarms check box, you display the node history of alarms. If you check the Events check box, you display the node history of Not Alarmed and transient events (conditions). If you check both check boxes, you retrieve node history for both.

9.3.6.1 History Column Descriptions

Table 9-6 lists the History window column headings and the information recorded in each column.

Table 9-6 History Column Description

Column	Information Recorded
Num	Num (number) is the quantity of alarm messages received, and is incremented automatically as alarms occur to display the current total of received error messages. (The column is hidden by default; to view it, right-click a column and choose Show Column > Num.)
Ref	Ref (reference) is a unique identification number assigned to each alarm to reference a specific alarm message that is displayed. (The column is hidden by default; to view it, right-click a column and choose Show Column > Ref.)
Date	Date and time of the condition.
Node	Shows the name of the node where the condition or alarm occurred. (Visible in network view.)
Object	TL1 AID for the condition object. For an STSmon or VTmon, the object.
Slot	Slot where the condition occurred [only displays in network view and node view (single-shelf mode) or shelf view (multishelf mode)].
Port	Port where the condition occurred. For STSTerm and VTTerm, the port refers to the upstream card it is partnered with.
Path Width	Width of the data path.
Sev	Severity level: Critical (CR), Major (MJ), Minor (MN), Not Alarmed (NA), Not Reported (NR).
ST	Status: raised (R), cleared (C), or transient (T).
SA	Indicates a service-affecting alarm (when checked).
Cond	Condition name.
Description	Description of the condition.
Eqpt Type	Card type in this slot.

9.3.6.2 Retrieving and Displaying Alarm and Condition History

You can retrieve and view the history of alarms and conditions, including transient conditions (passing notifications of processes as they occur) in the CTC History window. The information in this window is specific to the view where it is shown (that is, network history in the network view, node history in the node view (single-shelf mode) or shelf view (multishelf mode), and card history in the card view).

The node and card history views are each divided into two tabs. In node view (single-shelf mode) or shelf view (multishelf mode), when you click the Retrieve button, you can see the history of alarms, conditions, and transients that have occurred on the node in the History > Node window, and the history of alarms, conditions, and transients that have occurred on the node during your login session in the History > Session window. In the card-view history window, after you retrieve the card history, you can see the history of alarms, conditions, and transients on the card in the History > Card window, or a history of alarms, conditions, and transients that have occurred during your login session in the History > Session window. You can also filter the severities and occurrence period in these history windows.

9.3.7 Alarm History and Log Buffer Capacities

The ONS 15454 alarm history log, stored in the TCC2/TCC2P RSA memory, contains four categories of alarms. These include:

- CR severity alarms
- MJ severity alarms
- MN severity alarms
- the combined group of cleared, Not Alarmed severity, and Not Reported severity alarms

Each category can store between 4 and 640 alarm chunks, or entries. In each category, when the upper limit is reached, the oldest entry in the category is deleted. The capacity is not user-provisionable.

CTC also has a log buffer, separate from the alarm history log, that pertains to the total number of entries displayed in the Alarms, Conditions, and History windows. The total capacity is provisionable up to 5,000 entries. When the upper limit is reached, the oldest entries are deleted.

9.4 Alarm Severities

ONS 15454 alarm severities follow the Telcordia GR-474-CORE standard, so a condition might be Alarmed (at a severity of Critical [CR], Major [MJ], or Minor [MN]), Not Alarmed (NA), or Not Reported (NR). These severities are reported in the CTC software Alarms, Conditions, and History windows at all levels: network, shelf, and card.

ONS equipment provides a standard profile named Default listing all alarms and conditions with severity settings based on Telcordia GR-474-CORE and other standards, but users can create their own profiles with different settings for some or all conditions and apply these wherever desired. (See the [“9.5 Alarm Profiles” section on page 9-9.](#)) For example, in a custom alarm profile, the default severity of a carrier loss (CARLOSS) alarm on an Ethernet port could be changed from major to critical. The profile allows setting to Not Reported or Not Alarmed, as well as the three alarmed severities.

Critical and Major severities are only used for service-affecting alarms. If a condition is set as Critical or Major by profile, it will raise as Minor alarm in the following situations:

- In a protection group, if the alarm is on a standby entity (the side not carrying traffic)
- If the alarmed entity has no traffic provisioned on it, no service is lost

Because of this possibility of being raised at two different levels, the alarm profile pane shows Critical as CR / MN and Major as MJ / MN.

9.5 Alarm Profiles

The alarm profiles feature allows you to change default alarm severities by creating unique alarm profiles for individual ONS 15454 ports, cards, or nodes. A created alarm profile can be applied to any node on the network. Alarm profiles can be saved to a file and imported elsewhere in the network, but the profile must be stored locally on a node before it can be applied to the node, its cards, or its cards' ports.

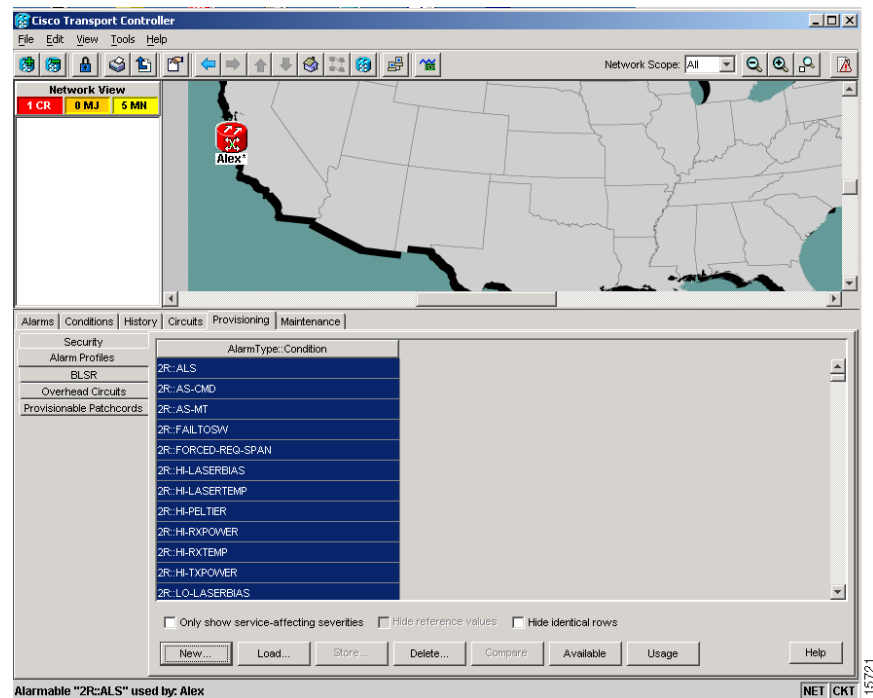
CTC can store up to ten active alarm profiles at any time to apply to the node. Custom profiles can take eight of these active profile positions. Two other profiles, Default profile and Inherited profile, are reserved by the NE, and cannot be edited. The reserved Default profile contains Telcordia GR-474-CORE severities. The reserved Inherited profile allows port alarm severities to be governed by the card-level severities, or card alarm severities to be determined by the node-level severities.

If one or more alarm profiles have been stored as files from elsewhere in the network onto the local PC or server hard drive where CTC resides, you can utilize as many profiles as you can physically store by deleting and replacing them locally in CTC so that only eight are active at any given time.

9.5.1 Creating and Modifying Alarm Profiles

Alarm profiles are created in the network view using the node view (single-shelf mode) or shelf view (multishelf mode) Provisioning > Alarm Profiles tabs. [Figure 9-2](#) shows the default list of alarm severities. A default alarm severity following Telcordia GR-474-CORE standards is preprovisioned for every alarm. After loading the default profile or another profile on the node, you can clone a profile to create custom profiles. After the new profile is created, the Alarm Profiles window shows the original profile (frequently Default) and the new profile.

Figure 9-2 Network View Alarm Profiles Window



**Note**

The alarm profile list contains a master list of alarms that is used for a mixed node network. Some of these alarms might not be used in all ONS nodes.

**Note**

The Default alarm profile list contains alarm and condition severities that correspond when applicable to default values established in Telcordia GR-474-CORE.

**Note**

All default or user-defined severity settings that are Critical (CR) or Major (MJ) are demoted to Minor (MN) in non-service-affecting situations as defined in Telcordia GR-474-CORE.

**Tip**

To see the full list of profiles, including those available for loading or cloning, click the Available button. You must load a profile before you can clone it.

**Note**

Up to 10 profiles, including the two reserved profiles (Inherited and Default) can be stored in CTC.

Wherever it is applied, the Default alarm profile sets severities to standard Telcordia GR-474-CORE settings. In the Inherited profile, alarms inherit, or copy, severity from the next-highest level. For example, a card with an Inherited alarm profile copies the severities used by the node housing the card. If you choose the Inherited profile from the network view, the severities at the lower levels (node and card) are copied from this selection.

You do not have to apply a single severity profile to the node-, card-, and port-level alarms. Different profiles can be applied at different levels. You could use the inherited or default profile on a node and on all cards and ports, but apply a custom profile that downgrades an alarm on one particular card. For example, you might choose to downgrade an OC-N unequipped path alarm (UNEQ-P) from Critical (CR) to Not Alarmed (NA) on an optical card because this alarm raises and then clears every time you create a circuit. UNEQ-P alarms for the card with the custom profile would not display on the Alarms tab (but they would still be recorded on the Conditions and History tabs.)

When you modify severities in an alarm profile:

- All Critical (CR) or Major (MJ) default or user-defined severity settings are demoted to Minor (MN) in Non-Service-Affecting (NSA) situations as defined in Telcordia GR-474.
- Default severities are used for all alarms and conditions until you create a new profile and apply it.

The Load and Store buttons are not available for Retrieve and Maintenance users.

The Delete and Store options will only display nodes to delete profiles from or store profiles to if the user has provisioning permission for those nodes. If the user does not have the proper permissions, CTC greys out the buttons and they are not available to the user.

9.5.2 Alarm Profile Buttons

The Alarm Profiles window displays six buttons at the bottom of the screen. [Table 9-7](#) lists and describes each of the alarm profile buttons and their functions.

Table 9-7 Alarm Profile Buttons

Button	Description
New	Creates a new profile.
Load	Loads a profile to a node or a file.
Store	Saves profiles on a node (or nodes) or in a file.
Delete	Deletes profiles from a node.
Compare	Displays differences between alarm profiles (for example, individual alarms that are not configured equivalently between profiles).
Available	Displays all profiles available on each node.
Usage	Displays all entities (nodes and alarm subjects) present in the network and which profiles contain the alarm. Can be printed.

9.5.3 Alarm Profile Editing

Table 9-8 lists and describes the five profile-editing options available when you right-click an alarm item in the profile column (such as Default).

Table 9-8 Alarm Profile Editing Options

Button	Description
Store	Saves a profile in a node or in a file.
Rename	Changes a profile name.
Clone	Creates a profile that contains the same alarm severity settings as the profile being cloned.
Reset	Restores a profile to its previous state or to the original state (if it has not yet been applied).
Remove	Removes a profile from the table editor.

9.5.4 Alarm Severity Options

To change or assign alarm severity, left-click the alarm severity you want to change in the alarm profile column. Seven severity levels appear for the alarm:

- Not Reported (NR)
- Not Alarmed (NA)
- Minor (MN)
- Major (MJ)
- Critical (CR)
- Use Default
- Inherited

Inherited and Use Default severity levels only appear in alarm profiles. They do not appear when you view alarms, history, or conditions.

9.5.5 Row Display Options

In the network or node view (single-shelf mode) or shelf view (multishelf mode), the Alarm Profiles window (Alarm Profile Editor for node view) displays three check boxes at the bottom of the window:

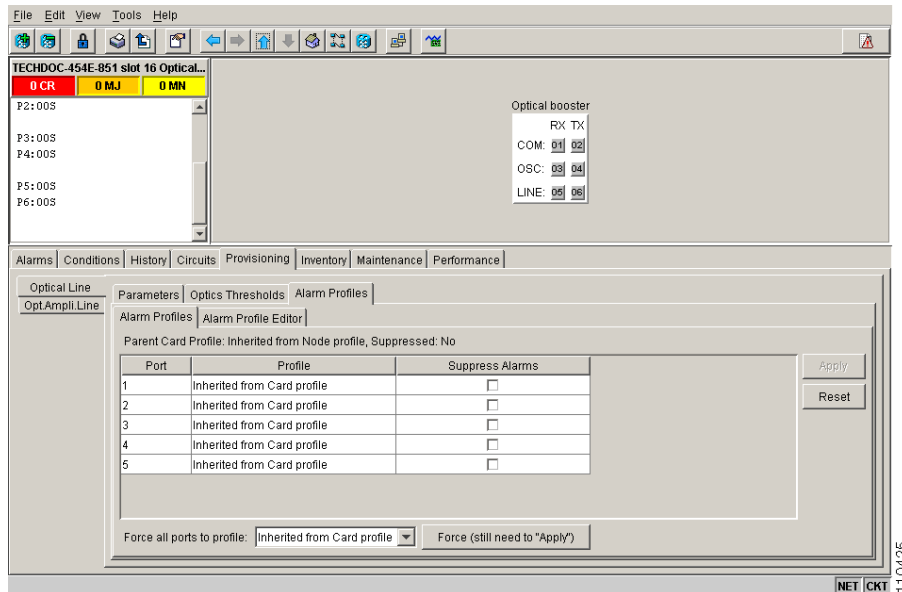
- Only show service-affecting severities—If unchecked, the editor shows severities in the format *sev1/sev2* where *sev1* is a service-affecting severity and *sev2* is not service-affecting. If checked, the editor only shows *sev1* alarms.
- Hide reference values—Highlights alarms with nondefault severities by clearing alarm cells with default severities.
- Hide identical rows—Hides rows of alarms that contain the same severity for each profile.

9.5.6 Applying Alarm Profiles

In CTC node view (single-shelf mode) or shelf view (multishelf mode), the Alarm Behavior window displays alarm profiles for the node. In card view, the Alarm Behavior window displays the alarm profiles for the selected card. Alarm profiles form a hierarchy. A node-level alarm profile applies to all cards in the node except cards that have their own profiles. A card-level alarm profile applies to all ports on the card except ports that have their own profiles.

At the node level, you can apply profile changes on a card-by-card basis or set a profile for the entire node. At the card-level view, you can apply profile changes on a port-by-port basis or set alarm profiles for all ports on that card. [Figure 9-3](#) shows alarm profiles for an OPT-BST card.

Figure 9-3 OPT-BST Card Alarm Profiles



9.6 External Alarms and Controls

External alarm inputs can be provisioned on the Alarm Interface Controller–International (AIC-I) card for external sensors such as an open door and flood sensors, temperature sensors, and other environmental conditions. External control outputs on these two cards allow you to drive external visual or audible devices such as bells and lights. They can control other devices such as generators, heaters, and fans.

Up to 12 external alarm inputs and four external controls are available with the AIC-I card. If you also provision the alarm extension panel (AEP), there are 32 inputs and 16 outputs. The AEP is compatible with the ONS 15454 ANSI shelf only. It is not compatible with the ONS 15454 ETSI shelf.

9.6.1 External Alarms

You can provision each alarm input separately. Provisionable characteristics of external alarm inputs include:

- Alarm Type—List of alarm types.
- Severity—CR, MJ, MN, NA, and NR.
- Virtual Wire—The virtual wire associated with the alarm.
- Raised When—Open means that the normal condition is no current flowing through the contact, and the alarm is generated when current does flow; closed means that normal condition is to have current flowing through the contact, and the alarm is generated when current stops flowing.
- Description—CTC alarm log description (up to 63 characters).



Note If you provision an external alarm to raise when a contact is open, and you have not attached the alarm cable, the alarm will remain raised until the alarm cable is connected.



Note When you provision an external alarm, the alarm object is ENV-IN-*nn*. The variable *nn* refers to the external alarm's number, regardless of the name you assign.

9.6.2 External Controls

You can provision each alarm output separately. Provisionable characteristics of alarm outputs include:

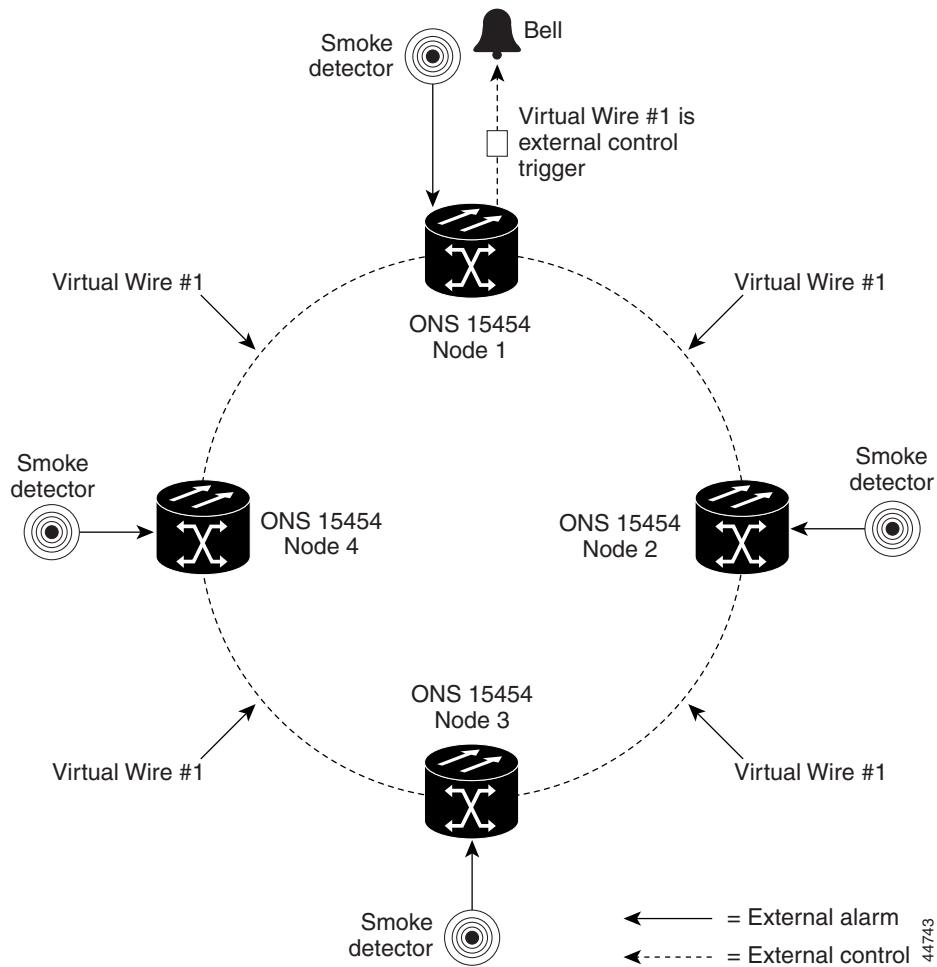
- Control type.
- Trigger type (alarm or virtual wire).
- Description for CTC display.
- Closure setting (manually or by trigger). If you provision the output closure to be triggered, the following characteristics can be used as triggers:
 - Local NE alarm severity—A chosen alarm severity (for example, major) and any higher-severity alarm (in this case, critical) causes output closure.
 - Remote NE alarm severity—Similar to local NE alarm severity trigger setting, but applies to remote alarms.

- Virtual wire entities—You can provision an alarm that is input to a virtual wire to trigger an external control output.

9.6.3 Virtual Wires

Provisioning the AIC and AIC-I card provides a “virtual wires” option used to route external alarms and controls from different nodes to one or more alarm collection centers. In [Figure 9-4](#), smoke detectors at Nodes 1, 2, 3, and 4 are assigned to Virtual Wire #1, and Virtual Wire #1 is provisioned as the trigger for an external bell at Node 1.

Figure 9-4 External Alarms and Controls Using a Virtual Wire



When using AIC virtual wires, you can:

- Assign different external devices to the same virtual wire.
- Assign virtual wires as the trigger type for different external controls.

9.7 Alarm Suppression

The following sections explain alarm suppression features for the ONS 15454.

9.7.1 Alarms Suppressed for Maintenance

When you place a port in OOS,MT administrative state, this raises the alarm suppressed for maintenance (AS-MT) alarm in the Conditions and History windows¹ and causes subsequently raised alarms for that port to be suppressed.

While the facility is in the OOS,MT state, any alarms or conditions that are raised and suppressed on it (for example, a transmit failure [TRMT] alarm) are reported in the Conditions window and show their normal severity in the Sev column. The suppressed alarms are not shown in the Alarms and History windows. (These windows only show AS-MT). When you place the port back into IS,AINS administrative state, the AS-MT alarm is resolved in all three windows. Suppressed alarms remain raised in the Conditions window until they are cleared.

9.7.2 Alarms Suppressed by User Command

In the node view (single-shelf mode) or shelf view (multishelf mode) Provisioning > Alarm Profiles tabs > Alarm Behavior tabs, the ONS 15454 has an alarm suppression option that clears raised alarm messages for the node, chassis, one or more slots (cards), or one or more ports. Using this option raises the alarms suppressed by user command, or AS-CMD alarm. The AS-CMD alarm, like the AS-MT alarm, appears in the Conditions, and History¹ windows. Suppressed conditions (including alarms) appear only in the Conditions window--showing their normal severity in the Sev column. When the Suppress Alarms check box is unchecked, the AS-CMD alarm is cleared from all three windows.

A suppression command applied at a higher level does not supersede a command applied at a lower level. For example, applying a node-level alarm suppression command makes all raised alarms for the node appear to be cleared, but it does not cancel out card-level or port-level suppression. Each of these conditions can exist independently and must be cleared independently.

**Caution**

Use alarm suppression with caution. If multiple CTC or TL1 sessions are open, suppressing the alarms in one session suppresses the alarms in all other open sessions.

9.8 Multishelf Configuration Alarming

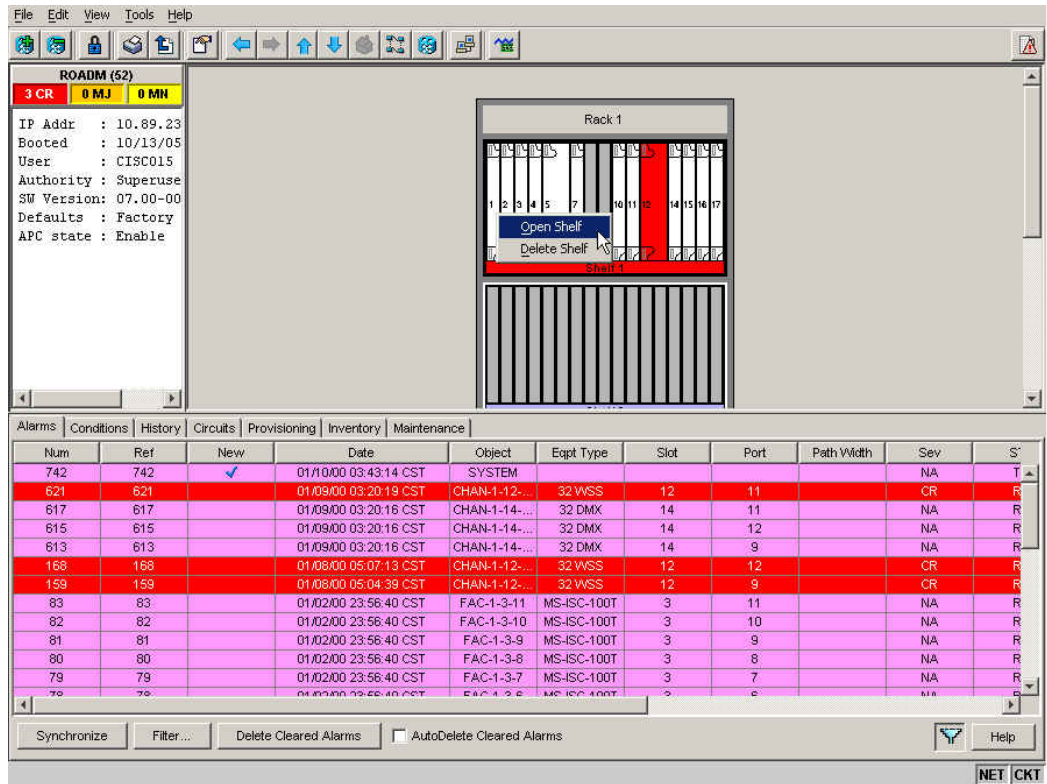
Multishelf systems can share a single IP address among shelves and also correlate optical signal alarms. Ethernet alarm-raising for this configuration also differs from alarm-raising for single-shelf configurations. This section explains how alarms are viewed on a multishelf configuration, how alarm locations are determined, and how multishelf alarming differs from single-shelf alarming.

1. AS-MT can be seen in the Alarms window as well if you have set the Filter dialog box to show NA severity events.

9.8.1 Viewing Multishelf Alarmed Entities

The multishelf view in CTC shows which slots are occupied in each shelf of the configuration (Figure 9-5).

Figure 9-5 Navigating to Shelf View from Multishelf View



You can determine where an alarm is raised by viewing the Object column. The entry there (for example, FAC-1-3-1) tells you the entity (“fac,” or facility), shelf, slot, and port. In shelf view, the Alarms and Conditions tabs also contain a Shelf column that indicates where the alarmed card is located.

9.8.2 Multishelf-Specific Alarming

The following sections explain how Ethernet communication alarms and correlated multishelf alarms are processed in the ONS 15454 DWDM system.

9.8.2.1 Ethernet Communication Alarms

The Ethernet interface card (MS-ISC) that is required for multishelf configurations does not raise traditional Ethernet alarms, such as CARLOSS, that apply to transponder (TXP) or muxponder (MXP) client ports. Instead, MS-ISC card alarms are raised on the shelf as EQPT alarms. These alarms include Duplicate Shelf ID (DUP-SHELF-ID) and Shelf Communication Failure (SHELF-COMM-FAIL).

9.8.2.2 Multishelf Correlated Alarms

ITU-T G.798-based alarm correlation simplifies alarm reporting for DWDM channels. Communication failures including Loss of Signal (LOS), Loss of Signal Payload (LOS-P), and Optical Power Receive Fail-Loss of Light (OPWR-LFAIL) generate multiple conditions at each affected node and channel. Correlation simplifies troubleshooting because a single alarm is reported for each root cause. (The original alarms retain their severity in the Conditions window.)

The Payload Missing Indication (PMI) condition is raised at the far end to correlate optical multiplex section (OMS) and optical transmission section (OTS) communication failures. A single PMI condition is sent when every channel on the aggregated port is lost, that is, when there are no pass-through channels or active added channels in service. If there are added channels on the node, the Forward Defect Indication (FDI) condition is raised at the near end to indicate there are no pass-through optical channels (OCH) in service.

9.9 Threshold Crossing Alert Suppression

This section describes threshold crossing alert (TCA) suppression on TXP and MXP cards when they are installed in a DWDM node.

9.9.1 Overview

Threshold default settings define the default cumulative values (thresholds) beyond which a TCA will be raised. TCAs make it possible to monitor the network and detect errors early.

The following thresholds are monitored for TXP and MXP cards:

- Optical Thresholds
- ITU-T G.709 Thresholds
- SONET and SDH Thresholds
- FEC Thresholds

Threshold defaults are defined for near end and/or far end and at 15-minute or one-day intervals.

When LOS-P, LOS, or LOF alarms occur on the TXP/MXP cards, different TCAs are suppressed. Which TCAs are suppressed by an alarm depends on how the trunk is configured (ITU-T G.709, SONET, or SDH). The reason for suppressing the TCAs after the alarm occurs is to prevent a flood of TCAs after a system failure.

TCA suppression does not extend to optical thresholds such as OPR (optical power received). Optical threshold TCAs can effectively be suppressed by setting their thresholds to the maximum value. TCA suppression also does not extend to client ports; it only applies to TXP and MXP trunk ports when they are configured as ITU-T G.709, SONET, or SDH. TCA suppression does not extend to 10GE payloads.

**Note**

Suppressed TCAs are not reported as Not Reported (NR) conditions. As a result, suppressed TCAs do not appear in the CTC Conditions tab and they cannot be retrieved with the RTRV-COND TL1 command.

9.9.2 G.709, SONET, and SDH TCA Groups

This section lists the TCAs that are suppressed for each alarm. TCA suppression is determined by how framing is configured for TXP and MXP trunks.

[Table 9-9](#) lists the TCAs for each type of trunk framing and alarm.

Table 9-9 TCA Suppression Groups

Alarm	TXP/MXP Trunk Framing	TCA Suppressed
LOS-P and LOF	G.709	BBE-SM ES-SM SES-SM UAS-SM FC-SM ESR-SM SESR-SM BBER-SM BBE-PM ES-PM SES-PM UAS-PM FC-PM ESR-PM SESR-PM BBER-PM BIT-EC UNC-WORDS

Table 9-9 TCA Suppression Groups (continued)

Alarm	TXP/MXP Trunk Framing	TCA Suppressed
LOS or LOF	SONET	ES-S
		SES-S
		SEFS-S
		CV-S
		ES-L
		SES-L
		UAS-L
		CV-L
		FC-L
LOS or LOF	SDH	RS-ES
		RS-ESR
		RS-SES
		RS-SESR
		RS-BBR
		RS-BBER
		RS-UAS
		RS-EB
		MS-ES
		MS-ESR
		MS-SES
		MS-SESR
		MS-BBR
		MS-BBER
		MS-UAS
MS-EB		



Performance Monitoring

Performance monitoring (PM) parameters are used by service providers to gather, store, set thresholds for, and report performance data for early detection of problems. In this chapter, PM parameters and concepts are defined for transponder, muxponder, and dense wavelength division multiplexing (DWDM) cards in the Cisco ONS 15454 including optical amplifier, multiplexer, demultiplexer, optical add/drop multiplexer (OADM), and optical service channel (OSC) cards.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

For information about enabling and viewing PM values, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

Chapter topics include:

- [10.1 Threshold Performance Monitoring, page 10-2](#)
- [10.2 Transponder and Muxponder Card Performance Monitoring, page 10-2](#)
- [10.3 DWDM Card Performance Monitoring, page 10-13](#)
- [10.4 Optics and 8b10b PM Parameter Definitions, page 10-17](#)
- [10.5 ITU G.709 and ITU-T G.8021 Trunk-Side PM Parameter Definitions, page 10-18](#)
- [10.6 Full RMON Statistics PM Parameter Definitions, page 10-20](#)
- [10.7 FEC PM Parameter Definitions, page 10-22](#)
- [10.8 SONET PM Parameter Definitions, page 10-23](#)
- [10.9 SDH PM Parameter Definitions, page 10-24](#)
- [10.10 Pointer Justification Count Performance Monitoring, page 10-26](#)



Note

For additional information regarding PM parameters, refer to ITU G.826, ITU-T G.8021, ITU G.709, Telcordia documents GR-1230-CORE, GR-820-CORE, GR-499-CORE, and GR-253-CORE, and the ANSI T1.231 document entitled *Digital Hierarchy - Layer 1 In-Service Digital Transmission Performance Monitoring*.

10.1 Threshold Performance Monitoring

Thresholds are used to set error levels for each PM parameter. You can set individual PM threshold values from the Cisco Transport Controller (CTC) card view Provisioning tab. For procedures about provisioning card thresholds, such as line and path thresholds, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

During the accumulation cycle, if the current value of a PM parameter reaches or exceeds its corresponding threshold value, a threshold crossing alert (TCA) is generated by the node and is displayed by CTC. TCAs provide early detection of performance degradation. When a threshold is crossed, the node continues to count the errors during a given accumulation period. If zero is entered as the threshold value, generation of TCAs is disabled but performance monitoring continues.



Note

Due to memory limitations and the number of TCAs generated by different platforms, you can manually add or modify the following two properties to the platform property file (CTC.INI for Windows and .ctcr for UNIX) to fit the need:

- **ctc.15xxx.node.tr.lowater=yyy** (where xxx is platform and yyy is the number of the lowater mark. The default lowater mark is 25.)
- **ctc.15xxx.node.tr.hiwater=yyy** (where xxx is platform and yyy is the number of the hiwater mark. The default hiwater mark is 50.)

If the number of the incoming TCA is greater than the hiwater mark, the node will keep the latest lowater mark and discard older ones.

Change the threshold if the default value does not satisfy your error monitoring needs. For example, customers with a critical OC192/STM64 transponder installed for 911 calls must guarantee the best quality of service on the line; therefore, they lower all thresholds on the client side so that the slightest error raises a TCA.



Note

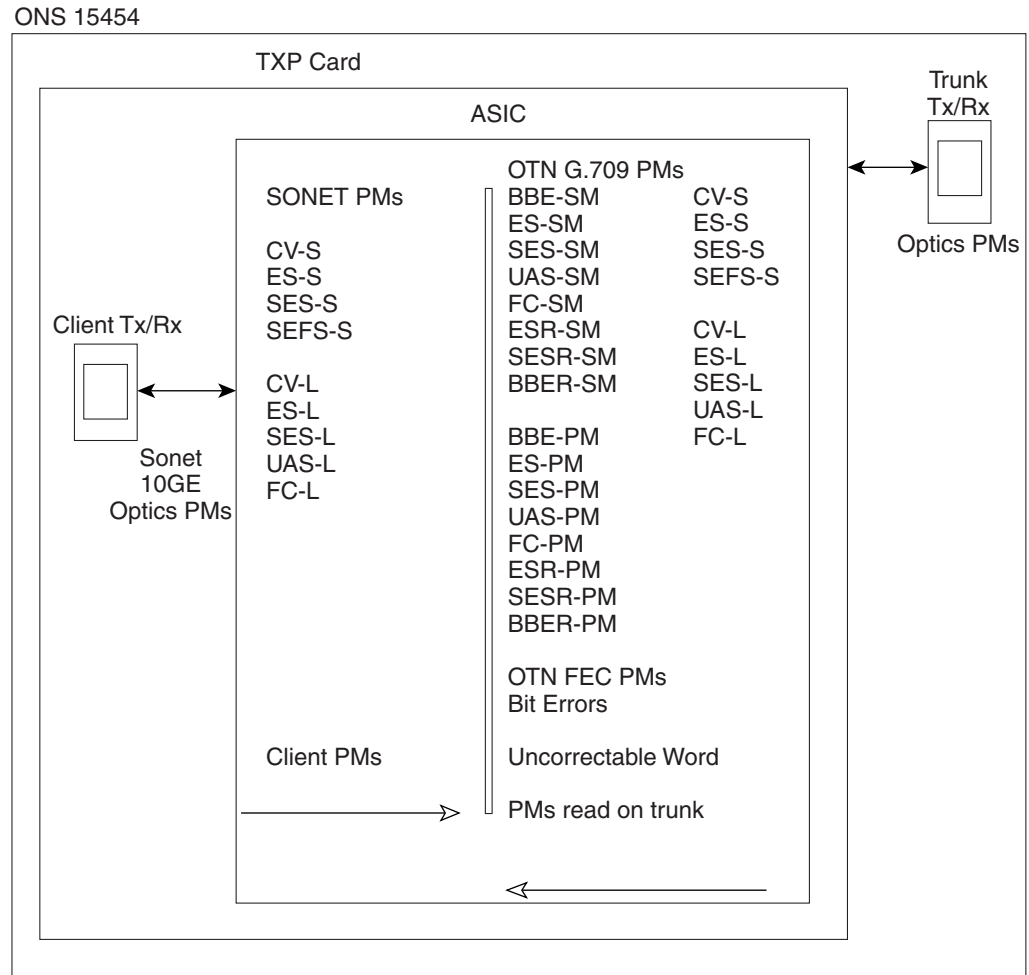
When LOS, LOS-P, or LOF alarms occur on TXP and MXP trunks, ITU-T G.709/SONET/SDH TCAs are suppressed. For details, see [Chapter 9, “Alarm and TCA Monitoring and Management.”](#)

10.2 Transponder and Muxponder Card Performance Monitoring

This section lists PM parameters for transponder cards (TXP_MR_10G, TXP_MR_2.5G, TXPP_MR_2.5G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L), and muxponder cards (MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_MR_2.5G, MXPP_MR_2.5G, MXP_MR_10DME-C, and MXP_MR_10DME-L). The transponder and muxponder PM parameters are divided into Optics PM, Payload PM, and OTN PM tabs. The tabs displayed vary depending on the card installed. For more information, see the “[10.2.1 Optics PM Window](#)” section on page 10-4, the “[10.2.2 Payload PM Window](#)” section on page 10-5, or the “[10.2.3 OTN PM Window](#)” section on page 10-10.

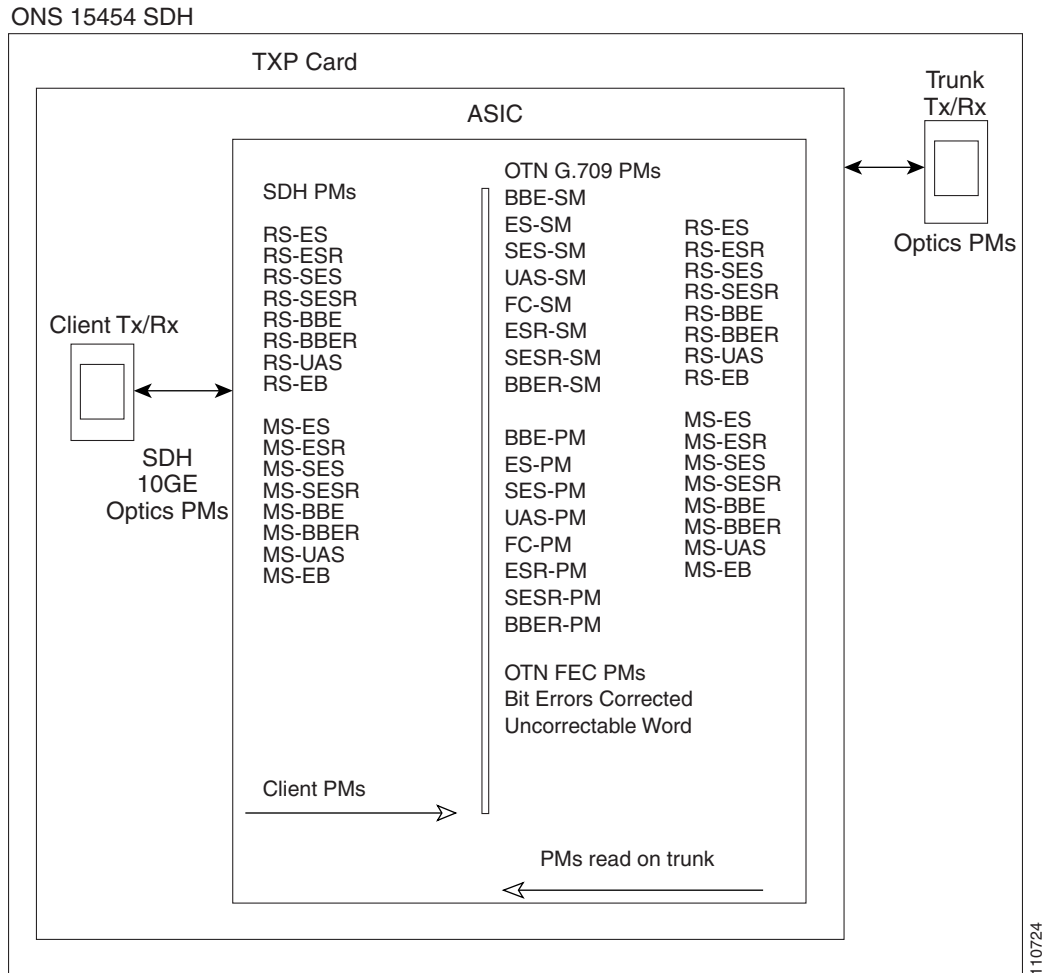
For ONS 15454 ANSI nodes, [Figure 10-1](#) shows where overhead bytes detected on the application-specific integrated circuits (ASICs) produce PM parameters for the TXP_MR_10G card. The remaining transponder and muxponder cards perform similarly to this illustration.

Figure 10-1 ONS 15454 ANSI Node PM Read Points for TXP_MR_10G Card



For ONS 15454 ETSI nodes, [Figure 10-2](#) shows where overhead bytes detected on the ASICs produce PM parameters for the TXP_MR_10G card. The remaining transponder and muxponder cards perform similarly to this illustration.

Figure 10-2 ONS 15454 ETSI Node PM Read Points on TXP_MR_10G Cards



10.2.1 Optics PM Window

The Optics PM window lists parameters at the trunk and client side for all transponder and muxponder cards. The Optics PM window provides buttons to change the statistical values shown. The Refresh button manually refreshes statistics. Auto-Refresh sets a time interval at which automatic refresh occurs. In the Historical PM subtab, the Clear button sets the values on the card to zero. All counters on the card are cleared. The Help button activates context sensitive help. [Table 10-1](#) lists the trunk-side and client-side optics PM parameters.

Table 10-1 Trunk-Side and Client-Side Optics PM Parameters

Trunk-Side/Client-Side Optics PM Parameters	Definition
Laser Bias (Avg,%)	Average Laser Bias Current (Laser Bias Avg) is the average percentage of laser bias current during the PM time interval.
Laser Bias (Max,%)	Maximum Laser Bias Current (Laser Bias Max) is the maximum percentage of laser bias current during the PM time interval.
Laser Bias (Min,%)	Minimum Laser Bias Current (Laser Bias Min) is the minimum percentage of laser bias current during the PM time interval.
Link Status	Indicates if the Fibre Channel link is receiving a valid Fibre Channel signal (carrier) from the attached Fibre Channel device. Up means present, and down means not present.
Rx Optical Pwr (Min,dBm)	Minimum Receive Optical Power (Rx Optical Pwr Min, dBm) is the minimum received optical power during the PM time interval.
Rx Optical Pwr (Avg,dBm)	Average Receive Optical Power (Rx Optical Pwr Avg, dBm) is the average received optical power during the PM time interval.
Rx Optical Pwr (Max,dBm)	Maximum Receive Optical Power (Rx Optical Pwr Max, dBm) is the maximum received optical power during the PM time interval.
Tx Optical Pwr (Min,dBm) ¹	Minimum Transmit Optical Power (Tx Optical Pwr Min, dBm) is the minimum optical power transmitted during the PM time interval.
Tx Optical Pwr (Avg,dBm) ¹	Average Transmit Optical Power (Tx Optical Pwr Avg, dBm) is the average optical power transmitted during the PM time interval.
Tx Optical Pwr (Max,dBm) ¹	Maximum Transmit Optical Power (Tx Optical Pwr Max, dBm) is the maximum optical power transmitted during the PM time interval.

1. On the trunk side, this PM is not available for the following cards: TXP_MR_2.5G, TXPP_MR_2.5G, MXP_MR_2.5G, and MXPP_MR_2.5G.

10.2.2 Payload PM Window

The Payload PM window subtabs change depending on the card provisioning. For more information about provisioning TXP and MXP cards, refer to the “Provision Transponder and Muxponder Cards” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*. Possible Payload PM subtabs are: SONET, SDH, Statistics, Utilization, and History. The following buttons function the same on all of the tabs. Not all tabs have all of these buttons.

- The Refresh button manually refreshes statistics.
- Auto-Refresh sets a time interval at which automatic refresh occurs.
- The Baseline button resets the displayed statistics values to zero.
- (Statistics window only) The Clear button allows you to set the values to zero for displayed statistics, all statistics for a port, and all statistics for all optical ports on a card.

- The Help button activates context sensitive help.

For a list of the payload PM provisioning options for all transponder and muxponder cards, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. The options selected in the Provisioning tab can affect the parameters displayed in the Performance > Payload PM tab.

[Table 10-2](#) lists the PM parameter types that appear when a particular port type is provisioned for a transponder or muxponder card.

Table 10-2 Transponder and Muxponder Port Type PM Provisioning Options

If this Port Type is Provisioned ¹	The Following PM Types are Activated ²
SONET/SDH (including 10G Ethernet WAN Phy) OC3/STM1 OC12/STM4 OC48/STM16	SONET or SDH PMs
10G Ethernet LAN Phy 10G FiberChannel ONE_GE FC1G FC2G FC1G ISL FC2G ISL FICON1G FICON2G FICON1G ISL FICON2G ISL ISC COMPAT ISC PEER	Full remote monitoring (RMON) statistics
ESCON DV6000 SDI_D1_VIDEO HDTV PASS_THRU ETR_CLO	Payload PMs are not applicable to 2R port types.

1. The port type is provisioned from card view on the Provisioning > Pluggable Port Modules tab. For pluggable port module (PPM) provisioning procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.
2. Performance monitoring parameters are displayed from the card view on the Performance tab.

10.2.2.1 Payload PM SONET/SDH Window

[Table 10-3](#) lists SONET/SDH layer near-end and far-end PM parameters listed in the card view on the Performance > Payload PM > SONET or SDH tab. SONET/SDH layer PMs are available when the client type is set to OC3/STM1, OC12/STM4, or OC48/STM16 on the TXP_MR_2.5G or when OC192/STM64 is set on the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, or TXP_MR_10E_L on ONS 15454 SONET nodes. OC48/STM16 trunk PMs are available on MXP_MR_2.5G and MXPP_MR_2.5G cards on ONS 15454 SONET or ONS 15454 SDH nodes. OC48/STM16 client PMs are available on MXP_MR_10DME_C, MXP_MR_10DME_L, MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, and MXP_2.5G_10E_L cards on ONS 15454 SONET or ONS 15454 SDH nodes. For PM definitions, see [Table 10-27 on page 10-23](#) and [Table 10-28 on page 10-24](#).

Table 10-3 ONS 15454 SONET/SDH Layer Far-End and Near-End PMs

	Layer Far-End (FE) ^{1,2}	Layer Near-End ^{1,2}	Note
SONET	CV-LFE ES-LFE FC-LFE SES-LFE UAS-LFE	CV-L CV-S ES-L ES-S FC-L SES-L SES-S SEF-S UAS-L	Applicable standard is Telcordia GR-253.
SDH	MS-BBE MS-BBER MS-EB MS-ES MS-ESR MS-SES MS-SESR MS-UAS	RS-BBE RS-BBER RS-EB RS-ES RS-ESR RS-SES RS-SESR RS-UAS MS-BBE MS-BBER MS-EB MS-ES MS-ESR MS-SES MS-SESR MS-UAS	Applicable standard is Telcordia GR-253.

1. Applicable to optical channel (OCH) and Client (CLNT) facilities.
2. For MXP_MR_2.5G and MXPP_MR_2.5G cards, these parameters are shown in the Performance > Payload PM > SONET PM tabs in the card view.

10.2.2.2 Payload PM Statistics Window

Table 10-4 lists the 10 Gigabit Ethernet (10 GE) payload statistics that are available on the TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L cards. PPM provisioning must be completed under the card view Provisioning > Pluggable Port Modules tab for 10 GE to be enabled. For PPM provisioning procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. The parameters are listed under card view on the Performance > Payload PM > Statistics tab. For 10 GE payload definitions, see Table 10-25 on page 10-20.



Note

Utilization PMs are also available per port.

Table 10-4 Full RMON Statistics on TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L cards

Full RMON Statistics	
dot3StatsFCSErrors	etherStatsBroadcastPkts
dot3StatsFrameTooLong	etherStatsCRCAlignErrors
ifInBroadcastPkts	etherStatsFragments
ifInErrors	etherStatsJabbers
ifInErrorsBytePkts	etherStatsMulticastPkts
ifInFramingErrorPkts	etherStatsOctets
ifInJunkInterPkts	etherStatsOversizePkts
ifInMulticastPkts	etherStatsPkts64Octets
ifInOctets	etherStatsPkts65to127Octets
ifOutBroadcastPkts	etherStatsPkts128to255Octets
ifOutMulticastPkts	etherStatsPkts256to511Octets
ifOutOctets	etherStatsPkts512to1023Octets
rxTotalPkts	etherStatsPkts1024to1518Octets
Time Last Cleared	etherStatsUndersizePkts
txTotalPkts	rxControlFrames
	rxPauseFrames
	rxUnknownOpcodeFrames

Table 10-5 lists the payload PM parameters that are available on the TXP_MR_2.5G and the TXPP_MR_2.5G cards when the ONE_GE or FC1G client type is enabled. For PPM provisioning procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. For payload definitions, see the “10.4 Optics and 8b10b PM Parameter Definitions” section on page 10-17 and the “10.6 Full RMON Statistics PM Parameter Definitions” section on page 10-20.



Note

Payload PM is not available for the 2FC client type.

Table 10-5 Gigabit Ethernet (GE) or Fibre Channel (FC) Payload PMs for the TXP_MR_2.5G and TXPP_MR_2.5G Cards

GE or FC Payload Performance Parameters
8b/10bDataOrderedSets
8b/10bIdleOrderedSets
8b/10bNonIdleOrderedSets
8b/10bStatsEncodingDispErrors
ifInErrors
rxTotalPkts

Table 10-6 lists the payload PM parameters that are available on the MXP_MR_2.5G and the MXPP_MR_2.5G cards when the ONE_GE or the FC1G client type is enabled. For PPM provisioning procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. For payload definitions, see the “10.4 Optics and 8b10b PM Parameter Definitions” section on page 10-17 and the “10.6 Full RMON Statistics PM Parameter Definitions” section on page 10-20.

Table 10-6 ONE_GE or FC1G Payload PMs for the MXP_MR_2.5G and MXPP_MR_2.5G Cards**ONE_GE or FC1G Payload Performance Parameters**

8b10bInvalidOrderedSets
 8b10bStatsEncodingDispErrors
 ifInDiscards
 ifInErrors
 ifInOctets
 ifOutDiscards
 ifOutOctets
 mediaIndStatsRxFramesBadCRC
 mediaIndStatsRxFramesTooLong
 mediaIndStatsRxFramesTruncated
 mediaIndStatsTxFramesBadCRC
 rxTotalPkts
 txTotalPkts

[Table 10-7](#) lists the FC client-side payload PM parameters. FC payload PMs are available on the FC port on both the MXP_MR_2.5G and the MXPP_MR_2.5G cards when the FC1G client type is enabled. For PPM provisioning procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. For payload definitions, see the [“10.6 Full RMON Statistics PM Parameter Definitions”](#) section on page 10-20.

Table 10-7 FC1G Payload PMs on the Client Side**FC1G Payload PMs on the Client Port**

fcStatsLinkRecoveries
 fcStatsRxCredits
 fcStatsTxCredits
 fcStatsZeroTxCredits
 gfpStatsRoundTripLatencyUsec
 gfpStatsRxDistanceExtBuffers
 gfpStatsTxDistanceExtBuffers

[Table 10-8](#) lists the Transparent Generic Framing Procedure (GFP-T) payload PMs. The GFP-T payload PMs are available on the GFP port on both the MXP_MR_2.5G and the MXPP_MR_2.5G cards when the ONE_GE or the 1 FC client type is enabled. GFP-T payload PMs are also available on the client port on both the MXP_MR_2.5G and the MXPP_MR_2.5G cards when the 1 FC client type is enabled. For PPM provisioning procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. For payload definitions, see the [“10.6 Full RMON Statistics PM Parameter Definitions”](#) section on page 10-20.

Table 10-8 GFP-T Payload PMs**GFP-T Payload PMs on the GFP Port**

gfpStatsCSFRaised
 gfpStatsLFDRaised
 gfpStatsRxCRCErrors
 gfpStatsRxMBitErrors
 gfpStatsRxBBitErrors
 gfpStatsRxTypeInvalid

10.2.2.3 MXP_MR_2.5G/MXPP_MR_2.5G Payload Utilization Window

The Payload PM Utilization window in the card view Performance > Payload > Utilization tab shows the percentage of transmit (Tx) and receive (Rx) line bandwidth used by the ports during consecutive time segments. This tab cannot be viewed unless the appropriate PPM port type is provisioned. For PPM provisioning procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. The Utilization window provides an Interval list that enables you to set time intervals of 15 minutes or 1 day. Line utilization is calculated with the following formulas:

$$\text{Rx} = (\text{inOctets} + \text{inPkts} * 20) * 8 / 100\% \text{ interval} * \text{maxBaseRate}$$

$$\text{Tx} = (\text{outOctets} + \text{outPkts} * 20) * 8 / 100\% \text{ interval} * \text{maxBaseRate}$$

The interval is defined in seconds. The maxBaseRate is defined by raw bits per second in one direction for the port (that is, 1 Gbps). The maxBaseRate for MXP_MR_2.5G and MXPP_MR_2.5G cards is shown for the ONS 15454 nodes in [Table 10-9](#).

Table 10-9 maxBaseRate for STS and VC Circuits

STS/VC	maxBaseRate
STS-1/VC3	51840000
STS-3c/VC4	155000000
STS-6c/VC4-2c	311000000
STS-12c/VC4-4c	622000000



Note

Line utilization numbers express the average of ingress and egress traffic as a percentage of capacity.

10.2.2.4 Payload History Window

The Payload PM History window in the card view Performance > Payload > History tab lists past statistics for the previous time intervals. This tab cannot be viewed unless the appropriate PPM port type is provisioned. For PPM provisioning procedures, refer to the *Cisco ONS 15454 DWDM Procedure Guide*. Depending on the selected time interval, the History window displays the statistics for each port for the number of previous time intervals as shown in [Table 10-10](#).

Table 10-10 History Statistics per Time Interval

Time Interval	Number of Intervals Displayed
15 minutes	32 (current and previous)
1 day (24 hours)	2 (current and previous)

10.2.3 OTN PM Window

The OTN tab has an ITU-T G.709 PM subtab and an FEC subtab. Both subtabs provide buttons to change the statistical values shown in the Performance tab. The Refresh button manually refreshes statistics. Auto-Refresh sets a time interval at which automatic refresh occurs. The Baseline button resets the displayed statistics values to zero. The Statistics window also has a Clear button. The Clear button sets

the values on the card to zero. All counters on the card are cleared. The Help button activates context sensitive help. For more information about provisioning optical transport network (OTN) settings, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

Table 10-11 lists the OTN PM provisioning options for all transponder and muxponder cards. The options selected in the Provisioning tab affects the parameters displayed in the Performance > OTN PM tab.

Table 10-11 Transponder and Muxponder PM Provisioning Options

Card	OTN Provisioning ¹
MXPP_MR_2.5G	—
MXP_2.5G_10E	G.709 FEC FEC Thresholds
MXP_2.5G_10E_C	G.709 FEC FEC Thresholds
MXP_2.5G_10E_L	G.709 FEC FEC Thresholds
MXP_2.5G_10G	G.709 FEC FEC Thresholds
MXP_MR_2.5G	—
MXP_MR_10DME_C	G.709 FEC FEC Thresholds
MXP_MR_10DME_L	G.709 FEC FEC Thresholds
TXPP_MR_2.5G	G.709 FEC FEC Thresholds
TXP_MR_10E	G.709 FEC FEC Thresholds
TXP_MR_10E_C	G.709 FEC FEC Thresholds
TXP_MR_10E_L	G.709 FEC FEC Thresholds

Table 10-11 Transponder and Muxponder PM Provisioning Options (continued)

Card	OTN Provisioning ¹
TXP_MR_10G	G.709 FEC FEC Thresholds
TXP_MR_2.5G	G.709 FEC FEC Thresholds

1. OTN provisioning is performed from card view on the Provisioning > OTN > OTN Lines, G.709 Thresholds, and FEC Thresholds tabs.

[Table 10-12](#) lists the OTN trunk-side PM parameters listed on the G.709 tab. OTN PMs are available when ITU G.709 is enabled from the card view Provisioning > OTN > OTN Lines tab. OTN PMs are not available on MXP_MR_2.5G and MXPP_MR_2.5G cards. For ITU G.709 section and path monitoring PM definitions, see the [“10.5 ITU G.709 and ITU-T G.8021 Trunk-Side PM Parameter Definitions”](#) section on page 10-18.

Table 10-12 ITU G.709 OTN Trunk-Side PMs

OTN Layer (Near End and Far End) ¹	Note
BBE-SM BBER-SM ES-SM ESR-SM FC-SM SES-SM SESR-SM UAS-SM	ITU G.709 standard section monitoring ITU-T G.8021
BBE-PM BBER-PM ES-PM ESR-PM FC-PM SES-PM SESR-PM UAS-PM	ITU G.709 standard path monitoring ITU-T G.8021

1. Applicable to OCH facility.

[Table 10-13](#) lists the forward error correction (FEC) PM parameters. FEC PMs are available when ITU-T G.709 is enabled and FEC is set to standard or enhanced. These parameters are provisioned from the card view Provisioning > OTN > OTN Lines tab. FEC PMs are not available on MXP_MR_2.5G and MXPP_MR_2.5G cards. For PM definitions, see the [“10.7 FEC PM Parameter Definitions”](#) section on page 10-22.

Table 10-13 FEC OTN Trunk-Side PMs

FEC Trunk-Side PMs	FEC (Near End) ¹
Bit Errors	BIT-EC
Uncorrectable Words	UNC-WORDS

1. Applicable to OCH facility.

Table 10-14 lists ONS 15454 optics and 8b10b PM parameters. For ONS 15454 optics and 8b10b definitions, see the “10.4 Optics and 8b10b PM Parameter Definitions” section on page 10-17.

Table 10-14 ONS 15454 Optics and 8b10b PMs

Optics (Near End) ^{1, 1}	8B10B (Near End) ²
LBCL-AVG	CGV
LBCL-MAX	DCG
LBCL-MIN	IOS
OPT-AVG	IPC
OPT-MAX	NIOS
OPT-MIN	VPC
OPR-AVG	
OPT-MAX	
OPR-MIN	

1. The TXP_MR_2.5G and TXPP_MR_2.5G card Enterprise System Connection (ESCON) payload does not support optics PMs on the client port due to Small Form-factor Pluggable (SFP)-imposed restrictions.
2. Applicable to TXP_MR_2.5G and TXPP_MR_2.5G cards only.

10.3 DWDM Card Performance Monitoring

The following sections define PM parameters and definitions for the ONS 15454 OPT-PRE, OPT-BST, OPT-BST-L, OPT-AMP-L, 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 4MD-xx.x, AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-1B-xx.x, AD-4B-xx.x, OSCM, OSC-CSM, 32WSS, and 32WSS-LDWDM cards.

10.3.1 Optical Amplifier Card Performance Monitoring Parameters

The PM parameters for the OPT-PRE, OPT-AMP-L, OPT-BST, and OPT-BST-L cards are listed Table 10-15. For ONS 15454 optics definitions, see the “10.4 Optics and 8b10b PM Parameter Definitions” section on page 10-17.

Table 10-15 Optical PM Parameters for Optical Amplifier Cards

Optical Line	Optical Amplifier Line
OPT	OPR

10.3.2 Multiplexer and Demultiplexer Card Performance Monitoring Parameters

The PM parameters for the 32MUX-O, 32WSS, 32WSS-L, 32DMX, 32DMX-L, and 32DMX-O cards are listed in [Table 10-16](#). For ONS 15454 optics definitions, see the “[10.4 Optics and 8b10b PM Parameter Definitions](#)” section on page 10-17.

Table 10-16 *Optical PM Parameters for 2MUX-O, 32WSS, 32WSS-L, 32DMX, 32DMX-L, and 32DMX-O Cards*

Optical Channel	Optical Line
OPR	OPT

10.3.3 4MD-xx.x Card Performance Monitoring Parameters

The PM parameters for the 4MD-xx.x cards are listed in [Table 10-17](#). For ONS 15454 optics definitions, see the “[10.4 Optics and 8b10b PM Parameter Definitions](#)” section on page 10-17.

Table 10-17 *Optical PM Parameters for 4MD-xx.x Cards*

Optical Channel	Optical Band
OPR	OPT

10.3.4 OADM Channel Filter Card Performance Monitoring Parameters

The PM parameters for the AD-1C-xx.x, AD-2C-xx.x, and AD-4C-xx.x cards are listed in [Table 10-18](#). For ONS 15454 optics definitions, see the “[10.4 Optics and 8b10b PM Parameter Definitions](#)” section on page 10-17.

Table 10-18 *Optical PM Parameters for AD-1C-xx.x, AD-2C-xx.x, and AD-4C-xx.x Cards*

Optical Channel	Optical Line
OPR	OPT

10.3.5 OADM Band Filter Card Performance Monitoring Parameters

The PM parameters for the AD-1B-xx.x and AD-4B-xx.x cards are listed in [Table 10-19](#). For ONS 15454 optics definitions, see the “[10.4 Optics and 8b10b PM Parameter Definitions](#)” section on page 10-17.

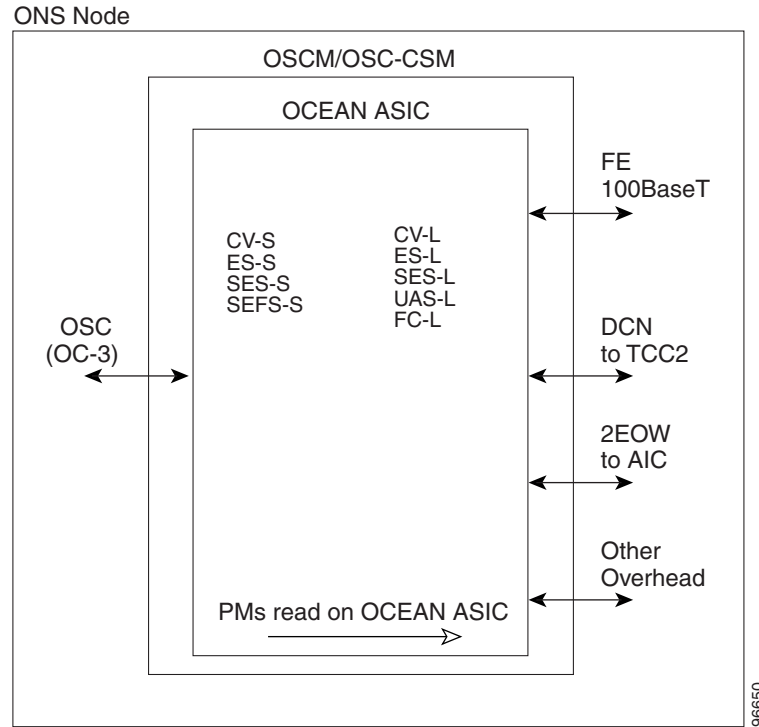
Table 10-19 *Optical PM Parameters for AD-1B-xx.x and AD-4B-xx.x Cards*

Optical Line	Optical Band
OPR	OPT

10.3.6 Optical Service Channel Card Performance Monitoring Parameters

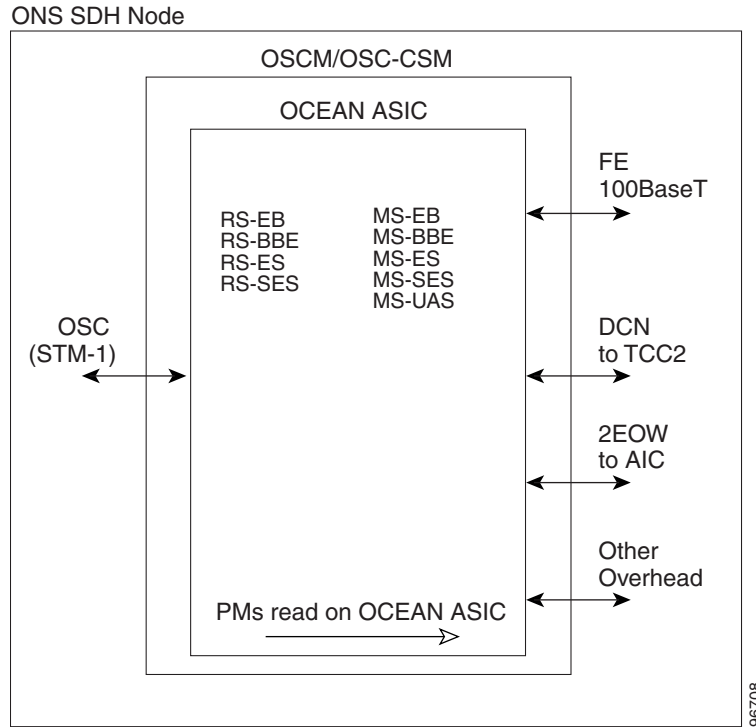
For ONS 15454 ANSI nodes, [Figure 10-3](#) shows where overhead bytes detected on the ASICs produce PM parameters for the OSCM and OSC-CSM cards.

Figure 10-3 ONS 15454 ANSI Node PM Read Points on OSCM and OSC-CSM Cards



For ONS 15454 ETSI nodes, [Figure 10-4](#) shows where overhead bytes detected on the ASICs produce PM parameters for the OSCM and OSC-CSM cards.

Figure 10-4 ONS 15454 ETSI Node PM Read Points on OSCM and OSC-CSM Cards



The ONS 15454 ANSI node PM parameters for the OSCM and OSC-CSM cards are listed in Table 10-20. For PM definitions, see the “10.8 SONET PM Parameter Definitions” section on page 10-23. For optics PM definitions, see the “10.4 Optics and 8b10b PM Parameter Definitions” section on page 10-17.

Table 10-20 ANSI OSCM/OSC-CSM (OC3) Card PMs

Section (Near End) ¹	Line (Near End/Far End) ¹	Optics (Near End) ²
CV-S	CV-L	OPWR
ES-S	ES-L	
SEF-S	FC-L	
SES-S	SES-L	
	UAS-L	

1. Applicable to OC3
2. Applicable to OTS facilities

Table 10-21 ETSI OSCM and OSC-CSM Card PMs

Regeneration Section (Near End)	Multiplex Section (Near End/Far End)	Optics (Near End)
RS-BBE	MS-BBE	OPT
RS-EB	MS-EB	
RS-ES	MS-ES	
RS-SES	MS-SES	
	MS-UAS	

10.4 Optics and 8b10b PM Parameter Definitions

Table 10-22 on page 10-17 lists Cisco ONS 15454 optics and 8b10b PM parameter definitions.

Table 10-22 ONS 15454 Optics and 8b10b PM Definitions

Parameter	Definition
8b10bDataOrderedSets	8b10b takes 8 bits of data and sends it as 10 bits, which allows control information to be sent along with the data. DataOrderedSets is a count of data ordered sets.
8b10bErrors	8b10b takes 8 bits of data and sends it as 10 bits, which allows control information to be sent along with the data. Errors is a count of 10b errors received by the serial or deserializer (serdes 8b/10b).
8b10bIdleOrderedSets	8b10b takes 8 bits of data and sends it as 10 bits, which allows control information to be sent along with the data. IdleOrderedSets is a count of idle ordered sets.
8b10bInvalidOrderedSets	8b10b takes 8 bits of data and sends it as 10 bits, which allows control information to be sent along with the data. InvalidOrderedSets is a count of the received invalid work errors.
8b10bNonIdleOrderedSets	8b10b takes 8 bits of data and sends it as 10 bits, which allows control information to be sent along with the data. NonIdleOrderedSets is a count of ordered sets that are not idle.
8b10bStatsEncodingDispErrors	8b10b takes 8 bits of data and sends it as 10 bits, which allows control information to be sent along with the data. StatsEncodingDispErrors is a count of the received disparity errors.
BIE	The number of bit errors (BIE) corrected in the DWDM trunk line during the PM time interval.
BIT-EC	The number of Bit Errors Corrected (BIT-EC) in the DWDM trunk line during the PM time interval.
CGV	Code Group Violations (CGV) is a count of received code groups that do not contain a start or end delimiter.
DCG	Date Code Groups (DCG) is a count of received data code groups that do not contain ordered sets.
IOS	Idle Ordered Sets (IOS) is a count of received packets containing idle ordered sets.
IPC	Invalid Packets (IPC) is the count of received packets that contain errored data code groups that have start and end delimiters.
LBCL-AVG	Laser Bias Current Line-Average (LBCL-AVG) is the average percentage of laser bias current.
LBCL-MAX	Laser Bias Current Line-Maximum (LBCL-MAX) is the maximum percentage of laser bias current.
LBCL-MIN	Laser Bias Current Line-Minimum (LBCL-MIN) is the minimum percentage of laser bias current.

Table 10-22 ONS 15454 Optics and 8b10b PM Definitions (continued)

Parameter	Definition
LOFC	Loss of Frame Count (LOFC) is a count of the lost frames.
NIOS	Non-Idle Ordered Sets (NIOS) is a count of received packets containing non-idle ordered sets.
OPR	Optical Power Received (OPR) is the measure of average optical power received as a percentage of the nominal OPR.
OPR-AVG	Average Receive Optical Power (OPR-AVG) is the average received optical power measured in dBm.
OPR-MAX	Maximum Receive Optical Power (OPR-MAX) is the maximum received optical power measured in dBm.
OPR-MIN	Minimum Receive Optical Power (OPR-MIN) is the minimum received optical power measured in dBm.
OPT	Optical Power Transmitted (OPT) is the average optical power transmitted as a percentage of the nominal OPT.
OPT-AVG	Average Transmit Optical Power (OPT-AVG) is the average transmitted optical power measured in dBm.
OPT-MAX	Maximum Transmit Optical Power (OPT-MAX) is the maximum transmitted optical power measured in dBm.
OPT-MIN	Minimum Transmit Optical Power (OPT-MIN) is the minimum transmitted optical power measured in dBm.
OPWR-AVG	Optical Power - Average (OPWR-AVG) is the measure of average optical power on the unidirectional port.
OPWR-MAX	Optical Power - Maximum (OPWR-MAX) is the measure of maximum value of optical power on the unidirectional port.
OPWR-MIN	Optical Power - Minimum (OPWR-MIN) is the measure of minimum value of optical power on the unidirectional port.
UNC-WORDS	Uncorrectable Words (UNC-WORDS) is the number of uncorrectable words detected in the DWDM trunk line during the PM time interval.
VPC	Valid Packets (VPC) is a count of received packets that contain non-errored data code groups that have start and end delimiters.

10.5 ITU G.709 and ITU-T G.8021 Trunk-Side PM Parameter Definitions

Table 10-25 defines the ITU G.709 and ITU-T G.8021 section monitoring trunk-side PM parameters. For more information, see the [“10.2 Transponder and Muxponder Card Performance Monitoring”](#) section on page 10-2.

Table 10-23 ITU G.709 and ITU-T G.8021 Section Monitoring PM Definitions

Parameter	Definition
BBE-SM	Section Monitoring Background Block Errors (BBE-SM) shows the number of background block errors recorded in the OTN section during the PM time interval.
BBER-SM	Section Monitoring Background Block Errors Ratio (BBER-SM) shows the background block errors ratio recorded in the OTN path during the PM time interval.
ES-SM	Section Monitoring Errored Seconds (ES-SM) shows the errored seconds recorded in the OTN section during the PM time interval.
ESR-SM	Section Monitoring Errored Seconds Ratio (ESR-SM) shows the severely errored seconds ratio recorded in the OTN section during the PM time interval.
FC-SM	Section Monitoring Failure Counts (FC-SM) shows the failure counts recorded in the OTN section during the PM time interval.
SES-SM	Section Monitoring Severely Errored Seconds (SES-SM) shows the severely errored seconds recorded in the OTN section during the PM time interval.
SESR-SM	Section Monitoring Severely Errored Seconds Ratio (SESR-SM) shows the severely errored seconds ratio recorded in the OTN section during the PM time interval.
UAS-SM	Section Monitoring Unavailable Seconds (UAS-SM) shows the unavailable seconds recorded in the OTN section during the PM time interval.

Table 10-24 defines the ITU G.709 path monitoring trunk-side PM parameters. For more information, see the “10.2 Transponder and Muxponder Card Performance Monitoring” section on page 10-2.

Table 10-24 ITU G.709 Path Monitoring PM Definitions

Parameter	Definition
BBE-PM	Path Monitoring Background Block Errors (BBE-PM) shows the number of background block errors recorded in the OTN path during the PM time interval.
BBER-PM	Path Monitoring Background Block Errors Ratio (BBER-PM) shows the background block errors ratio recorded in the OTN path during the PM time interval.
ES-PM	Path Monitoring Errored Seconds (ES-PM) shows the errored seconds recorded in the OTN path during the PM time interval.
ESR-PM	Path Monitoring Errored Seconds Ratio (ESR-PM) shows the severely errored seconds ratio recorded in the OTN path during the PM time interval.
FC-PM	Path Monitoring Failure Counts (FC-PM) shows the failure counts recorded in the OTN path during the PM time interval.

Table 10-24 ITU G.709 Path Monitoring PM Definitions (continued)

Parameter	Definition
SES-PM	Path Monitoring Severely Errored Seconds (SES-PM) shows the severely errored seconds recorded in the OTN path during the PM time interval.
SESR-PM	Path Monitoring Severely Errored Seconds Ratio (SESR-PM) shows the severely errored seconds ratio recorded in the OTN path during the PM time interval.
UAS-PM	Path Monitoring Unavailable Seconds (UAS-PM) shows the unavailable seconds recorded in the OTN path during the PM time interval.

10.6 Full RMON Statistics PM Parameter Definitions

Table 10-25 defines the MXP_MR_2.5G, MXPP_MR_2.5G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L card full RMON statistics PM parameters. For more information, see the “10.2 Transponder and Muxponder Card Performance Monitoring” section on page 10-2.

Table 10-25 Full RMON Statistics PM Definitions

Parameter	Definition
dot3StatsFCSErrors	The number of frames with frame check errors.
dot3StatsFrameTooLong	The number of packets at least 64 octets long, without a bad Frame Check Sequence (FCS), where the 802.3 length/type field did not match the computed DATA field length.
etherStatsBroadcastPkts	The number of broadcast packets, excluding multicast packets, that are 64–16376 octets in length, and have a valid FCS.
etherStatsCRCAlignErrors	The number of packets that are 64–1518 octets in length without an integral number of octets, or with a bad FCS.
etherStatsFragments	The number of packets less than 64 octets long that do not have an integral number of octets or that have a bad FCS.
etherStatsJabbers	The number of octets of data, including bad packets, that were received on the network.
etherStatsMulticastPkts	The number of multicast packets, excluding broadcast packets, that are 64–16376 octets in length, and have a valid FCS.
etherStatsOctets	The number in bytes of received packets, including bad packets and excluding framing bits except for FCS bytes.
etherStatsOversizePkts	The number of packets more than 16376 octets long that have a valid FCS.
etherStatsPkts64Octets	The number of packet received, including error packets, that are 64 octets in length.
etherStatsPkts65to127Octets	The number of packets received, including error packets, that are 65–127 octets in length.
etherStatsPkts128to255Octets	The number of packets received, including error packets, that are 128–255 octets in length.

Table 10-25 Full RMON Statistics PM Definitions (continued)

Parameter	Definition
etherStatsPkts256to511Octets	The number of packets received, including error packets, that are 256–511 octets in length.
etherStatsPkts512to1023Octets	The number of packets received, including error packets, that are 512–1023 octets in length.
etherStatsPkts1024to1518Octets	The number of packets received, including error packets, that are 1024–1518 octets in length.
etherStatsUndersizePkts	The number of packets less than 64 octets long that have a valid FCS.
fcStatsLinkRecoveries	The number of link recoveries.
fcStatsRxCredits	The number of current receive buffer to buffer credits.
fcStatsTxCredits	The number of current transmit buffer to buffer credits.
fcStatsZeroTxCredits	This is a count that increments when the FC/FICON Tx credits go from a nonzero value to zero.
gfpStatsLFDRaised	The number of loss of frame delineation (LFD) raised.
gfpStatsRoundTripLatencyUSec	Round trip delay for the end-to-end Fibre Channel transport in microseconds.
gfpStatsRxCRCErrors	The number of packets received with a payload FCS error.
gfpStatsRxCSFRaised	Received GFP loss of client character synchronization (LOCCS).
gfpStatsRxDistanceExtBuffers	The number of receive buffer credit for GFP-T (valid only if distance extension is enabled).
gfpStatsRxMBitErrors	The received multibit errored core header count (cHEC).
gfpStatsRxSBitErrors	The received single-bit errored cHEC.
gfpStatsRxSblkCRCErrors	The number of packets received with a payload FCS error. Sblk stands for super block in the GFP payload.
gfpStatsRxTypeInvalid	Received invalid type.
gfpStatsTxDistanceExtBuffers	The number of transmit buffer credit for GFP-T (valid only if distance extension is enabled).
ifInBroadcastPkts	The number of packets delivered to a higher sublayer and addressed to a broadcast address at this sublayer.
ifInDiscards	The number of inbound packets that were chosen to be discarded even though no errors were detected, to prevent them from being deliverable to a higher-layer protocol. One possible reason for discarding such a packet could be to free buffer space.
ifInErrors	The number of inbound packets (or transmission units) that contained errors preventing them from being delivered to a higher-layer protocol.
ifInErrorBytePkts	The number of received packets with an error symbol detected.
ifInFramingErrorPkts	The number of received packets with a control symbol other than an error detected.

Table 10-25 Full RMON Statistics PM Definitions (continued)

Parameter	Definition
ifInJunkInterPkts	The number of interpacket gaps between valid start symbols during which a symbol other than idle is detected, including packets of length 1–8 octets.
ifInMulticastPkts	The total number of multicast frames received error-free.
ifInOctets	The number of bytes received since the last counter reset.
ifOutBroadcastPkts	The number of packets requested by higher-level protocols and addressed to a broadcast address at this sublayer, including those not transmitted.
ifOutDiscards	The number of outbound packets that were chosen to be discarded even though no errors had been detected to prevent their being transmitted. One possible reason for discarding such a packet could be to free buffer space.
ifOutMulticastPkts	The number of multicast frames transmitted error-free.
ifOutOctets	The number of bytes transmitted since the last counter reset.
InvalidCRCError	A count of invalid cyclic redundancy checks (CRCs).
mediaIndStatsRxFramesBadCRC	The number of received frames with a CRC error.
mediaIndStatsRxFramesTooLong	The number of received frames that are too long.
mediaIndStatsRxFramesTruncated	The number of received frames that are too small.
mediaIndStatsTxFramesBadCRC	The number of transmitted frames with a CRC error.
Running Disparity Count	A count of errors that affect the disparity of the received data stream.
rxControlFrames	The number of MAC control packets that are type 0x8808 and contain at least 64 octets in length.
rxFrames	A count of the number of frames received without errors.
rxLinkReset (Only for FC Mode)	A count of the received link resets.
rxPauseFrames	The number of received 802.x paused frames.
rxTotalPkts	The number of received packets.
rxUnknownOpcodeFrames	Number of packets of at least 64 octets in length and type 0x8808, with opcode not equal to 1.
Time Last Cleared	A time stamp indicating the last time statistics were reset.
txBytes	A count of the number of bytes transmitted from the frame since the last counter reset.
txFrames	A count of the number of transmitted frames.
txTotalPkts	The number of transmitted packets.

10.7 FEC PM Parameter Definitions

Table 10-26 defines the MXP_MR_2.5G, MXPP_MR_2.5G, TXP_MR_10E, TXP_MR_10E_C, and TXP_MR_10E_L card FEC PM parameters. For more information, see the “10.2 Transponder and Muxponder Card Performance Monitoring” section on page 10-2.

Table 10-26 *FEC PM Definitions*

Parameter	Definition
Bit Errors	Bit Errors are the number of bit errors corrected.
FEC (NE)	<p>FEC enables correction and detection of errors along the optical links where OTN and FEC are provisioned. FEC uses Reed Solomon code RS (255,239) encoding. The FEC field is found in Rows 1 to 4 and Columns 3835 to 4080. It will contain either the Reed-Solomon RS(255,239) codes, or if FEC is disabled, fixed stuff bytes (zeros).</p> <p>Note The FEC PM information can be found in the card view Performance > OTN PM tab. FEC must be enabled on the transponder units in order for FEC PM values to be reported.</p>
UNC-Words	Uncorrectable Words (UNC-Words) occur when FEC detects and corrects errors to deliver a 7 to 8 dB improvement in the signal-to-noise ratio (also called margin). For ITU G.709, the FEC code used is Reed-Solomon RS (255, 239).

10.8 SONET PM Parameter Definitions

Table 10-27 gives definitions for each type of SONET PM parameter available on an ONS 15454 ANSI node. These parameters become available when the client type is set to OC-3, OC-12, or OC-48 on a TXP_MR_2.5G or TXPP_MR_2.5G card or to OC-192 on a TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, or TXP_MR_10E_L card. The OC-48 client PM is available on MXP_2.5_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_MR_10DME_C, and MXP_MR_10DME_L cards. The OC-48 trunk PM is available on MXP_MR_2.5G and MXPP_MR_2.5G cards.

Table 10-27 *SONET PM Parameters*

Parameter	Definition
CV-L	Line Coding Violation (CV-L) indicates the number of coding violations occurring on the line. This parameter is a count of bipolar violations (BPVs) and excessive zeros (EXZs) occurring over the accumulation period.
CV-S	Section Coding Violation (CV-S) is a count of bit interleaved parity (BIP) errors detected at the section layer (that is, using the B1 byte in the incoming SONET signal). Up to eight section BIP errors can be detected per STS-N frame; each error increments the current CV-S second register.
ES-L	Line Errored Seconds (ES-L) is a count of the seconds containing one or more anomalies (BPV + EXZ) and/or defects (that is, loss of signal) on the line.
ES-S	Section Errored Seconds (ES-S) is a count of the number of seconds when at least one section-layer BIP error was detected or an SEF or loss of signal (LOS) defect was present.

Table 10-27 SONET PM Parameters (continued)

Parameter	Definition
FC-L	Line Failure Count (FC-L) is a count of the number of near-end line failure events. A failure event begins when an Alarm Indication Signal Line (AIS-L) failure is declared or when a lower-layer, traffic-related, near-end failure is declared. This failure event ends when the failure is cleared. A failure event that begins in one period and ends in another period is counted only in the period where it begins.
SEF-S	Severely Errored Framing Seconds (SEFS-S) is a count of the seconds when an SEF defect was present. An SEF defect is expected to be present during most seconds when an LOS or loss of frame (LOF) defect is present. However, there can be situations when the SEFS-S parameter is only incremented based on the presence of the SEF defect.
SES-L	Line Severely Errored Seconds (SES-L) is a count of the seconds containing more than a particular quantity of anomalies (BPV + EXZ \geq 44) and/or defects on the line.
SES-S	Section Severely Errored Seconds (SES-S) is a count of the seconds when K (see Telcordia GR-253 for value) or more section-layer BIP errors were detected or an SEF or LOS defect was present.
UAS-L	Line Unavailable Seconds (UAS-L) is a count of the seconds when the line is unavailable. A line becomes unavailable when ten consecutive seconds occur that qualify as SES-Ls, and it continues to be unavailable until ten consecutive seconds occur that do not qualify as SES-Ls.

10.9 SDH PM Parameter Definitions

Table 10-28 gives definitions for each type of SDH PM parameter available on an ONS 15454 ETSI node. These parameters become available when the client type is set to STM-1, STM-4, or STM-16 on a TXP_MR_2.5G or TXPP_MR_2.5G card or to STM-64 on a TXP_MR_10G, TXP_MR_10E, TXP_MR_10E_C, or TXP_MR_10E_L card. The STM-16 client PM is available on MXP_2.5G_10G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_L, MXP_MR_10DME_C, and MXP_MR_10DME_L cards. The STM-16 trunk PM is available on MXP_MR_2.5G and MXPP_MR_2.5G cards.

Table 10-28 SDH PM Parameters

Parameter	Definition
MS-BBE	Multiplex Section Background Block Error (MS-BBE) is an errored block not occurring as part of an SES.
MS-BBER	Multiplex Section Background Block Error Ratio (MS-BBER) is the ratio of BBE to total blocks in available time during a fixed measurement interval. The count of total blocks excludes all blocks during SESs.
MS-EB	Multiplex Section Errored Block (MS-EB) indicates that one or more bits are in error within a block.
MS-ES	Multiplex Section Errored Second (MS-ES) is a one-second period with one or more errored blocks or at least one defect.

Table 10-28 SDH PM Parameters (continued)

Parameter	Definition
MS-ESR	Multiplex Section Errored Second Ratio (MS-ESR) is the ratio of errored seconds to total seconds in available time during a fixed measurement interval.
MS-SES	Multiplex Section Severely Errored Second (MS-SES) is a one-second period that contains 30 percent or more errored blocks or at least one defect. SES is a subset of ES. For more information, refer to ITU-T G.829 Section 5.1.3.
MS-SESR	Multiplex Section Severely Errored Second ratio (MS-SESR) is the ratio of SES to total seconds in available time during a fixed measurement interval.
MS-UAS	Multiplex Section Unavailable Seconds (MS-UAS) is a count of the seconds when the section was unavailable. A section becomes unavailable when ten consecutive seconds occur that qualify as MS-SESs, and it continues to be unavailable until ten consecutive seconds occur that do not qualify as MS-SESs. When the condition is entered, MS-SESs decrement and then count toward MS-UAS.
RS-BBE	Regenerator Section Background Block Error (RS-BBE) is an errored block not occurring as part of an SES.
RS-BBER	Regenerator Section Background Block Error Ratio (RS-BBER) is the ratio of BBE to total blocks in available time during a fixed measurement interval. The count of total blocks excludes all blocks during SESs.
RS-EB	Regenerator Section Errored Block (RS-EB) indicates that one or more bits are in error within a block.
RS-ES	Regenerator Section Errored Second (RS-ES) is a one-second period with one or more errored blocks or at least one defect.
RS-ESR	Regenerator Section Errored Second Ratio (RS-ESR) is the ratio of errored seconds to total seconds in available time during a fixed measurement interval.
RS-SES	Regenerator Section Severely Errored Second (RS-SES) is a one-second period which contains 30 percent or more errored blocks or at least one defect. SES is a subset of ES.
RS-SESR	Regenerator Section Severely Errored Second Ratio (RS-SESR) is the ratio of SES to total seconds in available time during a fixed measurement interval.
RS-UAS	Regenerator Section Unavailable Second (RS-UAS) is a count of the seconds when the regenerator section was unavailable. A section becomes unavailable when ten consecutive seconds occur that qualify as RS-UASs, and it continues to be unavailable until ten consecutive seconds occur that do not qualify as RS-UASs.

10.10 Pointer Justification Count Performance Monitoring

For the MultiService Transport Platform (MSTP), only the MXP_2.5G_10G card uses pointer justification counts. Pointers are used to compensate for frequency and phase variations. Pointer justification counts indicate timing errors on networks. When a network is out of synchronization, jitter and wander occur on the transported signal. Excessive wander can cause terminating equipment to slip.

Slips cause different effects in service. Voice service has intermittent audible clicks. Compressed voice technology has short transmission errors or dropped calls. Fax machines lose scanned lines or experience dropped calls. Digital video transmission has distorted pictures or frozen frames. Encryption service loses the encryption key, causing data to be transmitted again.

For ONS 15454 ANSI nodes, pointers provide a way to align the phase variations in STS and VT payloads. The STS payload pointer is located in the H1 and H2 bytes of the line overhead. Clocking differences are measured by the offset in bytes from the pointer to the first byte of the STS synchronous payload envelope (SPE) called the J1 byte. Clocking differences that exceed the normal range of 0 to 782 can cause data loss.

For ONS 15454 ETSI nodes, pointers provide a way to align the phase variations in VC4 payloads. The VC4 payload pointer is located in the H1 and H2 bytes of the AU pointers section and is a count of the number of bytes the VC4 path overhead (POH) J1 byte is away from the H3 byte, not including the section overhead bytes. Clocking differences are measured by the offset in bytes from the pointer to the first byte of the VC4 POH called the J1 byte. Clocking differences that exceed the normal range of 0 to 782 can cause data loss.

There are positive (PPJC) and negative (NPJC) pointer justification count parameters. PPJC is a count of path-detected (PPJC-PDET-P) or path-generated (PPJC-PGEN-P) positive pointer justifications. NPJC is a count of path-detected (NPJC-PDET-P) or path-generated (NPJC-PGEN-P) negative pointer justifications depending on the specific PM name. PJCDIFF is the absolute value of the difference between the total number of detected pointer justification counts and the total number of generated pointer justification counts. PJCS-PDET-P is a count of the one-second intervals containing one or more PPJC-PDET or NPJC-PDET. PJCS-PGEN-P is a count of the one-second intervals containing one or more PPJC-PGEN or NPJC-PGEN.

A consistent pointer justification count indicates clock synchronization problems between nodes. A difference between the counts means that the node transmitting the original pointer justification has timing variations with the node detecting and transmitting this count. For ONS 15454 SONET nodes, positive pointer adjustments occur when the frame rate of the SPE is too slow in relation to the rate of the STS-1. For ONS 15454 SDH nodes, positive pointer adjustments occur when the frame rate of the path overhead (POH) is too slow in relation to the rate of the VC4.

In CTC, the count fields for PPJC and NPJC PMs appear white and blank unless they are enabled on the card view Provisioning tab.



SNMP

This chapter explains Simple Network Management Protocol (SNMP) as implemented by the Cisco ONS 15454.

For SNMP setup information, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

Chapter topics include:

- [11.1 SNMP Overview, page 11-1](#)
- [11.2 Basic SNMP Components, page 11-2](#)
- [11.3 SNMP External Interface Requirement, page 11-4](#)
- [11.4 SNMP Version Support, page 11-4](#)
- [11.5 SNMP Message Types, page 11-4](#)
- [11.6 SNMP Management Information Bases, page 11-5](#)
- [11.7 SNMP Trap Content, page 11-9](#)
- [11.8 SNMP Community Names, page 11-17](#)
- [11.9 SNMP in Multishelf Management, page 11-17](#)
- [11.10 Proxy Over Firewalls, page 11-19](#)
- [11.11 Remote Monitoring, page 11-20](#)

11.1 SNMP Overview

SNMP is an application-layer communication protocol that allows ONS 15454 network devices to exchange management information among these systems and with other devices outside the network. Through SNMP, network administrators can manage network performance, find and solve network problems, and plan network growth. Up to 10 SNMP trap destinations and five concurrent CTC user sessions are allowed per node.

The ONS 15454 uses SNMP for asynchronous event notification to a network management system (NMS). ONS SNMP implementation uses standard Internet Engineering Task Force (IETF) management information bases (MIBs) to convey node-level inventory, fault, and performance management

information for generic read-only management of DS-1, DS-3, SONET, and Ethernet technologies. SNMP allows a generic SNMP manager such as HP OpenView Network Node Manager (NNM) or Open Systems Interconnection (OSI) NetExpert to be utilized for limited management functions.

The Cisco ONS 15454 supports SNMP Version 1 (SNMPv1) and SNMP Version 2c (SNMPv2c). These versions share many features, but SNMPv2c includes additional protocol operations and 64-bit performance monitoring support. This chapter describes both versions and gives SNMP configuration parameters for the ONS 15454.

**Note**

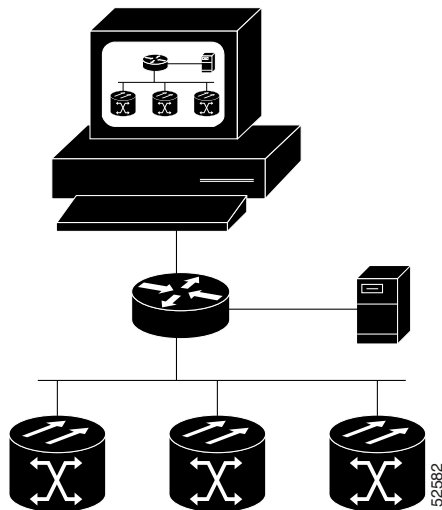
It is recommended that the SNMP Manager timeout value be set to 60 seconds. Under certain conditions, if this value is lower than the recommended time, the TCC card can reset. However, the response time depends on various parameters such as object being queried, complexity, and number of hops in the node, etc.

**Note**

The CERENT-MSDWDM-MIB.mib, CERENT-FC-MIB.mib, and CERENT-GENERIC-PM-MIB.mib in the CiscoV2 directory support 64-bit performance monitoring counters. The SNMPv1 MIB in the CiscoV1 directory does not contain 64-bit performance monitoring counters, but supports the lower and higher word values of the corresponding 64-bit counter. The other MIB files in the CiscoV1 and CiscoV2 directories are identical in content and differ only in format.

Figure 11-1 illustrates the basic layout idea of an SNMP-managed network.

Figure 11-1 Basic Network Managed by SNMP

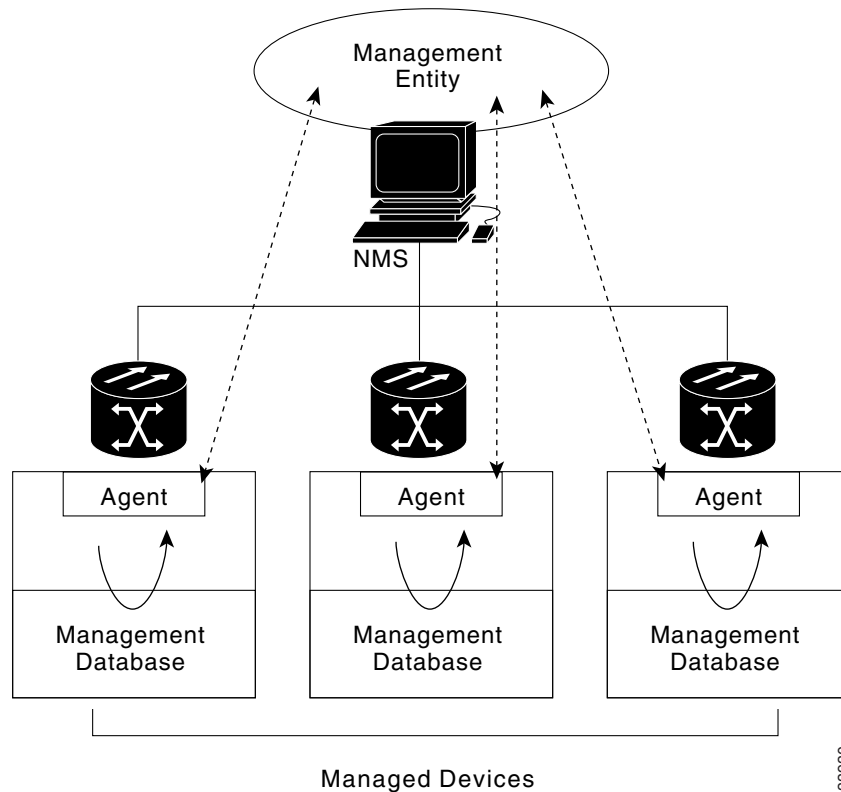


11.2 Basic SNMP Components

In general terms, an SNMP-managed network consists of a management system, agents, and managed devices.

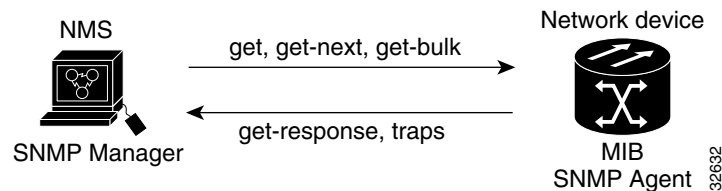
A management system such as HP OpenView executes monitoring applications and controls managed devices. Management systems execute most of the management processes and provide the bulk of memory resources used for network management. A network might be managed by one or more management systems. [Figure 11-2](#) illustrates the relationship between the network manager, the SNMP agent, and the managed devices.

Figure 11-2 Example of the Primary SNMP Components



An agent (such as SNMP) residing on each managed device translates local management information data, such as performance information or event and error information caught in software traps, into a readable form for the management system. [Figure 11-3](#) illustrates SNMP agent get-requests that transport data to the network management software.

Figure 11-3 Agent Gathering Data from a MIB and Sending Traps to the Manager



The SNMP agent captures data from MIBs, which are device parameter and network data repositories, or from error or change traps.

A managed element—such as a router, access server, switch, bridge, hub, computer host, or network element (such as an ONS 15454)—is accessed through the SNMP agent. Managed devices collect and store management information, making it available through SNMP to other management systems having the same protocol compatibility.

11.3 SNMP External Interface Requirement

Since all SNMP requests come from a third-party application, the only external interface requirement is that a third-part SNMP client application can upload RFC 3273 SNMP MIB variables in the `etherStatsHighCapacityTable`, `etherHistoryHighCapacityTable`, or `mediaIndependentTable`.

11.4 SNMP Version Support

The ONS 15454 supports SNMPv1 and SNMPv2c traps and get requests. The ONS 15454 SNMP MIBs define alarms, traps, and status. Through SNMP, NMS applications can query a management agent for data from functional entities such as Ethernet switches and SONET multiplexers using a supported MIB.



Note

ONS 15454 MIB files in the CiscoV1 and CiscoV2 directories are almost identical in content except for the difference in 64-bit performance monitoring features. The CiscoV2 directory contains three MIBs with 64-bit performance monitoring counters: `CERENT-MSDWDM-MIB.mib`, `CERENT-FC-MIB.mib`, and `CERENT-GENERIC-PM-MIB.mib`. The CiscoV1 directory does not contain any 64-bit counters, but it does support the lower and higher word values used in 64-bit counters. The two directories also have somewhat different formats.

11.5 SNMP Message Types

The ONS 15454 SNMP agent communicates with an SNMP management application using SNMP messages. [Table 11-1](#) describes these messages.

Table 11-1 ONS 15454 SNMP Message Types

Operation	Description
get-request	Retrieves a value from a specific variable.
get-next-request	Retrieves the value following the named variable; this operation is often used to retrieve variables from within a table. With this operation, an SNMP manager does not need to know the exact variable name. The SNMP manager searches sequentially to find the needed variable from within the MIB.
get-response	Replies to a get-request, get-next-request, get-bulk-request, or set-request sent by an NMS.
get-bulk-request	Fills the get-response with up to the max-repetition number of get-next interactions, similar to a get-next-request.
set-request	Provides remote network monitoring (RMON) MIB.
trap	Indicates that an event has occurred. An unsolicited message is sent by an SNMP agent to an SNMP manager.

11.6 SNMP Management Information Bases

Section 11.6.1 lists IETF-standard MIBs that are implemented in the ONS 15454 and shows their compilation order. Section 11.6.2 lists proprietary MIBs for the ONS 15454 and shows their compilation order. Section 11.6.3 contains information about the generic threshold and performance monitoring MIBs that can be used to monitor any network element (NE) contained in the network.

11.6.1 IETF-Standard MIBs for the ONS 15454

Table 11-2 lists the IETF-standard MIBs implemented in the ONS 15454 SNMP agents.

First compile the MIBs in Table 11-2. Compile the Table 11-3 MIBs next.



Caution

If you do not compile MIBs in the correct order, one or more might not compile correctly.

Table 11-2 IETF Standard MIBs Implemented in the ONS 15454 System

RFC ¹ Number	Module Name	Title/Comments
—	IANAifType-MIB.mib	Internet Assigned Numbers Authority (IANA) ifType
1213	RFC1213-MIB-rfc1213.mib	Management Information Base for Network
1907	SNMPV2-MIB-rfc1907.mib	Management of TCP/IP-based Internets: MIB-II Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2)
1253	RFC1253-MIB-rfc1253.mib	OSPF Version 2 Management Information Base
1493	BRIDGE-MIB-rfc1493.mib	Definitions of Managed Objects for Bridges (This defines MIB objects for managing MAC bridges based on the IEEE 802.1D-1990 standard between Local Area Network [LAN] segments.)
2819	RMON-MIB-rfc2819.mib	Remote Network Monitoring Management Information Base
2737	ENTITY-MIB-rfc2737.mib	Entity MIB (Version 2)
2233	IF-MIB-rfc2233.mib	Interfaces Group MIB using SNMPv2
2358	EtherLike-MIB-rfc2358.mib	Definitions of Managed Objects for the Ethernet-like Interface Types
2493	PerfHist-TC-MIB-rfc2493.mib	Textual Conventions for MIB Modules Using Performance History Based on 15 Minute Intervals
2495	DS1-MIB-rfc2495.mib	Definitions of Managed Objects for the DS1, E1, DS2 and E2 Interface Types
2496	DS3-MIB-rfc2496.mib	Definitions of Managed Object for the DS3/E3 Interface Type
2558	SONET-MIB-rfc2558.mib	Definitions of Managed Objects for the SONET/SDH Interface Type

Table 11-2 IETF Standard MIBs Implemented in the ONS 15454 System (continued)

RFC ¹ Number	Module Name	Title/Comments
2674	P-BRIDGE-MIB-rfc2674.mib Q-BRIDGE-MIB-rfc2674.mib	Definitions of Managed Objects for Bridges with Traffic Classes, Multicast Filtering and Virtual LAN Extensions
3273	HC-RMON-MIB	The MIB module for managing remote monitoring device implementations, augmenting the original RMON MIB as specified in RFC 2819 and RFC 1513 and RMON-2 MIB as specified in RFC 2021

1. RFC = Request for Comment

11.6.2 Proprietary ONS 15454 MIBs

Each ONS 15454 is shipped with a software CD containing applicable proprietary MIBs. [Table 11-3](#) lists the proprietary MIBs for the ONS 15454.

Table 11-3 ONS 15454 Proprietary MIBs

MIB Number	Module Name
1	CERENT-GLOBAL-REGISTRY.mib
2	CERENT-TC.mib
3	CERENT-454.mib
4	CERENT-GENERIC.mib (not applicable to ONS 15454)
5	CISCO-SMI.mib
6	CISCO-VOA-MIB.mib
7	CERENT-MSDWDM-MIB.mib
8	CERENT-OPTICAL-MONITOR-MIB.mib
9	CERENT-HC-RMON-MIB.mib
10	CERENT-ENVMON-MIB.mib
11	CERENT-GENERIC-PM-MIB.mib

**Note**

If you cannot compile the proprietary MIBs correctly, log into the Technical Support Website at <http://www.cisco.com/techsupport> or call Cisco TAC (800) 553-2447.

**Note**

When SNMP indicates that the wavelength is unknown, it means that the corresponding card (MXP_2.5G_10E, TXP_MR_10E, MXP_2.5G_10G, TXP_MR_10G, TXP_MR_2.5G, or TXPP_MR_2.5G) works with the first tunable wavelength. For more information about MXP and TXP cards, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

11.6.3 Generic Threshold and Performance Monitoring MIBs

A MIB called CERENT-GENERIC-PM-MIB allows network management stations (NMS) to use a single, generic MIB for accessing threshold and performance monitoring data of different interface types. The MIB is generic in the sense that it is not tied to any particular kind of interface. The MIB objects can be used to obtain threshold values, current performance monitoring (PM) counts, and historic PM statistics for each kind of monitor and any supported interval at the near end and far end.

Previously existing MIBs in the ONS 15454 system provide some of these counts. For example, SONET interface 15-minute current PM counts and historic PM statistics are available using the SONET-MIB. DS-1 and DS-3 counts and statistics are available through the DS1-MIB and DS-3 MIB respectively. The generic MIB provides these types of information and also fetches threshold values and single-day statistics. In addition, the MIB supports optics and dense wavelength division multiplexing (DWDM) threshold and performance monitoring information.

The CERENT-GENERIC-PM-MIB is organized into three different tables:

- `cerentGenericPmThresholdTable`
- `cerentGenericPmStatsCurrentTable`
- `cerentGenericPmStatsIntervalTable`

The `cerentGenericPmThresholdTable` is used to obtain the threshold values for the monitor types. It is indexed based on the interface index (`cerentGenericPmThresholdIndex`), monitor type (`cerentGenericPmThresholdMonType`), location (`cerentGenericPmThresholdLocation`), and time period (`cerentGenericPmThresholdPeriod`). The syntax of `cerentGenericPmThresholdMonType` is type `cerentMonitorType`, defined in CERENT-TC.mib. The syntax of `cerentGenericPmThresholdLocation` is type `cerentLocation`, defined in CERENT-TC.mib. The syntax of `cerentGenericPmThresholdPeriod` is type `cerentPeriod`, defined in CERENT-TC.mib.

Threshold values can be provided in 64-bit and 32-bit formats. (For more information about 64-bit counters, see the “[11.11.2 HC-RMON-MIB Support](#)” section on page 11-21.) The 64-bit values in `cerentGenericPmThresholdHCValue` can be used with agents that support SNMPv2. The two 32-bit values (`cerentGenericPmThresholdValue` and `cerentGenericPmThresholdOverFlowValue`) can be used by NMSs that only support SNMPv1.

Due to the 64-bit counter, the negative values for `cerentGenericPmThresholdHCValue` are displayed as large positive integers. If the `cerentGenericPmThresholdOverFlowValue` is less than zero, it indicates that the `cerentGenericPmThresholdHCValue` is representing a negative value.

The objects compiled in the `cerentGenericPmThresholdTable` are shown in [Table 11-4](#).

Table 11-4 *cerentGenericPmThresholdTable*

Index Objects	Information Objects
<code>cerentGenericPmThresholdIndex</code>	<code>cerentGenericPmThresholdValue</code>
<code>cerentGenericPmThresholdMonType</code>	<code>cerentGenericPmThresholdOverFlowValue</code>
<code>cerentGenericPmThresholdLocation</code>	<code>cerentGenericPmThresholdHCValue</code>
<code>cerentGenericPmThresholdPeriod</code>	—

The second table within the MIB, `cerentGenericPmStatsCurrentTable`, compiles the current performance monitoring (PM) values for the monitor types. The table is indexed based on interface index (`cerentGenericPmStatsCurrentIndex`), monitor type (`cerentGenericPmStatsCurrentMonType`), location (`cerentGenericPmStatsCurrentLocation`) and time period (`cerentGenericPmStatsCurrentPeriod`). The

syntax of `cerentGenericPmStatsCurrentIndex` is type `cerentLocation`, defined in `CERENT-TC.mib`. The syntax of `cerentGenericPmStatsCurrentMonType` is type `cerentMonitor`, defined in `CERENT-TC.mib`. The syntax of `cerentGenericPmStatsCurrentPeriod` is type `cerentPeriod`, defined in `CERENT-TC.mib`.

The `cerentGenericPmStatsCurrentTable` validates the current PM value using the `cerentGenericPmStatsCurrentValid` object and registers the number of valid intervals with historical PM statistics in the `cerentGenericPmStatsCurrentValidIntervals` object.

PM values are provided in 64-bit and 32-bit formats. The 64-bit values in `cerentGenericPmStatsCurrentHCValue` can be used with agents that support SNMPv2. The two 32-bit values (`cerentGenericPmStatsCurrentValue` and `cerentGenericPmStatsCurrentOverFlowValue`) can be used by NMS that only support SNMPv1.

Due to the 64-bit counter, the negative values for `cerentGenericPmStatsCurrentHCValue` are displayed as large positive integers. If the `cerentGenericPmStatsCurrentOverFlowValue` is less than zero, it indicates that the `cerentGenericPmStatsCurrentHCValue` is representing a negative value.

The `cerentGenericPmStatsCurrentTable` is shown in [Table 11-5](#).

Table 11-5 *cerentGenericPmStatsCurrentTable*

Index Objects	Informational Objects
<code>cerentGenericPmStatsCurrentIndex</code>	<code>cerentGenericPmStatsCurrentValue</code>
<code>cerentGenericPmStatsCurrentMonType</code>	<code>cerentGenericPmStatsCurrentOverFlowValue</code>
<code>cerentGenericPmStatsCurrentLocation</code>	<code>cerentGenericPmStatsCurrentHCValue</code>
<code>cerentGenericPmStatsCurrentPeriod</code>	<code>cerentGenericPmStatsCurrentValidData</code>
—	<code>cerentGenericPmStatsCurrentValidIntervals</code>

The third table in the MIB, `cerentGenericPmStatsIntervalTable`, obtains historic PM values for the monitor types. This table is indexed based on the interface index, monitor type, location, time period, and interval number. It validates the current PM value in the `cerentGenericPmStatsIntervalValid` object.

This table is indexed based on interface index (`cerentGenericPmStatsIntervalIndex`), monitor type (`cerentGenericPmStatsIntervalMonType`), location (`cerentGenericPmStatsIntervalLocation`), and period (`cerentGenericPmStatsIntervalPeriod`). The syntax of `cerentGenericPmStatsIntervalIndex` is type `cerentLocation`, defined in `CERENT-TC.mib`. The syntax of `cerentGenericPmStatsIntervalMonType` is type `cerentMonitor`, defined in `CERENT-TC.mib`. The syntax of `cerentGenericPmStatsIntervalPeriod` is type `cerentPeriod`, defined in `CERENT-TC.mib`.

The table provides historic PM values in 64-bit and 32-bit formats. The 64-bit values contained in the `cerentGenericPmStatsIntervalHCValue` table can be used with SNMPv2 agents. The two 32-bit values (`cerentGenericPmStatsIntervalValue` and `cerentGenericPmStatsIntervalOverFlowValue`) can be used by SNMPv1 NMS.

Due to the 64-bit counter, the negative values for `cerentGenericPmStatsIntervalHCValue` are displayed as large positive integers. If the `cerentGenericPmStatsIntervalOverFlowValue` is less than zero, it indicates that the `cerentGenericPmStatsIntervalHCValue` is representing a negative value.

The `cerentGenericPmStatsIntervalTable` is shown in [Table 11-6](#).

Table 11-6 *cerentGenericPmStatsIntervalTable*

Index Objects	Informational Objects
cerentGenericPmStatsIntervalIndex	cerentGenericPmStatsIntervalValue
cerentGenericPmStatsIntervalMonType	cerentGenericPmStatsIntervalOverflowValue
cerentGenericPmStatsIntervalLocation	cerentGenericPmStatsIntervalHCValue
cerentGenericPmStatsIntervalPeriod	cerentGenericPmStatsIntervalValidData
cerentGenericPmStatsIntervalNumber	—

11.7 SNMP Trap Content

The ONS 15454 generates all alarms and events, such as raises and clears, as SNMP traps. These contain the following information:

- Object IDs that uniquely identify each event with information about the generating entity (the slot or port; synchronous transport signal [STS] and Virtual Tributary [VT]; bidirectional line switched ring [BLSR], Spanning Tree Protocol [STP], etc.).
- Severity and service effect of the alarm (critical, major, minor, or event; service-affecting or non-service-affecting).
- Date and time stamp showing when the alarm occurred.

11.7.1 Generic and IETF Traps

The ONS 15454 supports the generic IETF traps listed in [Table 11-7](#).

Table 11-7 *Generic IETF Traps*

Trap	From RFC No. MIB	Description
coldStart	RFC1907-MIB	Agent up, cold start.
warmStart	RFC1907-MIB	Agent up, warm start.
authenticationFailure	RFC1907-MIB	Community string does not match.
newRoot	RFC1493/ BRIDGE-MIB	Sending agent is the new root of the spanning tree.
topologyChange	RFC1493/ BRIDGE-MIB	A port in a bridge has changed from Learning to Forwarding or Forwarding to Blocking.
entConfigChange	RFC2737/ ENTITY-MIB	The entLastChangeTime value has changed.
dsx1LineStatusChange	RFC2495/ DS1-MIB	The value of an instance of dsx1LineStatus has changed. The trap can be used by an NMS to trigger polls. When the line status change results from a higher-level line status change (for example, a DS-3), no traps for the DS-1 are sent.

Table 11-7 Generic IETF Traps (continued)

Trap	From RFC No. MIB	Description
dsx3LineStatusChange	RFC2496/ DS3-MIB	The value of an instance of dsx3LineStatus has changed. This trap can be used by an NMS to trigger polls. When the line status change results in a lower-level line status change (for example, a DS-1), no traps for the lower-level are sent.
risingAlarm	RFC2819/ RMON-MIB	The SNMP trap that is generated when an alarm entry crosses the rising threshold and the entry generates an event that is configured for sending SNMP traps.
fallingAlarm	RFC2819/ RMON-MIB	The SNMP trap that is generated when an alarm entry crosses the falling threshold and the entry generates an event that is configured for sending SNMP traps.

11.7.2 Variable Trap Bindings

Each SNMP trap contains variable bindings that are used to create the MIB tables. ONS 15454 traps and variable bindings are listed in [Table 11-8](#). For each group (such as Group A), all traps within the group are associated with all of its variable bindings.

Table 11-8 ONS 15454 SNMPv2 Trap Variable Bindings

Group	Trap Name(s) Associated with	Variable Binding Number	SNMPv2 Variable Bindings	Description
A	dsx1LineStatusChange (from RFC 2495)	(1)	dsx1LineStatus	This variable indicates the line status of the interface. It contains loopback, failure, received alarm and transmitted alarm information.
		(2)	dsx1LineStatusLastChange	The value of MIB II's sysUpTime object at the time this DS1 entered its current line status state. If the current state was entered prior to the last proxy-agent reinitialization, the value of this object is zero.
		(3)	cerent454NodeTime	The time that an event occurred.
		(4)	cerent454AlarmState	The alarm severity and service-affecting status. Severities are Minor, Major, and Critical. Service-affecting statuses are Service-Affecting and Non-Service Affecting.
		(5)	snmpTrapAddress	The address of the SNMP trap.

Table 11-8 ONS 15454 SNMPv2 Trap Variable Bindings (continued)

Group	Trap Name(s) Associated with	Variable Binding Number	SNMPv2 Variable Bindings	Description
B	dsx3LineStatusChange (from RFC 2496)	(1)	dsx3LineStatus	This variable indicates the line status of the interface. It contains loopback state information and failure state information.
		(2)	dsx3LineStatusLastChange	The value of MIB II's sysUpTime object at the time this DS3/E3 entered its current line status state. If the current state was entered prior to the last reinitialization of the proxy-agent, then the value is zero.
		(3)	cerent454NodeTime	The time that an event occurred.
B (cont.)		(4)	cerent454AlarmState	The alarm severity and service-affecting status. Severities are Minor, Major, and Critical. Service-affecting statuses are Service-Affecting and Non-Service Affecting.
		(5)	snmpTrapAddress	The address of the SNMP trap.
C	coldStart (from RFC 1907)	(1)	cerent454NodeTime	The time that the event occurred.
	warmStart (from RFC 1907)	(2)	cerent454AlarmState	The alarm severity and service-affecting status. Severities are Minor, Major, and Critical. Service-affecting statuses are Service-Affecting and Non-Service Affecting.
	newRoot (from RFC)	(3)	snmpTrapAddress	The address of the SNMP trap.
	topologyChange (from RFC)		—	—
	entConfigChange (from RFC 2737)		—	—
	authenticationFailure (from RFC 1907)		—	—

Table 11-8 ONS 15454 SNMPv2 Trap Variable Bindings (continued)

Group	Trap Name(s) Associated with	Variable Binding Number	SNMPv2 Variable Bindings	Description
D1	risingAlarm (from RFC 2819)	(1)	alarmIndex	This variable uniquely identifies each entry in the alarm table. When an alarm in the table clears, the alarm indexes change for each alarm listed.
		(2)	alarmVariable	The object identifier of the variable being sampled.
		(3)	alarmSampleType	The method of sampling the selected variable and calculating the value to be compared against the thresholds.
		(4)	alarmValue	The value of the statistic during the last sampling period.
D1 (cont.)		(5)	alarmRisingThreshold	When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event is generated. A single event is also generated if the first sample after this entry is greater than or equal to this threshold.
		(6)	cerent454NodeTime	The time that an event occurred.
		(7)	cerent454AlarmState	The alarm severity and service-affecting status. Severities are Minor, Major, and Critical. Service-affecting statuses are Service-Affecting and Non-Service Affecting.
		(8)	snmpTrapAddress	The address of the SNMP trap.

Table 11-8 ONS 15454 SNMPv2 Trap Variable Bindings (continued)

Group	Trap Name(s) Associated with	Variable Binding Number	SNMPv2 Variable Bindings	Description
D2	fallingAlarm (from RFC 2819)	(1)	alarmIndex	This variable uniquely identifies each entry in the alarm table. When an alarm in the table clears, the alarm indexes change for each alarm listed.
		(2)	alarmVariable	The object identifier of the variable being sampled.
		(3)	alarmSampleType	The method of sampling the selected variable and calculating the value to be compared against the thresholds.
		(4)	alarmValue	The value of the statistic during the last sampling period.
		(5)	alarmFallingThreshold	When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single event is generated. A single is also generated if the first sample after this entry is less than or equal to this threshold.
		(6)	cerent454NodeTime	The time that an event occurred.
D2 (cont.)		(7)	cerent454AlarmState	The alarm severity and service-affecting status. Severities are Minor, Major, and Critical. Service-affecting statuses are Service-Affecting and Non-Service Affecting.
		(8)	snmpTrapAddress	The address of the SNMP trap.

Table 11-8 ONS 15454 SNMPv2 Trap Variable Bindings (continued)

Group	Trap Name(s) Associated with	Variable Binding Number	SNMPv2 Variable Bindings	Description
E	failureDetectedExternalToTheNE (from CERENT-454-mib)	(1)	cerent454NodeTime	The time that an event occurred.
		(2)	cerent454AlarmState	The alarm severity and service-affecting status. Severities are Minor, Major, and Critical. Service-affecting statuses are Service-Affecting and Non-Service Affecting.
		(3)	cerent454AlarmObjectType	The entity that raised the alarm. The NMS should use this value to decide which table to poll for further information about the alarm.
		(4)	cerent454AlarmObjectIndex	Every alarm is raised by an object entry in a specific table. This variable is the index of objects in each table; if the alarm is interface-related, this is the index of the interface in the interface table.
		(5)	cerent454AlarmSlotNumber	The slot of the object that raised the alarm. If a slot is not relevant to the alarm, the slot number is zero.
		(6)	cerent454AlarmPortNumber	The port of the object that raised the alarm. If a port is not relevant to the alarm, the port number is zero.
		(7)	cerent454AlarmLineNumber	The object line that raised the alarm. If a line is not relevant to the alarm, the line number is zero.
		(8)	cerent454AlarmObjectName	The TL1-style user-visible name that uniquely identifies an object in the system.
E (cont.)		(9)	cerent454AlarmAdditionalInfo	Additional information for the alarm object. In the current version of the MIB, this object contains provisioned description for alarms that are external to the NE. If there is no additional information, the value is zero.
		(10)	snmpTrapAddress	The address of the SNMP trap.

Table 11-8 ONS 15454 SNMPv2 Trap Variable Bindings (continued)

Group	Trap Name(s) Associated with	Variable Binding Number	SNMPv2 Variable Bindings	Description
F	performanceMonitorThresholdCrossingAlert (from CERENT-454-mib)	(1)	cerent454NodeTime	The time that an event occurred.
		(2)	cerent454AlarmState	The alarm severity and service-affecting status. Severities are Minor, Major, and Critical. Service-affecting statuses are Service-Affecting and Non-Service Affecting.
		(3)	cerent454AlarmObjectType	The entity that raised the alarm. The NMS should use this value to decide which table to poll for further information about the alarm.
		(4)	cerent454AlarmObjectIndex	Every alarm is raised by an object entry in a specific table. This variable is the index of objects in each table; if the alarm is interface-related, this is the index of the interface in the interface table.
		(5)	cerent454AlarmSlotNumber	The slot of the object that raised the alarm. If a slot is not relevant to the alarm, the slot number is zero.
		(6)	cerent454AlarmPortNumber	The port of the object that raised the alarm. If a port is not relevant to the alarm, the port number is zero.
		(7)	cerent454AlarmLineNumber	The object line that raised the alarm. If a line is not relevant to the alarm, the line number is zero.
		(8)	cerent454AlarmObjectName	The TL1-style user-visible name that uniquely identifies an object in the system.
		(9)	cerent454ThresholdMonitorType	This object indicates the type of metric being monitored.

Table 11-8 ONS 15454 SNMPv2 Trap Variable Bindings (continued)

Group	Trap Name(s) Associated with	Variable Binding Number	SNMPv2 Variable Bindings	Description
F (cont.)		(10)	cerent454ThresholdLocation	Indicates whether the event occurred at the near or far end.
		(11)	cerent454ThresholdPeriod	Indicates the sampling interval period.
		(12)	cerent454ThresholdSetValue	The value of this object is the threshold provisioned by the NMS.
		(13)	cerent454ThresholdCurrentValue	—
		(14)	cerent454ThresholdDetectType	—
		(15)	snmpTrapAddress	The address of the SNMP trap.
G	All other traps (from CERENT-454-MIB) not listed above	(1)	cerent454NodeTime	The time that an event occurred.
		(2)	cerent454AlarmState	The alarm severity and service-affecting status. Severities are Minor, Major, and Critical. Service-affecting statuses are Service-Affecting and Non-Service Affecting.
		(3)	cerent454AlarmObjectType	The entity that raised the alarm. The NMS should use this value to decide which table to poll for further information about the alarm.
		(4)	cerent454AlarmObjectIndex	Every alarm is raised by an object entry in a specific table. This variable is the index of objects in each table; if the alarm is interface-related, this is the index of the interface in the interface table.
		(5)	cerent454AlarmSlotNumber	The slot of the object that raised the alarm. If a slot is not relevant to the alarm, the slot number is zero.
		(6)	cerent454AlarmPortNumber	The port of the object that raised the alarm. If a port is not relevant to the alarm, the port number is zero.
		(7)	cerent454AlarmLineNumber	The object line that raised the alarm. If a line is not relevant to the alarm, the line number is zero.

Table 11-8 ONS 15454 SNMPv2 Trap Variable Bindings (continued)

Group	Trap Name(s) Associated with	Variable Binding Number	SNMPv2 Variable Bindings	Description
G (cont.)		(8)	cerent454AlarmObjectName	The TL1-style user-visible name that uniquely identifies an object in the system.
		(9)	snmpTrapAddress	The address of the SNMP trap.

11.8 SNMP Community Names

Community names are used to group SNMP trap destinations. All ONS 15454 trap destinations can be provisioned as part of SNMP communities in Cisco Transport Controller (CTC). When community names are assigned to traps, the ONS 15454 treats the request as valid if the community name matches one that is provisioned in CTC. In this case, all agent-managed MIB variables are accessible to that request. If the community name does not match the provisioned list, SNMP drops the request.

11.9 SNMP in Multishelf Management

When using the dense wavelength division multiplexing (DWDM) multishelf management feature to subtend shelves from a node controller shelf, SNMP for the subtended shelves must be specially provisioned. All shelves within a multishelf configuration share the node controller's ID and IP address. Thus, the only way to route SNMP messages to or from subtended shelves is by using proxy ARP.

The `cerent454MultishelfEnabled` object ID (OID) can be used to determine whether the node is single shelf or multishelf.

To view the OID, use the `snmpwalk node IP address ifDescr` SNMP command in global configuration mode. This command output displays the OID as

```
<interface_name>_x/y/z
```

where

x = Shelf number (for a multishelf node)

y = Card slot number

z = Card port number.

The following example shows how to obtain the OID using the `snmpwalk node IP address ifDescr` SNMP command.

```
Router(config)# snmpwalk 192.0.2.1 ifDescr
RFC1213-MIB::ifDescr.1 = STRING: "motfcc0"
RFC1213-MIB::ifDescr.6 = STRING: "pdcc0"
RFC1213-MIB::ifDescr.7 = STRING: "pdcc1"
RFC1213-MIB::ifDescr.8 = STRING: "pdcc2"
RFC1213-MIB::ifDescr.9 = STRING: "pdcc3"
RFC1213-MIB::ifDescr.10 = STRING: "pdcc4"
RFC1213-MIB::ifDescr.11 = STRING: "pdcc5"
RFC1213-MIB::ifDescr.12 = STRING: "pdcc6"
RFC1213-MIB::ifDescr.13 = STRING: "pdcc7"
RFC1213-MIB::ifDescr.14 = STRING: "pdcc8"
RFC1213-MIB::ifDescr.15 = STRING: "pdcc9"
RFC1213-MIB::ifDescr.16 = STRING: "pdcc10"
```

```
RFC1213-MIB::ifDescr.17 = STRING: "pdcc11"  
RFC1213-MIB::ifDescr.18 = STRING: "pdcc12"  
RFC1213-MIB::ifDescr.19 = STRING: "pdcc13"  
RFC1213-MIB::ifDescr.20 = STRING: "pdcc14"  
RFC1213-MIB::ifDescr.21 = STRING: "pdcc15"  
RFC1213-MIB::ifDescr.22 = STRING: "pdcc16"  
RFC1213-MIB::ifDescr.23 = STRING: "pdcc17"  
RFC1213-MIB::ifDescr.24 = STRING: "pdcc18"  
RFC1213-MIB::ifDescr.25 = STRING: "pdcc19"  
RFC1213-MIB::ifDescr.26 = STRING: "pdcc20"  
RFC1213-MIB::ifDescr.27 = STRING: "pdcc21"  
RFC1213-MIB::ifDescr.28 = STRING: "pdcc22"  
RFC1213-MIB::ifDescr.29 = STRING: "pdcc23"  
RFC1213-MIB::ifDescr.30 = STRING: "pdcc24"  
RFC1213-MIB::ifDescr.31 = STRING: "pdcc25"  
RFC1213-MIB::ifDescr.32 = STRING: "pdcc26"  
RFC1213-MIB::ifDescr.33 = STRING: "pdcc27"  
RFC1213-MIB::ifDescr.34 = STRING: "pdcc28"  
RFC1213-MIB::ifDescr.35 = STRING: "pdcc29"  
RFC1213-MIB::ifDescr.36 = STRING: "pdcc30"  
RFC1213-MIB::ifDescr.37 = STRING: "pdcc31"  
RFC1213-MIB::ifDescr.38 = STRING: "pdcc32"  
RFC1213-MIB::ifDescr.39 = STRING: "pdcc33"  
RFC1213-MIB::ifDescr.40 = STRING: "pdcc34"  
RFC1213-MIB::ifDescr.41 = STRING: "pdcc35"  
RFC1213-MIB::ifDescr.42 = STRING: "pdcc36"  
RFC1213-MIB::ifDescr.43 = STRING: "pdcc37"  
RFC1213-MIB::ifDescr.44 = STRING: "pdcc38"  
RFC1213-MIB::ifDescr.45 = STRING: "pdcc39"  
RFC1213-MIB::ifDescr.46 = STRING: "pdcc40"  
RFC1213-MIB::ifDescr.47 = STRING: "pdcc41"  
RFC1213-MIB::ifDescr.48 = STRING: "pdcc42"  
RFC1213-MIB::ifDescr.49 = STRING: "pdcc43"  
RFC1213-MIB::ifDescr.50 = STRING: "pdcc44"  
RFC1213-MIB::ifDescr.51 = STRING: "pdcc45"  
RFC1213-MIB::ifDescr.52 = STRING: "pdcc46"  
RFC1213-MIB::ifDescr.53 = STRING: "pdcc47"  
RFC1213-MIB::ifDescr.54 = STRING: "pdcc48"  
RFC1213-MIB::ifDescr.55 = STRING: "pdcc49"  
RFC1213-MIB::ifDescr.56 = STRING: "pdcc50"  
RFC1213-MIB::ifDescr.57 = STRING: "pdcc51"  
RFC1213-MIB::ifDescr.58 = STRING: "pdcc52"  
RFC1213-MIB::ifDescr.59 = STRING: "pdcc53"  
RFC1213-MIB::ifDescr.60 = STRING: "pdcc54"  
RFC1213-MIB::ifDescr.61 = STRING: "pdcc55"  
RFC1213-MIB::ifDescr.62 = STRING: "pdcc56"  
RFC1213-MIB::ifDescr.63 = STRING: "pdcc57"  
RFC1213-MIB::ifDescr.64 = STRING: "pdcc58"  
RFC1213-MIB::ifDescr.65 = STRING: "pdcc59"  
RFC1213-MIB::ifDescr.66 = STRING: "pdcc60"  
RFC1213-MIB::ifDescr.67 = STRING: "pdcc61"  
RFC1213-MIB::ifDescr.68 = STRING: "pdcc62"  
RFC1213-MIB::ifDescr.69 = STRING: "pdcc63"  
RFC1213-MIB::ifDescr.70 = STRING: "pdcc64"  
RFC1213-MIB::ifDescr.71 = STRING: "pdcc65"  
RFC1213-MIB::ifDescr.72 = STRING: "pdcc66"  
RFC1213-MIB::ifDescr.73 = STRING: "pdcc67"  
RFC1213-MIB::ifDescr.74 = STRING: "pdcc68"  
RFC1213-MIB::ifDescr.75 = STRING: "pdcc69"  
RFC1213-MIB::ifDescr.76 = STRING: "pdcc70"  
RFC1213-MIB::ifDescr.77 = STRING: "pdcc71"  
RFC1213-MIB::ifDescr.78 = STRING: "pdcc72"  
RFC1213-MIB::ifDescr.79 = STRING: "pdcc73"  
RFC1213-MIB::ifDescr.80 = STRING: "pdcc74"
```



```

RFC1213-MIB::ifDescr.81 = STRING: "pdcc75"
RFC1213-MIB::ifDescr.82 = STRING: "pdcc76"
RFC1213-MIB::ifDescr.83 = STRING: "pdcc77"
RFC1213-MIB::ifDescr.84 = STRING: "pdcc78"
RFC1213-MIB::ifDescr.85 = STRING: "pdcc79"
RFC1213-MIB::ifDescr.86 = STRING: "pdcc80"
RFC1213-MIB::ifDescr.257 = STRING: "fog_1_36"
RFC1213-MIB::ifDescr.8194 = STRING: "TenGigabitEthernet2/1"
RFC1213-MIB::ifDescr.8195 = STRING: "TenGigabitEthernet2/2"
RFC1213-MIB::ifDescr.8196 = STRING: "TenGigabitEthernet2/3"
RFC1213-MIB::ifDescr.8197 = STRING: "TenGigabitEthernet2/4"
RFC1213-MIB::ifDescr.12290 = STRING: "dwdm-cli_2/3/1"
RFC1213-MIB::ifDescr.12291 = STRING: "dwdm-cli_2/3/2"
RFC1213-MIB::ifDescr.12292 = STRING: "dwdm-trk_2/3/3"
RFC1213-MIB::ifDescr.12293 = STRING: "dwdm-trk_2/3/4"
RFC1213-MIB::ifDescr.12294 = STRING: "TenGigabitEthernet3/1"
RFC1213-MIB::ifDescr.12295 = STRING: "TenGigabitEthernet3/2"
RFC1213-MIB::ifDescr.12296 = STRING: "TenGigabitEthernet3/3"
RFC1213-MIB::ifDescr.12297 = STRING: "TenGigabitEthernet3/4"
RFC1213-MIB::ifDescr.147458 = STRING: "GigabitEthernet36/1"
RFC1213-MIB::ifDescr.147459 = STRING: "GigabitEthernet36/2"
RFC1213-MIB::ifDescr.147502 = STRING: "TenGigabitEthernet36/45"
RFC1213-MIB::ifDescr.147503 = STRING: "TenGigabitEthernet36/46"
RFC1213-MIB::ifDescr.147504 = STRING: "TenGigabitEthernet36/47"
RFC1213-MIB::ifDescr.147505 = STRING: "TenGigabitEthernet36/48"
RFC1213-MIB::ifDescr.147554 = STRING: "dsl_36/1"
RFC1213-MIB::ifDescr.147555 = STRING: "dsl_36/2"

```

Lan-connected network elements (LNEs) can be set up as gateway network elements (GNEs) or as SOCKS proxies, depending upon network security requirements. If the GNE/ENE firewall feature is required, the LNE must be set up as a GNE. If the design does not require the firewall feature but does require all-IP networking, the LNE must be set up as a SOCKS proxy.

In a GNE/ENE firewall configuration, nonconnected network elements must be set up as end network elements (ENEs). With a SOCKS configuration, subtended nodes communicate with the proxy server by IP. For procedures to provision a node or shelf as a GNE, ENE or SOCKS proxy, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

11.10 Proxy Over Firewalls

SNMP and NMS applications have traditionally been unable to cross firewalls used for isolating security risks inside or from outside networks. CTC enables network operations centers (NOCs) to access performance monitoring data such as RMON statistics or autonomous messages across firewalls by using an SMP proxy element installed on a firewall.

The application-level proxy transports SNMP protocol data units (PDU) between the NMS and NEs, allowing requests and responses between the NMS and NEs and forwarding NE autonomous messages to the NMS. The proxy agent requires little provisioning at the NOC and no additional provisioning at the NEs.

The firewall proxy is intended for use in a gateway network element-end network element (GNE-ENE) topology with many NEs through a single NE gateway. Up to 64 SNMP requests (such as get, getnext, or getbulk) are supported at any time behind single or multiple firewalls. The proxy interoperates with common NMS such as HP OpenView.

For security reasons, the SNMP proxy feature must be enabled at all receiving and transmitting NEs to function. To enable proxy, refer to the *Cisco ONS 15454 DWDM Procedure Guide*.

11.11 Remote Monitoring

The ONS 15454 incorporates RMON to allow network operators to monitor Ethernet card performance and events. The RMON thresholds are user-provisionable in CTC. Refer to the *Cisco ONS 15454 Procedure Guide* or *Cisco ONS 15454 SDH Procedure Guide* for instructions. Note that otherwise, RMON operation is invisible to the typical CTC user.

ONS 15454 system RMON is based on the IETF-standard MIB RFC 2819 and includes the following five groups from the standard MIB: Ethernet Statistics, History Control, Ethernet History, Alarm, and Event.

11.11.1 64-Bit RMON Monitoring over DCC

The ONS 15454 DCC is implemented over the IP protocol, which is not compatible with Ethernet. The system builds Ethernet equipment History and Statistics tables using HDLC statistics that are gathered over the DCC (running point-to-point protocol, or PPP). RMON DCC monitoring (for both IP and Ethernet) monitors the health of remote DCC connections.

RMON DCC contains two MIBs for DCC interfaces. They are:

- `cMediaIndependentTable`—standard, `rfc3273`; the proprietary extension of the HC-RMON MIB used for reporting statistics
- `cMediaIndependentHistoryTable`—proprietary MIB used to support history

11.11.1.1 Row Creation in `MediaIndependentTable`

The `SetRequest` PDU for creating a row in the `mediaIndependentTable` should contain all the values required to activate a row in a single set operation along with an assignment of the status variable to `createRequest` (2). The `SetRequest` PDU for entry creation must have all the object IDs (OIDs) carrying an instance value of 0. That is, all the OIDs should be of the type `OID.0`.

In order to create a row, the `SetRequest` PDU should contain the following:

- `mediaIndependentDataSource` and its desired value
- `mediaIndependentOwner` and its desired value (The size of `mediaIndependentOwner` is limited to 32 characters.)
- `mediaIndependentStatus` with a value of `createRequest` (2)

The `mediaIndependentTable` creates a row if the `SetRequest` PDU is valid according to the above rules. When the row is created, the SNMP agent decides the value of `mediaIndependentIndex`. This value is not sequentially allotted or contiguously numbered. It changes when an Ethernet interface is added or deleted. The newly created row will have `mediaIndependentTable` value of `valid` (1).

If the row already exists, or if the `SetRequest` PDU values are insufficient or do not make sense, the SNMP agent returns an error code.



Note

`mediaIndependentTable` entries are not preserved if the SNMP agent is restarted.

The `mediaIndependentTable` deletes a row if the `SetRequest` PDU contains a `mediaIndependentStatus` with a value of `invalid` (4). The `varbind`'s OID instance value identifies the row for deletion. You can recreate a deleted row in the table if desired.

11.11.1.2 Row Creation in cMediaIndependentHistoryControlTable

SNMP row creation and deletion for the cMediaIndependentHistoryControlTable follows the same processes as for the MediaIndependentTable; only the variables differ.

In order to create a row, the SetRequest PDU should contain the following:

- cMediaIndependentHistoryControlDataSource and its desired value
- cMediaIndependentHistoryControlOwner and its desired value
- cMediaIndependentHistoryControlStatus with a value of createRequest (2)

11.11.2 HC-RMON-MIB Support

For the ONS 15454, the implementation of the high-capacity remote monitoring information base (HC-RMON-MIB, or RFC 3273) enables 64-bit support of existing RMON tables. This support is provided with the etherStatsHighCapacityTable and the etherHistoryHighCapacityTable. An additional table, the mediaIndependentTable, and an additional object, hcRMONCapabilities, are also added for this support. All of these elements are accessible by any third-party SNMP client having RFC 3273 support.

11.11.3 Ethernet Statistics RMON Group

The Ethernet Statistics group contains the basic statistics monitored for each subnetwork in a single table called the etherStatsTable.

11.11.3.1 Row Creation in etherStatsTable

The SetRequest PDU for creating a row in this table should contain all the values needed to activate a row in a single set operation, and an assigned status variable to createRequest. The SetRequest PDU object ID (OID) entries must all carry an instance value, or type OID, of 0.

In order to create a row, the SetRequest PDU should contain the following:

- The etherStatsDataSource and its desired value
- The etherStatsOwner and its desired value (size of this value is limited to 32 characters)
- The etherStatsStatus with a value of createRequest (2)

The etherStatsTable creates a row if the SetRequest PDU is valid according to the above rules. When the row is created, the SNMP agent decides the value of etherStatsIndex. This value is not sequentially allotted or contiguously numbered. It changes when an Ethernet interface is added or deleted. The newly created row will have etherStatsStatus value of valid (1).

If the etherStatsTable row already exists, or if the SetRequest PDU values are insufficient or do not make sense, the SNMP agent returns an error code.



Note

EtherStatsTable entries are not preserved if the SNMP agent is restarted.

11.11.3.2 Get Requests and getNext Requests

Get requests and getNext requests for the etherStatsMulticastPkts and etherStatsBroadcastPkts columns return a value of zero because the variables are not supported by ONS 15454 Ethernet cards.

11.11.3.3 Row Deletion in etherStatsTable

To delete a row in the etherStatsTable, the SetRequest PDU should contain an etherStatsStatus “invalid” value (4). The OID marks the row for deletion. If required, a deleted row can be recreated.

11.11.3.4 64-Bit etherStatsHighCapacity Table

The Ethernet statistics group contains 64-bit statistics in the etherStatsHighCapacityTable, which provides 64-bit RMON support for the HC-RMON-MIB. The etherStatsHighCapacityTable is an extension of the etherStatsTable that adds 16 new columns for performance monitoring data in 64-bit format. There is a one-to-one relationship between the etherStatsTable and etherStatsHighCapacityTable when rows are created or deleted in either table.

11.11.4 History Control RMON Group

The History Control group defines sampling functions for one or more monitor interfaces in the historyControlTable. The values in this table, as specified in RFC 2819, are derived from the historyControlTable and etherHistoryTable.

11.11.4.1 History Control Table

The RMON is sampled at one of four possible intervals. Each interval, or period, contains specific history values (also called buckets). [Table 11-9](#) lists the four sampling periods and corresponding buckets.

The historyControlTable maximum row size is determined by multiplying the number of ports on a card by the number of sampling periods. For example, an ONS 15454 E100 card contains 24 ports, which multiplied by periods allows 96 rows in the table. An E1000 card contains 14 ports, which multiplied by four periods allows 56 table rows.

Table 11-9 RMON History Control Periods and History Categories

Sampling Periods (historyControlValue Variable)	Total Values, or Buckets (historyControl Variable)
15 minutes	32
24 hours	7
1 minute	60
60 minutes	24

11.11.4.2 Row Creation in historyControlTable

The SetRequest PDU must be able to activate a historyControlTable row in one single-set operation. In order to do this, the PDU must contain all needed values and have a status variable value of 2 (createRequest). All OIDs in the SetRequest PDU should be type OID.0 type for entry creation.

To create a SetRequest PDU for the historyControlTable, the following values are required:

- The historyControlDataSource and its desired value
- The historyControlBucketsRequested and its desired value
- The historyControlInterval and its desired value
- The historyControlOwner and its desired value
- The historyControlStatus with a value of createRequest (2)

The historyControlBucketsRequested OID value is ignored because the number of buckets allowed for each sampling period, based upon the historyControlInterval value, is already fixed as listed in [Table 11-9](#).

The historyControlInterval value cannot be changed from the four allowed choices. If you use another value, the SNMP agent selects the closest smaller time period from the set buckets. For example, if the set request specifies a 25-minute interval, this falls between the 15-minute (32 bucket) variable and the 60-minute (24 bucket) variable. The SNMP agent automatically selects the lower, closer value, which is 15 minutes, so it allows 32 buckets.

If the SetRequest PDU is valid, a historyControlTable row is created. If the row already exists, or if the SetRequest PDU values do not make sense or are insufficient, the SNMP agent does not create the row and returns an error code.

11.11.4.3 Get Requests and GetNext Requests

These PDUs are not restricted.

11.11.4.4 Row Deletion in historyControl Table

To delete a row from the table, the SetRequest PDU should contain a historyControlStatus value of 4 (invalid). A deleted row can be recreated.

11.11.5 Ethernet History RMON Group

The ONS 15454 implements the etherHistoryTable as defined in RFC 2819. The group is created within the bounds of the historyControlTable and does not deviate from the RFC in its design.

11.11.5.1 64-Bit etherHistoryHighCapacityTable

64-bit Ethernet history for the HC-RMON-MIB is implemented in the etherHistoryHighCapacityTable, which is an extension of the etherHistoryTable. The etherHistoryHighCapacityTable adds four columns for 64-bit performance monitoring data. These two tables have a one-to-one relationship. Adding or deleting a row in one table will effect the same change in the other.

11.11.6 Alarm RMON Group

The Alarm group consists of the alarmTable, which periodically compares sampled values with configured thresholds and raises an event if a threshold is crossed. This group requires the implementation of the event group, which follows this section.

11.11.6.1 Alarm Table

The NMS uses the alarmTable to determine and provision network performance alarmable thresholds.

11.11.6.2 Row Creation in alarmTable

To create a row in the alarmTable, the SetRequest PDU must be able to create the row in one single-set operation. All OIDs in the SetRequest PDU should be type OID.0 type for entry creation. The table has a maximum number of 256 rows.

To create a SetRequest PDU for the alarmTable, the following values are required:

- The alarmInterval and its desired value
- The alarmVariable and its desired value
- The alarmSampleType and its desired value
- The alarmStartupAlarm and its desired value
- The alarmOwner and its desired value
- The alarmStatus with a value of createRequest (2)

If the SetRequest PDU is valid, a historyControlTable row is created. If the row already exists, or if the SetRequest PDU values do not make sense or are insufficient, the SNMP agent does not create the row and returns an error code.

In addition to the required values, the following restrictions must be met in the SetRequest PDU:

- The alarmOwner is a string of length 32 characters.
- The alarmRisingEventIndex always takes value 1.
- The alarmFallingEventIndex always takes value 2.
- The alarmStatus has only two values supported in SETs: createRequest (2) and invalid (4).
- The AlarmVariable is of the type OID.ifIndex, where ifIndex gives the interface this alarm is created on and OID is one of the OIDs supported in [Table 11-10](#).

Table 11-10 OIDs Supported in the AlarmTable

No.	Column Name	OID	Status
1	ifInOctets	{1.3.6.1.2.1.2.2.1.10}	—
2	IfInUcastPkts	{1.3.6.1.2.1.2.2.1.11}	—
3	ifInMulticastPkts	{1.3.6.1.2.1.31.1.1.1.2}	Unsupported in E100/E1000
4	ifInBroadcastPkts	{1.3.6.1.2.1.31.1.1.1.3}	Unsupported in E100/E1000
5	ifInDiscards	{1.3.6.1.2.1.2.2.1.13}	Unsupported in E100/E1000
6	ifInErrors	{1.3.6.1.2.1.2.2.1.14}	—
7	ifOutOctets	{1.3.6.1.2.1.2.2.1.16}	—
8	ifOutUcastPkts	{1.3.6.1.2.1.2.2.1.17}	—
9	ifOutMulticastPkts	{1.3.6.1.2.1.31.1.1.1.4}	Unsupported in E100/E1000
10	ifOutBroadcastPkts	{1.3.6.1.2.1.31.1.1.1.5}	Unsupported in E100/E1000
11	ifOutDiscards	{1.3.6.1.2.1.2.2.1.19}	Unsupported in E100/E1000
12	Dot3StatsAlignmentErrors	{1.3.6.1.2.1.10.7.2.1.2}	—

Table 11-10 *OIDs Supported in the AlarmTable (continued)*

No.	Column Name	OID	Status
13	Dot3StatsFCSErrors	{1.3.6.1.2.1.10.7.2.1.3}	—
14	Dot3StatsSingleCollisionFrames	{1.3.6.1.2.1.10.7.2.1.4}	—
15	Dot3StatsMultipleCollisionFrames	{1.3.6.1.2.1.10.7.2.1.5}	—
16	Dot3StatsDeferredTransmissions	{1.3.6.1.2.1.10.7.2.1.7}	—
17	Dot3StatsLateCollisions	{1.3.6.1.2.1.10.7.2.1.8}	—
18	Dot3StatsExcessiveCollisions	{13.6.1.2.1.10.7.2.1.9}	—
19	Dot3StatsFrameTooLong	{1.3.6.1.2.1.10.7.2.1.13}	—
20	Dot3StatsCarrierSenseErrors	{1.3.6.1.2.1.10.7.2.1.11}	Unsupported in E100/E1000
21	Dot3StatsSQETestErrors	{1.3.6.1.2.1.10.7.2.1.6}	Unsupported in E100/E1000
22	etherStatsUndersizePkts	{1.3.6.1.2.1.16.1.1.1.9}	—
23	etherStatsFragments	{1.3.6.1.2.1.16.1.1.1.11}	—
24	etherStatsPkts64Octets	{1.3.6.1.2.1.16.1.1.1.14}	—
25	etherStatsPkts65to127Octets	{1.3.6.1.2.1.16.1.1.1.15}	—
26	etherStatsPkts128to255Octets	{1.3.6.1.2.1.16.1.1.1.16}	—
27	etherStatsPkts256to511Octets	{1.3.6.1.2.1.16.1.1.1.17}	—
28	etherStatsPkts512to1023Octets	{1.3.6.1.2.1.16.1.1.1.18}	—
29	etherStatsPkts1024to1518Octets	{1.3.6.1.2.1.16.1.1.1.19}	—
30	EtherStatsBroadcastPkts	{1.3.6.1.2.1.16.1.1.1.6}	—
31	EtherStatsMulticastPkts	{1.3.6.1.2.1.16.1.1.1.7}	—
32	EtherStatsOversizePkts	{1.3.6.1.2.1.16.1.1.1.10}	—
33	EtherStatsJabbers	{1.3.6.1.2.1.16.1.1.1.12}	—
34	EtherStatsOctets	{1.3.6.1.2.1.16.1.1.1.4}	—
35	EtherStatsCollisions	{1.3.6.1.2.1.16.1.1.1.13}	—
36	EtherStatsCollisions	{1.3.6.1.2.1.16.1.1.1.8}	—
37	EtherStatsDropEvents	{1.3.6.1.2.1.16.1.1.1.3}	Unsupported in E100/E1000 and G1000

11.11.6.3 Get Requests and GetNext Requests

These PDUs are not restricted.

11.11.6.4 Row Deletion in alarmTable

To delete a row from the table, the SetRequest PDU should contain an alarmStatus value of 4 (invalid). A deleted row can be recreated. Entries in this table are preserved if the SNMP agent is restarted.

11.11.7 Event RMON Group

The Event group controls event generation and notification. It consists of two tables: the eventTable, which is a read-only list of events to be generated, and the logTable, which is a writable set of data describing a logged event. The ONS 15454 implements the logTable as specified in RFC 2819.

11.11.7.1 Event Table

The eventTable is read-only and unprovisionable. The table contains one row for rising alarms and another for falling ones. This table has the following restrictions:

- The eventType is always log-and-trap (4).
- The eventCommunity value is always a zero-length string, indicating that this event causes the trap to be despatched to all provisioned destinations.
- The eventOwner column value is always “monitor.”
- The eventStatus column value is always valid(1).

11.11.7.2 Log Table

The logTable is implemented exactly as specified in RFC 2819. The logTable is based upon data that is locally cached in a controller card. If there is a controller card protection switch, the existing logTable is cleared and a new one is started on the newly active controller card. The table contains as many rows as provided by the alarm controller.



Hardware Specifications

This appendix contains hardware and software specifications for the ONS 15454 ANSI and ETSI shelf assemblies and cards.



Note

Unless otherwise specified, “ONS 15454” refers to both ANSI and ETSI shelf assemblies.

The following sections are included:

- [A.1 Shelf Specifications, page A-1](#)
- [A.2 General Card Specifications, page A-5](#)
- [A.3 Common Control Card Specifications, page A-6](#)
- [A.4 DWDM Card Specifications, page A-11](#)
- [A.5 Transponder and Muxponder Card Specifications, page A-39](#)
- [A.6 SFP and XFP Specifications, page A-68](#)

A.1 Shelf Specifications

This section provides specifications for shelf bandwidth; a list of topologies; Cisco Transport Controller (CTC) specifications; the LAN, Transaction Language One (TL1), modem, and alarm specifications; timing, power, and environmental specifications; and shelf dimensions.

A.1.1 Bandwidth

The ONS 15454 has the following bandwidth specifications:

- Total bandwidth: 240 Gbps
- Data plane bandwidth: 160 Gbps
- SONET/SDH plane bandwidth: 80 Gbps

A.1.2 Configurations

The ONS 15454 can be configured for the following dense wavelength division multiplexing (DWDM) topologies:

- Hubbed rings
- Multihubbed rings
- Point-to-point
- Linear
- Linear with optical add/drop multiplexing (OADM)
- Hybrid terminal node
- Hybrid OADM node
- Hybrid line amplifier node

A.1.3 Cisco Transport Controller

CTC, the ONS 15454 craft interface software, has the following specifications:

- 10BaseT Ethernet
- TCC2/TCC2P card access: RJ-45 connector
- Backplane access: LAN pin field (ANSI only)
- Front Mount Electrical Connection (FMEC) access: LAN connector on MIC-C/T/P faceplate (ETSI only)

A.1.4 External LAN Interface

The ONS 15454 external LAN interface has the following specifications:

- 10BaseT Ethernet
- Backplane access: LAN pin field (ANSI only)
- FMEC access: LAN connector on MIC-C/T/P faceplate (ETSI only)

A.1.5 TL1 Craft Interface

The ONS 15454 TL1 craft interface has the following specifications:

- Speed: 9600 bps
- TCC2/TCC2P access: EIA/TIA-232 DB-9 type connector
- Backplane access: CRAFT pin field (ANSI only)

A.1.6 Modem Interface

The ONS 15454 modem interface has the following specifications:

- Hardware flow control
- TCC2/TCC2P: EIA/TIA-232 DB-9 type connector

A.1.7 Alarm Interface

The ONS 15454 alarm interface has the following specifications:

- ETSI
 - Visual: Critical, Major, Minor, Remote
 - Audible: Critical, Major, Minor, Remote
 - FMEC access: 62-Pin DB connector on MIC-A/P faceplate
 - Alarm inputs: Common 32-VDC output for all alarm-inputs, closed contact limited to 2 mA
 - Control outputs: Open contact maximum 60 VDC, closed contact maximum 100 mA
- ANSI
 - Visual: Critical, Major, Minor, Remote
 - Audible: Critical, Major, Minor, Remote
 - Backplane access: Alarm pin fields
 - Alarm contacts: 0.045 mm, -48 V, 50 mA

A.1.8 EIA Interface (ANSI only)

The ONS 15454 electrical interface assembly (EIA) interface has the following specifications:

- SMB: AMP #415504-3 75-ohm, 4-leg connectors
- BNC: Trompeter #UCBJ224 75-ohm 4 leg connector (King or ITT are also compatible)
- AMP Champ: AMP#552246-1 with #552562-2 bail locks

A.1.9 BITS Interface (ANSI only)

The ONS 15454 building integrated timing supply (BITS) interface has the following specifications:

- 2 DS-1 BITS inputs
- 2 derived DS-1 outputs
- Backplane access: BITS pin field

A.1.10 System Timing

The ONS 15454 ANSI has the following system timing specifications:

- Stratum 3 per Telcordia GR-253-CORE
- Free running accuracy: +/- 4.6 ppm
- Holdover stability: 3.7×10^{-7} per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

The ONS 15454 ETSI has the following system timing specifications:

- Stratum 3E, per ITU-T G.813
- Free running accuracy: +/- 4.6 ppm

- Holdover stability: $3.7 \exp -7$ per day, including temperature (< 255 slips in first 24 hours)
- Reference: External BITS, line, internal

A.1.11 System Power

The ONS 15454 ANSI has the following power specifications:

- Input power: –48 VDC
- Power consumption: Configuration dependent; 55 W (fan tray only)
- Power requirements: –40.5 to –57 VDC
- Power terminals: #6 Lug
- ANSI shelf: 100-A fuse panel (minimum 30 A fuse per shelf)
HD shelf: 100-A fuse panel (minimum 30 A fuse per shelf)

The ONS 15454 ETSI has the following power specifications:

- Input voltage: –48 VDC
- Power consumption: Configuration dependent; 53 W (fan tray only)
- Power requirements:
 - Nominal: –48 VDC
 - Tolerance limits: –40.5 to –57.0 VDC
- Power terminals: 3WK3 Combo-D power cable connector (MIC-A/P and MIC-C/T/P faceplates)
- Fusing: 100 A fuse panel; minimum 30 A fuse per shelf

A.1.12 System Environmental Specifications

The ONS 15454 ANSI has the following environmental specifications:

- Operating temperature:
 - C-Temp: 32 to +131 degrees Fahrenheit (0 to +55 degrees Celsius)
 - I-Temp: –40 to +139 degrees Fahrenheit (–40 to +65 degrees Celsius)
- Operating humidity: 5 to 95 percent, noncondensing

The ONS 15454 ETSI has the following environmental specifications:

- Operating temperature: 32 to 104 degrees Fahrenheit (0 to +40 degrees Celsius)
- Operating humidity: 5 to 95 percent, noncondensing

A.1.13 Dimensions

The ONS 15454 ANSI shelf assembly has the following dimensions:

- Height: 18.5 in. (40.7 cm)
- Width: 19 or 23 in. (41.8 or 50.6 cm) with mounting ears attached
- Depth: 12 in. (26.4 cm) (5 in. or 12.7 cm projection from rack)
- Weight: 55 lb (24.947 kg) empty

The ONS 15454 ETSI shelf assembly has the following dimensions:

- Height: 616.5 mm (24.27 in.)
- Width: 535 mm (17 in.) without mounting ears attached
- Depth: 280 mm (11.02 in.)
- Weight: 26 kg empty (57.3 lb)

A.2 General Card Specifications

This section provides power specifications and temperature ranges for all ONS 15454 cards.

A.2.1 Power

Table A-1 provides power consumption information for the ONS 15454 cards.

Table A-1 Individual Card Power Requirements (Typical Values at 25 degrees C)

Card Type	Card Name	(Power in Watts)	Amperes at -48 V	BTU/Hr.
Common Control Cards	TCC2/TCC2P	26	0.54	89
	AIC-I	8	0.17	28
	AEP	3	(from +5 VDC from AIC-I)	10
	MIC-A/P	0.13	via TCC2/TCC2P/TCC3	0.44
	MIC-C/T/P	0.38	via TCC2/TCC2P/TCC3	1.29
	MS-ISC-100T	53	1.10	181.0
Optical Service Channel Cards	OSCM	23	0.48	79
	OSC-CSM	24	0.5	82
Optical Amplifier Cards	OPT-PRE	30	0.63	103
	OPT-BST	30	0.63	103
	OPT-BST-E	30	0.63	103
	OPT-BST-L	25	0.52	86
	OPT-AMP-L	32	0.67	110
Multiplexer and Demultiplexer Cards	32MUX-O	16	0.33	55
	32DMX-O	16	0.33	55
	4MD-xx.x	17	0.35	58.0
ROADM Cards	32DMX	15	0.31	52
	32DMX-L	15	0.31	52
	32WSS	50	1.04	171
	32WSS-L	43	0.90	147
	MMU	7	0.15	24

Table A-1 Individual Card Power Requirements (continued)(Typical Values at 25 degrees C)

Card Type	Card Name	(Power in Watts)	Amperes at -48 V	BTU/Hr.
Optical Add/Drop Cards	AD-1C-xx.x	17	0.35	58.0
	AD-2C-xx.x	17	0.35	58.0
	AD-4C-xx.x	17	0.35	58.0
	AD-1B-xx.x	17	0.35	58.0
	AD-4B-xx.x	17	0.35	58.0
Transponder and Muxponder Cards	TXP_MR_10G	35	0.73	120
	TXP_MR_10E	50	1.05	171
	TXP_MR_10E_C	50	1.05	171
	TXP_MR_10E_L	50	1.05	171
	TXP_MR_2.5G	35	0.73	120
	TXPP_MR_2.5G	50	1.05	171
	MXP_2.5G_10G	50	1.05	171
	MXP_2.5G_10E	50	1.05	171
	MXP_2.5G_10E_C	50	1.05	171
	MXP_2.5G_10E_L	50	1.05	171
	MXP_MR_2.5G	50	1.05	171
	MXPP_MR_2.5G	50	1.05	171
	Transponder and Muxponder Cards	MXP_MR_10DME_C	60	1.25
MXP_MR_10DME_L		60	1.25	205

A.2.2 Temperature

- Operating temperature:
 - Long term: 0 to 40 degrees Celsius (32 to 104 degrees Fahrenheit)
 - Short term: Functionality is guaranteed at -5 to 55 degrees Celsius (23 to 131 degrees Fahrenheit), according to GR-63 Issue 3

The indicated temperatures are the ambient ones in which the shelf can be placed.

A.3 Common Control Card Specifications

This section provides specifications for the TCC2, TCC2P, AIC, and AIC-I cards, the alarm expansion panel (AEP), the MIC-A/P and MIC-C/T/P FMECs, and the MS-ISC-100T card.

For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

A.3.1 TCC2 Card Specifications

The TCC2 card has the following specifications:

- CTC software
 - Interface: EIA/TIA-232 (local craft access, on TCC2 faceplate)
 - Interface: 10BaseT LAN (on TCC2 faceplate)
 - Interface: 10BaseT LAN (through the backplane)
- Synchronization
 - Stratum 3, per Telcordia GR-253-CORE
 - Free running access: Accuracy +/- 4.6 ppm
 - Holdover stability: 3.7×10^{-7} per day including temperature (< 255 slips in first 24 hours)
 - Reference: External BITS, line, internal
- Supply voltage monitoring
 - Both supply voltage inputs are monitored.
 - Normal operation: -40.5 to -56.7 V
 - Undervoltage: Major alarm
 - Overvoltage: Major alarm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 235 mm (9.250 in.)
 - Weight not including clam shell: 0.7 kg (1.5 lb)

A.3.2 TCC2P Card Specifications

The TCC2P card has the following specifications:

- CTC software
 - Interface: EIA/TIA-232 (local craft access, on TCC2P faceplate)
 - Interface: 10BaseT LAN (on TCC2P faceplate)
 - Interface: 10BaseT LAN (through the backplane)
- Synchronization
 - Stratum 3, per Telcordia GR-253-CORE
 - Free running access: Accuracy +/- 4.6 ppm
 - Holdover stability: $3.7 * 10 \text{ exp} - 7$ per day including temperature (< 255 slips in first 24 hours)
 - Reference: External BITS, line, internal
- Supply voltage monitoring
 - Both supply voltage inputs are monitored.

- Normal operation: -40.5 to -56.7 V (in -48 VDC systems)
- Undervoltage: Major alarm
- Overvoltage: Major alarm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 1.5 lb (0.7 kg)

A.3.3 AIC-I Card Specifications

The AIC-I card has the following specifications:

- Alarm inputs
 - Number of inputs: 12 without AEP, 32 with AEP
 - Opto-coupler isolated
 - Label customer provisionable
 - Severity customer provisionable
 - Common 32 V output for all alarm inputs
 - Each input limited to 2 mA
 - Termination: Wire-wrap on backplane without AEP, on AEP connectors with AEP
- Alarm outputs
 - Number of outputs: 4 (user configurable as inputs) without AEP, 16 with AEP
 - Switched by opto MOS (metal oxide semiconductor)
 - Triggered by definable alarm condition
 - Maximum allowed open circuit voltage: 60 VDC
 - Maximum allowed closed circuit current: 100 mA
 - Termination: Wire-wrap on backplane without AEP, on AEP connectors with AEP
- Express orderwire/local orderwire (EOW/LOW)
 - ITU-T G.711, ITU-T G.712, Telcordia GR-253-CORE
 - A-law, mu-law



Note Due to the nature of mixed coding, in a mixed-mode (A-law/mu-law) configuration, the orderwire is not ITU-T G.712 compliant.

- Orderwire party line
- Dual tone, multifrequency (DTMF) signaling
- User data channel (UDC)
 - Bit rate: 64 kbps, codirectional

- ITU-T G.703
- Input/output impedance: 120 ohm
- Termination: RJ-11 connectors
- Data communications channel (DCC)
 - Bit rate: 576 kbps
 - EIA/TIA-485/V11
 - Input/output impedance: 120 ohm
 - Termination: RJ-45 connectors
- ACC connection for additional alarm interfaces
 - Connection to AEP
- Power monitoring alarming states:
 - Power failure (0 to -38 VDC)
 - Undervoltage (-38 to -40.5 VDC)
 - Overvoltage (beyond -56.7 VDC)
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Weight: 1.8 lb (0.82 kg)

A.3.4 AEP Specifications (ANSI only)

The AEP has the following specifications:

- Alarm inputs
 - Number of inputs: 32
 - Optocoupler isolated
 - Label customer provisionable
 - Severity customer provisionable
 - Common 32 V output for all alarm inputs
 - Each input limited to 2 mA
 - Termination: 50-pin AMP champ connector
- Alarm outputs
 - Number of outputs: 16
 - Switched by opto MOS
 - Triggered by definable alarm condition
 - Maximum allowed open circuit voltage: 60 VDC
 - Maximum allowed closed circuit current: 100 mA
 - Termination: 50-pin AMP champ connector

- Environmental
 - Overvoltage protection: as in ITU-T G.703 Annex B
- Dimensions of AEP board
 - Height: 20 mm (0.79 in.)
 - Width: 330 mm (13.0 in.)
 - Depth: 89 mm (3.5 in.)
 - Weight: 0.18 kg (0.4 lb)

A.3.5 MIC-A/P FMEC Specifications (ETSI only)

The MIC-A/P FMEC card has the following specifications:

- Power supply input BATTERY B
 - System supply voltage: Nominal –48 VDC
Tolerance limits: –40.5 to –57.0 VDC
 - Connector: 3WK3 Combo-D power cable connector
- Alarm outputs
 - Voltage (open contact): Maximum 60 VDC
 - Current (closed contact): Maximum 250 mA
 - Connector: 62-pin DB connector (common for inputs/outputs)
- Alarm inputs
 - Voltage (open contact): Maximum 60 VDC
 - Current (closed contact): Maximum 2 mA
 - Connector: 62-pin DB connector (common for inputs/outputs)
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 31.88 mm (1.255 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.2 kg (0.5 lb)

A.3.6 MIC-C/T/P FMEC Specifications (ETSI only)

The MIC-C/T/P FMEC card has the following specifications:

- Power supply input BATTERY A
 - System supply voltage: Nominal –48 VDC
Tolerance limits: –40.5 to –57.0 VDC
 - Connector: 3WK3 Combo-D power cable connector
- Timing connector
 - Frequency: 2.048 MHz +/-10 ppm

- Signal level: 0.75 to 1.5 V
- Impedance: 75 ohms +/-5 percent (switchable by jumper to high impedance > 3 kohms)



Note 120 ohms balanced impedance is possible with external matching cable.

- Cable attenuation: Up to 6 dB at 2 MHz
- Connectors: 1.0/2.3 miniature coax connector
- System management serial port:
 - System management serial port craft interface
 - Modem port (for future use)
 - Connectors: 8-pin RJ-45
- System management LAN port connectors:
 - Signal: IEEE 802.3 10BaseT
 - Connectors: 8-pin RJ-45
- Dimensions
 - Height: 182 mm (7.165 in.)
 - Width: 31.88 mm (1.255 in.)
 - Depth: 92 mm (3.62 in.)
 - Depth with backplane connector: 98 mm (3.87 in.)
 - Weight not including clam shell: 0.2 kg (0.5 lb)

A.3.7 MS-ISC-100T Card Specifications

The MS-ISC-100T card has the following specifications:

- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 2.3 lb (1.0 kg)

A.4 DWDM Card Specifications

This section provides specifications for the OSCM, OSC-CSM, OPT-PRE amplifier, OPT-BST amplifier, OPT-BST-E amplifier, OPT-BST-L amplifier, OPT-AMP-L preamplifier (configurable as a preamplifier or booster amplifier), 32MUX-O, 32DMX-O, 32DMX, 32DMX-L, 4MD-xx.x, AD-IC-xx.x, AD-2C-xx.x, AD-4C-xx.x, AD-1B-xx.x, AD-4B-xx.x, 32WSS, 32WSS-L, and MMU cards.

For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

A.4.1 OSCM Card Specifications

The OSCM card has the following specifications:

- Line
 - Bit rate: 155 Mbps
 - Code: Scrambled non-return to zero (NRZ)
 - Loopback modes: None
 - Connector: Duplex LC
- Transmitter optical service channel (OSC) signal
 - Maximum transmitter output power: –1 dBm
 - Minimum transmitter output power: –5 dBm
 - Nominal wavelength: 1510-nm +/-10 nm
 - Variable optical attenuator (VOA) necessary in the transmit path to adjust the in-fiber optical power level
- Receiver OSC signal
 - Maximum receiver level: –8 dBm at 10^{-10} bit error rate (BER)
 - Minimum receiver level: –40 dBm at 10^{-10} BER
 - Span budget: 40-dB span budget (about 150 km assuming fiber path loss equals 0.25 dB/km)
 - Jitter tolerance: Telcordia GR-253/G.823 compliant
- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.2 OSC-CSM Card Specifications

The OSC-CSM card has the following specifications:

- Line
 - Bit rate: 155 Mbps
 - Code: Scrambled NRZ
 - Loopback modes: None
 - Connector: Duplex LC
- Transmitter OSC signal
 - Maximum transmitter output power: –2 dBm
 - Minimum transmitter output power: –24 dBm
 - Nominal wavelength: 1510-nm +/-10 nm
 - VOA is necessary in the transmit path to adjust the in-fiber optical power level
- Receiver OSC signal

- Maximum receiver level: -8 dBm at 10^{-10} BER
- Minimum receiver level: -40 dBm at 10^{-10} BER
- Span loss budget: 35-dB span budget (approximately 140 km assuming that the fiber path loss is equal to 0.25 dB/km)
- Jitter tolerance: Telcordia GR-253/G.823 compliant
- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.3 OPT-PRE Amplifier Card Specifications

The OPT-PRE amplifier card has the following specifications:

- Optical characteristics:
 - Total operating wavelength range: 1530 to 1561.3 nm
 - Gain ripple (peak to valley): 1.5 dB
 - Mid-access loss (MAL) range (for dispersion compensation unit [DCU]): 3 to 9 dB
 - Gain range: 5 to 38.5 dBm in constant power mode, 5 to 28 dBm in constant gain mode
 - Minimum gain (standard range): 5.0 dBm
Maximum gain (standard range with programmable gain tilt): 21 dBm
Maximum gain (extended range with uncontrolled gain tilt): 38.5 dBm
 - Gain and power regulation over/undershoot: 0.5 dB
 - Limited maximum output power: 17.5 dBm
 - Maximum output power (with full channel load): 17 dB
 - Minimum output power (with one channel): -1 dBm
 - Input power (Pin) range at full channel load: -21.5 to 12 dBm
 - Input power (Pin) range at single channel load: -39.5 to -6 dBm
 - Noise figure at G^3 21 dB = 6.5 dB
 - OSC filter drop (channels) insertion loss maximum: 1 dB
 - OSC filter drop (OSC) insertion loss maximum: 1.8 dB
 - OSC filter add (OSC) insertion loss maximum: 1.3 dB
 - Optical connectors: LC-UPC/2
- Dimensions
 - Height: 12.65 in. (332 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (240 mm)

A.4.4 OPT-BST Amplifier Card Specifications

The OPT-BST amplifier card has the following specifications:

- Optical characteristics:
 - Total operating wavelength range: 1530 to 1561.3 nm
 - Gain ripple (peak to valley): 1.5 dB
 - Gain range: 5 to 20 dBm with programmable gain tilt
 - Gain and power regulation over/undershoot: 0.5 dB
 - Limited maximum output power: 17.5 dBm
 - Maximum output power (with full channel load): 17 dB
 - Minimum output power (with one channel): –1 dBm
 - Input power (Pin) range at full channel load: –3 to 12 dBm
 - Input power (Pin) range at single channel load: –21 to –6 dBm
 - Noise figure at G^3 20 dB = 6 dB
 - OSC filter drop (channels) insertion loss maximum: 1 dB
 - OSC filter drop (OSC) insertion loss maximum: 1.8 dB
 - OSC filter add (OSC) insertion loss maximum: 1.3 dB
 - Optical connectors: LC-UPC/2
- Dimensions
 - Height: 12.65 in. (332 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (240 mm)

A.4.5 OPT-BST-E Amplifier Card Specifications

The OPT-BST-E amplifier card has the following specifications:

- Optical characteristics:
 - Total operating wavelength range: 1530 to 1561.3 nm
 - Gain ripple (peak to valley): 1.8 dB
 - Gain range: 8 to 23 dB with programmable gain tilt
 - Extended gain range: 23 to 26 dB with gain tilt uncontrolled
 - Gain and power regulation over/undershoot: 0.5 dB
 - Limited maximum output power: 20.5 dBm
 - Maximum output power (with full channel load): 20 dB
 - Minimum output power (with one channel): –1 dBm
 - Input power (Pin) range at full channel load: –6 to 12 dBm
 - Input power (Pin) range at single channel load: –26 to –8 dBm
 - Noise figure at G^3 23 dB = 6 dB

- OSC filter drop (channels) insertion loss maximum: 1 dB
- OSC filter drop (OSC) insertion loss maximum: 1.8 dB
- OSC filter add (OSC) insertion loss maximum: 1.3 dB
- Optical connectors: LC-UPC/2
- Dimensions
 - Height: 12.65 in. (332 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (240 mm)

A.4.6 OPT-BST-L Amplifier Card Specifications

The OPT-BST-L amplifier card has the following specifications:

- Optical characteristics:
 - Total operating wavelength range: 1570.0 to 1605.0 nm
 - Gain ripple (peak to valley): 1.5 dB
 - Gain range: 8 to 20 dB with programmable gain tilt
 - Extended gain range: 20 to 27 dB with gain tilt uncontrolled
 - Gain and power regulation over/undershoot: 0.5 dB
 - Limited maximum output power: 10 dBm
 - Maximum output power (with full channel load): 17 dB
 - Minimum output power (with one channel): –10 dBm
 - Input power (Pin) range at full channel load: –10 to 9 dBm
 - Input power (Pin) range at single channel load: –37 to –18 dBm
 - Noise figure at G^3 20 dB = 7.5 dB
 - Insertion loss (Line RX to OSC TX): 0.3 to 1.8 dB
 - Insertion loss (Line RX to COM TX): 0.3 to 1.0 dB
 - Insertion loss (OSC RX to LINE TX): 0.3 to 1.3 dB
 - Optical connectors: LC-UPC/2
- Dimensions
 - Height: 12.65 in. (332 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (240 mm)

A.4.7 OPT-AMP-L Preamplifier Card Specifications

The OPT-AMP-L card has the following specifications:

- Optical characteristics:

- DWDM channel wavelength plan, 100 GHz, 4 skip 1, ITU-T wavelength grid channels 71 (1602.3 nm) to 90 (1570.4 nm)
- DWDM channel wavelength plan, 50 GHz, 8 skip 2, ITU-T wavelength grid channels 70.5 (1602.7 nm) to 90 (1570.4 nm)
- Channel spacing: 100 and 50 GHz
- Total operating wavelength range 1570.0 - 1605.0 nm
- Gain ripple (peak to valley): 1.5 dB
- Standard gain range: 12 to 24 dB
- Extended gain range (uncontrolled gain tilt): 24 to 35 dB
- Gain and power regulation over/undershoot: 0.5 dB
- Maximum power output (standard or extended gain range): 20 dB
- Input power range (full channel load): -15 to 8 dB
- Input power range (single channel load): -40 to -17
- Noise figure at G^3 20 dB = 8.9 dB
- Insertion loss (Line RX to OSC TX): 0.3 to 1.8 dB
- Insertion loss (Line RX to COM TX): 0.3 to 1.0 dB
- Insertion loss (OSC RX to LINE TX): 0.3 to 1.3 dB
- Optical connectors: LC-UPC/2
- Dimensions
 - Height: 12.65 in. (332 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (240 mm)

A.4.8 32MUX-0 Card Specifications

The 32MUX-0 card optical specifications are listed in [Table A-2](#).



Note

For power specifications, refer to the “[2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes](#)” section on page 2-7.

Table A-2 32MUX-0 Optical Specifications

Parameter	Note	Condition	Min	Max	Unit
Transmit (Tx) filter shape (-1 dB bandwidth)	All standard operating procedures (SOP) and within whole operating temperature range	In 1/32—Out beginning of life (BOL)	+/-180	+/-300	pm
		In 1/32—Out end of life (EOL)	+/-160	+/-300	pm
Insertion loss	All SOP and within whole operating temperature range	In 1/32—Out BOL	4	8.0	dB
		In 1/32—Out EOL	4	8.5	dB

Table A-2 32MUX-O Optical Specifications (continued)

Parameter	Note	Condition	Min	Max	Unit
VOA dynamic range	—	—	25	—	dB
Optical monitor tap-splitting ratio on monitor port	Optical monitor port with respect to output port in multiplexer only	—	19	21	dB
Maximum optical input power	—	—	300	—	mW

The 32MUX-O card has the following additional specifications:

- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 1.866 in. (47.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.9 32DMX-O Card Specifications

The 32DMX-O card optical specifications are listed in [Table A-3](#).



Note

For power specifications, see the “[2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes](#)” section on page 2-7.

Table A-3 32DMX-O Optical Specifications

Parameter	Note	Condition	Min	Max	Unit
Receive (Rx) filter shape (–1 dB bandwidth)	All SOP and within whole operating temperature range	In 1/32—Out BOL	+/-180	+/-300	pm
		In 1/32—Out EOL	+/-160	+/-300	pm
Insertion loss	All SOP and within whole operating temperature range	In 1/32—Out BOL	4	8.0	dB
		In 1/32—Out EOL	4	8.5	dB
VOA dynamic range	—	—	25	—	dB
Maximum optical input power	—	—	300	—	mW

The 32DMX-O card has the following additional specifications:

- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.10 32DMX Card Specifications

The 32DMX card optical specifications are listed in [Table A-4](#).


Note

For power specifications, see the “[2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes](#)” section on page 2-7.

Table A-4 32DMX Optical Specifications

Parameter	Note	Condition	Min	Typical	Max	Units
-1 dB bandwidth	All SOP and within whole operating temperature range, connectors included, and for maximum VOA operating attenuation.	COM RX => TX 1, 32 (OUT)	+/-110	—	—	pm
-3 dB bandwidth			+/-200	—	—	pm
Insertion loss	All SOP, and within whole operating temperature range, connectors included.	COM RX => TX 1, 32	—	—	5.5	dB
VOA dynamic range	—	COM RX => TX 1, 32	25	—	—	dB
Maximum optical input power	—	—	300	—	—	mW

The 32DMX channel plan is shown in [Table A-5](#). All 32DMX client interfaces must comply with this plan.

Table A-5 32DMX Channel Plan

Channel Number	Band	Channel ID	Frequency (GHz)	Wavelength (nm)
1	1	30.3	195.9	1530.33
2		31.2	195.8	1531.12
3		31.9	195.7	1531.90
4		32.6	195.6	1532.68
5	2	34.2	195.4	1534.25
6		35.0	195.3	1535.04
7		35.8	195.2	1535.82
8		36.6	195.1	1536.61
9	3	38.1	194.9	1538.19
10		38.9	194.8	1538.98
11		39.7	194.7	1539.77
12		40.5	194.6	1540.56

Table A-5 32DMX Channel Plan (continued)

Channel Number	Band	Channel ID	Frequency (GHz)	Wavelength (nm)
13	4	42.1	194.4	1542.14
14		42.9	194.3	1542.94
15		43.7	194.2	1543.73
16		44.5	194.1	1544.53
17	5	46.1	193.9	1546.12
18		46.9	193.8	1546.92
19		47.7	193.7	1547.72
20		48.5	193.6	1548.51
21	6	50.1	193.4	1550.12
22		50.9	193.3	1550.92
23		51.7	193.2	1551.72
24		52.5	193.1	1552.52
25	7	54.1	192.9	1554.13
26		54.9	192.8	1554.94
27		55.7	192.7	1555.75
28		56.5	192.6	1556.55
29	8	58.1	192.4	1558.17
30		58.9	192.3	1558.98
31		59.7	192.2	1559.79
32		60.6	192.1	1560.61

The 32DMX card has the following additional specifications:

- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.11 32DMX-L Card Specifications

The 32DMX-L card optical specifications are listed in [Table A-4](#).



Note

For power specifications, see the “[2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes](#)” section on page 2-7.

Table A-6 32DMX-L Optical Specifications

Parameter	Note	Condition	Min	Typical	Max	Units
-1 dB bandwidth	All SOP and within whole operating temperature range, connectors included, and for maximum VOA operating attenuation.	COM RX => TX 1, 32 (OUT)	+/-100	—	—	pm
-3 dB bandwidth			+/-199	—	—	pm
Insertion loss	All SOP, and within whole operating temperature range, connectors included.	COM RX => TX 1, 32	—	—	5.8	dB
VOA dynamic range	—	COM RX => TX 1, 32	25	—	—	dB
Maximum optical input power	—	—	300	—	—	mW

The 32DMX-L channel plan is shown in [Table A-7](#). All 32DMX-L client interfaces must comply with this plan.

Table A-7 32DMX-L Channel Plan

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B77.8	77.8	190	1577.86
	78.6	189.9	1578.69
	79.5	189.8	1579.52
	80.3	189.7	1580.35
B81.1	81.1	189.6	1581.18
	82.0	189.5	1582.02
	82.8	189.4	1582.85
	83.6	189.3	1583.69
B84.5	84.5	189.2	1584.53
	85.3	189.1	1585.36
	86.2	189	1586.20
	87.0	188.9	1587.04
B87.8	87.8	188.8	1587.88
	88.7	188.7	1588.73
	89.5	188.6	1589.57
	90.4	188.5	1590.41

Table A-7 32DMX-L Channel Plan (continued)

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B91.2	91.2	188.4	1591.26
	92.1	188.3	1592.10
	92.9	188.2	1592.95
	93.7	188.1	1593.79
B94.6	94.6	188	1594.64
	95.4	187.9	1595.49
	96.3	187.8	1596.34
	97.1	187.7	1597.19
B98.0	98.0	187.6	1598.04
	98.8	187.5	1598.89
	99.7	187.4	1599.75
	00.6	187.3	1600.60
B01.4	01.4	187.2	1601.46
	02.3	187.1	1602.31
	03.1	187	1603.17
	04.0	186.9	1604.03

The 32DMX-L card has the following additional specifications:

- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.12 4MD-xx.x Card Specifications

The 4MD-xx.x card optical specifications are listed in [Table A-8](#).



Note

For power specifications, see the “[2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes](#)” section on page 2-7.

Table A-8 4MD-xx.x Optical Specifications

Parameter	Note	Condition	Min	Max	Unit
Trx filter shape (−0.5 dB bandwidth TrxBW ₂)	All SOP and within whole operating temperature range	COM Rx—xx.xx Tx COM Rx—yy.yy Tx COM Rx—zz.zz Tx COM Rx—kk.kk Tx xx.xx Rx—COM Tx yy.yy Rx—COM Tx zz.zz Rx—COM Tx kk.kk Rx—COM Tx	+/-180	—	pm
Insertion loss demultiplexer section	All SOP and within whole operating temperature range	COM Rx—xx.xx Tx	—	1.9	dB
		COM Rx—yy.yy Tx	—	2.4	dB
		COM Rx—zz.zz Tx	—	2.8	dB
		COM Rx—kk.kk Tx	—	3.3	dB
Insertion loss multiplexer section	All SOP and within whole operating temperature range (two connectors included)	xx.xx Rx—COM Tx	—	3.6	dB
		yy.yy Rx—COM Tx	—	3.2	dB
		zz.zz Rx—COM Tx	—	3.0	dB
		kk.kk Rx—COM Tx	—	2.6	dB
VOA dynamic range	—	—	25	—	dB
Maximum optical input power	—	—	300	—	mW

The 4MD-xx.x card has the following additional specifications:

- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.13 AD-1C-xx.x Card Specifications

Table A-9 lists the AD-1C-xx.x optical specifications.

Table A-9 AD-1C-xx.x Card Optical Specifications

Parameter	Note	Condition	Min	Max	Unit
Trx filter shape (-0.5 dB bandwidth) TrxBW ₂	All SOP and within whole operating temperature range	COM Rx—xx.xx Tx xx.xx Rx—COM Tx	+/-180	—	pm
Rfx filter shape (-0.5 dB bandwidth) RfxBW ₂	All SOP and within whole operating temperature range	COM Rx—Exp Tx Exp Rx—COM Tx	+/-180	—	pm
Insertion loss (drop section)	All SOP and within whole operating temperature range (two connectors included)	COM Rx—xx.xx Tx	—	2.0	dB
Insertion loss (express section)	VOA at minimum attenuation; all SOP and within whole operating temperature range (two connectors included)	COM Rx—Exp Tx Exp Rx—COM Tx	—	2.4 or 1.2	dB
Insertion loss (add section)	VOA at minimum attenuation; all SOP and within whole operating temperature range (two connectors included)	xx.xx Rx—COM Tx	—	2.6	dB
VOA dynamic range	—	—	30	—	dB
Maximum optical input power	—	—	300	—	mW

The AD-1C-xx.x card optical input and output power varies with amplifier output levels and the class of transponder interfaces used. See [Table 2-3 on page 2-8](#) through [Table 2-5 on page 2-9](#) for this information.

The AD-1C-xx.x card has the following additional specifications:

- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.0 in. (228.6 mm)

A.4.14 AD-2C-xx.x Card Specifications

[Table A-10](#) lists the AD-2C-xx.x optical specifications.

Table A-10 AD-2C-xx.x Card Optical Specifications

Parameter	Note	Condition	Min	Max	Unit
Trx filter shape (-0.5 dB bandwidth) TrxBW ₂	All SOP and within whole operating temperature range	COM Rx—xx.xx Tx COM Rx—yy.yy Tx	+/-180	—	pm
		xx.xx Rx—COM Tx yy.yy Rx—COM Tx	+/-180	—	

Table A-10 AD-2C-xx.x Card Optical Specifications (continued)

Parameter	Note	Condition	Min	Max	Unit
Rfx filter shape (−0.5 dB bandwidth) RfxBW ₂	All SOP and within whole operating temperature range	COM Rx—Exp Tx Exp Rx—COM Tx	+/−180	—	pm
Insertion loss (drop section)	All SOP and within whole operating temperature range (two connectors included)	COM Rx—xx.xx Tx	—	2.0	dB
		COM Rx—yy.yy Tx	—	2.4	dB
Insertion loss (express section)	VOA at minimum attenuation; all SOP and within whole operating temperature range (two connectors included)	COM Rx—Exp Tx	—	2.7	dB
		Exp Rx—COM Tx	—	1.6	dB
Insertion loss (add section)	VOA at minimum attenuation; all SOP and within whole operating temperature range (two connectors included)	xx.xx Rx—COM Tx	—	3.1	dB
		yy.yy Rx—COM Tx	—	2.7	dB
VOA dynamic range	—	—	30	—	dB
Maximum optical input power	—	—	300	—	mW

The AD-2C-xx.x card optical input and output power varies with amplifier output levels and the class of transponder interfaces used. See [Table 2-3 on page 2-8](#) through [Table 2-5 on page 2-9](#) for this information.

The AD-2C-xx.x has the following additional specifications:

- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.0 in. (228.6 mm)

A.4.15 AD-4C-xx.x Card Specifications

[Table A-11](#) lists the AD-4C-xx.x optical specifications.

Table A-11 AD-4C-xx.x Optical Specifications

Parameter	Note	Condition	Min	Max	Unit
Channel grid	See Table A-12 . The channel plan for the AD-4C-xx.x card is identical to the channel plan for the AD-1B-xx.x card.	—	—	—	—
Trx filter shape (–0.5 dB bandwidth) TrxBW ₂	All SOP and within whole operating temperature range	COM Rx—xx.xx Tx COM Rx—yy.yy Tx COM Rx—zz.zz Tx COM Rx—kk.kk Tx xx.xx Rx—COM Tx yy.yy Rx—COM Tx	+/-180	—	pm
Rfx filter shape (–1 dB bandwidth) RfxBW ₂	All SOP and within whole operating temperature range	COM Rx—Exp Tx Exp Rx—COM Tx	—	—	pm
Insertion loss (drop section)	All SOP and within whole operating temperature range (two connectors included)	COM Rx—xx.xx Tx	—	5.5	dB
		COM Rx—yy.yy Tx	—	5.0	dB
		COM Rx—zz.zz Tx	—	4.5	dB
		COM Rx—kk.kk Tx	—	4.1	dB
Insertion loss (express section)	VOA at minimum attenuation; all SOP and within whole operating temperature range (two connectors included)	COM Rx—Exp Tx	—	2.7	dB
		Exp Rx—COM Tx	—	1.2	dB
Insertion loss (add section)	VOA at minimum attenuation; all SOP and within whole operating temperature range (two connectors included)	xx.xx Rx—COM Tx	—	3.9	dB
		yy.yy Rx—COM Tx	—	4.3	dB
		zz.zz Rx—COM Tx	—	4.5	dB
		kk.kk Rx—COM Tx	—	4.9	dB
VOA dynamic range	—	—	30	—	dB
Maximum optical input power	—	—	300	—	mW

The AD-4C-xx.x card optical input and output power varies with amplifier output levels and the class of transponder interfaces used. See [Table 2-3 on page 2-8](#) through [Table 2-5 on page 2-9](#) for this information.

The AD-4C-xx.x has the following additional specifications:

- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.0 in. (228.6 mm)

A.4.16 AD-1B-xx.x Card Specifications

Table A-12 lists the unit names, band IDs, channel IDs, frequencies, and wavelengths assigned to the eight versions of the AD-1B-xx.x card.

Table A-12 AD-1B-xx.x Channel Allocation Plan by Band

Unit Name	Band ID	Channel ID	Frequency (GHz)	Wavelength (nm)
AD-1B-30.3	B30.3	30.3	195.9	1530.33
		30.7	195.85	1530.72
		31.1	195.8	1531.12
		31.5	195.75	1531.51
		31.9	195.7	1531.90
		32.2	195.65	1532.29
		32.6	195.6	1532.68
		33.3	195.55	1533.07
AD-1B-34.2	B34.2	34.2	195.4	1534.25
		34.6	195.35	1534.64
		35.0	195.3	1535.04
		35.4	195.25	1535.43
		35.8	195.2	1535.82
		36.2	195.15	1536.22
		36.6	195.1	1536.61
		37.0	195.05	1537.00
AD-1B-38.1	B38.1	38.1	194.9	1538.19
		38.5	194.85	1538.58
		38.9	194.8	1538.98
		39.3	194.75	1539.37
		39.7	194.7	1539.77
		40.1	194.65	1540.16
		40.5	194.6	1540.56
		40.9	194.55	1540.95
AD-1B-42.2	B42.1	42.1	194.4	1542.14
		42.5	194.35	1542.54
		42.9	194.3	1542.94
		43.3	194.25	1543.33
		43.7	194.2	1543.73
		44.1	194.15	1544.13
		44.5	194.1	1544.53
		44.9	194.05	1544.92

Table A-12 AD-1B-xx.x Channel Allocation Plan by Band (continued)

Unit Name	Band ID	Channel ID	Frequency (GHz)	Wavelength (nm)
AD-1B-46.1	B46.1	46.1	193.9	1546.12
		46.5	193.85	1546.52
		46.9	193.8	1546.92
		47.3	193.75	1547.32
		47.7	193.7	1547.72
		48.1	193.65	1548.11
		48.5	193.6	1548.51
		48.9	193.55	1548.91
AD-1B-50.1	B50.1	50.1	193.4	1550.12
		50.5	193.35	1550.52
		50.9	193.3	1550.92
		51.3	193.25	1551.32
		51.7	193.2	1551.72
		52.1	193.15	1552.12
		52.5	193.1	1552.52
		52.9	193.05	1552.93
AD-1B-54.1	B54.1	54.1	192.9	1554.13
		54.5	192.85	1554.54
		54.9	192.8	1554.94
		55.3	192.75	1555.34
		55.7	192.7	1555.75
		56.1	192.65	1556.15
		56.5	192.6	1556.96
		56.9	192.55	1556.96
AD-1B-58.1	B58.1	58.1	192.4	1558.17
		58.5	192.35	1558.58
		58.9	192.3	1558.98
		59.3	192.25	1559.39
		59.7	192.2	1559.79
		60.2	192.15	1560.20
		60.6	192.1	1560.61
		61.0	192.05	1561.01

Table A-13 lists AD-1B-xx.x optical specifications.

Table A-13 AD-1B-xx.x Optical Specifications

Parameter	Note	Condition	Min	Max	Unit
-1 dB bandwidth	All SOP and within whole operating environmental range	COM Rx—Band Tx Band Rx—COM Tx	3.6	—	nm
-1 dB bandwidth	All SOP and within whole operating temperature range	COM Rx—Exp Tx Exp Rx—COM Tx	Refer to Table A-14 .		nm
Insertion loss (drop section)	All SOP and within whole operating environmental range; two connectors included, VOA set at minimum attenuation	COM Rx—Band Tx	—	3.0	dB
Insertion loss (express section)	All SOP and within whole operating environmental range; two connectors included	Exp Rx—COM Tx	—	1.6	dB
	All SOP and within whole operating environmental range; two connectors included, VOA set at its minimum attenuation	COM Rx—Exp Tx	—	2.2	dB
Insertion loss (add section)	All SOP and within whole operating environmental range; two connectors included	Band Rx—COM Tx	—	2.2	dB
VOA dynamic range	—	—	30	—	dB
Maximum optical input power	—	—	300	—	mW

[Table A-14](#) lists the range of wavelengths for the receive (express) band.

Table A-14 AD-1B-xx.x Transmit and Receive Dropped Band Wavelength Ranges

Tx (Dropped) Band	Rx (Express) Band	
	Left Side (nm)	Right Side (nm)
B30.3	—	Wavelengths 1533.825 or higher
B34.2	Wavelengths 1533.395 or lower	Wavelengths 1537.765 or higher
B38.1	Wavelengths 1537.325 or lower	Wavelengths 1541.715 or higher
42.1	Wavelengths 1541.275 or lower	Wavelengths 1545.695 or higher
46.1	Wavelengths 1545.245 or lower	Wavelengths 1549.695 or higher
50.1	Wavelengths 1549.235 or lower	Wavelengths 1553.705 or higher
54.1	Wavelengths 1553.255 or lower	Wavelengths 1557.745 or higher
58.1	Wavelengths 1557.285 or lower	—

The AD-1B-xx.x card optical input and output power varies with amplifier output levels and the class of transponder interfaces used. See [Table 2-3 on page 2-8](#) through [Table 2-5 on page 2-9](#) for this information.

The AD-1B-xx.x card has the following additional specifications:

- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.0 in. (228.6 mm)

A.4.17 AD-4B-xx.x Card Specifications

[Table A-15](#) lists the unit names, band IDs, channel IDs, frequencies, and wavelengths assigned to the two versions of the card.

Table A-15 AD-4B-xx.x Channel Allocation Plan by Band

Unit Name	Band ID	Channel ID	Frequency (GHz)	Wavelength (nm)
AD-4B-30.3	B30.3	30.3	195.9	1530.33
		30.7	195.85	1530.72
		31.1	195.8	1531.12
		31.5	195.75	1531.51
		31.9	195.7	1531.90
		32.2	195.65	1532.29
		32.6	195.6	1532.68
		33.3	195.55	1533.07
	B34.2	34.2	195.4	1534.25
		34.6	195.35	1534.64
		35.0	195.3	1535.04
		35.4	195.25	1535.43
		35.8	195.2	1535.82
		36.2	195.15	1536.22
		36.6	195.1	1536.61
		37.0	195.05	1537.00
	B38.1	38.1	194.9	1538.19
		38.5	194.85	1538.58
		38.9	194.8	1538.98
		39.3	194.75	1539.37
		39.7	194.7	1539.77
		40.1	194.65	1540.16
		40.5	194.6	1540.56
		40.9	194.55	1540.95
	B42.1	42.1	194.4	1542.14
		42.5	194.35	1542.54
		42.9	194.3	1542.94
		43.3	194.25	1543.33
		43.7	194.2	1543.73
		44.1	194.15	1544.13
		44.5	194.1	1544.53
		44.9	194.05	1544.92

Table A-15 AD-4B-xx.x Channel Allocation Plan by Band (continued)

Unit Name	Band ID	Channel ID	Frequency (GHz)	Wavelength (nm)
AD-4B-46.1	B46.1	46.1	193.9	1546.12
		46.5	193.85	1546.52
		46.9	193.8	1546.92
		47.3	193.75	1547.32
		47.7	193.7	1547.72
		48.1	193.65	1548.11
		48.5	193.6	1548.51
		48.9	193.55	1548.91
	B50.1	50.1	193.4	1550.12
		50.5	193.35	1550.52
		50.9	193.3	1550.92
		51.3	193.25	1551.32
		51.7	193.2	1551.72
		52.1	193.15	1552.12
		52.5	193.1	1552.52
		52.9	193.05	1552.93
	B54.1	54.1	192.9	1554.13
		54.5	192.85	1554.54
		54.9	192.8	1554.94
		55.3	192.75	1555.34
		55.7	192.7	1555.75
		56.1	192.65	1556.15
		56.5	192.6	1556.96
		56.9	192.55	1556.96
	B58.1	58.1	192.4	1558.17
		58.5	192.35	1558.58
		58.9	192.3	1558.98
		59.3	192.25	1559.39
		59.7	192.2	1559.79
		60.2	192.15	1560.20
		60.6	192.1	1560.61
		61.0	192.05	1561.01

Table A-16 lists AD-4B-xx.x optical specifications.

Table A-16 AD-4B-xx.x Optical Specifications

Parameter	Note	Condition	Min	Max	Unit
-1 dB bandwidth	All SOP and within whole operating environmental range	COM Rx—Band Tx Band Rx—COM Tx	3.6	—	nm
-1 dB bandwidth	All SOP and within whole operating temperature range	COM Rx—Exp Tx Exp Rx—COM Tx	Refer to Table A-17 .		nm
Insertion loss (drop section)	All SOP and within whole operating environmental range; two connectors included, VOA set at minimum attenuation	COM Rx—Band Tx 30.3/46.1	—	2.9	dB
		COM Rx—Band Tx 34.2/50.1	—	3.3	dB
		COM Rx—Band Tx 38.1/54.1	—	3.8	dB
		COM Rx—Band Tx 42.1/58.1	—	4.5	dB
Insertion loss (express section)	All SOP and within whole operating environmental range; two connectors included	Exp Rx—COM Tx	—	4.9	dB
		COM Rx—Exp Tx	—	3	dB
Insertion loss (add section)	All SOP and within whole operating environmental range; two connectors included	Band Rx 30.3/46.1—COM Tx	—	3.5	dB
		Band Rx 34.2/50.1—COM Tx	—	2.8	dB
		Band Rx 38.1/54.1—COM Tx	—	2.3	dB
		Band Rx 42.1/58.1—COM Tx	—	1.8	dB
VOA dynamic range	—	—	30	—	dB
Maximum optical input power	—	—	300	—	mW

[Table A-17](#) lists the range of wavelengths for the receive (express) band.

Table A-17 AD-4B-xx.x Transmit and Receive Dropped Band Wavelength Ranges

Tx (Dropped) Band	Rx (Express) Band	
	Left Side (nm)	Right Side (nm)
B30.3	—	Wavelengths 1533.825 or higher
B34.2	Wavelengths 1533.395 or lower	Wavelengths 1537.765 or higher
B38.1	Wavelengths 1537.325 or lower	Wavelengths 1541.715 or higher
B42.1	Wavelengths 1541.275 or lower	Wavelengths 1545.695 or higher

Table A-17 AD-4B-xx.x Transmit and Receive Dropped Band Wavelength Ranges (continued)

Tx (Dropped) Band	Rx (Express) Band	
	Left Side (nm)	Right Side (nm)
B46.1	Wavelengths 1545.245 or lower	Wavelengths 1549.695 or higher
B50.1	Wavelengths 1549.235 or lower	Wavelengths 1553.705 or higher
B54.1	Wavelengths 1553.255 or lower	Wavelengths 1557.745 or higher
B58.1	Wavelengths 1557.285 or lower	—

The AD-4B-xx.x card optical input and output power varies with amplifier output levels and the class of transponder interfaces used. See [Table 2-3 on page 2-8](#) through [Table 2-5 on page 2-9](#) for this information.

The AD-4B-xx.x has the following additional specifications:

- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.0 in. (228.6 mm)

A.4.18 32WSS Card Specifications

The 32WSS card optical specifications are listed in [Table A-18](#).



Note

For power specifications, see the “[2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes](#)” section on page 2-7.

Table A-18 32WSS Optical Specifications

Parameter	Note	Condition	Min	Typical	Max	Units
-0.25 dB bandwidth	All SOP and within whole operating temperature range, connectors included, and for maximum VOA operating attenuation.	EXP RX => COM TX	+/-95	—	—	pm
-0.5 dB bandwidth			+/-115	—	—	pm
-1.0 dB bandwidth			+/-135	—	—	pm
-0.25 dB bandwidth		Add 1, 32 => COM TX	+/-115	—	—	pm
-0.5 dB bandwidth			+/-135	—	—	pm
-1.0 dB bandwidth			+/-160	—	—	pm

Table A-18 32WSS Optical Specifications (continued)

Parameter	Note	Condition	Min	Typical	Max	Units
Insertion loss	All SOP, any optical switch state, and within whole operating temperature range, connectors included.	EXP RX => COM TX	—	—	11.3	dB
		COM RX => EXP TX	—	—	1.5	dB
		Add 1, 32 => COM TX	—	—	7.6	dB
		COM RX => DROP TX	6	—	8.5	dB
VOA dynamic range	—	EXP RX => COM TX	20	—	—	dB
		Add 1, 32 => COM TX	25	—	—	dB
Maximum optical input power	—	—	300	—	—	mW

The 32WSS channel plan is shown in [Table A-19](#). All 32WSS client interfaces must comply with this plan.

Table A-19 32WSS Channel Plan

Channel Number	Band	Channel ID	Frequency (GHz)	Wavelength (nm)
1	1	30.3	195.9	1530.33
2		31.2	195.8	1531.12
3		31.9	195.7	1531.90
4		32.6	195.6	1532.68
5	2	34.2	195.4	1534.25
6		35.0	195.3	1535.04
7		35.8	195.2	1535.82
8		36.6	195.1	1536.61
9	3	38.1	194.9	1538.19
10		38.9	194.8	1538.98
11		39.7	194.7	1539.77
12		40.5	194.6	1540.56

Table A-19 32WSS Channel Plan (continued)

Channel Number	Band	Channel ID	Frequency (GHz)	Wavelength (nm)
13	4	42.1	194.4	1542.14
14		42.9	194.3	1542.94
15		43.7	194.2	1543.73
16		44.5	194.1	1544.53
17	5	46.1	193.9	1546.12
18		46.9	193.8	1546.92
19		47.7	193.7	1547.72
20		48.5	193.6	1548.51
21	6	50.1	193.4	1550.12
22		50.9	193.3	1550.92
23		51.7	193.2	1551.72
24		52.5	193.1	1552.52
25	7	54.1	192.9	1554.13
26		54.9	192.8	1554.94
27		55.7	192.7	1555.75
28		56.5	192.6	1556.55
29	8	58.1	192.4	1558.17
30		58.9	192.3	1558.98
31		59.7	192.2	1559.79
32		60.6	192.1	1560.61

The 32WSS card has the following additional specifications:

- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 1.866 in. (47.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.19 32WSS-L Card Specifications

The 32WSS-L card optical specifications are listed in [Table A-20](#).



Note

For power specifications, see the “[2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes](#)” section on page 2-7.

Table A-20 32WSS-L Optical Specifications

Parameter	Note	Condition	Min	Typical	Max	Units
-0.1 dB bandwidth	All SOP and within whole operating temperature range, connectors included, and for maximum VOA operating attenuation.	EXP RX => COM TX	—	+/-/57	—	pm
-0.25 dB bandwidth			+/-/61	+/-/89	—	
-0.5 dB bandwidth			+/-/91	+/-/116	—	
-1.0 dB bandwidth			+/-/135	+/-/149	—	
-0.1 dB bandwidth		Add 1, 32 => COM TX	+/-/32	+/-/69	—	
-0.25 dB bandwidth			+/-/98	+/-/129	—	
-0.5 dB bandwidth			+/-/135	+/-/161	—	
-1.0 dB bandwidth			+/-/160	+/-/201	—	
Insertion loss	All SOP, any optical switch state, and within whole operating temperature range, connectors included.	EXP RX => COM TX	—	9.7	11.3	dB
		COM RX => EXP TX	—	1.4	1.6	dB
		Add 1, 32 => COM TX	—	6.2	8.0	dB
		COM RX => DROP TX	6.0	8.0	8.5	dB
VOA dynamic range	—	EXP RX => COM TX	20	25	—	dB
	—	Add 1, 32 => COM TX	25	25	—	dB
Maximum optical input power	—	—	300	—	—	mW

The 32WSS-L channel plan is shown in [Table A-21](#). All 32WSS-L client interfaces must comply with this plan.

Table A-21 32WSS-L Channel Plan

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B77.8	77.8	190	1577.86
	78.6	189.9	1578.69
	79.5	189.8	1579.52
	80.3	189.7	1580.35
B81.1	81.1	189.6	1581.18
	82.0	189.5	1582.02
	82.8	189.4	1582.85
	83.6	189.3	1583.69

Table A-21 32WSS-L Channel Plan (continued)

Band ID	Channel Label	Frequency (THz)	Wavelength (nm)
B84.5	84.5	189.2	1584.53
	85.3	189.1	1585.36
	86.2	189	1586.20
	87.0	188.9	1587.04
B87.8	87.8	188.8	1587.88
	88.7	188.7	1588.73
	89.5	188.6	1589.57
	90.4	188.5	1590.41
B91.2	91.2	188.4	1591.26
	92.1	188.3	1592.10
	92.9	188.2	1592.95
	93.7	188.1	1593.79
B94.6	94.6	188	1594.64
	95.4	187.9	1595.49
	96.3	187.8	1596.34
	97.1	187.7	1597.19
B98.0	98.0	187.6	1598.04
	98.8	187.5	1598.89
	99.7	187.4	1599.75
	00.6	187.3	1600.60
B01.4	01.4	187.2	1601.46
	02.3	187.1	1602.31
	03.1	187	1603.17
	04.0	186.9	1604.03

The 32WSS-L card has the following additional specifications:

- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 1.866 in. (47.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.00 in. (228.6 mm)

A.4.20 MMU Card Specifications

The MMU card optical specifications are listed in [Table A-22](#).

**Note**

For power specifications, see the “2.1.7 Multiplexer, Demultiplexer, and Optical Add/Drop Card Interface Classes” section on page 2-7.

Table A-22 MMU Optical Specifications

Parameter	Note	Condition	Min	Typical	Max	Units
Operating bandwidth	All SOP, any optical switch state, and within whole operating temperature range, connectors included.	All paths	1500	—	1605	nm
Insertion loss	All SOP, any optical switch state, and within whole operating temperature range, connectors included.	EXP RX => COM TX	—	—	7.0	dB
		EXP A RX => COM TX	—	—	2.3	dB
		COM RX => EXP TX	—	—	0.8	dB
		COM RX => EXP A TX	—	—	14.8	dB
Wavelength dependent losses	All SOP, any optical switch state, and within whole operating temperature range, connectors included.	C-band only	—	—	0.3	dB
		L-band only	—	—	0.3	dB
		C and L bands	—	—	0.5	dB
Polarization dependent loss (PDL)	—	C-band only	—	—	0.2	dB
		L-band only	—	—	0.2	dB
		C and L bands	—	—	0.3	dB
Chromatic dispersion	—	All paths	-20	—	+20	ps/nm
Polarization mode dispersion (PMD)	—	All paths	—	—	0.1	ps
Optical power reading resolution	—	All photodiodes (both real and virtual)	—	—	0.1	dB
Optical power reading precision	—		-0.1	—	0.1	dB
Directivity	All SOP, any optical switch state, and within whole operating temperature range, connectors included.	EXP RX => EXP A RX	40	—	—	dB
		EXP RX => EXP B RX	40	—	—	dB
		EXP A RX => EXP B RX	40	—	—	dB

Table A-22 MMU Optical Specifications (continued)

Parameter	Note	Condition	Min	Typical	Max	Units
Return loss	—	—	40	—	—	dB
Maximum optical input power	Maximum handling power	—	500	—	—	mW

The MMU card has the following additional specifications:

- Dimensions
 - Height: 12.65 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 8.66 in. (220.1 mm)

A.5 Transponder and Muxponder Card Specifications

This section provides specifications for the TXP_MR_10G, MXP_2.5G_10G, TXP_MR_2.5G, TXPP_MR_2.5G, MXP_MR_2.5G, MXPP_MR_2.5G, MXP_2.5G_10E, MXP_2.5G_10E_C, MXP_2.5G_10E_E, TXP_MR_10E, TXP_MR_10E_C, TXP_MR_10E_L, MXP_MR_10DME_C, and MXP_MR_10DME_L cards.

For compliance information, refer to the *Cisco Optical Transport Products Safety and Compliance Information* document.

A.5.1 TXP_MR_10G Card Specifications

The TXP_MR_10G card has the following specifications:

- Line (trunk side)
 - Bit rate:
 - 9.95328 Gbps for OC-192/STM-64
 - 10.70923 Gbps with ITU-T G.709 Digital Wrapper/forward error correction (FEC)
 - 10.3125 Gbps for 10 Gigabit Ethernet (GE)
 - 11.095 Gbps with ITU-T G.709 Digital Wrapper/FEC over 10 GE
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: 1000 ps/nm
 - Loopback modes: Terminal and facility



Caution

You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10G card in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_10G card. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_10G card.

- Connectors: LC

- Compliance Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.691
- Transmitter (trunk side)
 - Maximum transmitter output power: +3.5 dBm
 - Minimum transmitter output power: +2.5 dBm
 - Transmitter: Lithium Niobate (LN) external modulator transmitter
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths and versions of TXP_MR_10G (16 card versions, each covering two wavelengths):
 - 1530.33 to 1531.12 nm (two wavelengths)
 - 1531.90 to 1532.68 nm (two wavelengths)
 - 1534.25 to 1535.04 nm (two wavelengths)
 - 1535.82 to 1536.61 nm (two wavelengths)
 - 1538.19 to 1538.98 nm (two wavelengths)
 - 1539.77 to 1540.56 nm (two wavelengths)
 - 1542.14 to 1542.94 nm (two wavelengths)
 - 1543.73 to 1544.53 nm (two wavelengths)
 - 1546.12 to 1546.92 nm (two wavelengths)
 - 1547.72 to 1548.51 nm (two wavelengths)
 - 1550.12 to 1550.92 nm (two wavelengths)
 - 1551.72 to 1552.52 nm (two wavelengths)
 - 1554.13 to 1554.94 nm (two wavelengths)
 - 1555.75 to 1556.55 nm (two wavelengths)
 - 1558.17 to 1558.98 nm (two wavelengths)
 - 1559.79 to 1560.61 nm (two wavelengths)
- Receiver (trunk side):
 - Receiver input power (no FEC, unamplified, 23 dB optical signal-to-noise ratio [OSNR], BER $1 * 10^{exp - 12}$): -8 to -21 dBm
 - Receiver input power (no FEC, unamplified, 23 dB OSNR, at +/- 1000 ps/nm BER $1 * 10^{exp - 12}$): -8 to -19 dBm
 - Receiver input power (no FEC, amplified, 19 dB OSNR, BER $1 * 10^{exp - 12}$): -8 to -20 dBm
 - Receiver input power (no FEC, amplified, 19 dB OSNR, at +/- 1000 ps/nm BER $1 * 10^{exp - 12}$): -8 to -18 dBm
 - Receiver input power (FEC, unamplified, 23 dB OSNR, BER $8 * 10^{exp - 5}$): -8 to -24 dBm
 - Receiver input power (FEC, unamplified, 23 dB OSNR, at +/- 1000 ps/nm, BER $8 * 10^{exp - 5}$): -8 to -22 dBm
 - Receiver input power (FEC, amplified, 9 dB OSNR, BER $8 * 10^{exp - 5}$): -8 to -18 dBm

- Receiver input power (FEC, unamplified, 11 dB OSNR, at +/- 800 ps/nm, BER $8 * 10 \text{ exp} - 5$): -8 to -18 dBm
- Line (client side)
 - Bit rate: 9.95328 Gbps or 10.3125 Gbps
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: Compliant with SR-1 specification for OC-192. In the case of 10 GE, the allowance is up to 10 km of single-mode fiber (SMF) dispersion.
 - Loopback modes: Terminal and facility
 - Connectors: LC
- Transmitter (client side)
 - Maximum transmitter output power: -1 dBm
 - Minimum transmitter output power: -6 dBm
 - Center wavelength: 1290 to 1330 nm
 - Nominal wavelength: 1310 nm
 - Transmitter: Distributed feedback (DFB) laser
- Receiver (client side)
 - Maximum receiver level: -1 dBm at BER $1 * 10 \text{ exp} - 12$
 - Minimum receiver level: -14 dBm at BER $1 * 10 \text{ exp} - 12$
 - Receiver: avalanche photodiode (APD)
 - Link loss budget: 8 dB minimum, at BER = $1 * 10 \text{ exp} - 12$
 - Receiver input wavelength range: 1290 to 1605 nm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.5.2 MXP_2.5G_10G Card Specifications

The MXP_2.5G_10G card has the following specifications:

- Line (trunk side)
 - Bit rate:
 - 9.95328 Gbps for OC-192/STM-64
 - 10.70923 Gbps with ITU-T G.709 Digital Wrapper/FEC
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode

- Maximum chromatic dispersion allowance: 1000 ps/nm
- Loopback modes: Terminal and facility



Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_2.5G_10G card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_2.5G_10G card. Using direct fiber loopbacks causes irreparable damage to the MXP_2.5G_10G card.

- Connectors: LC
- Transmitter (trunk side)
 - Maximum transmitter output power: +3.5 dBm
 - Minimum transmitter output power: +2.5 dBm
 - Transmitter: LN external modulator transmitter
 - Wavelength stability (drift): +/- 25 picometers (pm)



Note An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths and versions of MXP_2.5G_10G (16 card versions, each covering two wavelengths):
 - 1530.33 to 1531.12 nm (two wavelengths)
 - 1531.90 to 1532.68 nm (two wavelengths)
 - 1534.25 to 1535.04 nm (two wavelengths)
 - 1535.82 to 1536.61 nm (two wavelengths)
 - 1538.19 to 1538.98 nm (two wavelengths)
 - 1539.77 to 1540.56 nm (two wavelengths)
 - 1542.14 to 1542.94 nm (two wavelengths)
 - 1543.73 to 1544.53 nm (two wavelengths)
 - 1546.12 to 1546.92 nm (two wavelengths)
 - 1547.72 to 1548.51 nm (two wavelengths)
 - 1550.12 to 1550.92 nm (two wavelengths)
 - 1551.72 to 1552.52 nm (two wavelengths)
 - 1554.13 to 1554.94 nm (two wavelengths)
 - 1555.75 to 1556.55 nm (two wavelengths)
 - 1558.17 to 1558.98 nm (two wavelengths)
 - 1559.79 to 1560.61 nm (two wavelengths)
- Receiver (trunk side)
 - Receiver input power (no FEC, unamplified, 23 dB OSNR, BER $1 * 10^{exp - 12}$): -8 to -21 dBm
 - Receiver input power (no FEC, unamplified, 23 dB OSNR, at +/- 1000 ps/nm BER $1 * 10^{exp - 12}$): -8 to -19 dBm

- Receiver input power (no FEC, amplified, 19 dB OSNR, BER $1 * 10^{exp - 12}$): -8 to -20 dBm
- Receiver input power (no FEC, amplified, 19 dB OSNR, at +/- 1000 ps/nm BER $1 * 10^{exp - 12}$): -8 to -18 dBm
- Receiver input power (FEC, unamplified, 23 dB OSNR, BER $8 * 10^{exp - 5}$): -8 to -24 dBm
- Receiver input power (FEC, unamplified, 23 dB OSNR, at +/- 1000 ps/nm, BER $8 * 10^{exp - 5}$): -8 to -22 dBm
- Receiver input power (FEC, amplified, 9 dB OSNR, BER $8 * 10^{exp - 5}$): -8 to -18 dBm
- Receiver input power (FEC, unamplified, 11 dB OSNR, at +/- 800 ps/nm, BER $8 * 10^{exp - 5}$): -8 to -18 dBm
- Line (client side)
 - Bit rate: 2.48832 Gbps
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: Compliant with SR-1 specification for OC-192. In the case of 10 GE, allowance is up to 10 km of SMF fiber of dispersion.
 - Loopback modes: Terminal and facility
 - Connectors: LC
- Transmitter (client side): Depends on the Small Form-factor Pluggable (SFP) that is used.
- Receiver (client side): Depends on the SFP that is used.
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.5.3 TXP_MR_2.5G and TXPP_MR_2.5G Card Specifications

The TXP_MR_2.5G and TXPP_MR_2.5G cards have the following specifications:

- Line (trunk side)
 - Bit rate:
 - 2.488 Gbps for OC-48/STM-16
 - 2.66 Gbps with ITU-T G.709 Digital Wrapper/FEC
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: 5400 ps/nm
 - Loopback modes: Terminal and facility

**Caution**

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the TXP_MR_2.5G and TXPP_MR_2.5G cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_2.5G and TXPP_MR_2.5G cards. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_2.5G and TXPP_MR_2.5G cards.

- Connectors: LC
- Transmitter (trunk side)
 - Maximum transmitter output power: +1 dBm
 - Minimum transmitter output power: -4.5 dBm
 - Transmitter: Direct modulated laser
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths of TXP_MR_2.5G and TXPP_MR_2.5G (eight card versions):
 - ITU grid blue band: 1530.334 to 1544.526 nm (four card versions covering four wavelengths each)
 - ITU grid red band: 1546.119 to 1560.606 nm (four card versions covering four wavelengths each)
- Receiver (trunk side, see [Table A-23](#))

Table A-23 TXP_MR_2.5G/TXPP_MR_2.5G Card Receiver Trunk Side Specifications

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity	Chromatic Dispersion Tolerance
22 dB	Off - 2R	< 10 exp - 12	N/A	- 9 to - 24 dBm	—
22 dB	Off - 2R	< 10 exp - 12	N/A	- 9 to - 21 dBm	+/- 3300ps/nm
21 dB	Off - 3R	< 10 exp - 12	N/A	- 9 to - 30 dBm	—
22 dB	Off - 3R	< 10 exp - 12	N/A	- 9 to - 30 dBm	+/- 1800ps/nm
23 dB	Off - 3R	< 10 exp - 12	N/A	- 9 to - 30 dBm	+/- 5400ps/nm
12 dB	Standard- 3R	< 10 exp - 5	< 10 exp - 15	- 9 to - 25 dBm	—
12 dB	Standard- 3R	< 10 exp - 5	< 10 exp - 15	- 9 to - 24 dBm	+/- 1800ps/nm
12 dB	Standard- 3R	< 10 exp - 5	< 10 exp - 15	- 9 to - 23 dBm	+/- 5400ps/nm
21 dB	Standard- 3R	< 10 exp - 5	< 10 exp - 15	- 9 to - 31 dBm	—

1. OSNR defined with 0.1 nm resolution bandwidth (RBW)

- Receiver: APD
- Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = 1 * 10 exp - 12 including dispersion
- Line (client side)
 - Bit rate: 8 Mbps to 2.488 Gbps
 - Code: Scrambled NRZ

- Fiber: Based on SFP (1310-nm single-mode or 850-nm multimode)
- Maximum chromatic dispersion allowance: Based on SFP
- Loopback modes: Terminal and facility
- Connectors: LC
- Transmitter (client side)
 - Maximum transmitter output power: –1 dBm
 - Minimum transmitter output power: –6 dBm
 - Center wavelength: Based on SFP
 - Nominal wavelength: Based on SFP
 - Transmitter: Based on SFP
- Receiver (client side)
 - Maximum receiver level: –1 dBm at BER $1 * 10 \text{ exp} - 12$
 - Minimum receiver level: –14 dBm at BER $1 * 10 \text{ exp} - 12$
 - Receiver: APD
 - Link loss budget: 8 dB minimum, at BER = $1 * 10 \text{ exp} - 12$
 - Receiver input wavelength range: 850nm to 1605 nm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.5.4 MXP_MR_2.5G and MXPP_MR_2.5G Card Specifications

The MXP_MR_2.5G and MXPP_MR_2.5G cards have the following specifications:

- Payload configuration
 - FC1G—Fibre Channel 1.06 Gbps
 - FC2G—Fibre Channel 2.125 Gbps
 - FICON1G—Fiber connectivity 1.06 Gbps (IBM signal)
 - FICON2G—Fiber connectivity 2.125 Gbps (IBM signal)
 - ESCON—Enterprise System Connection 200 Mbps
 - ONE_GE—One Gigabit Ethernet 1.125 Gbps
 - Mixed configurations up to maximum line rate of 2.5 Gbps (for example, if you have a port configured for FC2G, you cannot use another port at the same time). See the [“2.10.8 MXP_MR_2.5G and MXPP_MR_2.5G Cards” section on page 2-155](#) for more information on mixed-mode operation.
- Client ports: 8x SFP
- Performance monitoring (PM) for all interfaces

- Buffer-to-buffer credit management for distance extension
- Line (trunk side)
 - Bit rate: 2.488 Gbps for OC-48/STM-16
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: 6000 ps/nm
 - Loopback modes: Terminal and facility

**Caution**

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_MR_2.5G and MXPP_MR_2.5G cards in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_MR_2.5G and MXPP_MR_2.5G cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_2.5G and MXPP_MR_2.5G cards.

- Connectors: LC
- Transmitter (trunk side)
 - Transmit power: +3 +/- 1 dBm with MXP_MR_2.5G card, and +/- 1 dBm with MXPP_MR_2.5G card
 - 50-GHz DWDM migration ready (the wavelength deviation is less than +/- 0.040 nm through wavelocker deployment)
 - Four-channel wavelength tunability at 100-GHz spacing
 - Transmitter maximum return reflectance: -27 dB
 - Chromatic dispersion allowance: 5400 ps/nm, giving an optical power penalty < 2.0 dB
 - Minimum side mode suppression ratio: 30 dB
 - Transmitter is a direct modulated laser
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths of the TXP_MR_2.5G and TXPP_MR_2.5G cards (eight card versions):
 - ITU grid blue band: 1530.334 to 1544.526 nm (four card versions, four wavelengths each)
 - ITU grid red band: 1546.119 to 1560.606 nm (four card versions, four wavelengths each)
- Receiver (trunk side, see [Table A-24](#))

Table A-24 MXP_MR_2.5G/MXPP_MR_2.5G Card Receiver Trunk Side Specifications

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity	Chromatic Dispersion Tolerance
17 dB	N/A	< 10 exp - 12	N/A	- 9 to - 23 dBm	—
17 dB	N/A	< 10 exp - 12	N/A	- 9 to - 22 dBm	+/- 1800 ps/nm
17 dB	N/A	< 10 exp - 12	N/A	- 9 to - 21 dBm	+/- 5400 ps/nm

Table A-24 MXP_MR_2.5G/MXPP_MR_2.5G Card Receiver Trunk Side Specifications (continued)

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity	Chromatic Dispersion Tolerance
18 dB	N/A	< 10 exp – 12	N/A	– 9 to – 23 dBm	+/- 1800 ps/nm
19 dB	N/A	< 10 exp – 12	N/A	– 9 to – 23 dBm	+/- 5400 ps/nm
21 dB	N/A	< 10 exp – 12	N/A	– 9 to – 30 dBm	—
21 dB	N/A	< 10 exp – 12	N/A	– 9 to – 29 dBm	+/- 1800 ps/nm
21 dB	N/A	< 10 exp – 12	N/A	– 9 to – 28 dBm	+/- 5400 ps/nm
22 dB	N/A	< 10 exp – 12	N/A	– 9 to – 30 dBm	+/- 1800 ps/nm
23 dB	N/A	< 10 exp – 12	N/A	– 9 to – 30 dBm	+/- 5400 ps/nm

1. OSNR defined with 0.1 nm RBW

- Receiver sensitivity –28 dBm, BER $1 * 10 \text{ exp} - 12$
- Receiver overload is equal to or exceeds –8 dBm
- Receiver maximum reflectance of –27 dB
- Line (client side)
 - Bit rate: 200Mbps or 1.06 Gbps to 2.125 Gbps per client
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode or 850-nm multimode
 - Maximum chromatic dispersion allowance: 1600 ps/nm
 - Loopback modes: Terminal and facility
 - Connectors: LC
- Transmitter (client side)
 - Maximum transmitter output power: –1 dBm
 - Minimum transmitter output power: –6 dBm
 - Center wavelength: Based on SFP
 - Nominal wavelength: Based on SFP
 - Transmitter: Based on SFP
- Receiver (client side)
 - Maximum receiver level: –1 dBm at BER $1 * 10 \text{ exp} - 12$
 - Minimum receiver level: –14 dBm at BER $1 * 10 \text{ exp} - 12$
 - Receiver: APD
 - Link loss budget: 8 dB minimum, at BER = $1 * 10 \text{ exp} - 12$
 - Receiver input wavelength range: 1290 to 1605 nm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)

- Depth with backplane connector: 9.250 in. (235 mm)
- Weight not including clam shell: 2.25 lb (1.02 kg)

A.5.5 MXP_2.5G_10E Card Specifications

The MXP_2.5G_10E card has the following specifications:

- Line (trunk side)
 - Bit rate: 10.70923 Gbps (in ITU-T G.709 Digital Wrapper/FEC mode)
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: +/- 1200 ps/nm (specified penalty)
 - Loopback modes: Terminal and facility



Caution

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_2.5G_10E card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_2.5G_10E card. Using direct fiber loopbacks causes irreparable damage to the MXP_2.5G_10E card.

- Connectors: LC
- Transmitter (trunk side)
 - Maximum transmitter output power: +6 dBm
 - Minimum transmitter output power: +3 dBm
 - Transmitter: LN external modulator transmitter
 - Wavelength stability (drift): +/- 25 picometers (pm)



Note

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths and versions of MXP_2.5G_10E (eight card versions):
 - ITU grid blue band:
 - 1530.33 to 1533.07 nm (four channels)
 - 1534.25 to 1537.00 nm (four channels)
 - 1538.19 to 1540.95 nm (four channels)
 - 1542.14 to 1544.92 nm (four channels)
 - ITU grid red band:
 - 1546.12 to 1548.92 nm (four channels)
 - 1550.12 to 1552.93 nm (four channels)
 - 1554.13 to 1556.96 nm (four channels)
 - 1558.17 to 1561.01 nm (four channels)
- Receiver (trunk side, see [Table A-25](#))
 - Receiver: APD

- Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = 1×10^{-12} including dispersion

Table A-25 MXP_2.5G_10E Card Receiver Trunk Side Specifications

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity ²	Chromatic Dispersion Tolerance
30 dB	Off	$< 10 \text{ exp} - 12$	N/A	- 8 to - 20 dBm	+/- 1200 ps/nm
26 dB	Off	$< 10 \text{ exp} - 12$	N/A	- 8 to - 20 dBm	+/- 1000 ps/nm
26 dB	Off	$< 10 \text{ exp} - 12$	N/A	- 8 to - 22 dBm	—
17 dB	Standard	$< 10 \text{ exp} - 5$	$< 10 \text{ exp} - 15$	- 8 to - 18 dBm	+/- 800 ps/nm
15 dB	Standard	$< 10 \text{ exp} - 5$	$< 10 \text{ exp} - 15$	- 8 to - 18 dBm	—
15 dB	Enhanced	$< 7 \times 10 \text{ exp} - 4$	$< 10 \text{ exp} - 15$	- 8 to - 18 dBm	+/- 800 ps/nm
14 dB	Enhanced	$< 7 \times 10 \text{ exp} - 4$	$< 10 \text{ exp} - 15$	- 8 to - 18 dBm	—

1. OSNR defined with 0.1 nm RBW

2. Receiver filter bandwidth greater than or equal to 180 pm (at - 3 dBm)

- Line (client side)
 - Bit rate: 2.5 Gbps per port (OC-48/STM-16)
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode
 - Maximum chromatic dispersion allowance: 12 ps/nm (SR SFP version)
 - Loopback modes: Terminal and facility
 - Connectors: LC (optical)
- Transmitter (client side): Depends on the SFP that is used.
- Receiver (client side): Depends on the SFP that is used.
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.5.6 MXP_2.5G_10E_C Card Specifications

The MXP_2.5G_10E_C card has the following specifications:

- Line (trunk side)
 - Bit rate: 10.70923 Gbps (in ITU-T G.709 Digital Wrapper/FEC mode)
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode

- Maximum chromatic dispersion allowance: +/- 1200 ps/nm (specified penalty)
- Loopback modes: Terminal and facility

**Caution**

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_2.5G_10E_C card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_2.5G_10E_C card. Using direct fiber loopbacks causes irreparable damage to the card.

- Connectors: LC
- Transmitter (trunk side)
 - Maximum transmitter output power: +6 dBm
 - Minimum transmitter output power: +3 dBm
 - Transmitter: LN external modulator transmitter
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths and versions of MXP_2.5G_10E_C card:
There is a single version of the MXP_2.5G_10E_C card. It is tunable across 82 wavelengths in the C-band frequency plan, with channels on the ITU 50-GHz grid, as shown in [Table A-26](#).

Table A-26 MXP_2.5G_10E_C Card Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721

Table A-26 MXP_2.5G_10E_C Card Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

- Receiver (trunk side, see [Table A-27](#))

Table A-27 MXP_2.5G_10E_C Card Receiver Trunk Side Specifications

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity ²	Chromatic Dispersion Tolerance
30 dB	Off	< 10 exp – 12	N/A	– 8 to – 20 dBm	+/- 1200 ps/nm
26 dB	Off	< 10 exp – 12	N/A	– 8 to – 20 dBm	+/- 1000 ps/nm
26 dB	Off	< 10 exp – 12	N/A	– 8 to – 22 dBm	—
17 dB	Standard	< 10 exp – 5	< 10 exp – 15	– 8 to – 18 dBm	+/- 800 ps/nm
15.5 dB	Standard	< 10 exp – 5	< 10 exp – 15	– 8 to – 18 dBm	—

Table A-27 MXP_2.5G_10E_C Card Receiver Trunk Side Specifications (continued)

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity ²	Chromatic Dispersion Tolerance
14 dB	Enhanced	< 7 x 10 exp - 4	< 10 exp - 15	- 8 to - 18 dBm	+/- 800 ps/nm
12 dB	Enhanced	< 7 x 10 exp - 4	< 10 exp - 15	- 8 to - 18 dBm	—

1. OSNR defined with 0.1 nm RBW

2. Receiver filter bandwidth greater than or equal to 180 pm (at - 3 dBm)

- Receiver: APD
- Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = 1 * 10 exp - 12 including dispersion
- Receiver input wavelength range: 1529 to 1562 nm
- Line (client side)
 - Bit rate: 2.5 Gbps per port (OC-48/STM-16)
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode
 - Maximum chromatic dispersion allowance: 12 ps/nm (SR SFP version)
 - Loopback modes: Terminal and facility
 - Connectors: LC (optical)
- Transmitter (client side): Depends on the SFP that is used.
- Receiver (client side): Depends on the SFP that is used.
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.5.7 MXP_2.5G_10E_L Card Specifications

The MXP_2.5G_10E_L card has the following specifications:

- Line (trunk side)
 - Bit rate: 10.70923 Gbps (in ITU-T G.709 Digital Wrapper/FEC mode)
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: +/- 1200 ps/nm (specified penalty)
 - Loopback modes: Terminal and facility

**Caution**

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_2.5G_10E_L card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_2.5G_10E_L card. Using direct fiber loopbacks causes irreparable damage to the card.

- Connectors: LC
- Transmitter (trunk side)
 - Maximum transmitter output power: +6 dBm
 - Minimum transmitter output power: +3 dBm
 - Transmitter: LN external modulator transmitter
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths and versions of MXP_2.5G_10E_L card:

There is a single version of the MXP_2.5G_10E_L card. It is tunable across 80 wavelengths in the L band frequency plan, with channels on the ITU 50-GHz grid, as shown in [Table A-28](#).

Table A-28 MXP_2.5G_10E_L Card Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64

Table A-28 MXP_2.5G_10E_L Card Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

- Receiver (trunk side, see [Table A-29](#))

Table A-29 MXP_2.5G_10E_L Card Receiver Trunk Side Specifications

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity ²	Chromatic Dispersion Tolerance
30 dB	Off	< 10 exp - 12	N/A	- 8 to - 20 dBm	+/- 1200 ps/nm
26 dB	Off	< 10 exp - 12	N/A	- 8 to - 20 dBm	+/- 1000 ps/nm
26 dB	Off	< 10 exp - 12	N/A	- 8 to - 22 dBm	—
17 dB	Standard	< 10 exp - 5	< 10 exp - 15	- 8 to - 18 dBm	+/- 800 ps/nm
15.5 dB	Standard	< 10 exp - 5	< 10 exp - 15	- 8 to - 18 dBm	—
15 dB	Enhanced	< 7 x 10 exp - 4	< 10 exp - 15	- 8 to - 18 dBm	+/- 800 ps/nm
13 dB	Enhanced	< 7 x 10 exp - 4	< 10 exp - 15	- 8 to - 18 dBm	—

1. OSNR defined with 0.1 nm RBW

2. Receiver filter bandwidth greater than or equal to 180 pm (at – 3 dBm)
 - Receiver: APD
 - Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = $1 * 10 \text{ exp} - 12$ including dispersion
 - Receiver input wavelength range: 1570 to 1604 nm
- Line (client side)
 - Bit rate: 2.5 Gbps per port (OC-48/STM-16)
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode
 - Maximum chromatic dispersion allowance: 12 ps/nm (SR SFP version)
 - Loopback modes: Terminal and facility
 - Connectors: LC (optical)
- Transmitter (client side): Depends on the SFP that is used.
- Receiver (client side): Depends on the SFP that is used.
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.5.8 MXP_MR_10DME_C Card Specifications

The MXP_MR_10DME_C card has the following specifications:

- Payload configuration
 - FC1G—Fibre Channel 1.06 Gbps
 - FC2G—Fibre Channel 2.125 Gbps
 - FC4G—Fibre Channel 4.25 Gbps
 - FICON1G—Fiber connectivity 1.06 Gbps (IBM signal)
 - FICON2G—Fiber connectivity 2.125 Gbps (IBM signal)
 - FICON4G—Fiber connectivity 4.25 Gbps (IBM signal)
 - ONE_GE—One Gigabit Ethernet 1.125 Gbps
 - Mixed configurations up to maximum line rate of 10.0 Gbps. See the [“2.10.9 MXP_MR_10DME_C and MXP_MR_10DME_L Cards”](#) section on page 2-161 for more information on mixed-mode operation.
- Client ports: 8x SFP
- Line (trunk side)
 - Bit rate: 2.488 Gbps for OC-48/STM-16, 9.952 Gbps for OC-192/STM-64

- Code: Scrambled NRZ
- Fiber: 1550-nm single-mode
- Loopback modes: Terminal and facility



Caution You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_MR_10DME_C card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_MR_10DME_C cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_10DME_C cards.

- Connectors: LC
- Transmitter (trunk side)
 - Minimum output power: +3 dBm
 - Maximum output power: +6 dBm
 - Minimum Single-Mode Suppression Ratio (SMSR): 30 dB
 - Minimum optical extinction ratio: 10 dB
 - 41 wavelength tunability at 100-GHz spacing
 - Receiver maximum return reflectance (Rx return loss): -27 dB
 - Maximum chromatic dispersion allowance: +/- 1200 ps/nm (specified penalty)
 - Minimum side mode suppression ratio: 30 dB
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths for the MXP_MR_10DME_C card: See [Table 2-92 on page 2-166](#)
- Receiver (trunk side, see [Table A-30](#))

Table A-30 MXP_MR_10DME_C Card Receiver Trunk Side Specifications

FEC Applications	OSNR ¹	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity	Chromatic Dispersion Tolerance	Power Penalty	OSNR Penalty
None	23 dB	< 10 exp - 12	—	-8 to -20 dBm	+/- 1200 ps/nm	2 dBm	—
	19 dB	< 10 exp - 12	—	-9 to -22 dBm	+/- 1000 ps/nm	2 dBm	—
FEC	10 dB	< 10 exp - 5	< 10 exp - 15	-8 to -18 dBm	+/- 800 ps/nm	—	1.5 dB
Enhanced FEC	19 dB	< 10 exp - 4	< 10 exp - 15	-8 to -26 dBm	+/- 800 ps/nm	2 dBm	2 dB
	8 dB	< 10 exp - 4	< 10 exp - 15	-8 to -18 dBm	+/- 800 ps/nm	2 dBm	1.5 dB

1. OSNR defined with 0.5 nm RBW

- Receiver: APD
- Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = 1 * 10 exp - 12 including dispersion

- Receiver input wavelength range: 1529 to 1562 nm
- Line (client side)
 - Bit rate: 1.06 Gbps to 4.25 Gbps per client
 - Code: Scrambled NRZ
 - Fiber: Based on SFP (1310-nm single-mode or 850-nm multimode)
 - Maximum chromatic dispersion allowance: Based on SFP
 - Loopback modes: Terminal and facility
 - Connectors: LC
- Transmitter (client side)
 - Maximum transmitter output power: –1 dBm
 - Minimum transmitter output power: –6 dBm
 - Center wavelength: Based on SFP
 - Nominal wavelength: Based on SFP
 - Transmitter: Based on SFP
- Receiver (client side)
 - Maximum receiver level: –1 dBm at BER $1 * 10 \text{ exp} - 12$
 - Minimum receiver level: –14 dBm at BER $1 * 10 \text{ exp} - 12$
 - Receiver: APD
 - Link loss budget: 8 dB minimum, at BER = $1 * 10 \text{ exp} - 12$
 - Receiver input wavelength range: 1290 to 1605 nm or 850nm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 2.25 lb (1.02 kg)

A.5.9 MXP_MR_10DME_L Card Specifications

The MXP_MR_10DME_L card has the following specifications:

- Payload configuration
 - FC1G—Fibre Channel 1.06 Gbps
 - FC2G—Fibre Channel 2.125 Gbps
 - FC4G—Fibre Channel 4.25 Gbps
 - FICON1G—Fiber connectivity 1.06 Gbps (IBM signal)
 - FICON2G—Fiber connectivity 2.125 Gbps (IBM signal)
 - FICON4G—Fiber connectivity 4.25 Gbps (IBM signal)
 - ONE_GE—One Gigabit Ethernet 1.125 Gbps

- Mixed configurations up to maximum line rate of 10.0 Gbps. See the “2.10.9 MXP_MR_10DME_C and MXP_MR_10DME_L Cards” section on page 2-161 for more information on mixed-mode operation.
- Client ports: 8x SFP
- Line (trunk side)
 - Bit rate: 2.488 Gbps for OC-48/STM-16, 9.952 Gbps for OC-192/STM-64
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Loopback modes: Terminal and facility

**Caution**

You must use a 20-dB fiber attenuator (15 to 25 dB) when working with the MXP_MR_10DME_L card in a loopback on the trunk port. Do not use direct fiber loopbacks with the MXP_MR_10DME_L cards. Using direct fiber loopbacks causes irreparable damage to the MXP_MR_10DME_L cards.

- Connectors: LC
- Transmitter (trunk side)
 - Minimum output power: +3 dBm
 - Maximum output power: +6 dBm
 - Minimum SMSR: 30 dB
 - Minimum optical extinction ratio: 10.5 dB
 - 40 wavelength tunability at 100-GHz spacing, 80 wavelength tunability at 50-GHz spacing
 - Receiver maximum return reflectance (Rx return loss): -27 dB
 - Maximum chromatic dispersion allowance: +/- 1200 ps/nm (specified penalty)
 - Minimum side mode suppression ratio: 30 dB
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths for the MXP_MR_10DME_L card: See [Table 2-92 on page 2-166](#)
- Receiver (trunk side, see [Table A-31](#))

Table A-31 MXP_MR_10DME_L Card Receiver Trunk Side Specifications

FEC Applications	OSNR ¹	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity	Chromatic Dispersion Tolerance	Power Penalty	OSNR Penalty
None	23 dB	< 10 exp - 12	—	-8 to -19 dBm	+/- 1200 ps/nm	2 dBm	—
	19 dB	< 10 exp - 12	—	-9 to -19 dBm	+/- 1000 ps/nm	2 dBm	—
FEC	10 dB	< 10 exp - 5	< 10 exp - 15	-8 to -18 dBm	+/- 800 ps/nm	—	1.5 dB

Table A-31 MXP_MR_10DME_L Card Receiver Trunk Side Specifications (continued)

FEC Applications	OSNR ¹	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity	Chromatic Dispersion Tolerance	Power Penalty	OSNR Penalty
Enhanced FEC	19 dB	< 10 exp – 4	< 10 exp – 15	–8 to –26 dBm	+/- 800 ps/nm	—	2 dB
	8 dB	< 10 exp – 4	< 10 exp – 15	–8 to –18 dBm	+/- 800 ps/nm	—	1.5 dB

1. OSNR defined with 0.5 nm RBW

- Receiver: APD
- Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = $1 * 10 \text{ exp} - 12$ including dispersion
- Receiver input wavelength range: 1570 to 1604 nm
- Line (client side)
 - Bit rate: 1.06 Gbps to 4.25 Gbps per client
 - Code: Scrambled NRZ
 - Fiber: Based on SFP (1310-nm single-mode or 850-nm multimode)
 - Maximum chromatic dispersion allowance: Based on SFP
 - Loopback modes: Terminal and facility
 - Connectors: LC
- Transmitter (client side)
 - Maximum transmitter output power: –1 dBm
 - Minimum transmitter output power: –6 dBm
 - Center wavelength: Based on SFP
 - Nominal wavelength: Based on SFP
 - Transmitter: Based on SFP
- Receiver (client side)
 - Maximum receiver level: –1 dBm at BER $1 * 10 \text{ exp} - 12$
 - Minimum receiver level: –14 dBm at BER $1 * 10 \text{ exp} - 12$
 - Receiver: APD
 - Link loss budget: 8 dB minimum, at BER = $1 * 10 \text{ exp} - 12$
 - Receiver input wavelength range: 1290 to 1605 nm or 850 nm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 2.25 lb (1.02 kg)

A.5.10 TXP_MR_10E Card Specifications

The TXP_MR_10E card has the following specifications:

- Line (trunk side)
 - Bit rate: OC-192/STM-64 (9.95328 Gbps), OTU2 (10.70923 Gbps), 10GE (10.3125 Gbps), 10GE into OTU2 (non-standard 11.0957 Gbps), 10G FC (10.51875 Gbps), or 10G FC into OTU2 (non-standard 11.31764 Gbps)
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: +/- 1200 ps/nm (specified penalty)
 - Loopback modes: Terminal and facility



Caution

You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10E card in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_10E card. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_10E card.

- Connectors: LC
- Transmitter (trunk side)
 - Maximum transmitter output power: +6 dBm
 - Minimum transmitter output power: +3 dBm for C band and +2 dBm for L band
 - Transmitter: LN external modulator transmitter
 - Wavelength stability (drift): +/- 25 picometers (pm)



Note

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths and versions of TXP_MR_10E:
 - C-band frequency plan (eight card versions, each with four tunable channels on the ITU 100-GHz grid):
 - 1530.33 to 1533.07 nm (four channels)
 - 1534.25 to 1537.00 nm (four channels)
 - 1538.19 to 1540.95 nm (four channels)
 - 1542.14 to 1544.92 nm (four channels)
 - 1546.12 to 1548.92 nm (four channels)
 - 1550.12 to 1552.93 nm (four channels)
 - 1554.13 to 1556.96 nm (four channels)
 - 1558.17 to 1561.01 nm (four channels)
 - L-band frequency plan (five card versions, each with eight tunable channels on the ITU 50-GHz grid):
 - 1577.44 to 1580.35 nm (eight channels)
 - 1580.77 to 1583.69 nm (eight channels)

- 1584.11 to 1587.04 nm (eight channels)
- 1587.46 to 1590.41 nm (eight channels)
- 1590.83 to 1593.79 nm (eight channels)
- Receiver (trunk side, see [Table A-32](#))

Table A-32 TXP_MR_10E Card Receiver Trunk Side Specifications

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity ²	Chromatic Dispersion Tolerance
30 dB	Off	< 10 exp – 12	N/A	– 8 to – 20 dBm	+/- 1200 ps/nm
26 dB	Off	< 10 exp – 12	N/A	– 8 to – 20 dBm	+ – 1000 ps/nm
26 dB	Off	< 10 exp – 12	N/A	– 8 to – 22 dBm	—
17 dB	Standard	< 10 exp – 5	< 10 exp – 15	– 8 to – 18 dBm	+/- 800 ps/nm
15 dB	Standard	< 10 exp – 5	< 10 exp – 15	– 8 to – 18 dBm	—
15 dB	Enhanced	< 7 x 10 exp – 4	< 10 exp – 15	– 8 to – 18 dBm	+/- 800 ps/nm
14 dB	Enhanced	< 7 x 10 exp – 4	< 10 exp – 15	– 8 to – 18 dBm	—

1. OSNR defined with 0.1 nm RBW

2. Receiver filter bandwidth greater than or equal to 180 pm (at – 3 dBm)

- Receiver: APD
- Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = 1 * 10 exp – 12 including dispersion
- Line (client side):
 - 10-Gigabit Small Form-factor Pluggable (XFP)-based SR
 - Bit rate: 10GE (10.3125 Gbps), 10G FC (10.51875 Gbps), or STM-64/OC-192
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode
 - Maximum chromatic dispersion allowance: 6.6 ps/nm
 - Loopback modes: Terminal and facility
 - Connectors: LC
 - Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957, ITU-T G.691
- Transmitter (client side)
 - Maximum transmitter output power: –1 dBm
 - Minimum transmitter output power: –6 dBm
 - Center wavelength: 1290 to 1330 nm
 - Nominal wavelength: 1310 nm
 - Transmitter: DFB laser
- Receiver (client side)
 - Maximum receiver level: –1 dBm at BER 1 * 10 exp – 12
 - Minimum receiver level: –14 dBm at BER 1 * 10 exp – 12

- Receiver: APD
- Link loss budget: 8 dB minimum, at BER = $1 * 10 \text{ exp} - 12$
- Receiver input wavelength range: 1290 to 1605 nm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.5.11 TXP_MR_10E_C Card Specifications

The TXP_MR_10E_C card has the following specifications:

- Line (trunk side)
 - Bit rate: OC-192/STM-64 (9.95328 Gbps), OTU2 (10.70923 Gbps), 10GE (10.3125 Gbps), 10GE into OTU2 (non-standard 11.0957 Gbps), 10G FC (10.51875 Gbps), or 10G FC into OTU2 (non-standard 11.31764 Gbps)
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: +/- 1200 ps/nm (specified penalty)
 - Loopback modes: Terminal and facility



Caution

You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10E_C card in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_10E_C card. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_10E_C card.

- Connectors: LC
- Compliance: Telcordia GR-253-CORE, ITU-T G.707, ITU-T G.957, and ITU-T G.709
- Transmitter (trunk side)
 - Maximum transmitter output power: +6 dBm
 - Minimum transmitter output power: +3 dBm
 - Transmitter: LN external modulator transmitter
 - Wavelength stability (drift): +/- 25 picometers (pm)



Note

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths and versions of TXP_MR_10E_C card:

There is a single version of the TXP_MR_10E_C card. It is tunable across 82 wavelengths in the C-band frequency plan, with channels on the ITU 50-GHz grid, as shown in [Table A-33](#).

Table A-33 TXP_MR_10E_C Card Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	196.00	1529.55	42	193.95	1545.72
2	195.95	1529.94	43	193.90	1546.119
3	195.90	1530.334	44	193.85	1546.518
4	195.85	1530.725	45	193.80	1546.917
5	195.80	1531.116	46	193.75	1547.316
6	195.75	1531.507	47	193.70	1547.715
7	195.70	1531.898	48	193.65	1548.115
8	195.65	1532.290	49	193.60	1548.515
9	195.60	1532.681	50	193.55	1548.915
10	195.55	1533.073	51	193.50	1549.32
11	195.50	1533.47	52	193.45	1549.71
12	195.45	1533.86	53	193.40	1550.116
13	195.40	1534.250	54	193.35	1550.517
14	195.35	1534.643	55	193.30	1550.918
15	195.30	1535.036	56	193.25	1551.319
16	195.25	1535.429	57	193.20	1551.721
17	195.20	1535.822	58	193.15	1552.122
18	195.15	1536.216	59	193.10	1552.524
19	195.10	1536.609	60	193.05	1552.926
20	195.05	1537.003	61	193.00	1553.33
21	195.00	1537.40	62	192.95	1553.73
22	194.95	1537.79	63	192.90	1554.134
23	194.90	1538.186	64	192.85	1554.537
24	194.85	1538.581	65	192.80	1554.940
25	194.80	1538.976	66	192.75	1555.343
26	194.75	1539.371	67	192.70	1555.747
27	194.70	1539.766	68	192.65	1556.151
28	194.65	1540.162	69	192.60	1556.555
29	194.60	1540.557	70	192.55	1556.959
30	194.55	1540.953	71	192.50	1557.36
31	194.50	1541.35	72	192.45	1557.77
32	194.45	1541.75	73	192.40	1558.173
33	194.40	1542.142	74	192.35	1558.578
34	194.35	1542.539	75	192.30	1558.983
35	194.30	1542.936	76	192.25	1559.389

Table A-33 TXP_MR_10E_C Card Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
36	194.25	1543.333	77	192.20	1559.794
37	194.20	1543.730	78	192.15	1560.200
38	194.15	1544.128	79	192.10	1560.606
39	194.10	1544.526	80	192.05	1561.013
40	194.05	1544.924	81	192.00	1561.42
41	194.00	1545.32	82	191.95	1561.83

- Receiver (trunk side, see Table A-34)

Table A-34 TXP_MR_10E_C Card Receiver Trunk Side Specifications

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity ²	Chromatic Dispersion Tolerance
30 dB	Off	< 10 exp – 12	N/A	– 8 to – 20 dBm	+/- 1200 ps/nm
26 dB	Off	< 10 exp – 12	N/A	– 8 to – 20 dBm	+ – 1000 ps/nm
26 dB	Off	< 10 exp – 12	N/A	– 8 to – 22 dBm	—
17 dB	Standard	< 10 exp – 5	< 10 exp – 15	– 8 to – 18 dBm	+/- 800 ps/nm
15.5 dB	Standard	< 10 exp – 5	< 10 exp – 15	– 8 to – 18 dBm	—
14 dB	Enhanced	< 7 x 10 exp – 4	< 10 exp – 15	– 8 to – 18 dBm	+/- 800 ps/nm
12 dB	Enhanced	< 7 x 10 exp – 4	< 10 exp – 15	– 8 to – 18 dBm	—

1. OSNR defined with 0.1 nm RBW

2. Receiver filter bandwidth greater than or equal to 180 pm (at – 3 dBm)

- Receiver: APD
- Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = 1 * 10 exp – 12 including dispersion
- Receiver input wavelength range: 1529 to 1562 nm
- Line (client side):
 - XFP-based SR
 - Bit rate: 10GE (10.3125 Gbps), 10G FC (10.51875 Gbps), or STM-64/OC-192
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode
 - Maximum chromatic dispersion allowance: 6.6 ps/nm
 - Loopback modes: Terminal and facility
 - Connectors: LC
- Transmitter (client side)
 - Maximum transmitter output power: –1 dBm

- Minimum transmitter output power: -6 dBm
- Center wavelength: 1290 to 1330 nm
- Nominal wavelength: 1310 nm
- Transmitter: DFB laser
- Receiver (client side)
 - Maximum receiver level: -1 dBm at BER $1 * 10^{exp - 12}$
 - Minimum receiver level: -14 dBm at BER $1 * 10^{exp - 12}$
 - Receiver: APD
 - Link loss budget: 8 dB minimum, at BER = $1 * 10^{exp - 12}$
 - Receiver input wavelength range: 1290 to 1605 nm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.5.12 TXP_MR_10E_L Card Specifications

The TXP_MR_10E_L card has the following specifications:

- Line (trunk side)
 - Bit rate: OC-192/STM-64 (9.95328 Gbps), OTU2 (10.70923 Gbps), 10GE (10.3125 Gbps), 10GE into OTU2 (non-standard 11.0957 Gbps), 10G FC (10.51875 Gbps), or 10G FC into OTU2 (non-standard 11.31764 Gbps)
 - Code: Scrambled NRZ
 - Fiber: 1550-nm single-mode
 - Maximum chromatic dispersion allowance: +/- 1200 ps/nm (specified penalty)
 - Loopback modes: Terminal and facility



Caution

You must use a 15-dB fiber attenuator (10 to 20 dB) when working with the TXP_MR_10E_L card in a loopback on the trunk port. Do not use direct fiber loopbacks with the TXP_MR_10E_L card. Using direct fiber loopbacks causes irreparable damage to the TXP_MR_10E_L card.

- Connectors: LC
- Transmitter (trunk side)
 - Maximum transmitter output power: +6 dBm
 - Minimum transmitter output power: +2 dBm
 - Transmitter: LN external modulator transmitter
 - Wavelength stability (drift): +/- 25 picometers (pm)

**Note**

An optical device on the card keeps the laser wavelength locked as closely as possible to the ITU nominal value. The allowed drift is +/- 25 pm.

- Currently available wavelengths and versions of TXP_MR_10E_L card:

There is a single version of the TXP_MR_10E_L card. It is tunable across 80 wavelengths in the L band frequency plan, with channels on the ITU 50-GHz grid, as shown in [Table A-35](#).

Table A-35 TXP_MR_10E_L Card Trunk Wavelengths

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
1	190.85	1570.83	41	188.85	1587.46
2	190.8	1571.24	42	188.8	1587.88
3	190.75	1571.65	43	188.75	1588.30
4	190.7	1572.06	44	188.7	1588.73
5	190.65	1572.48	45	188.65	1589.15
6	190.6	1572.89	46	188.6	1589.57
7	190.55	1573.30	47	188.55	1589.99
8	190.5	1573.71	48	188.5	1590.41
9	190.45	1574.13	49	188.45	1590.83
10	190.4	1574.54	50	188.4	1591.26
11	190.35	1574.95	51	188.35	1591.68
12	190.3	1575.37	52	188.3	1592.10
13	190.25	1575.78	53	188.25	1592.52
14	190.2	1576.20	54	188.2	1592.95
15	190.15	1576.61	55	188.15	1593.37
16	190.1	1577.03	56	188.1	1593.79
17	190.05	1577.44	57	188.05	1594.22
18	190	1577.86	58	188	1594.64
19	189.95	1578.27	59	187.95	1595.06
20	189.9	1578.69	60	187.9	1595.49
21	189.85	1579.10	61	187.85	1595.91
22	189.8	1579.52	62	187.8	1596.34
23	189.75	1579.93	63	187.75	1596.76
24	189.7	1580.35	64	187.7	1597.19
25	189.65	1580.77	65	187.65	1597.62
26	189.6	1581.18	66	187.6	1598.04
27	189.55	1581.60	67	187.55	1598.47
28	189.5	1582.02	68	187.5	1598.89
29	189.45	1582.44	69	187.45	1599.32

Table A-35 TXP_MR_10E_L Card Trunk Wavelengths (continued)

Channel Number	Frequency (THz)	Wavelength (nm)	Channel Number	Frequency (THz)	Wavelength (nm)
30	189.4	1582.85	70	187.4	1599.75
31	189.35	1583.27	71	187.35	1600.17
32	189.3	1583.69	72	187.3	1600.60
33	189.25	1584.11	73	187.25	1601.03
34	189.2	1584.53	74	187.2	1601.46
35	189.15	1584.95	75	187.15	1601.88
36	189.1	1585.36	76	187.1	1602.31
37	189.05	1585.78	77	187.05	1602.74
38	189	1586.20	78	187	1603.17
39	188.95	1586.62	79	186.95	1603.60
40	188.9	1587.04	80	186.9	1604.03

- Receiver (trunk side, see [Table A-36](#))

Table A-36 TXP_MR_10E Card Receiver Trunk Side Specifications

OSNR ¹	FEC Type	Pre-FEC BER	Post-FEC BER	Input Power Sensitivity ²	Chromatic Dispersion Tolerance
30 dB	Off	< 10 exp – 12	N/A	– 8 to – 20 dBm	+/- 1200 ps/nm
26 dB	Off	< 10 exp – 12	N/A	– 8 to – 20 dBm	+ – 1000 ps/nm
26 dB	Off	< 10 exp – 12	N/A	– 8 to – 22 dBm	—
17 dB	Standard	< 10 exp – 5	< 10 exp – 15	– 8 to – 18 dBm	+/- 800 ps/nm
15.5 dB	Standard	< 10 exp – 5	< 10 exp – 15	– 8 to – 18 dBm	—
15 dB	Enhanced	< 7 x 10 exp – 4	< 10 exp – 15	– 8 to – 18 dBm	+/- 800 ps/nm
13 dB	Enhanced	< 7 x 10 exp – 4	< 10 exp – 15	– 8 to – 18 dBm	—

1. OSNR defined with 0.1 nm RBW

2. Receiver filter bandwidth greater than or equal to 180 pm (at – 3 dBm)

- Receiver: APD
- Link loss budget: 24 dB minimum, with no dispersion or 22 dB optical path loss at BER = 1 * 10 exp – 12 including dispersion
- Receiver input wavelength range: 1570 to 1604 nm
- Line (client side):
 - XFP-based SR
 - Bit rate: 10GE (10.3125 Gbps), 10G FC (10.51875 Gbps), or STM-64/OC-192
 - Code: Scrambled NRZ
 - Fiber: 1310-nm single-mode
 - Maximum chromatic dispersion allowance: 6.6 ps/nm

- Loopback modes: Terminal and facility
- Connectors: LC
- Transmitter (client side)
 - Maximum transmitter output power: -1 dBm
 - Minimum transmitter output power: -6 dBm
 - Center wavelength: 1290 to 1330 nm
 - Nominal wavelength: 1310 nm
 - Transmitter: DFB laser
- Receiver (client side)
 - Maximum receiver level: -1 dBm at BER $1 * 10 \text{ exp} - 12$
 - Minimum receiver level: -14 dBm at BER $1 * 10 \text{ exp} - 12$
 - Receiver: APD
 - Link loss budget: 8 dB minimum, at BER = $1 * 10 \text{ exp} - 12$
 - Receiver input wavelength range: 1290 to 1605 nm
- Dimensions
 - Height: 12.650 in. (321.3 mm)
 - Width: 0.921 in. (23.4 mm) (The dimension of the finger gasket is not included)
 - Depth: 9.000 in. (228.6 mm)
 - Depth with backplane connector: 9.250 in. (235 mm)
 - Weight not including clam shell: 3.1 lb (1.3 kg)

A.6 SFP and XFP Specifications

See the [Installing the GBIC, SFP, and XFP Optics Modules in Cisco ONS Platforms](#) for SFP and XFP specifications.



Administrative and Service States

This appendix describes the administrative and service states for Cisco ONS 15454 dense wavelength division multiplexing (DWDM) cards, optical payload ports, out-of-band optical service channel (OSC) ports, optical channel network connections (OCHNCs), and transponder/muxponder cards and ports. States for Software Release 5.0 and later are based on the generic state model defined in Telcordia GR-1093-Core, Issue 2 and ITU-T X.731.

B.1 Service States

Service states include a Primary State (PST), a Primary State Qualifier (PSTQ), and one or more Secondary States (SST). [Table B-1](#) lists the ANSI and ETSI service state PSTs and PSTQs supported by the ONS 15454.

Table B-1 ONS 15454 Service State Primary States and Primary State Qualifiers

ANSI Primary State, Primary State Qualifier	ETSI Primary State, Primary State Qualifier	Definition
IS-NR (In-Service and Normal)	Unlocked-enabled	The entity is fully operational and will perform as provisioned.
OOS-AU (Out-of-Service and Autonomous)	Unlocked-disabled	The entity is not operational because of an autonomous event.
OOS-AUMA (Out-of-Service and Autonomous Management)	Locked-disabled	The entity is not operational because of an autonomous event and has also been manually removed from service.
OOS-MA (Out-of-Service and Management)	Locked-enabled	The entity has been manually removed from service.

[Table B-2](#) defines the ANSI and ETSI SSTs supported by the ONS 15454.

Table B-2 ONS 15454 Secondary States

ANSI Secondary State	ETSI Secondary State	Definition
AINS	automaticInService	The entity is delayed before transitioning to the IS-NR (ANSI)/Unlocked-enabled (ETSI) service state. The transition to IS-NR/Unlocked-enabled depends on correction of conditions. Alarm reporting is suppressed, but traffic is carried. Raised fault conditions, whether or not their alarms are reported, can be retrieved on the Cisco Transport Controller (CTC) Conditions tab or by using the TL1 RTRV-COND command.
DSBLD	disabled	The entity was manually removed from service and does not provide its provisioned functions. All services are disrupted; unable to carry traffic.
FLT	failed	The entity has a raised alarm or condition.
MEA	mismatchOfEquipment	An improper card is installed. For example, an installed card is not compatible with the card preprovisioning or the slot. This SST applies only to cards.
MT	maintenance	The entity has been manually removed from service for a maintenance activity but still performs its provisioned functions. Alarm reporting is suppressed, but traffic is carried. Raised fault conditions, whether or not their alarms are reported, can be retrieved on the CTC Conditions tab or by using the TL1 RTRV-COND command.
SWDL	softwareDownload	The card is involved in a software and database download. This SST applies only to cards.
UAS	unassigned	The card is not provisioned in the database. This SST applies only to cards.
UEQ (Unequipped)	notInstalled	The card is not physically present (that is, an empty slot). This SST applies only to cards.

B.2 Administrative States

Administrative states are used to manage service states. Administrative states consist of a PST and an SST. [Table B-3](#) lists the ANSI and ETSI administrative states supported by the ONS 15454. See [Table B-2](#) for SST definitions.



Note

A change in the administrative state of an entity does not change the service state of supporting or supported entities.

Table B-3 ONS 15454 Administrative States

ANSI Administrative State (PST,SST)	ETSI Administrative State (PST,SST)	Definition
IS	Unlocked	Puts the entity in service.
IS,AINS	Unlocked,automaticInService	Puts the entity in automatic in-service.

Table B-3 ONS 15454 Administrative States (continued)

ANSI Administrative State (PST,SST)	ETSI Administrative State (PST,SST)	Definition
OOS,DSBLD	Locked,disabled	Removes the entity from service and disables it.
OOS,MT	Locked,maintenance	Removes the entity from service for maintenance.

B.3 Service State Transitions

This section describes the transition from one service state to the next state for DWDM shelves, cards, optical payload ports, OSC ports, OCHNCs, and transponder/muxponder cards and ports. A service state transition is based on the action performed on the entity and any autonomous activity.



Note

When an entity is put in the OOS,MT administrative state, the ONS node suppresses all standing alarms on that entity. All alarms and events appear on the Conditions tab. You can change this behavior for the LPBKFACILITY and LPBKTERMINAL alarms. To display these alarms on the Alarms tab, set the `NODE.general.ReportLoopbackConditionsOnOOS-MTPorts (ANSI)` or `NODE.general.ReportLoopbackConditionsOnPortsInLocked,Maintenance (ETSI)` to TRUE on the NE Defaults tab.

B.3.1 DWDM Shelf Service State Transitions

Table B-4 lists ANSI and ETSI service state transitions for shelf entities.

Table B-4 ONS 15454 Shelf Service State Transitions

Current Service State	Action	Next Service State
OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)	Connect a shelf.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Connect an invalid shelf.	OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)
	Add a shelf.	OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)
OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)	Disconnect a shelf.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
	Add a shelf.	IS-NR (ANSI) Unlocked-enabled (ETSI)

Table B-4 ONS 15454 Shelf Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)	Connect a shelf.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Connect an invalid shelf.	OOS-AU,AINS & MEA (ANSI) Unlocked-disabled,automaticInService & mismatchOfEquipment (ETSI)
	Delete a shelf.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)	Connect a shelf.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Connect an invalid shelf.	OOS-AU,MEA (ANSI) Unlocked-disabled,mismatchOfEquipment (ETSI)
	Delete a shelf.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
IS-NR (ANSI) Unlocked-enabled (ETSI)	Delete a shelf.	OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)
	Disconnect a shelf.	OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)
OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)	Disconnect a shelf.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
OOS-AUMA,AINS & MEA (ANSI) Locked-disabled,automaticInService & mismatchOfEquipment (ETSI)	Disconnect a shelf.	OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)
OOS-AU,MEA (ANSI) Unlocked-disabled,mismatchOfEquipment (ETSI)	Disconnect a shelf.	OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)
	Delete a shelf.	OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)

B.3.2 DWDM Card Service State Transitions

Table B-5 lists ANSI and ETSI service state transitions for AD-1B-xx.x, AD-4B-xx.x, AD-1C-xx.x, AD-2C-xx.x, AD-4C-xx.x, OSC-CSM, OSCM, OPT-BST, OPT-BST-E, OPT-BST-L, OPT-AMP-L, OPT-PRE, 4MD-xx.x, 32WSS, 32WSS-L, 32MUX-O, 32DMX, 32DMX-L, and 32DMX-O cards.

Table B-5 ONS 15454 Optical Unit Service State Transitions

Current Service State	Action	Next Service State
IS-NR (ANSI) Unlocked-enabled (ETSI)	Delete the card.	OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)
	Pull the card.	OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)
	Reset the card.	OOS-AU,SWDL (ANSI) Unlocked-disabled,softwareDownload (ETSI)
	Alarm/condition is raised.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
OOS-AU,AINS & MEA (ANSI) Unlocked-disabled,automaticInService & mismatchOfEquipment (ETSI)	Pull the card.	OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)
	Delete the card.	If the card is valid: <ul style="list-style-type: none"> OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI) If the card is invalid: <ul style="list-style-type: none"> OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)
OOS-AU,AINS & SWDL (ANSI) Unlocked-disabled,automaticInService & softwareDownload (ETSI)	Restart completed.	IS-NR (ANSI) Unlocked-enabled (ETSI) OOS-AU,AINS & MEA (ANSI) Unlocked-disabled,automaticInService & mismatchOfEquipment (ETSI)
	Pull the card.	OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)
OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)	Insert a valid card.	OOS-AU,AINS & SWDL (ANSI) Unlocked-disabled,automaticInService & softwareDownload (ETSI)
	Insert an invalid card.	OOS-AU,AINS & MEA (ANSI) Unlocked-disabled,automaticInService & mismatchOfEquipment (ETSI)
	Delete the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)

Table B-5 ONS 15454 Optical Unit Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)	Pull the card.	OOS-AU,UEQ (ANSI) Unlocked-disabled,unequipped (ETSI)
	Delete the card.	OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)
	Change the administrative state to OOS,MT (ANSI) or Locked,maintenance (ETSI).	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
	Reset the card.	OOS-AU,SWDL (ANSI) Unlocked-disabled,softwareDownload (ETSI)
	Alarm/condition is cleared.	IS-NR (ANSI) Unlocked-enabled (ETSI)
OOS-AU,MEA (ANSI) Unlocked-disabled,mismatchOfEquipment (ETSI)	Pull the card.	OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)
	Delete the card.	If the card is valid: <ul style="list-style-type: none"> OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI) If the card is invalid: <ul style="list-style-type: none"> OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)
OOS-AU,SWDL (ANSI) Unlocked-disabled,softwareDownload (ETSI)	Restart completed.	IS-NR (ANSI) Unlocked-enabled (ETSI)
		OOS-AU,MEA (ANSI) Unlocked-disabled,mismatchOfEquipment (ETSI)
OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)	Pull the card.	OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)
	Insert a valid card.	OOS-AU,SWDL (ANSI) Unlocked-disabled,softwareDownload (ETSI)
	Insert an invalid card.	OOS-AU,MEA (ANSI) Unlocked-disabled,mismatchOfEquipment (ETSI)
	Delete the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)

Table B-5 ONS 15454 Optical Unit Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)	Pull the card.	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)
	Delete the card.	OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)
	Change the administrative state to IS (ANSI) or Unlocked (ETSI).	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Reset the card.	OOS-AUMA,MT & SWDL (ANSI) Locked-disabled,maintenance & softwareDownload (ETSI)
	Alarm/condition is cleared.	IS-NR (ANSI) Unlocked-enabled (ETSI)
OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)	Pull the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
	Provision the card.	OOS-AU,MEA (ANSI) Unlocked-disabled,mismatchOfEquipment (ETSI)
OOS-AUMA,MT & SWDL (ANSI) Locked-disabled,maintenance & softwareDownload (ETSI)	Restart completed.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
		OOS-AUMA,MEA & MT (ANSI) Locked-disabled,mismatchOfEquipment & maintenance (ETSI)
OOS-AUMA,MT & SWDL (ANSI) Locked-disabled,maintenance & softwareDownload (ETSI)	Pull the card.	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)
	Restart completed.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)	Pull the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
	Provision an invalid card.	OOS-AU,MEA (ANSI) Unlocked-disabled,mismatchOfEquipment (ETSI)
	Provision a valid card.	OOS-AU,SWDL (ANSI) Unlocked-disabled,softwareDownload (ETSI)
OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)	Insert a valid card.	OOS-AU,SWDL (ANSI) Unlocked-disabled,softwareDownload (ETSI)
	Insert an invalid card.	OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)
	Preprovision a card.	OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)

B.3.3 Optical Payload Port Service State Transitions

Table B-6 lists the ANSI and ETSI optical payload port service state transitions.

Table B-6 ONS 15454 Optical Payload Port Service State Transitions

Current Service State	Action	Next Service State
IS-NR (ANSI) Unlocked-enabled (ETSI)	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	The OCHNC end-to-end path no longer exists.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Alarm/condition is raised.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)	All required OCHNC connections exist.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Alarm/condition is raised.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)	Alarm/condition is cleared.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Put the port or cross-connect in the IS (ANSI) or Unlocked (ETSI) administrative state.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Put the port or cross-connect in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port or cross-connect in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)

Table B-6 ONS 15454 Optical Payload Port Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)	Alarm/condition is cleared.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Put the port or cross-connect in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
	Put the port or cross-connect in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port or cross-connect in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
OOS-AUMA,FLT & LPBK & MT (ANSI) Locked-disabled,failed & loopback & maintenance (ETSI)	Release the loopback.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
	Alarm/condition is cleared.	OOS-MA,LPBK & MT (ANSI) Locked-enabled,loopback & maintenance (ETSI)
OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)	Alarm/condition is cleared.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Put the port or cross-connect in the IS (ANSI) or Unlocked-enabled (ETSI) administrative state.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Put the port or cross-connect in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
	Put the port or cross-connect in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port or cross-connect in a loopback.	OOS-AUMA,FLT & LPBK & MT (ANSI) Locked-disabled,failed & loopback & maintenance (ETSI)

Table B-6 ONS 15454 Optical Payload Port Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Alarm/condition is raised.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)

B.3.4 OSC Port Service State Transitions

Table B-7 lists the ANSI and ETSI OSC port service state transitions.

Table B-7 ONS 15454 OSC Port Service State Transitions

Current Service State	Action	Next Service State
IS-NR (ANSI) Unlocked-enabled (ETSI)	Delete the OSC.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Alarm/condition is raised.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)	Create the OSC.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Alarm/condition is raised.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)

Table B-7 ONS 15454 OSC Port Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)	Alarm/condition is cleared.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Put the port in the IS (ANSI) or Unlocked (ETSI) administrative state.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)	Alarm/condition is cleared.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)	Alarm/condition is cleared.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Put the port in the IS (ANSI) or Unlocked-enabled (ETSI) administrative state.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in a loopback.	OOS-AUMA,FLT & LPBK & MT (ANSI) Locked-disabled,failed & loopback & maintenance (ETSI)

Table B-7 ONS 15454 OSC Port Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Alarm/condition is raised.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)

B.3.5 OCHNC Service State Transitions

Table B-8 lists the ANSI and ETSI OCHNC service state transitions.

Table B-8 ONS 15454 OCHNC Service State Transitions

Current Service State	Action	Next Service State
IS-NR (ANSI) Unlocked-enabled (ETSI)	Put the connection in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Alarm/condition is raised.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)	Put the connection in the IS (ANSI) or Unlocked (ETSI) administrative state.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Alarm/condition is raised.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)	Alarm/condition is cleared.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Put the port in the IS (ANSI) or Unlocked (ETSI) administrative state.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)

Table B-8 ONS 15454 OCHNC Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)	Alarm/condition is cleared.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
OOS-AUMA,FLT & LPBK & MT (ANSI) Locked-disabled,failed & loopback & maintenance (ETSI)	Release the loopback.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
	Alarm/condition is cleared.	OOS-MA,LPBK & MT (ANSI) Locked-enabled,loopback & maintenance (ETSI)
OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)	Alarm/condition is cleared.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Put the port in the IS (ANSI) or Unlocked-enabled (ETSI) administrative state.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in a loopback.	OOS-AUMA,FLT & LPBK & MT (ANSI) Locked-disabled,failed & loopback & maintenance (ETSI)
OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)	Put the connection in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)

B.3.6 Transponder/Muxponder Card Service State Transitions

Table B-9 lists ANSI and ETSI transponder and muxponder card service state transitions.

Table B-9 ONS 15454 Transponder/Muxponder Card Service State Transitions

Current Service State	Action	Next Service State
IS-NR (ANSI) Unlocked-enabled (ETSI)	Change the administrative state to OOS,MT (ANSI) or Locked,maintenance (ETSI).	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Delete the card.	OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)
	Pull the card.	OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)
	Reset the card.	OOS-AU,SWDL (ANSI) Unlocked-disabled,softwareDownload (ETSI)
	Alarm/condition is raised.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
OOS-AU,AINS & MEA (ANSI) Unlocked-disabled,automaticInService & mismatchOfEquipment (ETSI)	Change the administrative state to OOS,MT (ANSI) or Locked,maintenance (ETSI).	OOS-AUMA,MEA & MT (ANSI) Locked-disabled,mismatchOfEquipment & maintenance (ETSI)
	Pull the card.	OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)
	Delete the card.	If the card is valid: <ul style="list-style-type: none"> • OOS-AUMA,UAS (ANSI) • Locked-disabled,unassigned (ETSI) If the card is invalid: <ul style="list-style-type: none"> • OOS-AUMA,MEA & UAS (ANSI) • Locked-disabled,mismatchOfEquipment & unassigned (ETSI)
OOS-AU,AINS & SWDL (ANSI) Unlocked-disabled,automaticInService & softwareDownload (ETSI)	Restart completed.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Pull the card.	OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)

Table B-9 ONS 15454 Transponder/Muxponder Card Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)	Insert a valid card.	OOS-AU,AINS & SWDL (ANSI) Unlocked-disabled,automaticInService & softwareDownload (ETSI)
	Insert an invalid card.	OOS-AU,AINS & MEA (ANSI) Unlocked-disabled,automaticInService & mismatchOfEquipment (ETSI)
	Delete the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
	Change the administrative state to OOS,MT (ANSI) or Locked,maintenance (ETSI).	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)
OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)	Pull the card.	OOS-AU,UEQ (ANSI) Unlocked-disabled,unequipped (ETSI)
	Delete the card.	OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)
	Change the administrative state to OOS,MT (ANSI) or Locked,maintenance (ETSI).	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
	Reset the card.	OOS-AU,SWDL (ANSI) Unlocked-disabled,softwareDownload (ETSI)
	Alarm/condition is cleared.	IS-NR (ANSI) Unlocked-enabled (ETSI)
OOS-AU,MEA (ANSI)	Pull the card.	OOS-AU,UEQ (ANSI) Unlocked-disabled,notInstalled (ETSI)
	Delete the card.	If the card is valid: <ul style="list-style-type: none"> OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI) If the card is invalid: <ul style="list-style-type: none"> OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)
	Change the administrative state to OOS,MT (ANSI) or Locked,maintenance (ETSI).	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)

Table B-9 ONS 15454 Transponder/Muxponder Card Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AU,SWDL (ANSI) Locked-disabled,softwareDownload (ETSI)	Restart completed.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Pull the card.	OOS-AU,UEQ (ANSI) Locked-disabled,notInstalled (ETSI)
OOS-AU,UEQ (ANSI) Locked-disabled,notInstalled (ETSI)	Insert a valid card.	OOS-AU,SWDL (ANSI) Locked-disabled,softwareDownload (ETSI)
	Insert an invalid card.	OOS-AU,MEA (ANSI) Locked-disabled,mismatchOfEquipment (ETSI)
	Delete the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
	Change the administrative state to OOS,MT (ANSI) or Locked,maintenance (ETSI).	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)
OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)	Pull the card.	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)
	Delete the card.	OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)
	Change the administrative state to IS (ANSI) or Unlocked (ETSI).	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Reset the card.	OOS-AUMA,MT & SWDL (ANSI) Locked-disabled,maintenance & softwareDownload (ETSI)
	Alarm/condition is cleared.	IS-NR (ANSI) Unlocked-enabled (ETSI)

Table B-9 ONS 15454 Transponder/Muxponder Card Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AUMA,MEA & MT (ANSI) Locked-disabled,mismatchOfEquipment & maintenance (ETSI)	Change the administrative state to IS (ANSI) or Unlocked (ETSI).	OOS-AU,MEA (ANSI) Locked-disabled,mismatchOfEquipment (ETSI)
	Pull the card.	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)
	Delete the card.	If the card is valid: <ul style="list-style-type: none"> OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI) If the card is invalid: <ul style="list-style-type: none"> OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)
OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)	Pull the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
	Provision the card.	OOS-AU,MEA (ANSI) Locked-disabled,mismatchOfEquipment (ETSI)
OOS-AUMA,MT & SWDL (ANSI) Locked-disabled,maintenance & softwareDownload (ETSI)	Restart completed.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Pull the card.	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)
OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)	Change the administrative state to IS (ANSI) or Unlocked (ETSI).	OOS-AU,UEQ (ANSI) Locked-disabled,notInstalled (ETSI)
	Insert a valid card.	OOS-AUMA,MT & SWDL (ANSI) Locked-disabled,maintenance & softwareDownload (ETSI)
	Insert an invalid card.	OOS-AUMA,MEA & MT (ANSI) Locked-disabled,mismatchOfEquipment & maintenance (ETSI)
	Delete the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)

Table B-9 ONS 15454 Transponder/Muxponder Card Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)	Pull the card.	OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)
	Provision an invalid card.	OOS-AU,MEA (ANSI) Locked-disabled,mismatchOfEquipment (ETSI)
	Provision a valid card.	OOS-AU,SWDL (ANSI) Locked-disabled,softwareDownload (ETSI)
OOS-AUMA,UAS & UEQ (ANSI) Locked-disabled,unassigned & notInstalled (ETSI)	Insert a valid card.	OOS-AU,SWDL (ANSI) Locked-disabled,softwareDownload (ETSI)
	Insert an invalid card.	OOS-AUMA,MEA & UAS (ANSI) Locked-disabled,mismatchOfEquipment & unassigned (ETSI)
	Preprovision a card.	OOS-AU,AINS & UEQ (ANSI) Unlocked-disabled,automaticInService & notInstalled (ETSI)
OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)	Change the administrative state to IS (ANSI) or Unlocked (ETSI).	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Delete the card.	OOS-AUMA,UAS (ANSI) Locked-disabled,unassigned (ETSI)
	Pull the card.	OOS-AUMA,MT & UEQ (ANSI) Locked-disabled,maintenance & notInstalled (ETSI)
	Reset the card.	OOS-AUMA,MT & SWDL (ANSI) Locked-disabled,maintenance & softwareDownload (ETSI)
	Alarm/condition is raised.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)

B.3.7 Transponder/Muxponder Port Service State Transitions

Table B-10 lists the ANSI and ETSI transponder and muxponder port service state transitions.

Table B-10 ONS 15454 Transponder/Muxponder Port Service State Transitions

Current Service State	Action	Next Service State
IS-NR (ANSI) Unlocked-enabled (ETSI)	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Alarm/condition is raised.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)	Put the port in the IS (ANSI) or Unlocked (ETSI) administrative state.	IS-NR ¹ (ANSI) Unlocked-enabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Alarm/condition is raised.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)	Alarm/condition is cleared.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Put the port in the IS (ANSI) or Unlocked (ETSI) administrative state.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)

Table B-10 ONS 15454 Transponder/Muxponder Port Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)	Alarm/condition is cleared.	IS-NR (ANSI) Unlocked-enabled (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
OOS-AUMA,FLT & LPBK & MT (ANSI) Locked-disabled,failed & loopback & maintenance (ETSI)	Release the loopback.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)
	Alarm/condition is cleared.	OOS-MA,LPBK & MT (ANSI) Locked-enabled,loopback & maintenance (ETSI)
OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)	Alarm/condition is cleared.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
	Put the port in the IS (ANSI) or Unlocked-enabled (ETSI) administrative state.	OOS-AU,FLT (ANSI) Unlocked-disabled,failed (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS & FLT (ANSI) Unlocked-disabled,automaticInService & failed (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in a loopback.	OOS-AUMA,FLT & LPBK & MT (ANSI) Locked-disabled,failed & loopback & maintenance (ETSI)

Table B-10 **ONS 15454 Transponder/Muxponder Port Service State Transitions (continued)**

Current Service State	Action	Next Service State
OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)	Put the port in the IS (ANSI) or Unlocked (ETSI) administrative state.	IS-NR ¹ (ANSI) Unlocked-enabled (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Put the port in the OOS,MT (ANSI) or Locked,maintenance (ETSI) administrative state.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)
OOS-MA,LPBK & MT (ANSI) Locked-enabled,loopback & maintenance (ETSI)	Release the loopback.	OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)

Table B-10 ONS 15454 Transponder/Muxponder Port Service State Transitions (continued)

Current Service State	Action	Next Service State
OOS-MA,MT (ANSI) Locked-enabled,maintenance (ETSI)	Put the port in the IS (ANSI) or Unlocked (ETSI) administrative state.	IS-NR ¹ Unlocked-enabled (ETSI)
	Put the port in the IS,AINS (ANSI) or Unlocked,automaticInService (ETSI) administrative state.	OOS-AU,AINS (ANSI) Unlocked-disabled,automaticInService (ETSI)
	Put the port in the OOS,DSBLD (ANSI) or Locked,disabled (ETSI) administrative state.	OOS-MA,DSBLD (ANSI) Locked-enabled,disabled (ETSI)
	Put the port in loopback.	OOS-MA,LPBK & MT ^{2 3} (ANSI) Locked-enabled,loopback & maintenance (ETSI)
	Alarm/condition is raised.	OOS-AUMA,FLT & MT (ANSI) Locked-disabled,failed & maintenance (ETSI)

1. The transponder and muxponder cards have both client and trunk ports. To bring up service, it is not necessary for both the client side and trunk side to be in the IS-NR (ANSI)/Unlocked-enabled (ETSI) service state.
2. In a client-side facility loopback, the client port is in the OOS-MA,LPBK & MT (ANSI)/Locked-enabled,loopback and maintenance (ETSI) service state and the remaining client and trunk ports can be in any other service state. In a client-side terminal loopback on transponder cards, the client port is in the OOS-MA,LPBK & MT service state and the trunk ports are in IS-NR (ANSI)/Unlocked-enabled (ETSI). For client-side terminal loopbacks on muxponder cards, the client port is in the OOS-MA,LPBK & MT service state and the remaining client and trunk ports can be in any service state.
3. In a trunk-side facility loopback, the trunk port is in the OOS-MA,LPBK & MT (ANSI)/Locked-enabled,loopback and maintenance (ETSI) service state and the remaining client and trunk ports can be in any other service state. In a trunk-side terminal loopback, the trunk port is in the OOS-MA,LPBK & MT (ANSI)/Locked-enabled,loopback and maintenance (ETSI) service state and the client ports are in IS-NR (ANSI)/Unlocked-enabled (ETSI) for complete loopback functionality. This type of loopback affects all client ports because it is performed on the aggregate signal.



Network Element Defaults



Note

The terms "Unidirectional Path Switched Ring" and "UPSR" may appear in Cisco literature. These terms do not refer to using Cisco ONS 15xxx products in a unidirectional path switched ring configuration. Rather, these terms, as well as "Path Protected Mesh Network" and "PPMN," refer generally to Cisco's path protection feature, which may be used in any topological network configuration. Cisco does not recommend using its path protection feature in any particular topological network configuration.

This appendix describes the factory-configured (default) network element (NE) settings for the Cisco ONS 15327. It includes descriptions of card, node, and Cisco Transport Controller (CTC) default settings. To import, export, or edit the settings, see the "Maintain the Node" chapter in the *Cisco ONS 15454 DWDM Procedure Guide*. Cards supported by this platform that are not listed in this appendix are not supported by user-configurable NE defaults settings.



Note

Unless otherwise specified, in this appendix "ONS 15454" refers to both ANSI (ONS 15454 SONET) and ETSI (ONS 15454 SDH) shelf assemblies.

C.1 Network Element Defaults Description

The NE defaults are preinstalled on each Cisco ONS 15327 TCC2 and TCC2P card. They also ship as a file called 15454-defaults.txt (ANSI shelves) or 15454SDH-defaults.txt (ETSI shelves) on the CTC software CD in case you want to import the defaults onto existing TCC2/TCC2P cards. The NE defaults include card-level, CTC, and node-level defaults.

Manual card provisioning overrides default settings. Manual changes are those made using the "Provision Transponder and Muxponder Cards" chapter or the "Change DWDM Card Settings" chapter in the *Cisco ONS 15454 DWDM Procedure Guide*. If you use the CTC Defaults editor (in the node view Provisioning > Defaults tabs) or import a new defaults file, any changes to card or port settings that result only affect cards that are installed or preprovisioned after the defaults have changed.

Changes made manually to most node-level default settings override the current settings, whether default or provisioned. If you change node-level default settings, either by using the Defaults editor or by importing a new defaults file, the new defaults reprovision the node immediately for all settings except those relating to protection (1+1 bidirectional switching, 1+1 reversion time, 1+1 revertive, Bidirectional Line Switched Ring [BLSR] or multiplex section-shared protection ring [MS-SPRing] reversion time, BLSR/MS-SPRing ring revertive, BLSR/MS-SPRing span reversion time, BLSR/MS-SPRing span revertive, y cable revertive or reversion time, splitter revertive or reversion time), which apply to subsequent provisioning.

**Note**

Changing some node-level provisioning via NE defaults can cause CTC disconnection or a reboot of the node in order for the provisioning to take effect. Before you change a default, check in the Side Effects column of the Defaults editor (right-click a column header and select **Show Column > Side Effects**) and be prepared for the occurrence of any side effects listed for that default.

C.2 ANSI Platform Defaults

The following sections give the NE defaults for the ONS 15454 ANSI platform. To see defaults for the ONS 15454 ETSI platform, see the [“C.4 ETSI Platform Defaults”](#) section on page C-76.

C.2.1 ANSI Card Defaults

The tables in this section list the default settings for each DWDM, Transponder (TXP), Muxponder (MXP), or Ethernet card. Cisco provides several types of user-configurable defaults for Cisco ONS 15454 DWDM, TXP, MXP, and Ethernet cards. Types of card defaults can be broadly grouped by function, as outlined in the following subsections. For information about individual card settings, refer to the “Provision Transponder and Muxponder Cards” chapter or the “Change DWDM Card Settings” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

**Note**

The tables in this section list the default settings for each DWDM, TXP, and MXP card. For all other cards, including electrical, optical, Ethernet, and Fibre Channel, refer to the *Cisco ONS 15454 Reference Manual* or the *Cisco ONS 15454 SDH Reference Manual*.

**Note**

When the card level defaults are changed, the new provisioning done after the defaults have changed is affected. Existing provisioning remains unaffected.

The following types of defaults are defined for DWDM, TXP, MXP, and Ethernet cards.

C.2.1.1 ANSI Configuration Defaults

Most card and port-level configuration defaults correspond to settings found in the CTC card-level Provisioning tabs.

**Note**

The full set of Automatic Laser Shutdown (ALS) configuration defaults can be found in the CTC card-level Maintenance > ALS tab for supported cards. ALS defaults are supported for OSCM, OSC-CSM, OPT-BST, OPT-BST-L, TXP, and MXP cards. For information on how ALS card settings achieve network level optical safety consult the “Network Optical Safety—Automatic Laser Shutdown” section in [Chapter 2, “Card Reference.”](#)

Configuration defaults that are reachable from the CTC card-level Provisioning tabs (except as noted) include the following types of options (arranged by CTC subtab):

- Line—(TXP and MXP cards) Line-level configuration settings, including SONET, Wavelength Trunk, Trunk, Client, Distance Extension, and Enhanced FC/FICON ISL settings.



Note Some line configuration tabs, including Client, Distance Extension, and Enhanced FC/FICON ISL settings tabs, only appear in the card-level Provisioning > Line tab after a pluggable port module (PPM) is provisioned to a fibre channel payload type (port rate) for the particular card.

- OTN—(MXP-2.5G-10E, MXP-2_5G-10G, MXP-MR-10DME, TXP-MR-10E, TXP-MR-10G, TXP-MR-2.5G, and TXPP-MR-2.5G cards) Optical transport network (OTN) line configuration settings.
- Card—(See listed settings for applicable cards)
 - Card mode (ESCON, FC_GE, or MIXED)—MXPP-MR-2.5G and MXP-MR-2.5G cards
 - Port range-level mode settings—MXP-MR-10DME cards only
 - Termination mode—TXP-MR-10E, MXP-2.5G-10E, MXP-2.5G-10G, TXPP_MR_2.5G, TXP_MR_10G, and TXP_MR_2.5G cards
 - AIS squelch settings—TXP-MR-10E and MXP-2.5G-10E cards
- ALS (card-level Maintenance > ALS tab)—(OSC-CSM, OSCM, OPT-BST, OPT-BST-L, TXP, and MXP cards) ALS configuration defaults.



Note

For further information about supported features on each card, see [Chapter 2, “Card Reference.”](#)

C.2.1.2 ANSI Threshold Defaults

Threshold default settings define the default cumulative values (thresholds) beyond which a threshold crossing alert (TCA) will be raised, making it possible to monitor the network and detect errors early.

Card threshold default settings are provided as follows:

- PM thresholds—(OSCM, OSC-CSM, TXP and MXP cards) Expressed in counts or seconds; includes line and SONET thresholds.
- Optical thresholds—(TXP and MXP cards) Expressed in percentages or dBm; includes client and trunk optical thresholds.
- OTN FEC thresholds (TXP and MXP cards)—Expressed in counts; includes enhanced, standard, 1G Ethernet, 1G Fibre channel, 1G FICON, OC-3, OC-12, OC-48, 2G FICON, and 2G Fibre channel thresholds.
- OTN G.709 thresholds (TXP and MXP cards)—Expressed in counts or seconds; includes ITU-T G.709 PM and SM thresholds.

Threshold defaults are defined for near end and/or far end, at 15-minute and one-day intervals. Thresholds are further broken down by type, such as Multiplex Section, Regeneration Section, VC LO, MS, RS, or Path, for performance monitoring (PM) thresholds, and TCA (warning) or Alarm for physical thresholds. PM threshold types define the layer to which the threshold applies. Physical threshold types define the level of response expected when the threshold is crossed.



Note

For full descriptions of the thresholds you can set for each card, see [Chapter 10, “Performance Monitoring.”](#)

**Note**

When LOS, LOS-P, or LOF alarms occur on TXP and MXP trunks, ITU-T G.709/SONET/SDH TCAs are suppressed. For details, see [Chapter 9, “Alarm and TCA Monitoring and Management.”](#)

**Note**

For additional information regarding PM parameter threshold defaults as defined by Telcordia specifications, refer to Telcordia GR-820-CORE and GR-253-CORE.

C.2.1.3 ANSI Defaults by Card

In the tables that follow, card defaults are defined by the default name, its factory-configured value, and the domain of allowable values that you can assign to it.

**Note**

Some default values, such as certain thresholds, are interdependent. Before changing a value, review the domain for that default and any other related defaults for potential dependencies.

C.2.1.3.1 ANSI MXP_2.5G_10E Card Default Settings

[Table C-1](#) lists the MXP_2.5G_10E card default settings.

Table C-1 ANSI MXP_2.5G_10E Card Default Settings

Default Name	Default Value	Default Domain
MXP-2_5G-10E.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-2_5G-10E.config.client.AisSquelchMode	Squelch	Ais, Squelch
MXP-2_5G-10E.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-2_5G-10E.config.client.AlsRecoveryPulseDuration	2.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-2_5G-10E.config.client.AlsRecoveryPulseInterval	100 (seconds)	100 - 2000
MXP-2_5G-10E.config.client.ppmPortAssignment	OC48_PORT	UNASSIGNED, OC48_PORT
MXP-2_5G-10E.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXP-2_5G-10E.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-2_5G-10E.config.client.SendDoNotUse	FALSE	TRUE, FALSE
MXP-2_5G-10E.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXP-2_5G-10E.config.client.SyncMsgIn	TRUE	FALSE, TRUE
MXP-2_5G-10E.config.client.TerminationMode	Transparent	Transparent, Section

Table C-1 ANSI MXP_2.5G_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10E.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-2_5G-10E.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-2_5G-10E.config.trunk.AlsRecoveryPulseDuration	100.0 (seconds)	60.0, 60.1, 60.2 .. 200.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-2_5G-10E.config.trunk.AlsRecoveryPulseInterval	300 (seconds)	200 - 2000
MXP-2_5G-10E.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	-21.0, -20.9, -20.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	-12.0, -11.9, -11.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. 0.0
MXP-2_5G-10E.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. -1.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	-16.0, -15.9, -15.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -3.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. 3.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	-16.0, -15.9, -15.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -3.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. 3.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	-20.0, -19.9, -19.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.HighTxPower	7.0 (dBm)	3.0, 3.1, 3.2 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.LowRxPower	-20.0 (dBm)	-40.0, -39.9, -39.8 .. -8.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.LowTxPower	3.0 (dBm)	-40.0, -39.9, -39.8 .. 7.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.HighTxPower	9.0 (dBm)	0.0, 0.1, 0.2 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -9.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. 9.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-1 ANSI MXP_2.5G_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.HighTxPower	9.0 (dBm)	0.0, 0.1, 0.2 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -9.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. 9.0
MXP-2_5G-10E.otn.fec thresholds.enhanced.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-2_5G-10E.otn.fec thresholds.enhanced.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-2_5G-10E.otn.fec thresholds.enhanced.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-2_5G-10E.otn.fec thresholds.enhanced.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-2_5G-10E.otn.fec thresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-2_5G-10E.otn.fec thresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-2_5G-10E.otn.fec thresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-2_5G-10E.otn.fec thresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400

Table C-1 ANSI MXP_2.5G_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.otnLines.AsynchSynchMapping	ODU Multiplex	ODU Multiplex
MXP-2_5G-10E.otn.otnLines.FEC	Standard	Disable, Standard, Enhanced
MXP-2_5G-10E.otn.otnLines.G709OTN	Enable	Enable
MXP-2_5G-10E.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-2_5G-10E.pmthresholds.client.line.farend.15min.CV	21260 (B2 count)	0 - 2212200
MXP-2_5G-10E.pmthresholds.client.line.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.line.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.pmthresholds.client.line.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.line.farend.15min.UAS	3 (seconds)	0 - 900

Table C-1 ANSI MXP_2.5G_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10E.pmthresholds.client.line.farend.1day.CV	212600 (B2 count)	0 - 212371200
MXP-2_5G-10E.pmthresholds.client.line.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.line.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.pmthresholds.client.line.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.line.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.line.nearend.15min.CV	21260 (B2 count)	0 - 2212200
MXP-2_5G-10E.pmthresholds.client.line.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.line.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.pmthresholds.client.line.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.line.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.line.nearend.1day.CV	212600 (B2 count)	0 - 212371200
MXP-2_5G-10E.pmthresholds.client.line.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.line.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.pmthresholds.client.line.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.line.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.section.nearend.15min.CV	10000 (B1 count)	0 - 2151900
MXP-2_5G-10E.pmthresholds.client.section.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.section.nearend.15min.SEFS	500 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.section.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.section.nearend.1day.CV	100000 (B1 count)	0 - 206582400
MXP-2_5G-10E.pmthresholds.client.section.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.2 ANSI MXP_2.5G_10G Card Default Settings

Table C-2 lists the MXP_2.5G_10G card default settings.

Table C-2 ANSI MXP_2.5G_10G Card Default Settings

Default Name	Default Value	Default Domain
MXP-2_5G-10G.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-2_5G-10G.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-2_5G-10G.config.client.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-2_5G-10G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXP-2_5G-10G.config.client.ppmPortAssignment	OC48_PORT	UNASSIGNED, OC48_PORT
MXP-2_5G-10G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXP-2_5G-10G.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-2_5G-10G.config.client.SendDoNotUse	FALSE	TRUE, FALSE
MXP-2_5G-10G.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXP-2_5G-10G.config.client.SyncMsgIn	TRUE	FALSE, TRUE
MXP-2_5G-10G.config.client.TerminationMode	Transparent	Transparent, Line
MXP-2_5G-10G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-2_5G-10G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-2_5G-10G.config.trunk.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-2_5G-10G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXP-2_5G-10G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower

Table C-2 ANSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.opticalthresholds.trunk.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.alarm.HighTxPower	4.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.alarm.LowRxPower	-24.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.trunk.alarm.LowTxPower	2.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.LowRxPower	-22.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.LowTxPower	-1.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0

Table C-2 ANSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.LowRxPower	-22.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.LowTxPower	-1.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.otn.fecthresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-2_5G-10G.otn.fecthresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-2_5G-10G.otn.fecthresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-2_5G-10G.otn.fecthresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600

Table C-2 ANSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.otnLines.FEC	Standard	Disable, Standard, Enhanced when G709OTN Enable; Disable when G709OTN Disable
MXP-2_5G-10G.otn.otnLines.G709OTN	Enable	Disable, Enable
MXP-2_5G-10G.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-2_5G-10G.pmtthresholds.client.line.farend.15min.CV	21260 (B2 count)	0 - 2212200

Table C-2 ANSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.pmthresholds.client.line.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.line.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.pmthresholds.client.line.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.line.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.line.farend.1day.CV	212600 (B2 count)	0 - 212371200
MXP-2_5G-10G.pmthresholds.client.line.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.line.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.pmthresholds.client.line.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.line.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.line.nearend.15min.CV	21260 (B2 count)	0 - 2212200
MXP-2_5G-10G.pmthresholds.client.line.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.line.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.pmthresholds.client.line.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.line.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.line.nearend.1day.CV	212600 (B2 count)	0 - 212371200
MXP-2_5G-10G.pmthresholds.client.line.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.line.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.pmthresholds.client.line.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.line.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.section.nearend.15min.CV	10000 (B1 count)	0 - 2151900
MXP-2_5G-10G.pmthresholds.client.section.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.section.nearend.15min.SEFS	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.section.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.section.nearend.1day.CV	100000 (B1 count)	0 - 206582400
MXP-2_5G-10G.pmthresholds.client.section.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.section.nearend.1day.SES	5000 (seconds)	0 - 86400

Table C-2 ANSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.pmthresholds.trunk.line.farend.15min.CV	85040 (B2 count)	0 - 8850600
MXP-2_5G-10G.pmthresholds.trunk.line.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.line.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.pmthresholds.trunk.line.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.line.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.line.farend.1day.CV	850400 (B2 count)	0 - 849657600
MXP-2_5G-10G.pmthresholds.trunk.line.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.line.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.pmthresholds.trunk.line.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.line.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.15min.CV	85040 (B2 count)	0 - 8850600
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.1day.CV	850400 (B2 count)	0 - 849657600
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.line.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.section.nearend.15min.CV	10000 (B1 count)	0 - 7967700
MXP-2_5G-10G.pmthresholds.trunk.section.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.section.nearend.15min.SEFS	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.section.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.section.nearend.1day.CV	100000 (B1 count)	0 - 764899200
MXP-2_5G-10G.pmthresholds.trunk.section.nearend.1day.ES	5000 (seconds)	0 - 86400

Table C-2 ANSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.pmthresholds.trunk.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.3 ANSI MXP_MR_2.5G Card Default Settings

Table C-3 lists the MXP_MR_2.5G card default settings.

Table C-3 ANSI MXP_MR_2.5G Card Default Settings

Default Name	Default Value	Default Domain
MXP-MR-2_5G.config.card.Mode	FC_GE	FC_GE, MIXED, ESCON
MXP-MR-2_5G.config.client.AlsMode	Disabled	Disabled, Manual Restart, Manual Restart for Test
MXP-MR-2_5G.config.client.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-MR-2_5G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXP-MR-2_5G.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, ONE_GE, FC1G ISL, FC2G ISL, FICON1G ISL, FICON2G ISL when //card.Mode FC_GE; UNASSIGNED, ONE_GE, ESCON_PORT, FC1G ISL, FICON1G ISL when //card.Mode MIXED; UNASSIGNED, ESCON_PORT when //card.Mode ESCON
MXP-MR-2_5G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXP-MR-2_5G.config.fc.distanceExtension.AutoadjustGFPBufferThreshold	TRUE	TRUE, FALSE
MXP-MR-2_5G.config.fc.distanceExtension.AutoDetect	TRUE	TRUE, FALSE
MXP-MR-2_5G.config.fc.distanceExtension.Enabled	TRUE	TRUE, FALSE
MXP-MR-2_5G.config.fc.distanceExtension.NumCredits	32	2 - 256
MXP-MR-2_5G.config.fc.distanceExtension.NumGFPBuffers	16	16, 32, 48 .. 1200
MXP-MR-2_5G.config.fc.enhancedFibreChannelFicon.MaxFrameSize	2148	2148, 2152, 2156, 2160, 2164, 2168, 2172

Table C-3 ANSI MXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-2_5G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-MR-2_5G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-MR-2_5G.config.trunk.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-MR-2_5G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXP-MR-2_5G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-MR-2_5G.config.trunk.SendDoNotUse	FALSE	TRUE, FALSE
MXP-MR-2_5G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXP-MR-2_5G.config.trunk.SyncMsgIn	TRUE	FALSE, TRUE
MXP-MR-2_5G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-3 ANSI MXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-2_5G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.trunk.alarm.HighRxPower	-7.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.alarm.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.alarm.LowRxPower	-26.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.trunk.alarm.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower

Table C-3 ANSI MXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-2_5G.pmthresholds.trunk.line.farend.15min.CV	21260 (B2 count)	0 - 2212200
MXP-MR-2_5G.pmthresholds.trunk.line.farend.15min.ES	87 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.line.farend.15min.FC	10 (count)	0 - 72
MXP-MR-2_5G.pmthresholds.trunk.line.farend.15min.SES	1 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.line.farend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.line.farend.1day.CV	212600 (B2 count)	0 - 212371200
MXP-MR-2_5G.pmthresholds.trunk.line.farend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.line.farend.1day.FC	40 (count)	0 - 6912
MXP-MR-2_5G.pmthresholds.trunk.line.farend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.line.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.CV	21260 (B2 count)	0 - 2212200
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.ES	87 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.FC	10 (count)	0 - 72
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.SES	1 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.CV	212600 (B2 count)	0 - 212371200
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.FC	40 (count)	0 - 6912
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.section.nearend.15min.CV	10000 (B1 count)	0 - 2151900
MXP-MR-2_5G.pmthresholds.trunk.section.nearend.15min.ES	500 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.section.nearend.15min.SEFS	500 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.section.nearend.15min.SES	500 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.section.nearend.1day.CV	100000 (B1 count)	0 - 206582400
MXP-MR-2_5G.pmthresholds.trunk.section.nearend.1day.ES	5000 (seconds)	0 - 86400

Table C-3 ANSI MXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.p thresholds.trunk.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
MXPP-MR-2_5G.p thresholds.trunk.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.4 ANSI MXPP_MR_2.5G Card Default Settings

Table C-4 lists the MXPP_MR_2.5G card default settings.

Table C-4 ANSI MXPP_MR_2.5G Card Default Settings

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.config.card.Mode	FC_GE	FC_GE, MIXED, ESCON
MXPP-MR-2_5G.config.client.AlsMode	Disabled	Disabled, Manual Restart, Manual Restart for Test
MXPP-MR-2_5G.config.client.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXPP-MR-2_5G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXPP-MR-2_5G.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, ONE_GE, FC1G ISL, FC2G ISL, FICON1G ISL, FICON2G ISL when //card.Mode FC_GE; UNASSIGNED, ONE_GE, ESCON_PORT, FC1G ISL, FICON1G ISL when //card.Mode MIXED; UNASSIGNED, ESCON_PORT when //card.Mode ESCON
MXPP-MR-2_5G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXPP-MR-2_5G.config.fc.distanceExtension.AutoadjustGFPBufferThreshold	TRUE	TRUE, FALSE
MXPP-MR-2_5G.config.fc.distanceExtension.AutoDetect	TRUE	TRUE, FALSE
MXPP-MR-2_5G.config.fc.distanceExtension.Enabled	TRUE	TRUE, FALSE
MXPP-MR-2_5G.config.fc.distanceExtension.NumCredits	32	2 - 256
MXPP-MR-2_5G.config.fc.distanceExtension.NumGFPBuffers	16	16, 32, 48 .. 1200

Table C-4 ANSI MXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.config.fc.enhancedFibreChannelFicon.MaxFrameSize	2148	2148, 2152, 2156, 2160, 2164, 2168, 2172
MXPP-MR-2_5G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXPP-MR-2_5G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXPP-MR-2_5G.config.trunk.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXPP-MR-2_5G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXPP-MR-2_5G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXPP-MR-2_5G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXPP-MR-2_5G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-4 ANSI MXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighRxPower	-7.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.LowRxPower	-26.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower

Table C-4 ANSI MXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.15min.CV	21260 (B2 count)	0 - 2212200
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.15min.ES	87 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.15min.FC	10 (count)	0 - 72
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.15min.SES	1 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.15min.UAS	3 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.1day.CV	212600 (B2 count)	0 - 212371200
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.1day.ES	864 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.1day.FC	40 (count)	0 - 6912
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.1day.SES	4 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.line.farend.1day.UAS	10 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.CV	21260 (B2 count)	0 - 2212200
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.ES	87 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.FC	10 (count)	0 - 72
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.SES	1 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.15min.UAS	3 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.CV	212600 (B2 count)	0 - 212371200
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.ES	864 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.FC	40 (count)	0 - 6912
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.SES	4 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.line.nearend.1day.UAS	10 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.section.nearend.15min.CV	10000 (B1 count)	0 - 2151900
MXPP-MR-2_5G.pmthresholds.trunk.section.nearend.15min.ES	500 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.section.nearend.15min.SEFS	500 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.section.nearend.15min.SES	500 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.section.nearend.1day.CV	100000 (B1 count)	0 - 206582400
MXPP-MR-2_5G.pmthresholds.trunk.section.nearend.1day.ES	5000 (seconds)	0 - 86400

Table C-4 ANSI MXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.pmthresholds.trunk.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.5 ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings

Table C-5 lists the MXP_MR_10DME_C and MXP_MR_10DME_L card default settings.

Table C-5 ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings

Default Name	Default Value	Default Domain
MXP-MR-10DME.config.card.Mode	Port 1-8: FC_GE_ISC	Port 1-8: FC_GE_ISC, Port 1-4: FC_GE_ISC, Port 5-8: FC4G, Port 1-4: FC4G, Port 5-8: FC_GE_ISC, Port 1-8: FC4G
MXP-MR-10DME.config.client.AlsMode	Disabled	Disabled, Manual Restart, Manual Restart for Test
MXP-MR-10DME.config.client.AlsRecoveryPulseDuration	2.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-MR-10DME.config.client.AlsRecoveryPulseInterval	100 (seconds)	100 - 2000

Table C-5 ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, ONE_GE_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC3 PEER 1G, ISC3 PEER 2G when //card.Mode Port 1-8: FC_GE_ISC; UNASSIGNED, FC4G_PORT when //card.Mode Port 1-8: FC4G; UNASSIGNED, ONE_GE_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, FC4G_PORT, ISC3 PEER 1G, ISC3 PEER 2G when //card.Mode Port 1-4: FC_GE_ISC, Port 5-8: FC4G, Port 1-4: FC4G, Port 5-8: FC_GE_ISC
MXP-MR-10DME.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXP-MR-10DME.config.fc.distanceExtension.Enabled	TRUE	TRUE, FALSE
MXP-MR-10DME.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-MR-10DME.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-MR-10DME.config.trunk.AlsRecoveryPulseDuration	100.0 (seconds)	60.0, 60.1, 60.2 .. 200.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-MR-10DME.config.trunk.AlsRecoveryPulseInterval	300 (seconds)	200 - 2000
MXP-MR-10DME.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-MR-10DME.config.trunk.SendDoNotUse	FALSE	FALSE, TRUE
MXP-MR-10DME.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXP-MR-10DME.config.trunk.SyncMsgIn	TRUE	FALSE, TRUE
MXP-MR-10DME.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-5 ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.opticalthresholds.client.alarm.HighRxPower	3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.alarm.HighTxPower	-2.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.alarm.LowRxPower	-20.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.client.warning.15min.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.warning.15min.LowRxPower	-17.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.client.warning.1day.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.warning.1day.LowRxPower	-17.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.alarm.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.alarm.LowRxPower	-20.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.trunk.alarm.LowTxPower	3.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower

Table C-5 ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.HighTxPower	9.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.HighTxPower	9.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.otn.fecthresholds.enhanced.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-MR-10DME.otn.fecthresholds.enhanced.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-MR-10DME.otn.fecthresholds.enhanced.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-MR-10DME.otn.fecthresholds.enhanced.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-MR-10DME.otn.fecthresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-MR-10DME.otn.fecthresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-MR-10DME.otn.fecthresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-MR-10DME.otn.fecthresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900

Table C-5 ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600

Table C-5 ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.otnLines.AsynchSynchMapping	Synch Mapping	Synch Mapping
MXP-MR-10DME.otn.otnLines.FEC	Standard	Disable, Standard, Enhanced when G709OTN Enable; Disable when G709OTN Disable
MXP-MR-10DME.otn.otnLines.G709OTN	Enable	Disable, Enable
MXP-MR-10DME.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-MR-10DME.pmthresholds.trunk.line.farend.15min.CV	85040 (B2 count)	0 - 2212200
MXP-MR-10DME.pmthresholds.trunk.line.farend.15min.ES	87 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.line.farend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.pmthresholds.trunk.line.farend.15min.SES	1 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.line.farend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.line.farend.1day.CV	850400 (B2 count)	0 - 212371200
MXP-MR-10DME.pmthresholds.trunk.line.farend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.line.farend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.pmthresholds.trunk.line.farend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.line.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.line.nearend.15min.CV	85040 (B2 count)	0 - 2212200
MXP-MR-10DME.pmthresholds.trunk.line.nearend.15min.ES	87 (seconds)	0 - 900

Table C-5 ANSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.pmthresholds.trunk.line.nearend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.pmthresholds.trunk.line.nearend.15min.SES	1 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.line.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.line.nearend.1day.CV	850400 (B2 count)	0 - 212371200
MXP-MR-10DME.pmthresholds.trunk.line.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.line.nearend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.pmthresholds.trunk.line.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.line.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.section.nearend.15min.CV	10000 (B1 count)	0 - 2151900
MXP-MR-10DME.pmthresholds.trunk.section.nearend.15min.ES	500 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.section.nearend.15min.SEFS	500 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.section.nearend.15min.SES	500 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.section.nearend.1day.CV	100000 (B1 count)	0 - 206582400
MXP-MR-10DME.pmthresholds.trunk.section.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.6 ANSI TXP_MR_10E Card Default Settings

Table C-6 lists the TXP_MR_10E card default settings.

Table C-6 ANSI TXP_MR_10E Card Default Settings

Default Name	Default Value	Default Domain
TXP-MR-10E.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-10E.config.client.AisSquelchMode	Squelch	Ais, Squelch
TXP-MR-10E.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test

Table C-6 ANSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.config.client.AlsRecoveryPulseDuration	2.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-10E.config.client.AlsRecoveryPulseInterval	100 (seconds)	100 - 2000
TXP-MR-10E.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, SONET (including 10G Ethernet WAN Phy), 10G Ethernet LAN Phy, 10G Fiber Channel
TXP-MR-10E.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
TXP-MR-10E.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10E.config.client.SendDoNotUse	FALSE	TRUE, FALSE
TXP-MR-10E.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-10E.config.client.SyncMsgIn	TRUE	FALSE, TRUE
TXP-MR-10E.config.client.TerminationMode	Transparent	Transparent, Line when ppmPortAssignment UNASSIGNED, SONET (including 10G Ethernet WAN Phy); Transparent when ppmPortAssignment 10G Ethernet LAN Phy, 10G Fiber Channel
TXP-MR-10E.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-10E.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-10E.config.trunk.AlsRecoveryPulseDuration	100.0 (seconds)	6.0, 6.1, 6.2 .. 200.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-10E.config.trunk.AlsRecoveryPulseInterval	300 (seconds)	200 - 2000
TXP-MR-10E.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10E.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-10E.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.client.alarm.HighRxPower	1.0 (dBm)	-13.0, -12.9, -12.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.alarm.HighTxPower	1.0 (dBm)	-8.0, -7.9, -7.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.alarm.LowRxPower	-13.0 (dBm)	-40.0, -39.9, -39.8 .. 1.0

Table C-6 ANSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.opticalthresholds.client.alarm.LowTxPower	-8.0 (dBm)	-40.0, -39.9, -39.8 .. 1.0
TXP-MR-10E.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.client.warning.15min.HighRxPower	-1.0 (dBm)	-11.0, -10.9, -10.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.warning.15min.HighTxPower	5.0 (dBm)	-12.0, -11.9, -11.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.warning.15min.LowRxPower	-11.0 (dBm)	-40.0, -39.9, -39.8 .. -1.0
TXP-MR-10E.opticalthresholds.client.warning.15min.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. 5.0
TXP-MR-10E.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.client.warning.1day.HighRxPower	-1.0 (dBm)	-11.0, -10.9, -10.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.warning.1day.HighTxPower	5.0 (dBm)	-12.0, -11.9, -11.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.warning.1day.LowRxPower	-11.0 (dBm)	-40.0, -39.9, -39.8 .. -1.0
TXP-MR-10E.opticalthresholds.client.warning.1day.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. 5.0
TXP-MR-10E.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	-20.0, -19.9, -19.8 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.alarm.HighTxPower	7.0 (dBm)	3.0, 3.1, 3.2 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.alarm.LowRxPower	-20.0 (dBm)	-40.0, -39.9, -39.8 .. -8.0
TXP-MR-10E.opticalthresholds.trunk.alarm.LowTxPower	3.0 (dBm)	-40.0, -39.9, -39.8 .. 7.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.HighTxPower	9.0 (dBm)	0.0, 0.1, 0.2 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -9.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. 9.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.HighTxPower	9.0 (dBm)	0.0, 0.1, 0.2 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -9.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. 9.0
TXP-MR-10E.otn.fec thresholds.enhanced.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
TXP-MR-10E.otn.fec thresholds.enhanced.15min.UncorrectableWords	5 (count)	0 - 4724697600
TXP-MR-10E.otn.fec thresholds.enhanced.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
TXP-MR-10E.otn.fec thresholds.enhanced.1day.UncorrectableWords	480 (count)	0 - 453570969600
TXP-MR-10E.otn.fec thresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
TXP-MR-10E.otn.fec thresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
TXP-MR-10E.otn.fec thresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
TXP-MR-10E.otn.fec thresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900

Table C-6 ANSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912

Table C-6 ANSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.otnLines.AsynchSynchMapping	Synch Mapping	Asynch mapping, Synch Mapping
TXP-MR-10E.otn.otnLines.FEC	Standard	Disable, Standard, Enhanced when G709OTN Enable; Disable when G709OTN Disable
TXP-MR-10E.otn.otnLines.G709OTN	Enable	Disable, Enable
TXP-MR-10E.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10E.pmthresholds.client.line.farend.15min.CV	85040 (B2 count)	0 - 8850600
TXP-MR-10E.pmthresholds.client.line.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.line.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.pmthresholds.client.line.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.line.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.line.farend.1day.CV	850400 (B2 count)	0 - 849657600
TXP-MR-10E.pmthresholds.client.line.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.line.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.pmthresholds.client.line.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.line.nearend.15min.CV	85040 (B2 count)	0 - 8850600
TXP-MR-10E.pmthresholds.client.line.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.line.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.pmthresholds.client.line.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.line.nearend.1day.CV	850400 (B2 count)	0 - 849657600
TXP-MR-10E.pmthresholds.client.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.line.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.pmthresholds.client.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.section.nearend.15min.CV	10000 (B1 count)	0 - 7967700
TXP-MR-10E.pmthresholds.client.section.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.section.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.section.nearend.1day.CV	100000 (B1 count)	0 - 764899200

Table C-6 ANSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.pmthresholds.client.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.section.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.line.farend.15min.CV	85040 (B2 count)	0 - 8850600
TXP-MR-10E.pmthresholds.trunk.line.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.line.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.pmthresholds.trunk.line.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.line.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.line.farend.1day.CV	850400 (B2 count)	0 - 849657600
TXP-MR-10E.pmthresholds.trunk.line.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.line.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.pmthresholds.trunk.line.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.line.nearend.15min.CV	85040 (B2 count)	0 - 8850600
TXP-MR-10E.pmthresholds.trunk.line.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.line.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.pmthresholds.trunk.line.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.line.nearend.1day.CV	850400 (B2 count)	0 - 849657600
TXP-MR-10E.pmthresholds.trunk.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.line.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.pmthresholds.trunk.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.section.nearend.15min.CV	10000 (B1 count)	0 - 7967700
TXP-MR-10E.pmthresholds.trunk.section.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.section.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.section.nearend.1day.CV	100000 (B1 count)	0 - 764899200
TXP-MR-10E.pmthresholds.trunk.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.7 ANSI TXP_MR_10G Card Default Settings

Table C-7 lists the TXP_MR_10G card default settings.

Table C-7 ANSI TXP_MR_10G Card Default Settings

Default Name	Default Value	Default Domain
TXP-MR-10G.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-10G.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-10G.config.client.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-10G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXP-MR-10G.config.client.mrPortAssignment	UNASSIGNED	UNASSIGNED, SONET (including 10G Ethernet WAN Phy), 10G Ethernet LAN Phy
TXP-MR-10G.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10G.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-10G.config.client.TerminationMode	Transparent	Transparent, Line when mrPortAssignment UNASSIGNED, SONET (including 10G Ethernet WAN Phy); Transparent when mrPortAssignment 10G Ethernet LAN Phy
TXP-MR-10G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-10G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-10G.config.trunk.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-10G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXP-MR-10G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-10G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.client.alarm.HighRxPower	1.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.alarm.HighTxPower	1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0

Table C-7 ANSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.opticalthresholds.client.alarm.LowRxPower	-13.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.client.alarm.LowTxPower	-8.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.client.warning.15min.HighRxPower	-1.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.warning.15min.HighTxPower	5.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.warning.15min.LowRxPower	-11.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.client.warning.15min.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.client.warning.1day.HighRxPower	-1.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.warning.1day.HighTxPower	5.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.warning.1day.LowRxPower	-11.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.client.warning.1day.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.trunk.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.alarm.HighTxPower	4.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.alarm.LowRxPower	-24.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.trunk.alarm.LowTxPower	2.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.trunk.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.trunk.warning.15min.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.warning.15min.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.warning.15min.LowRxPower	-22.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.trunk.warning.15min.LowTxPower	-1.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.trunk.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-7 ANSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.opticalthresholds.trunk.warning.1day.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.warning.1day.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.warning.1day.LowRxPower	-22.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.trunk.warning.1day.LowTxPower	-1.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.otn.fecthresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
TXP-MR-10G.otn.fecthresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
TXP-MR-10G.otn.fecthresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
TXP-MR-10G.otn.fecthresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900

Table C-7 ANSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.otnLines.FEC	Enable	Disable, Enable when G709OTN Enable; Disable when G709OTN Disable
TXP-MR-10G.otn.otnLines.G709OTN	Enable	Disable, Enable
TXP-MR-10G.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10G.pmthresholds.client.line.farend.15min.CV	85040 (B2 count)	0 - 8850600
TXP-MR-10G.pmthresholds.client.line.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.line.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.pmthresholds.client.line.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.line.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.line.farend.1day.CV	850400 (B2 count)	0 - 849657600
TXP-MR-10G.pmthresholds.client.line.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.line.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.pmthresholds.client.line.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.line.nearend.15min.CV	85040 (B2 count)	0 - 8850600
TXP-MR-10G.pmthresholds.client.line.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.line.nearend.15min.FC	10 (count)	0 - 72

Table C-7 ANSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.pmthresholds.client.line.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.line.nearend.1day.CV	850400 (B2 count)	0 - 849657600
TXP-MR-10G.pmthresholds.client.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.line.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.pmthresholds.client.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.section.nearend.15min.CV	10000 (B1 count)	0 - 7967700
TXP-MR-10G.pmthresholds.client.section.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.section.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.section.nearend.1day.CV	100000 (B1 count)	0 - 764899200
TXP-MR-10G.pmthresholds.client.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.section.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.line.farend.15min.CV	85040 (B2 count)	0 - 8850600
TXP-MR-10G.pmthresholds.trunk.line.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.line.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.pmthresholds.trunk.line.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.line.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.line.farend.1day.CV	850400 (B2 count)	0 - 849657600
TXP-MR-10G.pmthresholds.trunk.line.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.line.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.pmthresholds.trunk.line.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.line.nearend.15min.CV	85040 (B2 count)	0 - 8850600
TXP-MR-10G.pmthresholds.trunk.line.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.line.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.pmthresholds.trunk.line.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.line.nearend.1day.CV	850400 (B2 count)	0 - 849657600

Table C-7 ANSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.pmthresholds.trunk.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.line.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.pmthresholds.trunk.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.section.nearend.15min.CV	10000 (B1 count)	0 - 7967700
TXP-MR-10G.pmthresholds.trunk.section.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.section.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.section.nearend.1day.CV	100000 (B1 count)	0 - 764899200
TXP-MR-10G.pmthresholds.trunk.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.8 ANSI TXP_MR_2.5G Card Default Settings

Table C-8 lists the TXP_MR_2.5G card default settings.

Table C-8 ANSI TXP_MR_2.5G Card Default Settings

Default Name	Default Value	Default Domain
TXP-MR-2_5G.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-2_5G.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-2_5G.config.client.AlsRecoveryPulseDuration	40.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-2_5G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300

Table C-8 ANSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, OC3_PORT, OC12_PORT, OC48_PORT, ONE_GE_PORT, ESCON_PORT, DV6000_PORT, SDI_D1_VIDEO_PORT, HDTV_PORT, PASS_THRU_PORT, ETR_CLO_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC PEER
TXP-MR-2_5G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
TXP-MR-2_5G.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-2_5G.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-2_5G.config.client.TerminationMode	Transparent	Transparent, Section, Line when ppmPortAssignment UNASSIGNED, OC3_PORT, OC12_PORT, OC48_PORT; Transparent when ppmPortAssignment OC3_PORT, OC12_PORT, OC48_PORT, ONE_GE_PORT, ESCON_PORT, DV6000_PORT, SDI_D1_VIDEO_PORT, HDTV_PORT, PASS_THRU_PORT, ETR_CLO_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC PEER
TXP-MR-2_5G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-2_5G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-2_5G.config.trunk.AlsRecoveryPulseDuration	40.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test

Table C-8 ANSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXP-MR-2_5G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-2_5G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-2_5G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-2_5G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-2_5G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-2_5G.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.trunk.alarm.HighRxPower	-7.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.trunk.alarm.LowRxPower	-26.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower

Table C-8 ANSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.otn.fecthresholds.1gethernet.15min.BitErrorsCorrected	112500 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.1gethernet.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.1gethernet.1day.BitErrorsCorrected	10800000 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.1gethernet.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.1gfiberchannel.15min.BitErrorsCorrected	90000 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.1gfiberchannel.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.1gfiberchannel.1day.BitErrorsCorrected	8640000 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.1gfiberchannel.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.1gficon.15min.BitErrorsCorrected	90000 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.1gficon.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.1gficon.1day.BitErrorsCorrected	8640000 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.1gficon.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.2gfiberchannel.15min.BitErrorsCorrected	180900 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.2gfiberchannel.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.2gfiberchannel.1day.BitErrorsCorrected	17366400 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.2gfiberchannel.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.2gficon.15min.BitErrorsCorrected	180900 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.2gficon.15min.UncorrectableWords	1 (count)	0 - 4724697600

Table C-8 ANSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.otn.fecthresholds.2gfigon.1day.BitErrorsCorrected	17366400 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.2gfigon.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.oc12.15min.BitErrorsCorrected	56457 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.oc12.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.oc12.1day.BitErrorsCorrected	5419872 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.oc12.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.oc3.15min.BitErrorsCorrected	15012 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.oc3.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.oc3.1day.BitErrorsCorrected	1441152 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.oc3.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.oc48.15min.BitErrorsCorrected	225837 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.oc48.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.oc48.1day.BitErrorsCorrected	21680352 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.oc48.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.BBE	21260 (count)	0 - 8850600
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.BBE	212600 (count)	0 - 849657600
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.BBE	21260 (count)	0 - 8850600
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.BBE	212600 (count)	0 - 849657600
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400

Table C-8 ANSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.otnLines.FEC	Enable	Disable, Enable when G709OTN Enable; Disable when G709OTN Disable
TXP-MR-2_5G.otn.otnLines.G709OTN	Enable	Disable, Enable
TXP-MR-2_5G.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-2_5G.pmthresholds.oc12.line.farend.15min.CV	5315 (B2 count)	0 - 552600
TXP-MR-2_5G.pmthresholds.oc12.line.farend.15min.ES	87 (seconds)	0 - 900

Table C-8 ANSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.pmthresholds.oc12.line.farend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.pmthresholds.oc12.line.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc12.line.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc12.line.farend.1day.CV	53150 (B2 count)	0 - 53049600
TXP-MR-2_5G.pmthresholds.oc12.line.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc12.line.farend.1day.FC	40 (count)	0 - 72
TXP-MR-2_5G.pmthresholds.oc12.line.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc12.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.CV	5315 (B2 count)	0 - 552600
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.CV	53150 (B2 count)	0 - 53049600
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc12.section.nearend.15min.CV	10000 (B1 count)	0 - 553500
TXP-MR-2_5G.pmthresholds.oc12.section.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc12.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc12.section.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc12.section.nearend.1day.CV	100000 (B1 count)	0 - 53136000
TXP-MR-2_5G.pmthresholds.oc12.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc12.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc12.section.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.line.farend.15min.CV	1312 (B2 count)	0 - 137700
TXP-MR-2_5G.pmthresholds.oc3.line.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc3.line.farend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.pmthresholds.oc3.line.farend.15min.SES	1 (seconds)	0 - 900

Table C-8 ANSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.pmthresholds.oc3.line.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc3.line.farend.1day.CV	13120 (B2 count)	0 - 13219200
TXP-MR-2_5G.pmthresholds.oc3.line.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.line.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.pmthresholds.oc3.line.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.CV	1312 (B2 count)	0 - 137700
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.CV	13120 (B2 count)	0 - 13219200
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.section.nearend.15min.CV	10000 (B1 count)	0 - 138600
TXP-MR-2_5G.pmthresholds.oc3.section.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc3.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc3.section.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc3.section.nearend.1day.CV	100000 (B1 count)	0 - 13305600
TXP-MR-2_5G.pmthresholds.oc3.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc3.section.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.line.farend.15min.CV	21260 (B2 count)	0 - 2212200
TXP-MR-2_5G.pmthresholds.oc48.line.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc48.line.farend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.pmthresholds.oc48.line.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc48.line.farend.15min.UAS	3 (seconds)	0 - 900

Table C-8 ANSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.pmthresholds.oc48.line.farend.1day.CV	212600 (B2 count)	0 - 212371200
TXP-MR-2_5G.pmthresholds.oc48.line.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.line.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.pmthresholds.oc48.line.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.CV	21260 (B2 count)	0 - 2212200
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.CV	212600 (B2 count)	0 - 212371200
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.section.nearend.15min.CV	10000 (B1 count)	0 - 2151900
TXP-MR-2_5G.pmthresholds.oc48.section.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc48.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc48.section.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.oc48.section.nearend.1day.CV	100000 (B1 count)	0 - 206582400
TXP-MR-2_5G.pmthresholds.oc48.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.oc48.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.9 ANSI TXPP_MR_2.5G Card Default Settings

Table C-9 lists the TXPP_MR_2.5G card default settings.

Table C-9 **ANSI TXPP_MR_2.5G Card Default Settings**

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXPP-MR-2_5G.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXPP-MR-2_5G.config.client.AlsRecoveryPulseDuration	40.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXPP-MR-2_5G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXPP-MR-2_5G.config.client.ppmPortAssignment	UNASSIGN ED	UNASSIGNED, OC3_PORT, OC12_PORT, OC48_PORT, ONE_GE_PORT, ESCON_PORT, DV6000_PORT, SDI_D1_VIDEO_PORT, HDTV_PORT, PASS_THRU_PORT, ETR_CLO_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC PEER
TXPP-MR-2_5G.config.client.ppmSlotAssignment	UNASSIGN ED	UNASSIGNED, PPM (1 Port)
TXPP-MR-2_5G.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXPP-MR-2_5G.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.config.client.TerminationMode	Transparent	Transparent, Section, Line when ppmPortAssignment UNASSIGNED, OC3_PORT, OC12_PORT, OC48_PORT; Transparent when ppmPortAssignment OC3_PORT, OC12_PORT, OC48_PORT, ONE_GE_PORT, ESCON_PORT, DV6000_PORT, SDI_D1_VIDEO_PORT, HDTV_PORT, PASS_THRU_PORT, ETR_CLO_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC PEER
TXPP-MR-2_5G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXPP-MR-2_5G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXPP-MR-2_5G.config.trunk.AlsRecoveryPulseDuration	40.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXPP-MR-2_5G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXPP-MR-2_5G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXPP-MR-2_5G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXPP-MR-2_5G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighRxPower	-7.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.trunk.alarm.LowRxPower	-26.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.otn.fecthresholds.1gethernet.15min.BitErrorsCorrected	112500 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.1gethernet.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.1gethernet.1day.BitErrorsCorrected	10800000 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.1gethernet.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.1gfiberchannel.15min.BitErrorsCorrected	90000 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.1gfiberchannel.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.1gfiberchannel.1day.BitErrorsCorrected	8640000 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.1gfiberchannel.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.1gficon.15min.BitErrorsCorrected	90000 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.1gficon.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.1gficon.1day.BitErrorsCorrected	8640000 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.1gficon.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.2gfiberchannel.15min.BitErrorsCorrected	180900 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.2gfiberchannel.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.2gfiberchannel.1day.BitErrorsCorrected	17366400 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.2gfiberchannel.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.2gficon.15min.BitErrorsCorrected	180900 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.2gficon.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.2gficon.1day.BitErrorsCorrected	17366400 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.2gficon.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.oc12.15min.BitErrorsCorrected	56457 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.oc12.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.oc12.1day.BitErrorsCorrected	5419872 (count)	0 - 867227693875200

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.otn.fecthresholds.oc12.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.oc3.15min.BitErrorsCorrected	15012 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.oc3.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.oc3.1day.BitErrorsCorrected	1441152 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.oc3.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.oc48.15min.BitErrorsCorrected	225837 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.oc48.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.oc48.1day.BitErrorsCorrected	21680352 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.oc48.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.BBE	21260 (count)	0 - 8850600
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.BBE	212600 (count)	0 - 849657600
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.BBE	21260 (count)	0 - 8850600
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.BBE	212600 (count)	0 - 849657600
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.otnLines.FEC	Enable	Disable, Enable when G709OTN Enable; Disable when G709OTN Disable
TXPP-MR-2_5G.otn.otnLines.G709OTN	Enable	Disable, Enable

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.15min.CV	5315 (B2 count)	0 - 552600
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.1day.CV	53150 (B2 count)	0 - 53049600
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.1day.FC	40 (count)	0 - 72
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc12.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.CV	5315 (B2 count)	0 - 552600
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.CV	53150 (B2 count)	0 - 53049600
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc12.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc12.section.nearend.15min.CV	10000 (B1 count)	0 - 553500
TXPP-MR-2_5G.pmthresholds.oc12.section.nearend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.section.nearend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc12.section.nearend.1day.CV	100000 (B1 count)	0 - 53136000
TXPP-MR-2_5G.pmthresholds.oc12.section.nearend.1day.ES	5000 (seconds)	0 - 86400

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.pmthresholds.oc12.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc12.section.nearend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.15min.CV	1312 (B2 count)	0 - 137700
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.1day.CV	13120 (B2 count)	0 - 13219200
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.CV	1312 (B2 count)	0 - 137700
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.CV	13120 (B2 count)	0 - 13219200
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.section.nearend.15min.CV	10000 (B1 count)	0 - 138600
TXPP-MR-2_5G.pmthresholds.oc3.section.nearend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.section.nearend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc3.section.nearend.1day.CV	100000 (B1 count)	0 - 13305600

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.pmthresholds.oc3.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc3.section.nearend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.15min.CV	21260 (B2 count)	0 - 2212200
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.1day.CV	212600 (B2 count)	0 - 212371200
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.line.farend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.CV	21260 (B2 count)	0 - 2212200
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.CV	212600 (B2 count)	0 - 212371200
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.line.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.section.nearend.15min.CV	10000 (B1 count)	0 - 2151900
TXPP-MR-2_5G.pmthresholds.oc48.section.nearend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc48.section.nearend.15min.SEFS	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.oc48.section.nearend.15min.SES	500 (seconds)	0 - 900

Table C-9 ANSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.pmthresholds.oc48.section.nearend.1day.CV	100000 (B1 count)	0 - 206582400
TXPP-MR-2_5G.pmthresholds.oc48.section.nearend.1day.ES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.oc48.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.10 ANSI OSCM Card Default Settings

Table C-10 lists the OSCM card default settings.

Table C-10 ANSI OSCM Card Default Settings

Default Name	Default Value	Default Domain
OSCM.config.card.AlsMode	Auto Restart	Disabled, Auto Restart
OSCM.pmthresholds.line.farend.15min.CV	1312 (B2 count)	0 - 137700
OSCM.pmthresholds.line.farend.15min.ES	87 (seconds)	0 - 900
OSCM.pmthresholds.line.farend.15min.FC	10 (count)	0 - 72
OSCM.pmthresholds.line.farend.15min.SES	1 (seconds)	0 - 900
OSCM.pmthresholds.line.farend.15min.UAS	3 (seconds)	0 - 900
OSCM.pmthresholds.line.farend.1day.CV	13120 (B2 count)	0 - 13219200
OSCM.pmthresholds.line.farend.1day.ES	864 (seconds)	0 - 86400
OSCM.pmthresholds.line.farend.1day.FC	40 (count)	0 - 6912
OSCM.pmthresholds.line.farend.1day.SES	4 (seconds)	0 - 86400
OSCM.pmthresholds.line.farend.1day.UAS	10 (seconds)	0 - 86400
OSCM.pmthresholds.line.nearend.15min.CV	1312 (B2 count)	0 - 137700
OSCM.pmthresholds.line.nearend.15min.ES	87 (seconds)	0 - 900
OSCM.pmthresholds.line.nearend.15min.FC	10 (count)	0 - 72
OSCM.pmthresholds.line.nearend.15min.SES	1 (seconds)	0 - 900
OSCM.pmthresholds.line.nearend.15min.UAS	3 (seconds)	0 - 900
OSCM.pmthresholds.line.nearend.1day.CV	13120 (B2 count)	0 - 13219200
OSCM.pmthresholds.line.nearend.1day.ES	864 (seconds)	0 - 86400
OSCM.pmthresholds.line.nearend.1day.FC	40 (count)	0 - 6912
OSCM.pmthresholds.line.nearend.1day.SES	4 (seconds)	0 - 86400
OSCM.pmthresholds.line.nearend.1day.UAS	10 (seconds)	0 - 86400
OSCM.pmthresholds.section.nearend.15min.CV	10000 (B1 count)	0 - 138600
OSCM.pmthresholds.section.nearend.15min.ES	500 (seconds)	0 - 900

Table C-10 ANSI OSCM Card Default Settings (continued)

Default Name	Default Value	Default Domain
OSCM.pmthresholds.section.nearend.15min.SEFS	500 (seconds)	0 - 900
OSCM.pmthresholds.section.nearend.15min.SES	500 (seconds)	0 - 900
OSCM.pmthresholds.section.nearend.1day.CV	100000 (B1 count)	0 - 13305600
OSCM.pmthresholds.section.nearend.1day.ES	5000 (seconds)	0 - 86400
OSCM.pmthresholds.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
OSCM.pmthresholds.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.11 ANSI OSC-CSM Card Default Settings

Table C-11 lists the OSC-CSM card default settings.

Table C-11 ANSI OSC-CSM Card Default Settings

Default Name	Default Value	Default Domain
OSC_CSM.config.card.AlsMode	Auto Restart	Disabled, Auto Restart
OSC_CSM.pmthresholds.line.farend.15min.CV	1312 (B2 count)	0 - 137700
OSC_CSM.pmthresholds.line.farend.15min.ES	87 (seconds)	0 - 900
OSC_CSM.pmthresholds.line.farend.15min.FC	10 (count)	0 - 72
OSC_CSM.pmthresholds.line.farend.15min.SES	1 (seconds)	0 - 900
OSC_CSM.pmthresholds.line.farend.15min.UAS	3 (seconds)	0 - 900
OSC_CSM.pmthresholds.line.farend.1day.CV	13120 (B2 count)	0 - 13219200
OSC_CSM.pmthresholds.line.farend.1day.ES	864 (seconds)	0 - 86400
OSC_CSM.pmthresholds.line.farend.1day.FC	40 (count)	0 - 6912
OSC_CSM.pmthresholds.line.farend.1day.SES	4 (seconds)	0 - 86400
OSC_CSM.pmthresholds.line.farend.1day.UAS	10 (seconds)	0 - 86400
OSC_CSM.pmthresholds.line.nearend.15min.CV	1312 (B2 count)	0 - 137700
OSC_CSM.pmthresholds.line.nearend.15min.ES	87 (seconds)	0 - 900
OSC_CSM.pmthresholds.line.nearend.15min.FC	10 (count)	0 - 72
OSC_CSM.pmthresholds.line.nearend.15min.SES	1 (seconds)	0 - 900
OSC_CSM.pmthresholds.line.nearend.15min.UAS	3 (seconds)	0 - 900
OSC_CSM.pmthresholds.line.nearend.1day.CV	13120 (B2 count)	0 - 13219200
OSC_CSM.pmthresholds.line.nearend.1day.ES	864 (seconds)	0 - 86400
OSC_CSM.pmthresholds.line.nearend.1day.FC	40 (count)	0 - 6912
OSC_CSM.pmthresholds.line.nearend.1day.SES	4 (seconds)	0 - 86400
OSC_CSM.pmthresholds.line.nearend.1day.UAS	10 (seconds)	0 - 86400
OSC_CSM.pmthresholds.section.nearend.15min.CV	10000 (B1 count)	0 - 138600
OSC_CSM.pmthresholds.section.nearend.15min.ES	500 (seconds)	0 - 900
OSC_CSM.pmthresholds.section.nearend.15min.SEFS	500 (seconds)	0 - 900

Table C-11 ANSI OSC-CSM Card Default Settings (continued)

Default Name	Default Value	Default Domain
OSC_CSM.pmthresholds.section.nearend.15min.SES	500 (seconds)	0 - 900
OSC_CSM.pmthresholds.section.nearend.1day.CV	100000 (B1 count)	0 - 13305600
OSC_CSM.pmthresholds.section.nearend.1day.ES	5000 (seconds)	0 - 86400
OSC_CSM.pmthresholds.section.nearend.1day.SEFS	5000 (seconds)	0 - 86400
OSC_CSM.pmthresholds.section.nearend.1day.SES	5000 (seconds)	0 - 86400

C.2.1.3.12 ANSI Amplifier Card Default Settings

Table C-12 lists the OPT-BST and OPT-BST-L card default settings.

Table C-12 ANSI Amplifier Card Default Settings

Default Name	Default Value	Default Domain
OPT-BST.config.card.AlsMode	Auto Restart	Disabled, Auto Restart
OPT-BST-L.config.card.AlsMode	Auto Restart	Disabled, Auto Restart

C.2.2 ANSI Node Default Settings

Table C-13 on page C-62 lists the node-level default settings for the Cisco ONS 15327. Cisco provides the following types of user-configurable defaults for each Cisco ONS 15327 node:

- Circuit settings—Set the administrative state and path protection circuit defaults, and whether to have circuits send a payload defect indication condition (PDIP).
- General settings—Set general node management defaults, including whether to use Daylight Savings Time (DST), whether to insert Alarm Indication Signal VT (AIS-V) in each VT when the carrying STS crosses the signal degrade (SD) path bit error rate (BER) threshold, the IP address of the NTP/SNTP server to be used, the time zone where the node is located, the SD path BER value, the defaults description, whether to raise a condition on an empty card slot, and whether to report loopback conditions on Out-of-Service, Maintenance (OOS-MT) state ports.
- Link Management Protocol settings—Set link management protocol data link type, traffic engineering link, and general settings.
- Power Monitor settings—Set default voltage thresholds for the node.
- Network settings—Set whether to prevent display of node IP addresses in CTC (applicable for all users except Superusers); default gateway node type; whether to raise an alarm when the backplane LAN cable is disconnected; and whether to display the IP address in the LCD in an editable mode (in which you can change the IP address directly from LCD screen), to display the IP address on the LCD as read-only, or to suppress display of the IP on the LCD entirely.
- OSI settings—Set Open System Interconnection (OSI) main setup, generic routing encapsulation (GRE) tunnel, link access protocol on the D channel (LAP-D), router subnet, and TID address resolution protocol (TARP) settings.
- 1+1 and Optimized 1+1 protection settings—Set whether or not protected circuits have bidirectional switching, are revertive, and what the reversion time is; set optimized 1+1 detection, recovery, and verify guard timer values.

**Note**

Optimized 1+1 supports three timers that ensure the correct state of the cards at key points in card communication. A verification guard timer is used when a Force is issued, to ensure that the far end has a chance to respond. A detection guard timer is used to ensure the presence of an SF/SD condition before switching away from a card. A recover guard timer ensures the absence of SF/SD prior to switching to a card. You can change the default number of seconds before these timers expire by changing the NE default for the corresponding timer to a value within its domain of allowable values.

- BLSR protection settings—Set whether BLSR-protected circuits are revertive, and what the reversion time is, at both the ring and span levels.
- Y Cable protection settings—Set whether Y-cable protected circuits are revertive, and what the reversion time is.
- Splitter protection settings—Set whether splitter protected circuits are revertive, and what the reversion time is.
- Legal Disclaimer—Set the legal disclaimer that warns users at the login screen about the possible legal or contractual ramifications of accessing equipment, systems, or networks without authorization.
- Security Grant Permissions—Set default user security levels for activating/reverting software, performance monitoring data clearing, database restoring, and retrieving audit logs.
- Security DataComm settings—Set default security settings for TCC Ethernet IP address and IP netmask, and CTC backplane IP suppression; set secure mode on and secure mode locked (for TCC2P cards only).
- Security Access settings—Set default security settings for LAN access, shell access, serial craft access, element management system (EMS) access (including Internet Inter-Object Request Broker Protocol [IIOP] listener port number), TL1 access, and SNMP access.
- Security RADIUS settings—Set default RADIUS server settings for accounting port number, authentication port number, and whether to enable the node as a final authenticator.
- Security Policy settings—Set the allowable failed logins before lockout, idle user timeout for each user-level, optional lockout duration or manual unlock enabled, password reuse and change frequency policies, number of characters difference between the old and new password, password aging by security level, enforced single concurrent session per user, and option to disable inactive user after a set inactivity period.
- BITS Timing settings—Set the AIS threshold, Admin SSM, coding, facility type, framing, state, and line build-out (LBO) settings for building integrated timing supply 1 (BITS-1) and BITS2 timing.
- General Timing settings—Set the mode (External, Line, or Mixed), quality of reserved (RES) timing (set the rule that defines the order of clock quality from lowest to highest), revertive, reversion time, and SSM message set for node timing.

**Note**

Any node level defaults changed using the **Provisioning > Defaults** tab, changes existing node level provisioning. Although this is service affecting, it depends on the type of defaults changed, for example, general, and all timing and security attributes. The “Changing default values for some node level attributes overrides the current provisioning.” message is displayed. The Side Effects column of the Defaults editor (right-click a column header and select **Show Column > Side Effects**) explains the effect of changing the default values. However, when the card level defaults are changed using the **Provisioning > Defaults** tab, existing card provisioning remains unaffected.

**Note**

For more information about each individual node setting, refer to the “Manage the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

Table C-13 Node Default Settings

Default Name	Default Value	Default Domain
NODE.circuits.SendPDIP	FALSE	TRUE, FALSE
NODE.circuits.State	IS,AINS	IS, OOS,DSBLD, OOS,MT, IS,AINS
NODE.circuits.upsr.AllowUpsrOverOnePlusOne	FALSE	TRUE, FALSE
NODE.circuits.upsr.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.circuits.upsr.Revertive	FALSE	TRUE, FALSE
NODE.circuits.upsr.STS_SDBER	1.00E-06	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
NODE.circuits.upsr.STS_SFBER	1.00E-04	1E-3, 1E-4, 1E-5
NODE.circuits.upsr.SwitchOnPDIP	FALSE	TRUE, FALSE
NODE.circuits.upsr.VT_SDBER	1.00E-06	1E-5, 1E-6, 1E-7, 1E-8
NODE.circuits.upsr.VT_SFBER	1.00E-04	1E-3, 1E-4, 1E-5
NODE.general.DefaultsDescription	Factory Defaults	Free form field
NODE.general.InsertAISVOnSDP	FALSE	TRUE, FALSE
NODE.general.NtpSntpServer	0.0.0.0	IP Address
NODE.general.RaiseConditionOnEmptySlot	FALSE	TRUE, FALSE
NODE.general.ReportLoopbackConditionsOnOOS-MTPorts	FALSE	FALSE, TRUE
NODE.general.SDPBER	1.00E-06	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
NODE.general.TimeZone	(GMT-08:00) Pacific Time (US & Canada), Tijuana	[xref]
NODE.general.UseDST	TRUE	TRUE, FALSE
NODE.lmp.controlChannel.AdminState	OOS,DSBL D	IS, OOS,DSBLD

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.lmp.controlChannel.HelloDeadInterval	12000 (ms)	maximum_of(2000,MinHelloDeadInterval,product_of(HelloInterval,3)), maximum_of(2000,MinHelloDeadInterval,product_of(HelloInterval,3)) + 1, maximum_of(2000,MinHelloDeadInterval,product_of(HelloInterval,3)) + 2 .. minimum_of(2000,MaxHelloDeadInterval)
NODE.lmp.controlChannel.HelloInterval	500 (ms)	maximum_of(300,MinHelloInterval), maximum_of(300,MinHelloInterval) + 1, maximum_of(300,MinHelloInterval) + 2 .. minimum_of(500,MaxHelloInterval,quotient_of(HelloDeadInterval,3))
NODE.lmp.controlChannel.MaxHelloDeadInterval	20000 (ms)	maximum_of(2000,HelloDeadInterval,sum_of(MaxHelloInterval,1)), maximum_of(2000,HelloDeadInterval,sum_of(MaxHelloInterval,1)) + 1, maximum_of(2000,HelloDeadInterval,sum_of(MaxHelloInterval,1)) + 2 .. 20000

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.lmp.controlChannel.MaxHelloInterval	2000 (ms)	maximum_of(300,HelloInterval), maximum_of(300,HelloInterval) + 1, maximum_of(300,HelloInterval) + 2 .. minimum_of(5000,difference_of(MaxHelloDeadInterval,1))
NODE.lmp.controlChannel.MinHelloDeadInterval	2000 (ms)	maximum_of(2000,sum_of(MinHelloInterval,1)), maximum_of(2000,sum_of(MinHelloInterval,1)) + 1, maximum_of(2000,sum_of(MinHelloInterval,1)) + 2 .. minimum_of(2000,HelloDeadInterval)
NODE.lmp.controlChannel.MinHelloInterval	300 (ms)	300, 301, 302 .. minimum_of(5000,HelloInterval,difference_of(MinHelloDeadInterval,1))
NODE.lmp.dataLink.Type	Port	Port, Component
NODE.lmp.general.Allowed	TRUE	FALSE, TRUE
NODE.lmp.general.Enabled	FALSE	FALSE, TRUE when Allowed TRUE; FALSE when Allowed FALSE
NODE.lmp.general.LMP-WDM	TRUE	FALSE, TRUE
NODE.lmp.general.Role	OLS	PEER, OLS
NODE.lmp.teLink.AdminState	OOS,DSBLD	IS, OOS,DSBLD
NODE.lmp.teLink.DWDM	TRUE	FALSE, TRUE

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.Imp.teLink.MuxCapability	Lambda Switch	Packet Switch - Level 1, Packet Switch - Level 2, Packet Switch - Level 3, Packet Switch - Level 4, Layer 2 Switch, TDM Cross-connect, Lambda Switch, Fiber Switch
NODE.network.general.AlarmMissingBackplaneLAN	FALSE	TRUE, FALSE
NODE.network.general.CtcIpDisplaySuppression	FALSE	TRUE, FALSE
NODE.network.general.GatewaySettings	None	LeaveAsIs, None, ENE, GNE, ProxyOnlyNode
NODE.network.general.LcdSetting	Allow Configuration	Allow Configuration, Display Only, Suppress Display
NODE.osi.greTunnel.OspfCost	110	110 - 65535
NODE.osi.greTunnel.SubnetMask	24 (bits)	8, 9, 10 .. 32
NODE.osi.lapd.Mode	AITS	AITS, UITS
NODE.osi.lapd.MTU	512	512, 513, 514 .. 1500
NODE.osi.lapd.Role	Network	Network, User
NODE.osi.lapd.T200	200 (ms)	200, 300, 400 .. 20000
NODE.osi.lapd.T203	10000 (ms)	4000, 4100, 4200 .. 120000
NODE.osi.mainSetup.L1L2LSPBufferSize	512 (bytes)	512 - 1500
NODE.osi.mainSetup.L1LSPBufferSize	512 (bytes)	512 - 1500
NODE.osi.mainSetup.NodeRoutingMode	Intermediate System Level 1	End System, Intermediate System Level 1, Intermediate System Level 1/Level 2
NODE.osi.subnet.DISPriority	63	1, 2, 3 .. 127
NODE.osi.subnet.ESH	10 (sec)	10, 20, 30 .. 1000
NODE.osi.subnet.GCCISISCost	60	1, 2, 3 .. 63
NODE.osi.subnet.IIH	3 (sec)	1, 2, 3 .. 600

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.osi.subnet.ISH	10 (sec)	10, 20, 30 .. 1000
NODE.osi.subnet.LANISISCost	20	1, 2, 3 .. 63
NODE.osi.subnet.LDCCISISCost	40	1, 2, 3 .. 63
NODE.osi.subnet.OSCISISCost	60	1, 2, 3 .. 63
NODE.osi.subnet.SDCCISISCost	60	1, 2, 3 .. 63
NODE.osi.tarp.L1DataCache	TRUE	FALSE, TRUE
NODE.osi.tarp.L2DataCache	FALSE	FALSE, TRUE
NODE.osi.tarp.LANStormSuppression	TRUE	FALSE, TRUE
NODE.osi.tarp.LDB	TRUE	FALSE, TRUE
NODE.osi.tarp.LDBEntry	5 (min)	10-Jan
NODE.osi.tarp.LDBFlush	5 (min)	0 - 1440
NODE.osi.tarp.PDUsL1Propagation	TRUE	FALSE, TRUE
NODE.osi.tarp.PDUsL2Propagation	TRUE	FALSE, TRUE
NODE.osi.tarp.PDUsOrigination	TRUE	FALSE, TRUE
NODE.osi.tarp.T1Timer	15 (sec)	0 - 3600
NODE.osi.tarp.T2Timer	25 (sec)	0 - 3600
NODE.osi.tarp.T3Timer	40 (sec)	0 - 3600
NODE.osi.tarp.T4Timer	20 (sec)	0 - 3600
NODE.osi.tarp.Type4PDUDelay	0 (sec)	0 - 255
NODE.powerMonitor.EHIBATVG	-56.5 (Vdc)	-54.0, -54.5, -55.0, -55.5, -56.0, -56.5
NODE.powerMonitor.ELWBATVG	-40.5 (Vdc)	-40.5, -41.0, -41.5, -42.0, -42.5, -43.0, -43.5, -44.0
NODE.powerMonitor.HIBATVG	-54.0 (Vdc)	-44.0, -44.5, -45.0 .. -56.5
NODE.powerMonitor.LWBATVG	-44.0 (Vdc)	-40.5, -41.0, -41.5 .. -54.0
NODE.protection.1+1.BidirectionalSwitching	FALSE	TRUE, FALSE
NODE.protection.1+1.DetectionGuardTimer	1 (seconds)	0, 0.05, 0.1, 0.5, 1, 2, 3, 4, 5
NODE.protection.1+1.RecoveryGuardTimer	1 (seconds)	0, 0.05, 0.1 .. 10
NODE.protection.1+1.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.1+1.Revertive	FALSE	TRUE, FALSE
NODE.protection.1+1.VerifyGuardTimer	0.5 (seconds)	0.5, 1

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.protection.blsr.RingReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.blsr.RingRevertive	TRUE	TRUE, FALSE
NODE.protection.blsr.SpanReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.blsr.SpanRevertive	TRUE	TRUE, FALSE
NODE.protection.splitter.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.splitter.Revertive	FALSE	TRUE, FALSE
NODE.protection.ycable.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.ycable.Revertive	FALSE	TRUE, FALSE
NODE.security.dataComm.CtcBackplaneIpDisplaySuppression	TRUE	FALSE, TRUE when isSecureModeSupportedOnControlCard TRUE; (NOT SUPPORTED) when isSecureModeSupportedOnControlCard FALSE
NODE.security.dataComm.DefaultTCCEthernetIP	10.0.0.1	IP Address
NODE.security.dataComm.DefaultTCCEthernetIPNetmask	24 (bits)	8, 9, 10 .. 32
NODE.security.dataComm.isSecureModeSupportedOnControlCard	TRUE	FALSE, TRUE
NODE.security.dataComm.LcdBackplaneIpSetting	Display Only	Allow Configuration, Display Only, Suppress Display when isSecureModeSupportedOnControlCard TRUE; (NOT SUPPORTED) when isSecureModeSupportedOnControlCard FALSE

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.security.dataComm.SecureModeLocked	FALSE	FALSE, TRUE when isSecureModeSupportedOnControlCard TRUE; (NOT SUPPORTED) when isSecureModeSupportedOnControlCard FALSE
NODE.security.dataComm.SecureModeOn (May reboot node)	FALSE	FALSE, TRUE when isSecureModeSupportedOnControlCard TRUE; (NOT SUPPORTED) when isSecureModeSupportedOnControlCard FALSE
NODE.security.emsAccess.AccessState	NonSecure	NonSecure, Secure
NODE.security.emsAccess.IIOPListenerPort (May reboot node)	57790 (port #)	0 - 65535
NODE.security.grantPermission.ActivateRevertSoftware	Superuser	Provisioning, Superuser
NODE.security.grantPermission.PMclearingPrivilege	Provisioning	Provisioning, Superuser
NODE.security.grantPermission.RestoreDB	Superuser	Provisioning, Superuser
NODE.security.grantPermission.RetrieveAuditLog	Superuser	Provisioning, Superuser
NODE.security.idleUserTimeout.Maintenance	01:00 (hours:mins)	00:00, 00:01, 00:02 .. 16:39
NODE.security.idleUserTimeout.Provisioning	00:30 (hours:mins)	00:00, 00:01, 00:02 .. 16:39
NODE.security.idleUserTimeout.Retrieve	00:00 (hours:mins)	00:00, 00:01, 00:02 .. 16:39
NODE.security.idleUserTimeout.Superuser	00:15 (hours:mins)	00:00, 00:01, 00:02 .. 16:39

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.security.lanAccess.LANAccess (May disconnect CTC from node)	Front & Backplane	No LAN Access, Front Only, Backplane Only, Front & Backplane
NODE.security.lanAccess.RestoreTimeout	5 (minutes)	0 - 60
NODE.security.legalDisclaimer.LoginWarningMessage	<html><center>WARNING</center>This system is restricted to authorized users for business purposes. Unauthorized access is a violation of the law. This service may be monitored for administrative and security reasons. By proceeding, you consent to this monitoring.	Free form field
NODE.security.other.DisableInactiveUser	FALSE	FALSE, TRUE
NODE.security.other.InactiveDuration	45 (days)	1, 2, 3 .. 99 when DisableInactiveUser TRUE; 45 when DisableInactiveUser FALSE
NODE.security.other.SingleSessionPerUser	FALSE	TRUE, FALSE
NODE.security.passwordAging.EnforcePasswordAging	FALSE	TRUE, FALSE
NODE.security.passwordAging.maintenance.AgingPeriod	45 (days)	20 - 90
NODE.security.passwordAging.maintenance.WarningPeriod	5 (days)	20-Feb
NODE.security.passwordAging.provisioning.AgingPeriod	45 (days)	20 - 90
NODE.security.passwordAging.provisioning.WarningPeriod	5 (days)	20-Feb

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.security.passwordAging.retrieve.AgingPeriod	45 (days)	20 - 90
NODE.security.passwordAging.retrieve.WarningPeriod	5 (days)	20-Feb
NODE.security.passwordAging.superuser.AgingPeriod	45 (days)	20 - 90
NODE.security.passwordAging.superuser.WarningPeriod	5 (days)	20-Feb
NODE.security.passwordChange.CannotChangeNewPassword	FALSE	TRUE, FALSE
NODE.security.passwordChange.CannotChangeNewPasswordForNDays	20 (days)	20 - 95
NODE.security.passwordChange.NewPasswordMustDifferFromOldByNCharacters	1 (characters)	5-Jan
NODE.security.passwordChange.PreventReusingLastNPasswords	1 (times)	10-Jan
NODE.security.passwordChange.RequirePasswordChangeOnFirstLoginToNewAccount	FALSE	TRUE, FALSE
NODE.security.radiusServer.AccountingPort	1813 (port)	0 - 32767
NODE.security.radiusServer.AuthenticationPort	1812 (port)	0 - 32767
NODE.security.radiusServer.EnableNodeAsFinalAuthenticator	TRUE	FALSE, TRUE
NODE.security.serialCraftAccess.EnableCraftPort	TRUE	TRUE, FALSE
NODE.security.shellAccess.AccessState	NonSecure	Disabled, NonSecure, Secure
NODE.security.shellAccess.EnableShellPassword	FALSE	TRUE, FALSE
NODE.security.shellAccess.TelnetPort	23	23 - 9999
NODE.security.snmpAccess.AccessState	NonSecure	Disabled, NonSecure
NODE.security.tl1Access.AccessState	NonSecure	Disabled, NonSecure, Secure
NODE.security.userLockout.FailedLoginsAllowedBeforeLockout	5 (times)	0 - 10
NODE.security.userLockout.LockoutDuration	00:30 (mins:secs)	00:00, 00:05, 00:10 .. 10:00
NODE.security.userLockout.ManualUnlockBySuperuser	FALSE	TRUE, FALSE
NODE.timing.bits-1.AdminSSMIn	STU	PRS, STU, ST2, TNC, ST3E, ST3, SMC, ST4, DUS, RES
NODE.timing.bits-1.AISThreshold	SMC	PRS, STU, ST2, TNC, ST3E, ST3, SMC, ST4, DUS, RES
NODE.timing.bits-1.Coding	B8ZS	B8ZS, AMI when FacilityType DS1; AMI when FacilityType 64kHz+8kHz

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.timing.bits-1.CodingOut	B8ZS	B8ZS, AMI when FacilityTypeOut DS1; AMI when FacilityTypeOut 6MHz
NODE.timing.bits-1.FacilityType	DS1	DS1, 64kHz+8kHz
NODE.timing.bits-1.FacilityTypeOut	DS1	DS1, 6MHz
NODE.timing.bits-1.Framing	ESF	ESF, D4 when FacilityType DS1; N/A when FacilityType 64kHz+8kHz
NODE.timing.bits-1.FramingOut	ESF	ESF, D4 when FacilityTypeOut DS1; N/A when FacilityTypeOut 6MHz
NODE.timing.bits-1.LBO	0-133	0-133, 134-266, 267-399, 400-533, 534-655
NODE.timing.bits-1.State	IS	IS, OOS,DSBLD
NODE.timing.bits-1.StateOut	IS	IS, OOS,DSBLD
NODE.timing.bits-2.AdminSSMIn	STU	PRS, STU, ST2, TNC, ST3E, ST3, SMC, ST4, DUS, RES
NODE.timing.bits-2.AISThreshold	SMC	PRS, STU, ST2, TNC, ST3E, ST3, SMC, ST4, DUS, RES
NODE.timing.bits-2.Coding	B8ZS	B8ZS, AMI when FacilityType DS1; AMI when FacilityType 64kHz+8kHz
NODE.timing.bits-2.CodingOut	B8ZS	B8ZS, AMI when FacilityTypeOut DS1; AMI when FacilityTypeOut 6MHz
NODE.timing.bits-2.FacilityType	DS1	DS1, 64kHz+8kHz
NODE.timing.bits-2.FacilityTypeOut	DS1	DS1, 6MHz

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.timing.bits-2.Framing	ESF	ESF, D4 when FacilityType DS1; N/A when FacilityType 64kHz+8kHz
NODE.timing.bits-2.FramingOut	ESF	ESF, D4 when FacilityTypeOut DS1; N/A when FacilityTypeOut 6MHz
NODE.timing.bits-2.LBO	0-133	0-133, 134-266, 267-399, 400-533, 534-655
NODE.timing.bits-2.State	IS	IS, OOS,DSBLD
NODE.timing.bits-2.StateOut	IS	IS, OOS,DSBLD
NODE.timing.general.Mode	External	External, Line, Mixed
NODE.timing.general.QualityOfRES	RES=DUS	PRS<RES, STU<RES<PRS, ST2<RES<STU, ST3<RES<ST2, SMC<RES<ST3, ST4<RES<SMC, RES<ST4, RES=DUS when SSMMMessageSet Generation 1; PRS<RES, STU<RES<PRS, ST2<RES<STU, TNC<RES<ST2, ST3E<RES<TN C, ST3<RES<ST3E , SMC<RES<ST3, ST4<RES<SMC, RES<ST4, RES=DUS when SSMMMessageSet Generation 2
NODE.timing.general.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0

Table C-13 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.timing.general.Revertive	FALSE	TRUE, FALSE
NODE.timing.general.SSMMMessageSet	Generation 1	Generation 1, Generation 2

C.2.2.1 Time Zones

Table C-14 lists the time zones that apply for node time zone defaults. Time zones in the table are ordered by their relative relationships to Greenwich Mean Time (GMT), and the default values are displayed in the correct format for valid default input.

Table C-14 Time Zones

Time Zone (GMT +/- Hours)	Default Value
GMT-11:00	(GMT-11:00) Midway Islands, Samoa
GMT-10:00	(GMT-10:00) Hawaiian Islands, Tahiti
GMT-09:00	(GMT-09:00) Anchorage - Alaska
GMT-08:00	(GMT-08:00) Pacific Time (US & Canada), Tijuana
GMT-07:00	(GMT-07:00) Mountain Time (US & Canada)
GMT-07:00	(GMT-07:00) Phoenix - Arizona
GMT-06:00	(GMT-06:00) Central Time (US & Canada)
GMT-06:00	(GMT-06:00) Mexico City
GMT-06:00	(GMT-06:00) Costa Rica, Managua, San Salvador
GMT-06:00	(GMT-06:00) Saskatchewan
GMT-05:00	(GMT-05:00) Bogota, Lima, Quito
GMT-05:00	(GMT-05:00) Eastern Time (US & Canada)
GMT-05:00	(GMT-05:00) Havana
GMT-05:00	(GMT-05:00) Indiana (US)
GMT-04:00	(GMT-04:00) Asuncion
GMT-04:00	(GMT-04:00) Caracas, La Paz, San Juan
GMT-04:00	(GMT-04:00) Atlantic Time (Canada), Halifax, Saint John, Charlottetown
GMT-04:00	(GMT-04:00) Santiago
GMT-04:00	(GMT-04:00) Thule (Qaanaaq)
GMT-03:30	(GMT-03:30) St. John's - Newfoundland
GMT-03:00	(GMT-03:00) Brasilia, Rio de Janeiro, Sao Paulo
GMT-03:00	(GMT-03:00) Buenos Aires, Georgetown
GMT-03:00	(GMT-03:00) Godthab (Nuuk) - Greenland
GMT-02:00	(GMT-02:00) Mid-Atlantic
GMT-01:00	(GMT-01:00) Azores, Scoresbysund
GMT-01:00	(GMT-01:00) Praia - Cape Verde

Table C-14 Time Zones (continued)

Time Zone (GMT +/- Hours)	Default Value
GMT 00:00	(GMT 00:00) Casablanca, Reykjavik, Monrovia
GMT	(GMT) Greenwich Mean Time
GMT 00:00	(GMT 00:00) Dublin, Edinburgh, London, Lisbon
GMT+01:00	(GMT+01:00) Amsterdam, Berlin, Rome, Stockholm, Paris
GMT+01:00	(GMT+01:00) Belgrade, Bratislava, Budapest, Ljubljana, Prague
GMT+01:00	(GMT+01:00) Brussels, Copenhagen, Madrid, Vienna
GMT+01:00	(GMT+01:00) Sarajevo, Skopje, Sofija, Vilnius, Warsaw, Zagreb
GMT+01:00	(GMT+01:00) West Central Africa, Algiers, Lagos, Luanda
GMT+01:00	(GMT+01:00) Windhoek (Namibia)
GMT+02:00	(GMT+02:00) Al Jizah, Alexandria, Cairo
GMT+02:00	(GMT+02:00) Amman
GMT+02:00	(GMT+02:00) Athens, Bucharest, Istanbul
GMT+02:00	(GMT+02:00) Beirut
GMT+02:00	(GMT+02:00) Cape Town, Harare, Johannesburg, Pretoria
GMT+02:00	(GMT+02:00) Jerusalem
GMT+02:00	(GMT+02:00) Kaliningrad, Minsk
GMT+03:00	(GMT+03:00) Aden, Antananarivo, Khartoum, Nairobi
GMT+03:00	(GMT+03:00) Baghdad
GMT+03:00	(GMT+03:00) Kuwait, Riyadh
GMT+03:00	(GMT+03:00) Moscow, St. Petersburg, Novgorod
GMT+03:30	(GMT+03:30) Tehran
GMT+04:00	(GMT+04:00) Abu Dhabi, Mauritius, Muscat
GMT+04:00	(GMT+04:00) Aqtau, T'bilisi
GMT+04:00	(GMT+04:00) Baku
GMT+04:00	(GMT+04:00) Yerevan, Samara
GMT+04:30	(GMT+04:30) Kabul
GMT+05:00	(GMT+05:00) Chelyabinsk, Prem, Yekaterinburg, Ufa
GMT+05:00	(GMT+05:00) Islamabad, Karachi, Tashkent
GMT+05:30	(GMT+05:30) Calcutta, Mumbai, New Delhi, Chennai
GMT+05:45	(GMT+05:45) Kathmandu
GMT+06:00	(GMT+06:00) Almaty
GMT+06:00	(GMT+06:00) Colombo, Dhaka, Astana
GMT+06:00	(GMT+06:00) Novosibirsk, Omsk
GMT+06:30	(GMT+06:30) Cocos, Rangoon
GMT+07:00	(GMT+07:00) Bangkok, Hanoi, Jakarta
GMT+07:00	(GMT+07:00) Krasnoyarsk, Norilsk, Novokuznetsk

Table C-14 Time Zones (continued)

Time Zone (GMT +/- Hours)	Default Value
GMT+08:00	(GMT+08:00) Irkutsk, Ulaan Bataar
GMT+08:00	(GMT+08:00) Beijing, Shanghai, Hong Kong, Urumqi
GMT+08:00	(GMT+08:00) Perth
GMT+08:00	(GMT+08:00) Singapore, Manila, Taipei, Kuala Lumpur
GMT+09:00	(GMT+09:00) Chita, Yakutsk
GMT+09:00	(GMT+09:00) Osaka, Sapporo, Tokyo
GMT+09:00	(GMT+09:00) Palau, Pyongyang, Seoul
GMT+09:30	(GMT+09:30) Adelaide, Broken Hill
GMT+09:30	(GMT+09:30) Darwin
GMT+10:00	(GMT+10:00) Brisbane, Port Moresby, Guam
GMT+10:00	(GMT+10:00) Canberra, Melbourne, Sydney
GMT+10:00	(GMT+10:00) Hobart
GMT+10:00	(GMT+10:00) Khabarovsk, Vladivostok
GMT+10:30	(GMT+10:30) Lord Howe Island
GMT+11:00	(GMT+11:00) Honiara, Magadan, Solomon Islands
GMT+11:00	(GMT+11:00) Noumea - New Caledonia
GMT+11:30	(GMT+11:30) Kingston - Norfolk Island
GMT+12:00	(GMT+12:00) Andyra, Kamchatka
GMT+12:00	(GMT+12:00) Auckland, Wellington
GMT+12:00	(GMT+12:00) Marshall Islands, Eniwetok
GMT+12:00	(GMT+12:00) Suva - Fiji
GMT+12:45	(GMT+12:45) Chatham Island
GMT+13:00	(GMT+13:00) Nuku'alofa - Tonga
GMT+13:00	(GMT+13:00) Rawaki, Phoenix Islands
GMT+14:00	(GMT+14:00) Line Islands, Kiritimati - Kiribati

C.3 CTC Default Settings

Table C-15 on page C-76 lists the CTC-level default settings for the Cisco ONS 15327. Cisco provides the following user-configurable defaults for CTC:

- Automatic Routing—Set circuit creation with the Route Automatically check box selected by default.
- Network Circuit Automatic Routing Overridable—Set by default whether or not a user creating circuits can change (override) the Automatic Circuit Routing setting (also provisionable as a default) in the CTC Circuit Routing Preferences area. When this default is set to TRUE it enables users to change whether or not Route Automatically is selected in the check box. When this default is set to FALSE it ensures that users cannot change the Route Automatically setting while creating circuits in CTC.

**Note**

When the Route Automatically check box is not selectable (and is not checked) during circuit creation, the following automatic routing sub-options are also unavailable: Using Required Nodes/Spans, Review Route Before Creation, VT-DS3 Mapped Conversion.

- Create TL1-like—Set whether to create only TL1-like circuits; that is, instruct the node to create only cross-connects, allowing the resulting circuits to be in an upgradable state.
- Local domain creation and viewing—Set whether domains that you create and view persist globally (all CTC sessions), or only locally (within the current CTC session).
- Network Map—Set the default network map (which country’s map is displayed in CTC network view).

Table C-15 CTC Default Settings

Default Name	Default Value	Default Domain
CTC.circuits.CreateLikeTL1	FALSE	TRUE, FALSE
CTC.circuits.RouteAutomatically	TRUE	TRUE, FALSE
CTC.circuits.RouteAutomaticallyDefaultOverridable	TRUE	TRUE, FALSE
CTC.network.LocalDomainCreationAndViewing	FALSE	TRUE, FALSE
CTC.network.Map	United States	-none-, Germany, Japan, Netherlands, South Korea, United Kingdom, United States

C.4 ETSI Platform Defaults

The following sections give the NE defaults for the 15454 ETSI platform. To see defaults for the 15454 ANSI platform, see the “[C.2 ANSI Platform Defaults](#)” section on page C-2.

C.4.1 ETSI Card Defaults

The tables in this section list the default settings for each DWDM, Transponder (TXP), Muxponder (MXP), or Ethernet card. Cisco provides several types of user-configurable defaults for Cisco ONS 15454 DWDM, TXP, MXP, and Ethernet cards. Types of card defaults can be broadly grouped by function, as outlined in the following subsections. For information about individual card settings, refer to the “Provision Transponder and Muxponder Cards” chapter, or the “Change DWDM Card Settings” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

**Note**

The tables in this section list the default settings for each DWDM, TXP, and MXP card. For all other cards, including electrical, optical, Ethernet, and Fibre Channel, refer to the *Cisco ONS 15454 Reference Manual* or the *Cisco ONS 15454 SDH Reference Manual*.

**Note**

When the card level defaults are changed, the new provisioning done after the defaults have changed is affected. Existing provisioning remains unaffected.

The following types of defaults are defined for DWDM, TXP, MXP, and Ethernet cards.

C.4.1.1 ETSI Configuration Defaults

Most card and port-level configuration defaults correspond to settings found in the CTC card-level Provisioning tabs.



Note

The full set of Automatic Laser Shutdown (ALS) configuration defaults can be found in the CTC card-level Maintenance > ALS tab for supported cards. ALS defaults are supported for OSCM, OSC-CSM, OPT-BST, OPT-BST-L, TXP and MXP cards.

Configuration defaults that are reachable from the CTC card-level Provisioning tabs (except as noted) include the following types of options (arranged by CTC subtab):

- Line—(TXP and MXP cards) Line-level configuration settings, including SONET, Wavelength Trunk, Trunk, Client, Distance Extension, and Enhanced FC/FICON ISL settings.



Note

Some line configuration tabs, including Client, Distance Extension, and Enhanced FC/FICON ISL settings tabs, only appear in the card-level Provisioning > Line tab after a pluggable port module (PPM) is provisioned to a fibre channel payload type (port rate) for the particular card.

- OTN—(MXP-2.5G-10E, MXP-2_5G-10G, MXP-MR-10DME, TXP-MR-10E, TXP-MR-10G, TXP-MR-2.5G, and TXPP-MR-2.5G cards) Optical transport network (OTN) line configuration settings.
- Card—(See listed settings for applicable cards)
 - Card mode (ESCON, FC_GE, or MIXED)—MXPP-MR-2.5G and MXP-MR-2.5G cards
 - Port range-level mode settings—MXP-MR-10DME cards only
 - Termination mode—TXP-MR-10E, MXP-2.5G-10E, MXP-2.5G-10G, TXPP_MR_2.5G, TXP_MR_10G, and TXP_MR_2.5G cards
 - AIS squelch settings—TXP-MR-10E and MXP-2.5G-10E cards
- ALS (card-level Maintenance > ALS tab)—(OSCM, OSCM, OPT-BST, OPT-BST-L, TXP, and MXP cards) ALS configuration defaults.



Note

For further information about supported features on each card, see [Chapter 2, “Card Reference.”](#)

C.4.1.2 ETSI Threshold Defaults

Threshold default settings define the default cumulative values (thresholds) beyond which a threshold crossing alert (TCA) will be raised, making it possible to monitor the network and detect errors early.

Card threshold default settings are provided as follows:

- PM thresholds—(OSCM, OSC-CSM, TXP and MXP cards) Expressed in counts or seconds; includes line and SDH thresholds.
- Optical thresholds—(TXP and MXP cards) Expressed in percentages or dBm; includes client and trunk optical thresholds.
- OTN FEC thresholds (TXP and MXP cards)—Expressed in counts; includes enhanced, standard, 1G Ethernet, 1G Fibre channel, 1G FICON, STM-1, STM-4, STM-16, 2G FICON, and 2G Fibre channel thresholds.

- OTN G.709 thresholds (TXP and MXP cards)—Expressed in counts or seconds; includes ITU-T G.709 PM and SM thresholds.

Threshold defaults are defined for near end and/or far end, at 15-minute and one-day intervals. Thresholds are further broken down by type, such as Multiplex Section, Regeneration Section, VC LO, MS, RS, or Path, for performance monitoring (PM) thresholds, and TCA (warning) or Alarm for physical thresholds. PM threshold types define the layer to which the threshold applies. Physical threshold types define the level of response expected when the threshold is crossed.

**Note**

For full descriptions of the thresholds you can set for each card, see [Chapter 10, “Performance Monitoring.”](#)

**Note**

In R7.0.1, when LOS, LOS-P, or LOF alarms occur on TXP and MXP trunks, certain TCAs are suppressed. For details, see [Chapter 9, “Alarm and TCA Monitoring and Management.”](#)

**Note**

For additional information regarding PM parameter threshold defaults as defined by Telcordia specifications, refer to Telcordia GR-820-CORE and GR-253-CORE.

C.4.1.3 ETSI Defaults by Card

In the tables that follow, card defaults are defined by the default name, its factory-configured value, and the domain of allowable values that you can assign to it.

**Note**

Some default values, such as certain thresholds, are interdependent. Before changing a value, review the domain for that default and any other related defaults for potential dependencies.

C.4.1.3.1 ETSI MXP_2.5G_10E Card Default Settings

[Table C-16](#) lists the MXP_2.5G_10E card default settings.

Table C-16 ETSI MXP_2.5G_10E Card Default Settings

Default Name	Default Value	Default Domain
MXP-2_5G-10E.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-2_5G-10E.config.client.AisSquelchMode	Squelch	Ais, Squelch
MXP-2_5G-10E.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-2_5G-10E.config.client.AlsRecoveryPulseDuration	2.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-2_5G-10E.config.client.AlsRecoveryPulseInterval	100 (seconds)	100 - 2000

Table C-16 ETSI MXP_2.5G_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10E.config.client.ppmPortAssignment	STM16_PORT	UNASSIGNED, STM16_PORT
MXP-2_5G-10E.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXP-2_5G-10E.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-2_5G-10E.config.client.SendDoNotUse	FALSE	TRUE, FALSE
MXP-2_5G-10E.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXP-2_5G-10E.config.client.SyncMsgIn	TRUE	FALSE, TRUE
MXP-2_5G-10E.config.client.TerminationMode	Transparent	Transparent, Regeneration Section
MXP-2_5G-10E.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-2_5G-10E.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-2_5G-10E.config.trunk.AlsRecoveryPulseDuration	100.0 (seconds)	60.0, 60.1, 60.2 .. 200.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-2_5G-10E.config.trunk.AlsRecoveryPulseInterval	300 (seconds)	200 - 2000
MXP-2_5G-10E.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	-21.0, -20.9, -20.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	-12.0, -11.9, -11.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. 0.0
MXP-2_5G-10E.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. -1.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	-16.0, -15.9, -15.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -3.0
MXP-2_5G-10E.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. 3.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	-16.0, -15.9, -15.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -3.0
MXP-2_5G-10E.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. 3.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	-20.0, -19.9, -19.8 .. 30.0

Table C-16 ETSI MXP_2.5G_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10E.opticalthresholds.trunk.alarm.HighTxPower	7.0 (dBm)	3.0, 3.1, 3.2 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.LowRxPower	-20.0 (dBm)	-40.0, -39.9, -39.8 .. -8.0
MXP-2_5G-10E.opticalthresholds.trunk.alarm.LowTxPower	3.0 (dBm)	-40.0, -39.9, -39.8 .. 7.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.HighTxPower	9.0 (dBm)	0.0, 0.1, 0.2 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -9.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.15min.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. 9.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.HighTxPower	9.0 (dBm)	0.0, 0.1, 0.2 .. 30.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -9.0
MXP-2_5G-10E.opticalthresholds.trunk.warning.1day.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. 9.0
MXP-2_5G-10E.otn.fec thresholds.enhanced.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-2_5G-10E.otn.fec thresholds.enhanced.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-2_5G-10E.otn.fec thresholds.enhanced.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-2_5G-10E.otn.fec thresholds.enhanced.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-2_5G-10E.otn.fec thresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-2_5G-10E.otn.fec thresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-2_5G-10E.otn.fec thresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-2_5G-10E.otn.fec thresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900

Table C-16 ETSI MXP_2.5G_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
MXP-2_5G-10E.otn.otnLines.AsynchSynchMapping	ODU Multiplex	ODU Multiplex
MXP-2_5G-10E.otn.otnLines.FEC	Standard	Disable, Standard, Enhanced
MXP-2_5G-10E.otn.otnLines.G709OTN	Enable	Enable
MXP-2_5G-10E.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-2_5G-10E.pmthresholds.client.ms.farend.15min.BBE	21260 (count)	0 - 2212200
MXP-2_5G-10E.pmthresholds.client.ms.farend.15min.EB	21260 (count)	0 - 2212200
MXP-2_5G-10E.pmthresholds.client.ms.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.ms.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.ms.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.ms.farend.1day.BBE	212600 (count)	0 - 212371200

Table C-16 ETSI MXP_2.5G_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10E.pmthresholds.client.ms.farend.1day.EB	212600 (count)	0 - 212371200
MXP-2_5G-10E.pmthresholds.client.ms.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.ms.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.ms.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.ms.nearend.15min.BBE	21260 (count)	0 - 2212200
MXP-2_5G-10E.pmthresholds.client.ms.nearend.15min.EB	21260 (count)	0 - 2212200
MXP-2_5G-10E.pmthresholds.client.ms.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.ms.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.ms.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.ms.nearend.1day.BBE	212600 (count)	0 - 212371200
MXP-2_5G-10E.pmthresholds.client.ms.nearend.1day.EB	212600 (count)	0 - 212371200
MXP-2_5G-10E.pmthresholds.client.ms.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.ms.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.rs.nearend.15min.BBE	10000 (count)	0 - 2212200
MXP-2_5G-10E.pmthresholds.client.rs.nearend.15min.EB	10000 (count)	0 - 2151900
MXP-2_5G-10E.pmthresholds.client.rs.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.rs.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.rs.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10E.pmthresholds.client.rs.nearend.1day.BBE	100000 (count)	0 - 212371200
MXP-2_5G-10E.pmthresholds.client.rs.nearend.1day.EB	100000 (count)	0 - 206582400
MXP-2_5G-10E.pmthresholds.client.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10E.pmthresholds.client.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.2 ETSI MXP_2.5G_10G Card Default Settings

Table C-17 lists the MXP_2.5G_10G card default settings.

Table C-17 ETSI MXP_2.5G_10G Card Default Settings

Default Name	Default Value	Default Domain
MXP-2_5G-10G.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-2_5G-10G.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test

Table C-17 ETSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.config.client.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-2_5G-10G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXP-2_5G-10G.config.client.ppmPortAssignment	STM16_PORT	UNASSIGNED, STM16_PORT
MXP-2_5G-10G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXP-2_5G-10G.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-2_5G-10G.config.client.SendDoNotUse	FALSE	TRUE, FALSE
MXP-2_5G-10G.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXP-2_5G-10G.config.client.SyncMsgIn	TRUE	FALSE, TRUE
MXP-2_5G-10G.config.client.TerminationMode	Transparent	Transparent, Multiplex Section
MXP-2_5G-10G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-2_5G-10G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-2_5G-10G.config.trunk.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-2_5G-10G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXP-2_5G-10G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-17 ETSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.opticalthresholds.trunk.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.alarm.HighTxPower	4.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.alarm.LowRxPower	-24.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.trunk.alarm.LowTxPower	2.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.LowRxPower	-22.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.trunk.warning.15min.LowTxPower	-1.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower

Table C-17 ETSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.LowRxPower	-22.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-2_5G-10G.opticalthresholds.trunk.warning.1day.LowTxPower	-1.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-2_5G-10G.otn.fectthresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-2_5G-10G.otn.fectthresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-2_5G-10G.otn.fectthresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-2_5G-10G.otn.fectthresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72

Table C-17 ETSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
MXP-2_5G-10G.otn.otnLines.FEC	Standard	Disable, Standard, Enhanced when G709OTN Enable; Disable when G709OTN Disable
MXP-2_5G-10G.otn.otnLines.G709OTN	Enable	Disable, Enable
MXP-2_5G-10G.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-2_5G-10G.pmthresholds.client.ms.farend.15min.BBE	21260 (count)	0 - 2212200
MXP-2_5G-10G.pmthresholds.client.ms.farend.15min.EB	21260 (count)	0 - 2212200
MXP-2_5G-10G.pmthresholds.client.ms.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.ms.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.ms.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.ms.farend.1day.BBE	212600 (count)	0 - 212371200
MXP-2_5G-10G.pmthresholds.client.ms.farend.1day.EB	212600 (count)	0 - 212371200
MXP-2_5G-10G.pmthresholds.client.ms.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.ms.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.ms.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.ms.nearend.15min.BBE	21260 (count)	0 - 2212200
MXP-2_5G-10G.pmthresholds.client.ms.nearend.15min.EB	21260 (count)	0 - 2212200
MXP-2_5G-10G.pmthresholds.client.ms.nearend.15min.ES	87 (seconds)	0 - 900

Table C-17 ETSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.pmthresholds.client.ms.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.ms.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.ms.nearend.1day.BBE	212600 (count)	0 - 212371200
MXP-2_5G-10G.pmthresholds.client.ms.nearend.1day.EB	212600 (count)	0 - 212371200
MXP-2_5G-10G.pmthresholds.client.ms.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.ms.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.rs.nearend.15min.BBE	10000 (count)	0 - 2212200
MXP-2_5G-10G.pmthresholds.client.rs.nearend.15min.EB	10000 (count)	0 - 2151900
MXP-2_5G-10G.pmthresholds.client.rs.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.rs.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.rs.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.client.rs.nearend.1day.BBE	100000 (count)	0 - 212371200
MXP-2_5G-10G.pmthresholds.client.rs.nearend.1day.EB	100000 (count)	0 - 206582400
MXP-2_5G-10G.pmthresholds.client.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.client.rs.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.15min.EB	85040 (count)	0 - 8850600
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.1day.EB	850400 (count)	0 - 849657600
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.1day.SES	4 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.ms.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.15min.BBE	85040 (count)	0 - 8850600
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.15min.EB	85040 (count)	0 - 8850600
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.15min.ES	87 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.15min.SES	1 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.1day.BBE	850400 (count)	0 - 849657600
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.1day.EB	850400 (count)	0 - 849657600
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.1day.SES	4 (seconds)	0 - 86400

Table C-17 ETSI MXP_2.5G_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-2_5G-10G.pmthresholds.trunk.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.15min.BBE	10000 (count)	0 - 8850600
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.15min.EB	10000 (count)	0 - 7967700
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.15min.ES	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.15min.SES	500 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.1day.BBE	100000 (count)	0 - 849657600
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.1day.EB	100000 (count)	0 - 764899200
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-2_5G-10G.pmthresholds.trunk.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.3 ETSI MXP_MR_2.5G Card Default Settings

Table C-18 lists the MXP_MR_2.5G card default settings.

Table C-18 ETSI MXP_MR_2.5G Card Default Settings

Default Name	Default Value	Default Domain
MXP-MR-2_5G.config.card.Mode	FC_GE	FC_GE, MIXED, ESCON
MXP-MR-2_5G.config.client.AlsMode	Disabled	Disabled, Manual Restart, Manual Restart for Test
MXP-MR-2_5G.config.client.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-MR-2_5G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXP-MR-2_5G.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, ONE_GE, FC1G ISL, FC2G ISL, FICON1G ISL, FICON2G ISL when //card.Mode FC_GE; UNASSIGNED, ONE_GE, ESCON_PORT, FC1G ISL, FICON1G ISL when //card.Mode MIXED; UNASSIGNED, ESCON_PORT when //card.Mode ESCON
MXP-MR-2_5G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXP-MR-2_5G.config.fc.distanceExtension.AutoadjustGFPBufferThreshold	TRUE	TRUE, FALSE

Table C-18 ETSI MXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-2_5G.config.fc.distanceExtension.AutoDetect	TRUE	TRUE, FALSE
MXP-MR-2_5G.config.fc.distanceExtension.Enabled	TRUE	TRUE, FALSE
MXP-MR-2_5G.config.fc.distanceExtension.NumCredits	32	2 - 256
MXP-MR-2_5G.config.fc.distanceExtension.NumGFPBuffers	16	16, 32, 48 .. 1200
MXP-MR-2_5G.config.fc.enhancedFibreChannelFicon.MaxFrameSize	2148	2148, 2152, 2156, 2160, 2164, 2168, 2172
MXP-MR-2_5G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-MR-2_5G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-MR-2_5G.config.trunk.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-MR-2_5G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXP-MR-2_5G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-MR-2_5G.config.trunk.SendDoNotUse	FALSE	TRUE, FALSE
MXP-MR-2_5G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXP-MR-2_5G.config.trunk.SyncMsgIn	TRUE	FALSE, TRUE
MXP-MR-2_5G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0

Table C-18 ETSI MXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-2_5G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.trunk.alarm.HighRxPower	-7.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.alarm.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.alarm.LowRxPower	-26.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.trunk.alarm.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0

Table C-18 ETSI MXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.BBE	21260 (count)	0 - 2212200
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.EB	21260 (count)	0 - 2212200
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.ES	87 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.SES	1 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.BBE	212600 (count)	0 - 2212200
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.EB	212600 (count)	0 - 212371200
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.BBE	21260 (count)	0 - 2212200
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.EB	21260 (count)	0 - 2212200
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.ES	87 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.SES	1 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.BBE	212600 (count)	0 - 2212200
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.EB	212600 (count)	0 - 212371200
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.BBE	10000 (count)	0 - 2151900
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.EB	10000 (count)	0 - 2151900
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.ES	500 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.SES	500 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.BBE	100000 (count)	0 - 206582400

Table C-18 ETSI MXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.EB	100000 (count)	0 - 206582400
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.4 ETSI MXPP_MR_2.5G Card Default Settings

Table C-19 lists the MXPP_MR_2.5G card default settings.

Table C-19 ETSI MXPP_MR_2.5G Card Default Settings

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.config.card.Mode	FC_GE	FC_GE, MIXED, ESCON
MXPP-MR-2_5G.config.client.AlsMode	Disabled	Disabled, Manual Restart, Manual Restart for Test
MXPP-MR-2_5G.config.client.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXPP-MR-2_5G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXPP-MR-2_5G.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, ONE_GE, FC1G ISL, FC2G ISL, FICON1G ISL, FICON2G ISL when //.card.Mode FC_GE; UNASSIGNED, ONE_GE, ESCON_PORT, FC1G ISL, FICON1G ISL when //.card.Mode MIXED; UNASSIGNED, ESCON_PORT when //.card.Mode ESCON
MXPP-MR-2_5G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)

Table C-19 ETSI MXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.config.fc.distanceExtension.AutoadjustGFPBufferThreshold	TRUE	TRUE, FALSE
MXPP-MR-2_5G.config.fc.distanceExtension.AutoDetect	TRUE	TRUE, FALSE
MXPP-MR-2_5G.config.fc.distanceExtension.Enabled	TRUE	TRUE, FALSE
MXPP-MR-2_5G.config.fc.distanceExtension.NumCredits	32	2 - 256
MXPP-MR-2_5G.config.fc.distanceExtension.NumGFPBuffers	16	16, 32, 48 .. 1200
MXPP-MR-2_5G.config.fc.enhancedFibreChannelFicon.MaxFrameSize	2148	2148, 2152, 2156, 2160, 2164, 2168, 2172
MXPP-MR-2_5G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXPP-MR-2_5G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXPP-MR-2_5G.config.trunk.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXPP-MR-2_5G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
MXPP-MR-2_5G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXPP-MR-2_5G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXPP-MR-2_5G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0

Table C-19 ETSI MXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighRxPower	-7.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.LowRxPower	-26.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.trunk.alarm.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0

Table C-19 ETSI MXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighTxPower	30.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowTxPower	-40.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.BBE	21260 (count)	0 - 2212200
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.EB	21260 (count)	0 - 2212200
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.ES	87 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.SES	1 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.15min.UAS	3 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.BBE	212600 (count)	0 - 2212200
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.EB	212600 (count)	0 - 212371200
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.ES	864 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.SES	4 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.ms.farend.1day.UAS	10 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.BBE	21260 (count)	0 - 2212200
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.EB	21260 (count)	0 - 2212200
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.ES	87 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.SES	1 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.15min.UAS	3 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.BBE	212600 (count)	0 - 2212200
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.EB	212600 (count)	0 - 212371200
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.ES	864 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.SES	4 (seconds)	0 - 86400

Table C-19 ETSI MXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXPP-MR-2_5G.pmthresholds.trunk.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.BBE	10000 (count)	0 - 2151900
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.EB	10000 (count)	0 - 2151900
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.ES	500 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.SES	500 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.15min.UAS	3 (seconds)	0 - 900
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.BBE	100000 (count)	0 - 206582400
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.EB	100000 (count)	0 - 206582400
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
MXPP-MR-2_5G.pmthresholds.trunk.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.5 ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings

Table C-20 lists the MXP_MR_10DME_C and MXP_MR_10DME_L card default settings.

Table C-20 ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings

Default Name	Default Value	Default Domain
MXP-MR-10DME.config.card.Mode	Port 1-8: FC_GE_ISC	Port 1-8: FC_GE_ISC, Port 1-4: FC_GE_ISC, Port 5-8: FC4G, Port 1-4: FC4G, Port 5-8: FC_GE_ISC, Port 1-8: FC4G
MXP-MR-10DME.config.client.AlsMode	Disabled	Disabled, Manual Restart, Manual Restart for Test
MXP-MR-10DME.config.client.AlsRecoveryPulseDuration	2.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-MR-10DME.config.client.AlsRecoveryPulseInterval	100 (seconds)	100 - 2000

Table C-20 ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, ONE_GE_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC3 PEER 1G, ISC3 PEER 2G when //card.Mode Port 1-8: FC_GE_ISC; UNASSIGNED, FC4G_PORT when //card.Mode Port 1-8: FC4G; UNASSIGNED, ONE_GE_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, FC4G_PORT, ISC3 PEER 1G, ISC3 PEER 2G when //card.Mode Port 1-4: FC_GE_ISC, Port 5-8: FC4G, Port 1-4: FC4G, Port 5-8: FC_GE_ISC
MXP-MR-10DME.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
MXP-MR-10DME.config.fc.distanceExtension.Enabled	TRUE	TRUE, FALSE
MXP-MR-10DME.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
MXP-MR-10DME.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
MXP-MR-10DME.config.trunk.AlsRecoveryPulseDuration	100.0 (seconds)	60.0, 60.1, 60.2 .. 200.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
MXP-MR-10DME.config.trunk.AlsRecoveryPulseInterval	300 (seconds)	200 - 2000
MXP-MR-10DME.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-MR-10DME.config.trunk.SendDoNotUse	FALSE	FALSE, TRUE
MXP-MR-10DME.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
MXP-MR-10DME.config.trunk.SyncMsgIn	TRUE	FALSE, TRUE
MXP-MR-10DME.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-20 ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.opticalthresholds.client.alarm.HighRxPower	3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.alarm.HighTxPower	-2.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.alarm.LowRxPower	-20.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.client.warning.15min.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.warning.15min.LowRxPower	-17.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.client.warning.1day.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.client.warning.1day.LowRxPower	-17.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.alarm.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.alarm.LowRxPower	-20.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.trunk.alarm.LowTxPower	3.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower

Table C-20 ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.HighTxPower	9.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.trunk.warning.15min.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.HighTxPower	9.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
MXP-MR-10DME.opticalthresholds.trunk.warning.1day.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
MXP-MR-10DME.otn.fecthresholds.enhanced.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-MR-10DME.otn.fecthresholds.enhanced.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-MR-10DME.otn.fecthresholds.enhanced.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-MR-10DME.otn.fecthresholds.enhanced.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-MR-10DME.otn.fecthresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
MXP-MR-10DME.otn.fecthresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
MXP-MR-10DME.otn.fecthresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
MXP-MR-10DME.otn.fecthresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600

Table C-20 ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400

Table C-20 ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
MXP-MR-10DME.otn.otnLines.AsynchSynchMapping	Synch Mapping	Synch Mapping
MXP-MR-10DME.otn.otnLines.FEC	Standard	Disable, Standard, Enhanced when G709OTN TRUE; Disable when G709OTN FALSE
MXP-MR-10DME.otn.otnLines.G709OTN	TRUE	FALSE, TRUE
MXP-MR-10DME.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
MXP-MR-10DME.pmthresholds.trunk.ms.farend.15min.BBE	85040 (count)	0 - 2212200
MXP-MR-10DME.pmthresholds.trunk.ms.farend.15min.EB	85040 (count)	0 - 2212200
MXP-MR-10DME.pmthresholds.trunk.ms.farend.15min.ES	87 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.ms.farend.15min.SES	1 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.ms.farend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.ms.farend.1day.BBE	850400 (count)	0 - 2212200
MXP-MR-10DME.pmthresholds.trunk.ms.farend.1day.EB	850400 (count)	0 - 212371200
MXP-MR-10DME.pmthresholds.trunk.ms.farend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.ms.farend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.ms.farend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.15min.BBE	85040 (count)	0 - 2212200
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.15min.EB	85040 (count)	0 - 2212200
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.15min.ES	87 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.15min.SES	1 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.1day.BBE	850400 (count)	0 - 2212200
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.1day.EB	850400 (count)	0 - 212371200
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.1day.ES	864 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.1day.SES	4 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.15min.BBE	10000 (count)	0 - 2151900
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.15min.EB	10000 (count)	0 - 2151900

Table C-20 ETSI MXP_MR_10DME_C and MXP_MR_10DME_L Card Default Settings (continued)

Default Name	Default Value	Default Domain
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.15min.ES	500 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.15min.SES	500 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.15min.UAS	3 (seconds)	0 - 900
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.1day.BBE	100000 (count)	0 - 206582400
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.1day.EB	100000 (count)	0 - 206582400
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
MXP-MR-10DME.pmthresholds.trunk.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.6 ETSI TXP_MR_10E Card Default Settings

Table C-21 lists the TXP_MR_10E card default settings.

Table C-21 ETSI TXP_MR_10E Card Default Settings

Default Name	Default Value	Default Domain
TXP-MR-10E.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-10E.config.client.AisSquelchMode	Squelch	Ais, Squelch
TXP-MR-10E.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-10E.config.client.AlsRecoveryPulseDuration	2.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-10E.config.client.AlsRecoveryPulseInterval	100 (seconds)	100 - 2000
TXP-MR-10E.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, SDH, 10G Ethernet, 10G Fiber Channel
TXP-MR-10E.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
TXP-MR-10E.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10E.config.client.SendDoNotUse	FALSE	TRUE, FALSE
TXP-MR-10E.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-10E.config.client.SyncMsgIn	TRUE	FALSE, TRUE

Table C-21 ETSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.config.client.TerminationMode	Transparent	Transparent, Regeneration Section, Multiplex Section when ppmPortAssignment UNASSIGNED, SONET; Transparent when ppmPortAssignment 10G Ethernet, 10G Fiber Channel
TXP-MR-10E.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-10E.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-10E.config.trunk.AlsRecoveryPulseDuration	100.0 (seconds)	6.0, 6.1, 6.2 .. 200.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-10E.config.trunk.AlsRecoveryPulseInterval	300 (seconds)	200 - 2000
TXP-MR-10E.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10E.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-10E.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.client.alarm.HighRxPower	1.0 (dBm)	-13.0, -12.9, -12.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.alarm.HighTxPower	1.0 (dBm)	-8.0, -7.9, -7.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.alarm.LowRxPower	-13.0 (dBm)	-40.0, -39.9, -39.8 .. 1.0
TXP-MR-10E.opticalthresholds.client.alarm.LowTxPower	-8.0 (dBm)	-40.0, -39.9, -39.8 .. 1.0
TXP-MR-10E.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.client.warning.15min.HighRxPower	-1.0 (dBm)	-11.0, -10.9, -10.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.warning.15min.HighTxPower	5.0 (dBm)	-12.0, -11.9, -11.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.warning.15min.LowRxPower	-11.0 (dBm)	-40.0, -39.9, -39.8 .. -1.0
TXP-MR-10E.opticalthresholds.client.warning.15min.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. 5.0
TXP-MR-10E.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.client.warning.1day.HighRxPower	-1.0 (dBm)	-11.0, -10.9, -10.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.warning.1day.HighTxPower	5.0 (dBm)	-12.0, -11.9, -11.8 .. 30.0
TXP-MR-10E.opticalthresholds.client.warning.1day.LowRxPower	-11.0 (dBm)	-40.0, -39.9, -39.8 .. -1.0
TXP-MR-10E.opticalthresholds.client.warning.1day.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. 5.0
TXP-MR-10E.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	-20.0, -19.9, -19.8 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.alarm.HighTxPower	7.0 (dBm)	3.0, 3.1, 3.2 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.alarm.LowRxPower	-20.0 (dBm)	-40.0, -39.9, -39.8 .. -8.0
TXP-MR-10E.opticalthresholds.trunk.alarm.LowTxPower	3.0 (dBm)	-40.0, -39.9, -39.8 .. 7.0

Table C-21 ETSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.HighTxPower	9.0 (dBm)	0.0, 0.1, 0.2 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -9.0
TXP-MR-10E.opticalthresholds.trunk.warning.15min.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. 9.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	-18.0, -17.9, -17.8 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.HighTxPower	9.0 (dBm)	0.0, 0.1, 0.2 .. 30.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. -9.0
TXP-MR-10E.opticalthresholds.trunk.warning.1day.LowTxPower	0.0 (dBm)	-40.0, -39.9, -39.8 .. 9.0
TXP-MR-10E.otn.fec thresholds.enhanced.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
TXP-MR-10E.otn.fec thresholds.enhanced.15min.UncorrectableWords	5 (count)	0 - 4724697600
TXP-MR-10E.otn.fec thresholds.enhanced.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
TXP-MR-10E.otn.fec thresholds.enhanced.1day.UncorrectableWords	480 (count)	0 - 453570969600
TXP-MR-10E.otn.fec thresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
TXP-MR-10E.otn.fec thresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
TXP-MR-10E.otn.fec thresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
TXP-MR-10E.otn.fec thresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900

Table C-21 ETSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-10E.otn.otnLines.AsynchSynchMapping	Synch Mapping	Asynch mapping, Synch Mapping

Table C-21 ETSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.otn.otnLines.FEC	Standard	Disable, Standard, Enhanced when G709OTN Enable; Disable when G709OTN Disable
TXP-MR-10E.otn.otnLines.G709OTN	Enable	Disable, Enable
TXP-MR-10E.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10E.pmthresholds.client.ms.farend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.client.ms.farend.15min.EB	85040 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.client.ms.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.ms.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.ms.farend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.client.ms.farend.1day.EB	850400 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.client.ms.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.ms.nearend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.client.ms.nearend.15min.EB	85040 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.client.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.ms.nearend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.client.ms.nearend.1day.EB	850400 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.client.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.rs.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.client.rs.nearend.15min.EB	10000 (count)	0 - 7967700
TXP-MR-10E.pmthresholds.client.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.client.rs.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.client.rs.nearend.1day.EB	100000 (count)	0 - 764899200

Table C-21 ETSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.pmthresholds.client.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.client.rs.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.ms.farend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.trunk.ms.farend.15min.EB	85040 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.trunk.ms.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.ms.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.ms.farend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.trunk.ms.farend.1day.EB	850400 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.trunk.ms.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.ms.nearend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.trunk.ms.nearend.15min.EB	85040 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.trunk.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.ms.nearend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.trunk.ms.nearend.1day.EB	850400 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.trunk.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.rs.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10E.pmthresholds.trunk.rs.nearend.15min.EB	10000 (count)	0 - 7967700
TXP-MR-10E.pmthresholds.trunk.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10E.pmthresholds.trunk.rs.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10E.pmthresholds.trunk.rs.nearend.1day.EB	100000 (count)	0 - 764899200

Table C-21 ETSI TXP_MR_10E Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10E.pmthresholds.trunk.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10E.pmthresholds.trunk.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.7 ETSI TXP_MR_10G Card Default Settings

Table C-22 lists the TXP_MR_10G card default settings.

Table C-22 ETSI TXP_MR_10G Card Default Settings

Default Name	Default Value	Default Domain
TXP-MR-10G.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-10G.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-10G.config.client.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-10G.config.client.AlsRecoveryPulseInterval	100 (seconds)	100 - 300
TXP-MR-10G.config.client.mrPortAssignment	UNASSIGNED	UNASSIGNED, SDH, 10G Ethernet
TXP-MR-10G.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10G.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-10G.config.client.TerminationMode	Transparent	Transparent, Regeneration Section, Multiplex Section when mrPortAssignment UNASSIGNED, SDH; Transparent when mrPortAssignment 10G Ethernet
TXP-MR-10G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-10G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test

Table C-22 ETSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.config.trunk.AlsRecoveryPulseDuration	4.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-10G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXP-MR-10G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-10G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.client.alarm.HighRxPower	1.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.alarm.HighTxPower	1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.alarm.LowRxPower	-13.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.client.alarm.LowTxPower	-8.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.client.warning.15min.HighRxPower	-1.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.warning.15min.HighTxPower	5.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.warning.15min.LowRxPower	-11.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.client.warning.15min.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.client.warning.1day.HighRxPower	-1.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.warning.1day.HighTxPower	5.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.client.warning.1day.LowRxPower	-11.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.client.warning.1day.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.trunk.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0

Table C-22 ETSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.opticalthresholds.trunk.alarm.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.alarm.HighTxPower	4.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.alarm.LowRxPower	-24.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.trunk.alarm.LowTxPower	2.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.trunk.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.trunk.warning.15min.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.warning.15min.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.warning.15min.LowRxPower	-22.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.trunk.warning.15min.LowTxPower	-1.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.opticalthresholds.trunk.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-10G.opticalthresholds.trunk.warning.1day.HighRxPower	-8.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.warning.1day.HighTxPower	7.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-10G.opticalthresholds.trunk.warning.1day.LowRxPower	-22.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-10G.opticalthresholds.trunk.warning.1day.LowTxPower	-1.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-10G.otn.fecthresholds.standard.15min.BitErrorsCorrected	903330 (count)	0 - 9033621811200
TXP-MR-10G.otn.fecthresholds.standard.15min.UncorrectableWords	5 (count)	0 - 4724697600
TXP-MR-10G.otn.fecthresholds.standard.1day.BitErrorsCorrected	86719680 (count)	0 - 867227693875200
TXP-MR-10G.otn.fecthresholds.standard.1day.UncorrectableWords	480 (count)	0 - 453570969600
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400

Table C-22 ETSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-10G.otn.otnLines.FEC	Enable	Disable, Enable when G709OTN Enable; Disable when G709OTN Disable
TXP-MR-10G.otn.otnLines.G709OTN	Enable	Disable, Enable

Table C-22 ETSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-10G.pmthresholds.client.ms.farend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.client.ms.farend.15min.EB	85040 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.client.ms.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.ms.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.ms.farend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.client.ms.farend.1day.EB	850400 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.client.ms.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.ms.nearend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.client.ms.nearend.15min.EB	85040 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.client.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.ms.nearend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.client.ms.nearend.1day.EB	850400 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.client.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.rs.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.client.rs.nearend.15min.EB	10000 (count)	0 - 7967700
TXP-MR-10G.pmthresholds.client.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.client.rs.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.client.rs.nearend.1day.EB	100000 (count)	0 - 764899200
TXP-MR-10G.pmthresholds.client.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.client.rs.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.ms.farend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.trunk.ms.farend.15min.EB	85040 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.trunk.ms.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.ms.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.ms.farend.15min.UAS	3 (seconds)	0 - 900

Table C-22 ETSI TXP_MR_10G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-10G.pmthresholds.trunk.ms.farend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.trunk.ms.farend.1day.EB	850400 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.trunk.ms.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.ms.nearend.15min.BBE	85040 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.trunk.ms.nearend.15min.EB	85040 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.trunk.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.ms.nearend.1day.BBE	850400 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.trunk.ms.nearend.1day.EB	850400 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.trunk.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.rs.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-10G.pmthresholds.trunk.rs.nearend.15min.EB	10000 (count)	0 - 7967700
TXP-MR-10G.pmthresholds.trunk.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-10G.pmthresholds.trunk.rs.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-10G.pmthresholds.trunk.rs.nearend.1day.EB	100000 (count)	0 - 764899200
TXP-MR-10G.pmthresholds.trunk.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-10G.pmthresholds.trunk.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.8 ETSI TXP_MR_2.5G Card Default Settings

Table C-23 lists the TXP_MR_2.5G card default settings.

Table C-23 ETSI TXP_MR_2.5G Card Default Settings

Default Name	Default Value	Default Domain
TXP-MR-2_5G.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-2_5G.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.config.client.AlsRecoveryPulseDuration	40.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-2_5G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXP-MR-2_5G.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, STM1_PORT, STM4_PORT, STM16_PORT, ONE_GE_PORT, ESCON_PORT, DV6000_PORT, SDI_D1_VIDEO_PORT, HDTV_PORT, PASS_THRU_PORT, ETR_CLO_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC PEER
TXP-MR-2_5G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
TXP-MR-2_5G.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-2_5G.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.config.client.TerminationMode	Transparent	Transparent, Regeneration Section, Multiplex Section when ppmPortAssignment UNASSIGNED, STM1_PORT, STM4_PORT, STM16_PORT; Transparent when ppmPortAssignment STM1_PORT, STM4_PORT, STM16_PORT, ONE_GE_PORT, ESCON_PORT, DV6000_PORT, SDI_D1_VIDEO_PORT, HDTV_PORT, PASS_THRU_PORT, ETR_CLO_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC PEER
TXP-MR-2_5G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXP-MR-2_5G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXP-MR-2_5G.config.trunk.AlsRecoveryPulseDuration	40.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXP-MR-2_5G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXP-MR-2_5G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-2_5G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXP-MR-2_5G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-2_5G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-2_5G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXP-MR-2_5G.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.trunk.alarm.HighRxPower	-7.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.trunk.alarm.LowRxPower	-26.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXP-MR-2_5G.otn.fecthresholds.1gethernet.15min.BitErrorsCorrected	112500 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.1gethernet.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.1gethernet.1day.BitErrorsCorrected	10800000 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.1gethernet.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.1gfiberchannel.15min.BitErrorsCorrected	90000 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.1gfiberchannel.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.1gfiberchannel.1day.BitErrorsCorrected	8640000 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.1gfiberchannel.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.1gficon.15min.BitErrorsCorrected	90000 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.1gficon.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.1gficon.1day.BitErrorsCorrected	8640000 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.1gficon.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.2gfiberchannel.15min.BitErrorsCorrected	180900 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.2gfiberchannel.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.2gfiberchannel.1day.BitErrorsCorrected	17366400 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.2gfiberchannel.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.2gficon.15min.BitErrorsCorrected	180900 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.2gficon.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.2gficon.1day.BitErrorsCorrected	17366400 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.2gficon.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.stm1.15min.BitErrorsCorrected	15012 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.stm1.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.stm1.1day.BitErrorsCorrected	1441152 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.stm1.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.stm16.15min.BitErrorsCorrected	225837 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.stm16.15min.UncorrectableWords	1 (count)	0 - 4724697600

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.otn.fecthresholds.stm16.1day.BitErrorsCorrected	21680352 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.stm16.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.fecthresholds.stm4.15min.BitErrorsCorrected	56457 (count)	0 - 9033621811200
TXP-MR-2_5G.otn.fecthresholds.stm4.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXP-MR-2_5G.otn.fecthresholds.stm4.1day.BitErrorsCorrected	5419872 (count)	0 - 867227693875200
TXP-MR-2_5G.otn.fecthresholds.stm4.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.BBE	21260 (count)	0 - 8850600
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.BBE	212600 (count)	0 - 849657600
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.BBE	21260 (count)	0 - 8850600
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.BBE	212600 (count)	0 - 849657600
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400
TXP-MR-2_5G.otn.otnLines.FEC	Enable	Disable, Enable when G709OTN Enable; Disable when G709OTN Disable
TXP-MR-2_5G.otn.otnLines.G709OTN	Enable	Disable, Enable
TXP-MR-2_5G.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.BBE	1312 (count)	0 - 137700
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.EB	1312 (count)	0 - 137700
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.BBE	13120 (count)	0 - 13219200
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.EB	13120 (count)	0 - 13219200
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.BBE	1312 (count)	0 - 137700
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.EB	1312 (count)	0 - 137700

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.BBE	13120 (count)	0 - 13219200
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.EB	13120 (count)	0 - 13219200
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.BBE	10000 (count)	0 - 138600
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.EB	10000 (count)	0 - 138600
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.BBE	10000 (count)	0 - 13305600
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.EB	100000 (count)	0 - 13305600
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.BBE	21260 (count)	0 - 2212200
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.EB	21260 (count)	0 - 2212200
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.BBE	212600 (count)	0 - 212371200
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.EB	212600 (seconds)	0 - 212371200
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.ES	864 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.BBE	21260 (count)	0 - 2212200
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.EB	21260 (count)	0 - 2212200
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.SES	1 (seconds)	0 - 900

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.BBE	212600 (count)	0 - 212371200
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.EB	212600 (count)	0 - 212371200
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.BBE	10000 (count)	0 - 2151900
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.EB	10000 (count)	0 - 2151900
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.BBE	10000 (count)	0 - 206582400
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.EB	100000 (count)	0 - 206582400
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.BBE	5315 (count)	0 - 552600
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.EB	5315 (count)	0 - 552600
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.BBE	53150 (count)	0 - 53049600
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.EB	53150 (count)	0 - 53049600
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.BBE	5315 (count)	0 - 552600
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.EB	5315 (count)	0 - 552600
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.BBE	53150 (count)	0 - 53049600

Table C-23 ETSI TXP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.EB	53150 (count)	0 - 53049600
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.BBE	10000 (count)	0 - 553500
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.EB	10000 (count)	0 - 553500
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.BBE	10000 (count)	0 - 53136000
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.EB	100000 (count)	0 - 53136000
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.9 ETSI TXPP_MR_2.5G Card Default Settings

Table C-24 lists the TXPP_MR_2.5G card default settings.

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.config.client.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00
TXPP-MR-2_5G.config.client.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXPP-MR-2_5G.config.client.AlsRecoveryPulseDuration	40.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXPP-MR-2_5G.config.client.AlsRecoveryPulseInterval	100 (seconds)	60 - 300

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.config.client.ppmPortAssignment	UNASSIGNED	UNASSIGNED, STM1_PORT, STM4_PORT, STM16_PORT, ONE_GE_PORT, ESCON_PORT, DV6000_PORT, SDI_D1_VIDEO_PORT, HDTV_PORT, PASS_THRU_PORT, ETR_CLO_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC PEER
TXPP-MR-2_5G.config.client.ppmSlotAssignment	UNASSIGNED	UNASSIGNED, PPM (1 Port)
TXPP-MR-2_5G.config.client.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXPP-MR-2_5G.config.client.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXPP-MR-2_5G.config.client.TerminationMode	Transparent	Transparent, Regeneration Section, Multiplex Section when ppmPortAssignment UNASSIGNED, STM1_PORT, STM4_PORT, STM16_PORT; Transparent when ppmPortAssignment STM1_PORT, STM4_PORT, STM16_PORT, ONE_GE_PORT, ESCON_PORT, DV6000_PORT, SDI_D1_VIDEO_PORT, HDTV_PORT, PASS_THRU_PORT, ETR_CLO_PORT, ISC COMPAT, FC1G_PORT, FC2G_PORT, FICON1G_PORT, FICON2G_PORT, ISC PEER
TXPP-MR-2_5G.config.trunk.AINSSoakTime	08:00 (hours:mins)	00:00, 00:15, 00:30 .. 48:00

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.config.trunk.AlsMode	Disabled	Disabled, Auto Restart, Manual Restart, Manual Restart for Test
TXPP-MR-2_5G.config.trunk.AlsRecoveryPulseDuration	40.0 (seconds)	2.0, 2.1, 2.2 .. 100.0 when AlsMode Disabled, Auto Restart, Manual Restart; 80.0, 80.1, 80.2 .. 100.0 when AlsMode Manual Restart for Test
TXPP-MR-2_5G.config.trunk.AlsRecoveryPulseInterval	100 (seconds)	60 - 300
TXPP-MR-2_5G.config.trunk.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXPP-MR-2_5G.config.trunk.SFBER	1.00E-04	1E-3, 1E-4, 1E-5
TXPP-MR-2_5G.opticalthresholds.client.alarm.HighLaserBias	90.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.client.alarm.HighRxPower	0.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.alarm.HighTxPower	-1.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.alarm.LowRxPower	-21.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.client.alarm.LowTxPower	-12.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighLaserBias	81.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.client.warning.15min.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighLaserBias	85.5 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighRxPower	-3.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.HighTxPower	3.0 (dBm)	LowTxPower, LowTxPower + 0.1, LowTxPower + 0.2 .. 30.0

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.LowRxPower	-18.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.client.warning.1day.LowTxPower	-16.0 (dBm)	-40.0, -39.9, -39.8 .. HighTxPower
TXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighLaserBias	98.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.trunk.alarm.HighRxPower	-7.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.trunk.alarm.LowRxPower	-26.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighLaserBias	95.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.trunk.warning.15min.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighLaserBias	96.0 (%)	0.0, 0.1, 0.2 .. 100.0
TXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.HighRxPower	-9.0 (dBm)	LowRxPower, LowRxPower + 0.1, LowRxPower + 0.2 .. 30.0
TXPP-MR-2_5G.opticalthresholds.trunk.warning.1day.LowRxPower	-23.0 (dBm)	-40.0, -39.9, -39.8 .. HighRxPower
TXPP-MR-2_5G.otn.fecthresholds.1gethernet.15min.BitErrorsCorrected	112500 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.1gethernet.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.1gethernet.1day.BitErrorsCorrected	10800000 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.1gethernet.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.1gfiberchannel.15min.BitErrorsCorrected	90000 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.1gfiberchannel.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.1gfiberchannel.1day.BitErrorsCorrected	8640000 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.1gfiberchannel.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.1gficon.15min.BitErrorsCorrected	90000 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fecthresholds.1gficon.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fecthresholds.1gficon.1day.BitErrorsCorrected	8640000 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fecthresholds.1gficon.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fecthresholds.2gfiberchannel.15min.BitErrorsCorrected	180900 (count)	0 - 9033621811200

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.otn.fec thresholds.2gfiberchannel.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fec thresholds.2gfiberchannel.1day.BitErrorsCorrected	17366400 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fec thresholds.2gfiberchannel.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fec thresholds.2gficon.15min.BitErrorsCorrected	180900 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fec thresholds.2gficon.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fec thresholds.2gficon.1day.BitErrorsCorrected	17366400 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fec thresholds.2gficon.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fec thresholds.stm1.15min.BitErrorsCorrected	15012 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fec thresholds.stm1.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fec thresholds.stm1.1day.BitErrorsCorrected	1441152 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fec thresholds.stm1.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fec thresholds.stm16.15min.BitErrorsCorrected	225837 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fec thresholds.stm16.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fec thresholds.stm16.1day.BitErrorsCorrected	21680352 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fec thresholds.stm16.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.fec thresholds.stm4.15min.BitErrorsCorrected	56457 (count)	0 - 9033621811200
TXPP-MR-2_5G.otn.fec thresholds.stm4.15min.UncorrectableWords	1 (count)	0 - 4724697600
TXPP-MR-2_5G.otn.fec thresholds.stm4.1day.BitErrorsCorrected	5419872 (count)	0 - 867227693875200
TXPP-MR-2_5G.otn.fec thresholds.stm4.1day.UncorrectableWords	96 (count)	0 - 453570969600
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.BBE	21260 (count)	0 - 8850600
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.BBE	212600 (count)	0 - 849657600
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.farend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.BBE	21260 (count)	0 - 8850600

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.BBE	212600 (count)	0 - 849657600
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.pm.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.BBE	10000 (count)	0 - 8850600
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.15min.UAS	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.BBE	100000 (count)	0 - 849657600
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.ES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.farend.1day.UAS	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.BBE	10000 (count)	0 - 8850600
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.FC	10 (count)	0 - 72
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.15min.UAS	500 (seconds)	0 - 900
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.BBE	100000 (count)	0 - 849657600
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.ES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.FC	40 (count)	0 - 6912
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.otn.g709thresholds.sm.nearend.1day.UAS	5000 (seconds)	0 - 86400

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.otn.otnLines.FEC	Enable	Disable, Enable when G709OTN Enable; Disable when G709OTN Disable
TXPP-MR-2_5G.otn.otnLines.G709OTN	Enable	Disable, Enable
TXPP-MR-2_5G.otn.otnLines.SDBER	1.00E-07	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.BBE	1312 (count)	0 - 137700
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.EB	1312 (count)	0 - 137700
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.BBE	13120 (count)	0 - 13219200
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.EB	13120 (count)	0 - 13219200
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm1.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.BBE	1312 (count)	0 - 137700
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.EB	1312 (count)	0 - 137700
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.BBE	13120 (count)	0 - 13219200
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.EB	13120 (count)	0 - 13219200
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm1.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.BBE	10000 (count)	0 - 138600
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.EB	10000 (count)	0 - 138600
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.BBE	10000 (count)	0 - 13305600
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.EB	100000 (count)	0 - 13305600
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.ES	5000 (seconds)	0 - 86400

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm1.rs.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.BBE	21260 (count)	0 - 2212200
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.EB	21260 (count)	0 - 2212200
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.BBE	212600 (count)	0 - 212371200
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.EB	212600 (seconds)	0 - 212371200
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.ES	864 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm16.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.BBE	21260 (count)	0 - 2212200
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.EB	21260 (count)	0 - 2212200
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.BBE	212600 (count)	0 - 212371200
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.EB	212600 (count)	0 - 212371200
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm16.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.BBE	10000 (count)	0 - 2151900
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.EB	10000 (count)	0 - 2151900
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.BBE	10000 (count)	0 - 206582400
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.EB	100000 (count)	0 - 206582400
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.ES	5000 (seconds)	0 - 86400

Table C-24 ETSI TXPP_MR_2.5G Card Default Settings (continued)

Default Name	Default Value	Default Domain
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm16.rs.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.BBE	5315 (count)	0 - 552600
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.EB	5315 (count)	0 - 552600
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.BBE	53150 (count)	0 - 53049600
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.EB	53150 (count)	0 - 53049600
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.ms.farend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.BBE	5315 (count)	0 - 552600
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.EB	5315 (count)	0 - 552600
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.ES	87 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.SES	1 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.BBE	53150 (count)	0 - 53049600
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.EB	53150 (count)	0 - 53049600
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.ES	864 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.SES	4 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.BBE	10000 (count)	0 - 553500
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.EB	10000 (count)	0 - 553500
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.ES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.SES	500 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.15min.UAS	3 (seconds)	0 - 900
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.BBE	10000 (count)	0 - 53136000
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.EB	100000 (count)	0 - 53136000
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
TXPP-MR-2_5G.pmthresholds.stm4.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.10 ETSI OSCM Card Default Settings

Table C-25 lists the OSCM card default settings.

Table C-25 ETSI OSCM Card Default Settings

Default Name	Default Value	Default Domain
OSCM.config.card.AlsMode	Auto Restart	Disabled, Auto Restart
OSCM.pmthresholds.ms.farend.15min.BBE	1312 (count)	0 - 137700
OSCM.pmthresholds.ms.farend.15min.EB	1312 (count)	0 - 137700
OSCM.pmthresholds.ms.farend.15min.ES	87 (seconds)	0 - 900
OSCM.pmthresholds.ms.farend.15min.SES	1 (seconds)	0 - 900
OSCM.pmthresholds.ms.farend.15min.UAS	3 (seconds)	0 - 900
OSCM.pmthresholds.ms.farend.1day.BBE	13120 (count)	0 - 13219200
OSCM.pmthresholds.ms.farend.1day.EB	13120 (count)	0 - 13219200
OSCM.pmthresholds.ms.farend.1day.ES	864 (seconds)	0 - 86400
OSCM.pmthresholds.ms.farend.1day.SES	4 (seconds)	0 - 86400
OSCM.pmthresholds.ms.farend.1day.UAS	10 (seconds)	0 - 86400
OSCM.pmthresholds.ms.nearend.15min.BBE	1312 (count)	0 - 137700
OSCM.pmthresholds.ms.nearend.15min.EB	1312 (count)	0 - 137700
OSCM.pmthresholds.ms.nearend.15min.ES	87 (seconds)	0 - 900
OSCM.pmthresholds.ms.nearend.15min.SES	1 (seconds)	0 - 900
OSCM.pmthresholds.ms.nearend.15min.UAS	3 (seconds)	0 - 900
OSCM.pmthresholds.ms.nearend.1day.BBE	13120 (count)	0 - 13219200
OSCM.pmthresholds.ms.nearend.1day.EB	13120 (count)	0 - 13219200
OSCM.pmthresholds.ms.nearend.1day.ES	864 (seconds)	0 - 86400
OSCM.pmthresholds.ms.nearend.1day.SES	4 (seconds)	0 - 86400
OSCM.pmthresholds.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
OSCM.pmthresholds.rs.nearend.15min.BBE	10000 (count)	0 - 138600
OSCM.pmthresholds.rs.nearend.15min.EB	10000 (count)	0 - 138600
OSCM.pmthresholds.rs.nearend.15min.ES	500 (seconds)	0 - 900
OSCM.pmthresholds.rs.nearend.15min.SEFS	500 (seconds)	0 - 900
OSCM.pmthresholds.rs.nearend.15min.SES	500 (seconds)	0 - 900
OSCM.pmthresholds.rs.nearend.15min.UAS	3 (seconds)	0 - 900
OSCM.pmthresholds.rs.nearend.1day.BBE	100000 (count)	0 - 13305600
OSCM.pmthresholds.rs.nearend.1day.EB	100000 (count)	0 - 13305600
OSCM.pmthresholds.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
OSCM.pmthresholds.rs.nearend.1day.SEFS	5000 (seconds)	0 - 86400
OSCM.pmthresholds.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
OSCM.pmthresholds.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.11 ETSI OSC-CSM Card Default Settings

Table C-26 lists the OSC-CSM card default settings.

Table C-26 ETSI OSC-CSM Card Default Settings

Default Name	Default Value	Default Domain
OSC_CSM.config.card.AlsMode	Auto Restart	Disabled, Auto Restart
OSC_CSM.pmthresholds.ms.farend.15min.BBE	1312 (count)	0 - 137700
OSC_CSM.pmthresholds.ms.farend.15min.EB	1312 (count)	0 - 137700
OSC_CSM.pmthresholds.ms.farend.15min.ES	87 (seconds)	0 - 900
OSC_CSM.pmthresholds.ms.farend.15min.SES	1 (seconds)	0 - 900
OSC_CSM.pmthresholds.ms.farend.15min.UAS	3 (seconds)	0 - 900
OSC_CSM.pmthresholds.ms.farend.1day.BBE	13120 (count)	0 - 13219200
OSC_CSM.pmthresholds.ms.farend.1day.EB	13120 (count)	0 - 13219200
OSC_CSM.pmthresholds.ms.farend.1day.ES	864 (seconds)	0 - 86400
OSC_CSM.pmthresholds.ms.farend.1day.SES	4 (seconds)	0 - 86400
OSC_CSM.pmthresholds.ms.farend.1day.UAS	10 (seconds)	0 - 86400
OSC_CSM.pmthresholds.ms.nearend.15min.BBE	1312 (count)	0 - 137700
OSC_CSM.pmthresholds.ms.nearend.15min.EB	1312 (count)	0 - 137700
OSC_CSM.pmthresholds.ms.nearend.15min.ES	87 (seconds)	0 - 900
OSC_CSM.pmthresholds.ms.nearend.15min.SES	1 (seconds)	0 - 900
OSC_CSM.pmthresholds.ms.nearend.15min.UAS	3 (seconds)	0 - 900
OSC_CSM.pmthresholds.ms.nearend.1day.BBE	13120 (count)	0 - 13219200
OSC_CSM.pmthresholds.ms.nearend.1day.EB	13120 (count)	0 - 13219200
OSC_CSM.pmthresholds.ms.nearend.1day.ES	864 (seconds)	0 - 86400
OSC_CSM.pmthresholds.ms.nearend.1day.SES	4 (seconds)	0 - 86400
OSC_CSM.pmthresholds.ms.nearend.1day.UAS	10 (seconds)	0 - 86400
OSC_CSM.pmthresholds.rs.nearend.15min.BBE	10000 (count)	0 - 138600
OSC_CSM.pmthresholds.rs.nearend.15min.EB	10000 (count)	0 - 138600
OSC_CSM.pmthresholds.rs.nearend.15min.ES	500 (seconds)	0 - 900
OSC_CSM.pmthresholds.rs.nearend.15min.SEFS	500 (seconds)	0 - 900
OSC_CSM.pmthresholds.rs.nearend.15min.SES	500 (seconds)	0 - 900
OSC_CSM.pmthresholds.rs.nearend.15min.UAS	3 (seconds)	0 - 900
OSC_CSM.pmthresholds.rs.nearend.1day.BBE	100000 (count)	0 - 13305600
OSC_CSM.pmthresholds.rs.nearend.1day.EB	100000 (count)	0 - 13305600
OSC_CSM.pmthresholds.rs.nearend.1day.ES	5000 (seconds)	0 - 86400
OSC_CSM.pmthresholds.rs.nearend.1day.SEFS	5000 (seconds)	0 - 86400
OSC_CSM.pmthresholds.rs.nearend.1day.SES	5000 (seconds)	0 - 86400
OSC_CSM.pmthresholds.rs.nearend.1day.UAS	10 (seconds)	0 - 86400

C.4.1.3.12 ETSI Amplifier Card Default Settings

Table C-27 lists the OPT-BST and OPT-BST-L card default settings.

Table C-27 ETSI Amplifier Card Default Settings

Default Name	Default Value	Default Domain
OPT-BST.config.card.AlsMode	Auto Restart	Disabled, Auto Restart
OPT-BST-L.config.card.AlsMode	Auto Restart	Disabled, Auto Restart

C.4.2 ETSI Node Default Settings

Table C-28 on page C-134 lists the Cisco ONS 15327 node-level default settings for the ETSI shelf assembly. Cisco provides the following types of user-configurable defaults for each Cisco ONS 15327 node:

- **Circuit settings**—Set the administrative state, subnetwork connection protection (SNCP) circuit threshold levels for signal degradation and failure, SNCP reversion time, and whether SNCP circuits are revertive by default.
- **General settings**—Set general node management defaults, including whether to use Daylight Savings Time (DST), the IP address of the NTP/SNTP server to be used, the time zone where the node is located, the SD path BER value, and the defaults description.
- **Link Management Protocol settings**—Set link management protocol data link type, traffic engineering link, and general settings.
- **Power Monitor settings**—Set default voltage thresholds for the node.
- **Network settings**—Set whether to prevent display of node IP addresses in CTC (applicable for all users except Superusers); default gateway node type; whether to raise an alarm when the backplane LAN cable is disconnected; and whether to display the IP address in the LCD in an editable mode (in which you can change the IP address directly from LCD screen), to display the IP address on the LCD as read-only, or to suppress display of the IP on the LCD entirely.
- **OSI settings**—Set Open System Interconnection (OSI) main setup, generic routing encapsulation (GRE) tunnel, link access protocol on the D channel (LAP-D), router subnet, and TID address resolution protocol (TARP) settings.
- **Linear Multiplex Section Protection (LMSP) settings**—Set whether or not protected circuits have bidirectional switching, are revertive, and what the reversion time is.
- **MS-SPRing protection settings**—Set whether MS-SPRing-protected circuits are revertive, and what the reversion time is, at both the ring and span levels.
- **Y Cable protection settings**—Set whether Y-cable protected circuits are revertive, and what the reversion time is.
- **Splitter protection settings**—Set whether splitter protected circuits are revertive, and what the reversion time is.
- **Legal Disclaimer**—Set the legal disclaimer that warns users at the login screen about the possible legal or contractual ramifications of accessing equipment, systems, or networks without authorization.
- **Security Grant Permissions**—Set default user security levels for activating/reverting software, performance monitoring data clearing, database restoring, and retrieving audit logs.

- Security DataComm settings—Set default security settings for TCC Ethernet IP address and IP netmask, and CTC backplane IP suppression; set secure mode on and secure mode locked (for TCC2P cards only).
- Security Access settings—Set default security settings for LAN access, shell access, serial craft access, element management system (EMS) access (including Internet Inter-Object Request Broker Protocol [IIOP] listener port number), TL1 access, and SNMP access.
- Security RADIUS settings—Set default RADIUS server settings for accounting port number, authentication port number, and whether to enable the node as a final authenticator.
- Security Policy settings—Set the allowable failed logins before lockout, idle user timeout for each user-level, optional lockout duration or manual unlock enabled, password reuse and change frequency policies, number of characters difference between the old and new password, password aging by security level, enforced single concurrent session per user, and option to disable inactive user after a set inactivity period.
- BITS Timing settings—Set the AIS threshold, Admin SSM, coding, facility type, framing, state, and Sa bit (the overhead bit that will carry the SSM) for building integrated timing supply 1 (BITS-1) and BITS2 timing.
- General Timing settings—Set the mode (External, Line, or Mixed), revertive, and reversion time.

**Note**

Any node level defaults changed using the **Provisioning > Defaults** tab, changes existing node level provisioning. Although this is service affecting, it depends on the type of defaults changed, for example, general, and all timing and security attributes. The “Changing default values for some node level attributes overrides the current provisioning.” message is displayed. The Side Effects column of the Defaults editor (right-click a column header and select **Show Column > Side Effects**) explains the effect of changing the default values. However, when the card level defaults are changed using the **Provisioning > Defaults** tab, existing card provisioning remains unaffected.

**Note**

For more information about each individual node setting, refer to the “Manage the Node” chapter in the *Cisco ONS 15454 DWDM Procedure Guide*.

**Note**

Refer to the [C.3 CTC Default Settings, page C-75](#) for CTC-level default settings for the Cisco ONS 15327.

Table C-28 Node Default Settings

Default Name	Default Value	Default Domain
NODE.circuits.snep.HO_SDBER	1.00E-06	1E-5, 1E-6, 1E-7, 1E-8, 1E-9
NODE.circuits.snep.HO_SFBER	1.00E-04	1E-3, 1E-4, 1E-5
NODE.circuits.snep.LO_SDBER	1.00E-06	1E-5, 1E-6, 1E-7, 1E-8
NODE.circuits.snep.LO_SFBER	1.00E-04	1E-3, 1E-4, 1E-5
NODE.circuits.snep.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.circuits.snep.Revertive	FALSE	TRUE, FALSE

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.circuits.State	unlocked, automaticInService	unlocked, locked, disabled, locked, maintenance, unlocked, automaticInService
NODE.general.DefaultsDescription	Factory Defaults	Free form field
NODE.general.NtpSntpServer	0.0.0.0	IP Address
NODE.general.ReportLoopbackConditionsOnUnlocked,MaintenancePorts	FALSE	FALSE, TRUE
NODE.general.TimeZone	(GMT-08:00) Pacific Time (US & Canada), Tijuana	(For applicable time zones, see Table C-14 on page C-73.)
NODE.general.UseDST	TRUE	TRUE, FALSE
NODE.lmp.controlChannel.AdminState	locked, disabled	unlocked, locked, disabled
NODE.lmp.controlChannel.HelloDeadInterval	12000 (ms)	maximum_of(2000,MinHelloDeadInterval,product_of(HelloInterval,3)), maximum_of(2000,MinHelloDeadInterval,product_of(HelloInterval,3)) + 1, maximum_of(2000,MinHelloDeadInterval,product_of(HelloInterval,3)) + 2 .. minimum_of(2000,MaxHelloDeadInterval)

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.lmp.controlChannel.HelloInterval	500 (ms)	maximum_of(300,MinHelloInterval), maximum_of(300,MinHelloInterval) + 1, maximum_of(300,MinHelloInterval) + 2 .. minimum_of(5000,MaxHelloInterval,quotient_of(HelloDeadInterval,3))
NODE.lmp.controlChannel.MaxHelloDeadInterval	20000 (ms)	maximum_of(2000,HelloDeadInterval,sum_of(MaxHelloInterval,1)), maximum_of(2000,HelloDeadInterval,sum_of(MaxHelloInterval,1)) + 1, maximum_of(2000,HelloDeadInterval,sum_of(MaxHelloInterval,1)) + 2 .. 20000
NODE.lmp.controlChannel.MaxHelloInterval	2000 (ms)	maximum_of(300,HelloInterval), maximum_of(300,HelloInterval) + 1, maximum_of(300,HelloInterval) + 2 .. minimum_of(5000,difference_of(MaxHelloDeadInterval,1))

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.imp.controlChannel.MinHelloDeadInterval	2000 (ms)	maximum_of(2000,sum_of(MinHelloInterval,1)), maximum_of(2000,sum_of(MinHelloInterval,1)) + 1, maximum_of(2000,sum_of(MinHelloInterval,1)) + 2 .. minimum_of(2000,HelloDeadInterval)
NODE.imp.controlChannel.MinHelloInterval	300 (ms)	300, 301, 302 .. minimum_of(500,HelloInterval,difference_of(MinHelloDeadInterval,1))
NODE.imp.dataLink.Type	Port	Port, Component
NODE.imp.general.Allowed	TRUE	FALSE, TRUE
NODE.imp.general.Enabled	FALSE	FALSE, TRUE when Allowed TRUE; FALSE when Allowed FALSE
NODE.imp.general.LMP-WDM	TRUE	FALSE, TRUE
NODE.imp.general.Role	OLS	PEER, OLS
NODE.imp.teLink.AdminState	locked, disabled	unlocked, locked, disabled
NODE.imp.teLink.DWDM	TRUE	FALSE, TRUE
NODE.imp.teLink.MuxCapability	Lambda Switch	Packet Switch - Level 1, Packet Switch - Level 2, Packet Switch - Level 3, Packet Switch - Level 4, Layer 2 Switch, TDM Cross-connect, Lambda Switch, Fiber Switch
NODE.network.general.AlarmMissingBackplaneLAN	FALSE	TRUE, FALSE
NODE.network.general.CtcIpDisplaySuppression	FALSE	TRUE, FALSE

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.network.general.GatewaySettings	None	LeaveAsIs, None, ENE, GNE, ProxyOnlyNode
NODE.network.general.LcdSetting	Allow Configuration	Allow Configuration, Display Only, Suppress Display
NODE.osi.greTunnel.OspfCost	110	110 - 65535
NODE.osi.greTunnel.SubnetMask	24 (bits)	8, 9, 10 .. 32
NODE.osi.lapd.Mode	AITS	AITS, UITS
NODE.osi.lapd.MTU	512	512, 513, 514 .. 1500
NODE.osi.lapd.Role	Network	Network, User
NODE.osi.lapd.T200	200 (ms)	200, 300, 400 .. 20000
NODE.osi.lapd.T203	10000 (ms)	4000, 4100, 4200 .. 120000
NODE.osi.mainSetup.L1L2LSPBufferSize	512 (bytes)	512 - 1500
NODE.osi.mainSetup.L1LSPBufferSize	512 (bytes)	512 - 1500
NODE.osi.mainSetup.NodeRoutingMode	Intermediate System Level 1	End System, Intermediate System Level 1, Intermediate System Level 1/Level 2
NODE.osi.subnet.DISPriority	63	1, 2, 3 .. 127
NODE.osi.subnet.ESH	10 (sec)	10, 20, 30 .. 1000
NODE.osi.subnet.GCCISISCost	60	1, 2, 3 .. 63
NODE.osi.subnet.IIH	3 (sec)	1, 2, 3 .. 600
NODE.osi.subnet.ISH	10 (sec)	10, 20, 30 .. 1000
NODE.osi.subnet.LANISISCost	20	1, 2, 3 .. 63
NODE.osi.subnet.LDCCISISCost	40	1, 2, 3 .. 63
NODE.osi.subnet.OSCISISCost	60	1, 2, 3 .. 63
NODE.osi.subnet.SDCCISISCost	60	1, 2, 3 .. 63
NODE.osi.tarp.L1DataCache	TRUE	FALSE, TRUE
NODE.osi.tarp.L2DataCache	FALSE	FALSE, TRUE
NODE.osi.tarp.LANStormSuppression	TRUE	FALSE, TRUE
NODE.osi.tarp.LDB	TRUE	FALSE, TRUE
NODE.osi.tarp.LDBEntry	5 (min)	10-Jan
NODE.osi.tarp.LDBFlush	5 (min)	0 - 1440

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.osi.tarp.PDUsL1Propagation	TRUE	FALSE, TRUE
NODE.osi.tarp.PDUsL2Propagation	TRUE	FALSE, TRUE
NODE.osi.tarp.PDUsOrigination	TRUE	FALSE, TRUE
NODE.osi.tarp.T1Timer	15 (sec)	0 - 3600
NODE.osi.tarp.T2Timer	25 (sec)	0 - 3600
NODE.osi.tarp.T3Timer	40 (sec)	0 - 3600
NODE.osi.tarp.T4Timer	20 (sec)	0 - 3600
NODE.osi.tarp.Type4PDUDelay	0 (sec)	0 - 255
NODE.powerMonitor.EHIBATVG_48V	-56.5 (Vdc)	-40.5, -41.0, -41.5 .. -57.0
NODE.powerMonitor.EHIBATVG_60V	-72.0 (Vdc)	-50.0, -50.5, -51.0 .. -72.0
NODE.powerMonitor.ELWBATVG_48V	-40.5 (Vdc)	-40.5, -41.0, -41.5 .. -56.5
NODE.powerMonitor.ELWBATVG_60V	-50.0 (Vdc)	-50.0, -50.5, -51.0 .. -72.0
NODE.protection.lmsp.BidirectionalSwitching	FALSE	TRUE, FALSE
NODE.protection.lmsp.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.lmsp.Revertive	FALSE	TRUE, FALSE
NODE.protection.msspr.RingReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.msspr.RingRevertive	TRUE	TRUE, FALSE
NODE.protection.msspr.SpanReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.msspr.SpanRevertive	TRUE	TRUE, FALSE
NODE.protection.splitter.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.splitter.Revertive	FALSE	TRUE, FALSE
NODE.protection.ycable.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.protection.ycable.Revertive	FALSE	TRUE, FALSE
NODE.security.dataComm.CtcBackplaneIpDisplaySuppression	TRUE	FALSE, TRUE when isSecureModeSupportedOnControlCard TRUE; (NOT SUPPORTED) when isSecureModeSupportedOnControlCard FALSE
NODE.security.dataComm.DefaultTCCEthernetIP	10.0.0.1	IP Address
NODE.security.dataComm.DefaultTCCEthernetIPNetmask	24 (bits)	8, 9, 10 .. 32

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.security.dataComm.isSecureModeSupportedOnControlCard	TRUE	FALSE, TRUE
NODE.security.dataComm.LcdBackplaneIpSetting	Display Only	Allow Configuration, Display Only, Suppress Display when isSecureModeSupportedOnControlCard TRUE; (NOT SUPPORTED) when isSecureModeSupportedOnControlCard FALSE
NODE.security.dataComm.SecureModeLocked	FALSE	FALSE, TRUE when isSecureModeSupportedOnControlCard TRUE; (NOT SUPPORTED) when isSecureModeSupportedOnControlCard FALSE
NODE.security.dataComm.SecureModeOn (May reboot node)	FALSE	FALSE, TRUE when isSecureModeSupportedOnControlCard TRUE; (NOT SUPPORTED) when isSecureModeSupportedOnControlCard FALSE
NODE.security.emsAccess.AccessState	NonSecure	NonSecure, Secure
NODE.security.emsAccess.IIOPListenerPort (May reboot node)	57790 (port #)	0 - 65535
NODE.security.grantPermission.ActivateRevertSoftware	Superuser	Provisioning, Superuser
NODE.security.grantPermission.PMclearingPrivilege	Provisioning	Provisioning, Superuser

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.security.grantPermission.RestoreDB	Superuser	Provisioning, Superuser
NODE.security.grantPermission.RetrieveAuditLog	Superuser	Provisioning, Superuser
NODE.security.idleUserTimeout.Maintenance	01:00 (hours:mins)	00:00, 00:01, 00:02 .. 16:39
NODE.security.idleUserTimeout.Provisioning	00:30 (hours:mins)	00:00, 00:01, 00:02 .. 16:39
NODE.security.idleUserTimeout.Retrieve	00:00 (hours:mins)	00:00, 00:01, 00:02 .. 16:39
NODE.security.idleUserTimeout.Superuser	00:15 (hours:mins)	00:00, 00:01, 00:02 .. 16:39
NODE.security.lanAccess.LANAccess (May disconnect CTC from node)	Front & Backplane	No LAN Access, Front Only, Backplane Only, Front & Backplane
NODE.security.lanAccess.RestoreTimeout	5 (minutes)	0 - 60
NODE.security.legalDisclaimer.LoginWarningMessage	<html><center>WARNING</center>This system is restricted to authorized users for business purposes. Unauthorized access is a violation of the law. This service may be monitored for administrative and security reasons. By proceeding, you consent to this monitoring.	Free form field
NODE.security.other.DisableInactiveUser	FALSE	FALSE, TRUE

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.security.other.InactiveDuration	45 (days)	1, 2, 3 .. 99 when DisableInactiveUser TRUE; 45 when DisableInactiveUser FALSE
NODE.security.other.SingleSessionPerUser	FALSE	TRUE, FALSE
NODE.security.passwordAging.EnforcePasswordAging	FALSE	TRUE, FALSE
NODE.security.passwordAging.maintenance.AgingPeriod	45 (days)	20 - 90
NODE.security.passwordAging.maintenance.WarningPeriod	5 (days)	20-Feb
NODE.security.passwordAging.provisioning.AgingPeriod	45 (days)	20 - 90
NODE.security.passwordAging.provisioning.WarningPeriod	5 (days)	20-Feb
NODE.security.passwordAging.retrieve.AgingPeriod	45 (days)	20 - 90
NODE.security.passwordAging.retrieve.WarningPeriod	5 (days)	20-Feb
NODE.security.passwordAging.superuser.AgingPeriod	45 (days)	20 - 90
NODE.security.passwordAging.superuser.WarningPeriod	5 (days)	20-Feb
NODE.security.passwordChange.CannotChangeNewPassword	FALSE	TRUE, FALSE
NODE.security.passwordChange.CannotChangeNewPasswordForNDays	20 (days)	20 - 95
NODE.security.passwordChange.NewPasswordMustDifferFromOldByNCharacters	1 (characters)	5-Jan
NODE.security.passwordChange.PreventReusingLastNPasswords	1 (times)	10-Jan
NODE.security.passwordChange.RequirePasswordChangeOnFirstLoginToNewAccount	FALSE	TRUE, FALSE
NODE.security.radiusServer.AccountingPort	1813 (port)	0 - 32767
NODE.security.radiusServer.AuthenticationPort	1812 (port)	0 - 32767
NODE.security.radiusServer.EnableNodeAsFinalAuthenticator	TRUE	FALSE, TRUE
NODE.security.serialCraftAccess.EnableCraftPort	TRUE	TRUE, FALSE
NODE.security.shellAccess.AccessState	NonSecure	Disabled, NonSecure, Secure
NODE.security.shellAccess.EnableShellPassword	FALSE	TRUE, FALSE
NODE.security.shellAccess.TelnetPort	23	23 - 9999
NODE.security.snmpAccess.AccessState	NonSecure	Disabled, NonSecure
NODE.security.tl1Access.AccessState	NonSecure	Disabled, NonSecure, Secure
NODE.security.userLockout.FailedLoginsAllowedBeforeLockout	5 (times)	0 - 10
NODE.security.userLockout.LockoutDuration	00:30 (mins:secs)	00:00, 00:05, 00:10 .. 10:00
NODE.security.userLockout.ManualUnlockBySuperuser	FALSE	TRUE, FALSE

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.timing.bits-1.AdminSSMIn	STU	G811, STU, G812T, G812L, SETS, DUS
NODE.timing.bits-1.AISThreshold	DUS	G811, STU, G812T, G812L, SETS, DUS
NODE.timing.bits-1.Coding	HDB3	HDB3, AMI when FacilityType E1; N/A when FacilityType 2MHz; AMI when FacilityType 64kHz+8kHz
NODE.timing.bits-1.CodingOut	HDB3	HDB3, AMI when FacilityTypeOut E1; N/A when FacilityTypeOut 2MHz; AMI when FacilityTypeOut 6MHz
NODE.timing.bits-1.FacilityType	E1	E1, 64kHz+8kHz, 2MHz
NODE.timing.bits-1.FacilityTypeOut	E1	E1, 6MHz, 2MHz
NODE.timing.bits-1.Framing	FAS+CAS+CRC	FAS+CRC, FAS+CAS, FAS+CAS+CRC, FAS, Unframed when FacilityType E1; when FacilityType 2MHz; FAS+CRC, FAS+CAS, FAS+CAS+CRC, FAS, Unframed, Unframed - 2Mhz when FacilityType 64kHz+8kHz

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.timing.bits-1.FramingOut	FAS+CAS+ CRC	FAS+CRC, FAS+CAS, FAS+CAS+CRC, FAS, Unframed when FacilityTypeOut E1; when FacilityTypeOut 2MHz; FAS+CRC, FAS+CAS, FAS+CAS+CRC, FAS, Unframed, Unframed - 2Mhz when FacilityTypeOut 6MHz
NODE.timing.bits-1.Sa bit	4	4, 5, 6, 7, 8 when FacilityType E1; N/A when FacilityType 2MHz; N/A when FacilityType 64kHz+8kHz
NODE.timing.bits-1.State	unlocked	unlocked, locked, disabled
NODE.timing.bits-1.StateOut	unlocked	unlocked, locked, disabled
NODE.timing.bits-2.AdminSSMIn	STU	G811, STU, G812T, G812L, SETS, DUS
NODE.timing.bits-2.AISThreshold	DUS	G811, STU, G812T, G812L, SETS, DUS
NODE.timing.bits-2.Coding	HDB3	HDB3, AMI when FacilityType E1; N/A when FacilityType 2MHz; AMI when FacilityType 64kHz+8kHz

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.timing.bits-2.CodingOut	HDB3	HDB3, AMI when FacilityTypeOut E1; N/A when FacilityTypeOut 2MHz; AMI when FacilityTypeOut 6MHz
NODE.timing.bits-2.FacilityType	E1	E1, 64kHz+8kHz, 2MHz
NODE.timing.bits-2.FacilityTypeOut	E1	E1, 6MHz, 2MHz
NODE.timing.bits-2.Framing	FAS+CAS+ CRC	FAS+CRC, FAS+CAS, FAS+CAS+CRC, FAS, Unframed when FacilityType E1; when FacilityType 2MHz; FAS+CRC, FAS+CAS, FAS+CAS+CRC, FAS, Unframed, Unframed - 2Mhz when FacilityType 64kHz+8kHz
NODE.timing.bits-2.FramingOut	FAS+CAS+ CRC	FAS+CRC, FAS+CAS, FAS+CAS+CRC, FAS, Unframed when FacilityTypeOut E1; when FacilityTypeOut 2MHz; FAS+CRC, FAS+CAS, FAS+CAS+CRC, FAS, Unframed, Unframed - 2Mhz when FacilityTypeOut 6MHz

Table C-28 Node Default Settings (continued)

Default Name	Default Value	Default Domain
NODE.timing.bits-2.Sa bit	4	4, 5, 6, 7, 8 when FacilityType E1; N/A when FacilityType 2MHz; N/A when FacilityType 64kHz+8kHz
NODE.timing.bits-2.State	unlocked	unlocked, locked, disabled
NODE.timing.bits-2.StateOut	unlocked	unlocked, locked, disabled
NODE.timing.general.Mode	External	External, Line, Mixed
NODE.timing.general.ReversionTime	5.0 (minutes)	0.5, 1.0, 1.5 .. 12.0
NODE.timing.general.Revertive	FALSE	TRUE, FALSE



Numerics

10DME_C card. *See* MXP_MR_10DME_C card

10DME_L card. *See* MXP_MR_10DME_L card

32DMX card

See also DWDM cards

block diagrams [2-73](#)

channel plan [A-18](#)

description [2-71](#)

faceplate [2-72](#)

input power class [2-7](#)

LEDs [2-74](#)

PM parameters [10-14](#)

port calibration [2-74](#)

power monitoring [2-74](#)

power requirements [A-5](#)

provisionable patchcords [8-23](#)

ROADM [2-73](#)

service state transitions [B-4](#)

specifications [A-18](#)

32DMX-L card

See also DWDM cards

block diagrams [2-77](#)

description [2-74](#)

faceplate [2-76](#)

input power class [2-7](#)

LEDs [2-78](#)

PM parameters [10-14](#)

port calibration [2-78](#)

power monitoring [2-78](#)

power requirements [A-5](#)

ROADM [2-77](#)

service state transitions [B-4](#)

specifications [A-19](#)

32DMX-O card

See also DWDM cards

block diagrams [2-70](#)

description [2-67](#)

faceplate [2-69](#)

input power class [2-7](#)

LEDs [2-71](#)

PM parameters [10-14](#)

port calibration [2-70](#)

power monitoring [2-70](#)

power requirements [A-5](#)

provisionable patchcords [8-23](#)

service state transitions [B-4](#)

specifications [A-17](#)

32MUX-O card

See also DWDM cards

block diagrams [2-65](#)

channel plan [2-65](#)

description [2-63](#)

faceplate [2-64](#)

input power class [2-7](#)

LEDs [2-67](#)

PM parameters [10-14](#)

port calibration [2-67](#)

power monitoring [2-67](#)

power requirements [A-5](#)

provisionable patchcords [8-23](#)

service state transitions [B-4](#)

specifications [A-16](#)

32WSS card

See also DWDM cards

block diagrams [2-81 to 2-82](#)

- channel plan [A-34](#)
- description [2-79](#)
- faceplate [2-80](#)
- input power class [2-7](#)
- LEDs [2-83](#)
- PM parameters [10-14](#)
- port calibration [2-83](#)
- power monitoring [2-83](#)
- power requirements [A-5](#)
- provisionable patchcords [8-23](#)
- service state transitions [B-4](#)
- specifications [A-33](#)

32WSS-L card

See also DWDM cards

- block diagrams [2-86 to 2-87](#)
- channel plan [2-88, A-20, A-36](#)
- description [2-84](#)
- faceplate [2-85](#)
- input power class [2-7](#)
- LEDs [2-90](#)
- PM parameters [10-14](#)
- port calibration [2-88](#)
- power monitoring [2-88](#)
- power requirements [A-5](#)
- service state transitions [B-4](#)
- specifications [A-35](#)
- wavelength plan [2-88](#)

4MD-xx.x card

See also DWDM cards

- block diagram [2-93](#)
- description [2-91](#)
- faceplate [2-92](#)
- input power [2-7](#)
- LEDs [2-94](#)
- PM parameters [10-14](#)
- port calibration [2-94](#)
- power monitoring [2-94](#)
- power requirements [A-5](#)
- provisionable patchcords [8-23](#)

- service state transitions [B-4](#)
- specifications [A-21](#)
- wavelength pairs [2-94](#)

8b10b PM parameters [10-13](#)

- 8b10bDataOrderedSets parameter definition [10-17](#)

- 8b10bErrors parameter definition [10-17](#)

- 8b10bIdleOrderedSets parameter definition [10-17](#)

- 8b10bInvalidOrderedSets parameter definition [10-17](#)

- 8b10bNonIdleOrderedSets parameter definition [10-17](#)

- 8b10bStatsEncodingDispErrors parameter definition [10-17](#)

A

ACO [1-52](#)

AD-1B-xx.x card

See also DWDM cards

- block diagrams [2-108](#)

- channel plan [A-26](#)

- description [2-106](#)

- faceplate [2-107](#)

- input power [2-7](#)

- LEDs [2-109](#)

- PM parameters [10-14](#)

- port calibration [2-108](#)

- power monitoring [2-108](#)

- power requirements [A-6](#)

- service state transition [B-4](#)

- specifications [A-26](#)

AD-1C-xx.x card

See also DWDM cards

- block diagrams [2-97](#)

- description [2-95](#)

- faceplate [2-96](#)

- input power [2-7](#)

- LEDs [2-98](#)

- PM parameters [10-14](#)

- port calibration [2-97](#)

- power monitoring [2-97](#)

- power requirements [A-6](#)
 - provisionable patchcords [8-23](#)
 - service state transitions [B-4](#)
 - specifications [A-22](#)
- AD-2C-xx.x card
- See also* DWDM cards
 - block diagrams [2-100](#)
 - description [2-98](#)
 - faceplate [2-99](#)
 - input power [2-7](#)
 - LEDs [2-101](#)
 - PM parameters [10-14](#)
 - port calibration [2-101](#)
 - power monitoring [2-101](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23](#)
 - service state transitions [B-4](#)
 - specifications [A-24](#)
 - wavelength sets [2-104](#)
- administrative states. *See* states
- AEP
- description [1-31](#)
 - pin assignments [1-33](#)
 - power requirements [A-5](#)
 - printed circuit board assembly [1-32](#)
 - specifications [A-9](#)
- AIC-I card
- See also* pin assignments
 - block diagram [2-26](#)
 - description [2-25](#)
 - faceplate [2-26](#)
 - LEDs [2-26](#)
 - power requirements [A-5](#)
 - specifications [A-8](#)
 - virtual wires [9-14](#)
- AIP
- description [1-30](#)
 - location [1-28](#)
 - replacing [1-30](#)
- air filter, description [1-48](#)
- air ramp
- ANSI placement overview [1-3](#)
 - ETSI placement overview [1-6](#)
 - typical site layout [1-19](#)
- alarm filtering
- description [9-4](#)
 - filter tool [9-4](#)
- alarm interface panel. *See* AIP
- alarm profiles
- LEDs [2-105](#)
 - PM parameters [10-14](#)
 - port calibration [2-105](#)
 - power monitoring [2-105](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23](#)
 - service state transitions [B-4](#)
 - specifications [A-24](#)
 - wavelength sets [2-104](#)
- AD-4B-xx.x card
- See also* DWDM cards
 - block diagrams [2-111](#)
 - channel plan [A-30](#)
 - description [2-109](#)
 - faceplate [2-110](#)
 - input power [2-7](#)
 - LEDs [2-112](#)
 - PM parameters [10-14](#)
 - port calibration [2-112](#)
 - power monitoring [2-111](#)
 - power requirements [A-6](#)
 - service state transitions [B-4](#)
 - specifications [A-29](#)
- AD-4C-xx.x card
- See also* DWDM cards
 - block diagram [2-104](#)
 - description [2-102](#)
 - faceplate [2-103](#)
 - input power [2-7](#)

- applying [9-12](#)
- button definitions [9-10](#)
- changing row display [9-12](#)
- creating [9-9](#)
- description [9-9](#)
- editing [9-11](#)
- modifying [9-9](#)
- alarms
 - See also* external alarms
 - alarm contact connections [1-51](#)
 - changing default severities. *See* alarm profiles
 - changing time zone [9-3](#)
 - deleting cleared alarms from the display [9-4](#)
 - entries in session [9-6](#)
 - Ethernet communication [9-16](#)
 - history [9-6](#)
 - history, column descriptions [9-7](#)
 - history, retrieving [9-7](#)
 - history log capacity [9-8](#)
 - interface specifications [A-3](#)
 - multishelf configuration [9-15](#)
 - multishelf-specific [9-16](#)
 - overview [9-1](#)
 - RMON [11-23](#)
 - suppressing [9-15](#)
 - synchronizing [9-4](#)
 - traps. *See* traps
 - viewing [9-2, 9-4](#)
 - viewing alarm counts on the LCD [9-2](#)
- alarm severities
 - description [9-8](#)
 - options in alarm profiles [9-11](#)
- ALS
 - default settings [C-2](#)
 - description [4-14](#)
 - MXP cards [4-15](#)
 - MXP_2.5G_10E_C card [2-153](#)
 - MXP_2.5G_10E_L card [2-153](#)
 - MXP_2.5G_10E card [2-144](#)
 - MXP_2.5G_10G card [2-137](#)
 - MXP_MR_10DME_C card [2-163](#)
 - MXP_MR_10DME_L card [2-163](#)
 - MXP_MR_2.5G card [2-160](#)
 - MXPP_MR_2.5G card [2-160](#)
 - OPT-AMP-L card [2-60, 4-21](#)
 - OPT-BST card [2-49, 4-16](#)
 - OPT-BST-E card [2-52, 4-16](#)
 - OPT-BST-L card [2-56, 4-20](#)
 - OSC-CSM card [2-40, 4-18](#)
 - TXP cards [4-15](#)
 - TXP_MR_10E_C card [2-127](#)
 - TXP_MR_10E_L card [2-127](#)
 - TXP_MR_10E card [2-123](#)
 - TXP_MR_10G card [2-119](#)
 - TXP_MR_2.5G card [2-133](#)
 - TXPP_MR_2.5G card [2-133](#)
- amplified nodes
 - OADM [4-5](#)
 - TDM [3-43](#)
- amplifier cards
 - See* OPT-AMP-L card
 - See* OPT-BST card
 - See* OPT-BST-E card
 - See* OPT-BST-L card
 - See* OPT-PRE card
- ANS
 - description [3-46](#)
 - parameters [3-48](#)
 - parameters by node type [3-53](#)
 - parameter summary [3-56](#)
 - provisioning parameters [3-50](#)
 - viewing parameters [3-50](#)
 - WDM-ANS provisioning [3-51](#)
- anti-ASE node
 - description [3-11](#)
 - meshed rings [4-5](#)
- any-to-any rings [4-4](#)
- APC

APR [4-15](#)
 at the amplifier card level [4-9](#)
 at the node and network levels [4-9](#)
 description [4-8](#)
 managing [4-11](#)
 applying alarm profiles [9-12](#)
 APR [4-15](#)
 audit trail
 capacities [6-7](#)
 log entries [6-7](#)
 security description [6-6](#)
 automatic laser shutdown. *See* ALS
 automatic node setup. *See* ANS
 automatic power control. *See* APC
 automatic power reduction. *See* APR

B

backplane
 connection overview [1-49](#)
 covers, overview [1-27](#)
 lower cover, description [1-28](#)
 rear cover, description [1-29](#)
 bandwidth
 line percentage used by MXP cards [10-10](#)
 specifications [A-1](#)
 bay assembly. *See* rack
 BBE-PM parameter definition [10-19](#)
 BBER-PM parameter definition [10-19](#)
 BBER-SM parameter definition [10-19](#)
 BBE-SM parameter definition [10-19](#)
 BIEC parameter definition [10-17](#)
 BIE parameter definition [10-17](#)
 Bit Errors parameter definition [10-23](#)
 BITS
 ANSI interface specifications [A-3](#)
 external node timing source [7-1](#)
 pin field assignments [1-52](#)
 browsers, installation overview [5-4](#)

C

cables
 EAP [1-38](#)
 fiber management [1-40, 1-44](#)
 routing and management [1-39](#)
 tie-down bar [1-45](#)
 cabling
 DWDM nodes [3-15](#)
 hub nodes [3-18](#)
 LAN cable requirements [5-6](#)
 line amplifier nodes [3-20](#)
 OADM nodes [3-24](#)
 OSC link termination [3-15](#)
 OSC regeneration nodes [3-22](#)
 ROADM nodes [3-28](#)
 terminal nodes [3-20](#)
 cards
 ANSI NE defaults [C-2](#)
 Class 1 laser safety [2-13](#)
 Class 1M laser safety [2-15](#)
 colors in node view [5-10, 5-11](#)
 colors in shelf view [5-11](#)
 compatibility [2-6](#)
 ETSI NE defaults [C-77](#)
 interface classes [2-7](#)
 replacement [1-56](#)
 slot requirements [1-55](#)
 slots. *See* slots
 summary [2-3](#)
 symbol and slot correspondence [1-56](#)
 transponder and muxponder card types [2-3](#)
 card view
 Alarms tab [5-17](#)
 Circuits tab [5-17](#)
 Conditions tab [5-17](#)
 description [5-16](#)
 History tab [5-17](#)
 Inventory tab [5-18](#)

- list of tabs [5-17](#)
 - Maintenance tab [5-18](#)
 - Performance tab [5-18](#)
 - Provisioning tab [5-18](#)
 - CD-ROM, ONS [xlvii](#)
 - CGV parameter definition [10-17](#)
 - changing
 - See also* modifying
 - alarm and condition time zones [9-3](#)
 - alarm profile display [9-12](#)
 - default alarm severities [9-9](#)
 - channel allocation plan [2-10](#)
 - circuits, OCH [4-29](#)
 - Cisco MetroPlanner
 - ANS parameters [3-48](#)
 - anti-ASE node configuration [3-11](#)
 - installation parameters [4-28](#)
 - Class 1 laser safety cards [2-13](#)
 - Class 1M laser safety cards [2-15](#)
 - client port PM parameters [10-9](#)
 - colors
 - cards [5-10, 5-11](#)
 - FMECs [5-10](#)
 - nodes [5-15](#)
 - compatibility
 - card [2-6](#)
 - JRE [5-4](#)
 - conditions
 - changing time zone [9-3](#)
 - column descriptions [9-5](#)
 - controlling the display of [9-5](#)
 - description [9-4](#)
 - displaying [9-5](#)
 - filtering [9-6](#)
 - history [9-7](#)
 - retrieving [9-5](#)
 - connected rings [4-5](#)
 - connecting EAPs to node controllers and subtending shelves [1-37](#)
 - control channel management. *See* LMP
 - corporate LAN connection [5-7](#)
 - cost [8-9](#)
 - craft connection [5-6, 5-7](#)
 - creating alarm profiles [9-9](#)
 - CTC
 - compatibility with JRE [5-4](#)
 - computer requirements [5-4](#)
 - DCC link appearance [5-15](#)
 - DCC link consolidation [5-16](#)
 - installation overview [5-4](#)
 - loopback indicators [5-12](#)
 - NE defaults [C-75](#)
 - overview [5-7](#)
 - revert to earlier load [5-19](#)
 - software installed on the TCC2/TCC2P card [5-1](#)
 - software installed on the workstation [5-3](#)
 - specifications [A-2](#)
 - CV-L parameter definition [10-23](#)
 - CV-S parameter definition [10-23](#)
-
- ## D
- database
 - description [5-19](#)
 - MAC address [1-30](#)
 - revert [5-19](#)
 - data communications channel. *See* DCC
 - datagrams [8-4](#)
 - DCC
 - AIC-I compatibility [2-30](#)
 - link appearance in CTC [5-15](#)
 - link consolidation [5-16](#)
 - pin assignments [2-30](#)
 - provisionable patchcords [8-23](#)
 - RMON over [11-20](#)
 - terminations in a multishelf node [3-15](#)
 - viewing connections [5-15](#)
 - DCG parameter definition [10-17](#)

DCU

- hub node [3-2](#)
- OPT-PRE card [2-45](#)
- overview [2-2](#)
- typical rack layout [1-18](#)

deleting cleared alarms from the display [9-4](#)

demultiplexer cards

- See* 32DMX card
- See* 32DMX-L card
- See* 32DMX-O card
- See* 4MD-xx.x card
- See* DWDM cards

destination

- host [8-4](#)
- routing table [8-24](#)

DHCP scenario [8-3](#)

dispersion compensating unit. *See* DCU

displaying

- alarms [9-2, 9-4](#)
- conditions [9-5](#)

documentation

- audience [v-xi](#)
- objectives [v-xi](#)
- related to this book [v-xi](#)
- typographical conventions [v-xli](#)

dot3StatsFCSErrors parameter definition [10-20](#)

dot3StatsFrameTooLong parameter definition [10-20](#)

DWDM

- configurations [A-1](#)
- fiber tray [1-44](#)
- hybrid nodes [3-31](#)
- network applications [4-2](#)
- node cabling [3-15](#)
- nodes [3-1 to 3-58](#)
- rack layouts [1-18](#)
- shelf service state transitions [B-3](#)
- topologies [A-1](#)
- TXP_MR_10E_C and TXP_MR_10E_L card trunk interface [2-126](#)

TXP_MR_10E card trunk interface [2-121](#)

DWDM cards

- See also* individual DWDM card names
- channel allocation plan [2-10 to 2-13](#)
- performance monitoring [10-13](#)
- service state transitions [B-4 to B-7](#)
- specifications [A-11 to A-39](#)

E

EAP

- cable [1-38](#)
- connecting to the node controller and subtending shelf [1-37](#)
- description [1-36](#)

editing alarm profiles [9-11](#)

E-FEC

See also FEC

- MXP_2.5G_10E_C card [2-146, 2-150](#)
- MXP_2.5G_10E_L card [2-146, 2-150](#)
- MXP_2.5G_10E card, description [2-139](#)
- MXP_2.5G_10E card capability [2-142](#)
- MXP_2.5G_10E card modes [2-143](#)
- MXP_MR_10DME_C card [2-163](#)
- MXP_MR_10DME_L card [2-163](#)
- TXP_MR_10E_C card [2-127](#)
- TXP_MR_10E_L card [2-127](#)
- TXP_MR_10E card [2-122](#)

EIA interface specifications [A-3](#)

electrical codes [1-2](#)

enhanced forward error correction. *See* E-FEC

enterprise LAN connection. *See* corporate LAN connection

environmental specifications [A-4](#)

ES-L parameter definition [10-23](#)

ES-PM parameter definition [10-19](#)

ESR-PM parameter definition [10-19](#)

ESR-SM parameter definition [10-19](#)

ES-SM parameter definition [10-19](#)

ES-S parameter definition [10-23](#)

Ethernet adapter panel. *See* EAP

Ethernet RMON

- history group [11-23](#)
- overview [11-20 to 11-26](#)

etherStatsBroadcastPkts parameter definition [10-20](#)

etherStatsCRCAAlignErrors parameter definition [10-20](#)

etherStatsFragments parameter definition [10-20](#)

etherStatsJabbers parameter definition [10-20](#)

etherStatsMulticastPkts parameter definition [10-20](#)

etherStatsOctets parameter definition [10-20](#)

etherStatsOversizePkts parameter definition [10-20](#)

etherStatsPkts1024to1518Octets parameter definition [10-21](#)

etherStatsPkts128to255Octets parameter definition [10-20](#)

etherStatsPkts256to511Octets parameter definition [10-21](#)

etherStatsPkts512to1023Octets parameter definition [10-21](#)

etherStatsPkts64Octets parameter definition [10-20](#)

etherStatsPkts65to127Octets parameter definition [10-20](#)

etherStatsUndersizePkts parameter definition [10-21](#)

external alarms

- description [2-27](#)
- overview [9-13](#)
- pin assignments with AEP [1-34](#)
- provisioning [9-13](#)
- wiring description [1-51](#)

external controls

- description [2-27](#)
- overview [9-13](#)
- pin assignments with AEP [1-35](#)
- provisioning [9-13](#)
- wiring description [1-51](#)

external firewall [8-26](#)

external LAN interface [A-2](#)

external timing. *See* timing

F

facility loopback (CTC indicator) [5-12](#)

fan-tray assembly

- description [1-46](#)
- fan failure [1-48](#)
- fan speed [1-47](#)

far-end laser control. *See* FELC

FC1G payload performance parameters [10-9](#)

FC1G payload PMs on the client port [10-9](#)

FC-L parameter definition [10-24](#)

FC payload performance parameters [10-8](#)

FC-PM parameter definition [10-19](#)

FC-SM parameter definition [10-19](#)

fcStatsLinkRecoveries parameter definition [10-21](#)

fcStatsRxCredits parameter definition [10-21](#)

fcStatsTxCredits parameter definition [10-21](#)

fcStatsZeroTxCredits parameter definition [10-21](#)

FEC

See also E-FEC

MXP_2.5G_10E_C card [2-150](#)

MXP_2.5G_10E_L card [2-150](#)

MXP_2.5G_10E card [2-143](#)

near-end trunk-side PMs [10-13](#)

OTN provisioning [10-11](#)

PM parameter definitions [10-22](#)

TXP_MR_10E_C card [2-127](#)

TXP_MR_10E_L card [2-127](#)

TXP_MR_10E card [2-122](#)

FELC [2-171](#)

ferrites [1-56](#)

fiber

- capacity [1-41](#)
- management [1-40](#)
- managing using the Y-cable module tray [1-44](#)
- managing with the patch-panel tray [1-42](#)

filler cards

- description [1-38](#)
- faceplate (illustration) [1-39](#)

filtering

- alarms [9-4](#)
- conditions [9-6](#)

finding warning information [xlvii](#)

firewall

external firewall description [8-26](#)

firewall proxy with SNMP [11-19](#)

flange [1-5](#)

FlexLayer

block diagram [1-11](#)

modules [1-10](#)

system description [1-9](#)

two-channel drop component connector mapping [1-12](#)

FMEC

cover [1-3](#)

description [1-31](#)

LAN connection through [5-6](#)

foreign node settings, open GNE [8-28](#)

forward error correction. *See* FEC

front door

deep door (ANSI only) [1-21](#)

description [1-20](#)

label [1-24](#)

label (ANSI) [1-25](#)

label (ETSI) [1-26](#)

removing (ANSI) [1-23](#)

removing (ETSI) [1-24](#)

front mount electrical connection. *See* FMEC

fuse and alarm panel

description [1-2](#)

location (ANSI) [1-5](#)

location (ETSI) [1-8](#)

G

G.709 PM parameters. *See* ITU-T G.709

gateway

default [8-7](#)

on routing table [8-25](#)

returning MAC address [8-4](#)

gateway network element. *See* GNE

GCC

provisionable patchcords [8-23](#)

terminations in a multishelf node [3-15](#)

TXP_MR_10E_C card Y-cable protection [2-127](#)

TXP_MR_10E_L card Y-cable protection [2-127](#)

TXP_MR_10E card Y-cable protection [2-122](#)

TXP_MR_10G card Y-cable protection [2-119](#)

TXP_MR_2.5G card Y-cable protection [2-133](#)

TXPP_MR_2.5G card Y-cable protection [2-133](#)

generic communications channel. *See* GCC

GE payload performance parameters [10-8](#)

gfpStatsLFDRaised parameter definition [10-21](#)

gfpStatsRoundTripLatencyUsec parameter definition [10-21](#)

gfpStatsRxCRCErrors parameter definition [10-21](#)

gfpStatsRxCSFRaised parameter definition [10-21](#)

gfpStatsRxDistanceExtBuffers parameter definition [10-21](#)

gfpStatsRxMBitErrors parameter definition [10-21](#)

gfpStatsRxSbitErrors parameter definition [10-21](#)

gfpStatsRxSblkCRCErrors parameter definition [10-21](#)

gfpStatsRxTypeInvalid parameter definition [10-21](#)

gfpStatsTxDistanceExtBuffers parameter definition [10-21](#)

GFP-T payload PMs on the GFP port [10-9](#)

GMPLS [8-35](#)

GNE

dual GNEs on a subnet [8-17](#)

load balancing [8-17](#)

open GNE [8-28](#)

ground

ANSI [1-48](#)

description [1-48](#)

ETSI [1-49](#)

ground posts [1-49](#)

ground strap illustration [1-22](#)

H

history

- alarms [9-6 to 9-8](#)
- Ethernet RMON group [11-23](#)
- RMON [11-22](#)

hop [8-9](#)hubbed rings [4-2](#)

hub node

- ANS parameters [3-53](#)
- cabling [3-18](#)
- description [3-2](#)
- OSC terminations [3-17](#)

Iidle user timeout [6-6](#)

IETF

- MIBs [11-5](#)
- traps [11-9](#)

ifInBroadcastPkts parameter definition [10-21](#)ifInDiscards parameter definition [10-21](#)ifInErrorBytePkts parameter definition [10-21](#)ifInErrors parameter definition [10-21](#)ifInFramingErrorPkts parameter definition [10-21](#)ifInJunkInterPkts parameter definition [10-22](#)ifInMulticastPkts parameter definition [10-22](#)ifInOctets parameter definition [10-22](#)ifOutBroadcastPkts parameter definition [10-22](#)ifOutDiscards parameter definition [10-22](#)ifOutMulticastPkts parameter definition [10-22](#)ifOutOctets parameter definition [10-22](#)

installation

See also rack

- CTC installation overview [5-4](#)
- overview [1-2](#)
- power and ground [1-48](#)

Internet protocol. *See* IPinvalidCRCErrors parameter definition [10-22](#)IOS parameter definition [10-17](#)

IP

- addressing scenarios [8-2 to 8-22](#)
- dual IP addresses using secure mode [8-20](#)
- environments [8-2](#)
- requirements [8-2](#)
- subnetting [8-2](#)

IPC parameter definition [10-17](#)ITU performance monitoring [10-1](#)

ITU-T G.709

- PM parameters [10-12](#)
- TCAAs [9-18](#)

Jjitter [2-145, 2-154, 2-172](#)

JRE

- compatibility with CTC [5-4](#)
- overview [5-4](#)
- requirements [5-6](#)

L

labels

- Class 1 laser product [2-13](#)
- Class 1M laser product [2-15](#)
- FDA statement [2-14, 2-16](#)
- Hazard Level 1 [2-14](#)
- Hazard Level 1M [2-16](#)
- laser source connector [2-14, 2-16](#)
- shock hazard [2-15, 2-17](#)

LAN

- connection points [1-52](#)
- pin assignments [1-53](#)

LAN cable [5-6](#)Laser Bias (Avg,%) parameter definition [10-5](#)Laser Bias (Max,%) parameter definition [10-5](#)Laser Bias (Min,%) parameter definition [10-5](#)

- lasers, shutting down. *See* ALS
 - laser warning [1-26, 1-27](#)
 - LBCL-AVG parameter definition [10-17](#)
 - LBCL-MAX parameter definition [10-17](#)
 - LBCL-MIN parameter definition [10-17](#)
 - LCD, viewing alarm counts on [9-2](#)
 - line amplifier node
 - ANS parameters [3-55](#)
 - cabling [3-20](#)
 - description [3-11](#)
 - hybrid [3-41](#)
 - linear configurations, description [4-6](#)
 - line node. *See* line amplifier node
 - line PM parameters [10-16](#)
 - line timing. *See* timing
 - link management protocol. *See* LMP
 - Link Status parameter definition [10-5](#)
 - LMP
 - control channel management [8-35, 8-36](#)
 - example network implementation [8-38](#)
 - fault management [8-37](#)
 - GMPLS [8-35](#)
 - link connectivity verification [8-37](#)
 - LMP WDM extensions [8-38](#)
 - MPLS [8-35](#)
 - overview [8-34](#)
 - TE link management [8-37](#)
 - LOFC parameter definition [10-18](#)
 - login node groups, viewing [5-14](#)
 - loopback
 - facility (CTC indicator) [5-12](#)
 - terminal (CTC indicator) [5-12](#)
 - default timeout [6-6](#)
 - network view privileges [6-4](#)
 - node view privileges [6-2](#)
 - management information base. *See* MIB
 - managing
 - APC [4-11](#)
 - cables [1-39](#)
 - fiber using the Y-cable module tray [1-44](#)
 - fiber with the patch-panel tray [1-42](#)
 - network-level gain [4-23](#)
 - MDS switch interoperability [2-157, 2-164](#)
 - mediaIndStatsRxFramesBadCRC parameter definition [10-22](#)
 - mediaIndStatsRxFramesTooLong parameter definition [10-22](#)
 - mediaIndStatsRxFramesTruncated parameter definition [10-22](#)
 - mediaIndStatsTxFramesBadCRC parameter definition [10-22](#)
 - meshed rings [4-5](#)
 - MetroPlanner. *See* Cisco MetroPlanner
 - MIBs
 - generic threshold and performance monitoring [11-7](#)
 - proprietary [11-6](#)
 - RMON [11-21](#)
 - standard IETF [11-5](#)
 - MIC-A/P FMEC
 - block diagram [2-34](#)
 - description [2-33](#)
 - faceplate [2-33](#)
 - pinouts [2-34 to 2-36](#)
 - power requirements [A-5](#)
 - specifications [A-10](#)
 - MIC-C/T/P FMEC
 - description [2-36](#)
 - power requirements [A-5](#)
 - specifications [A-10](#)
 - MMU card
 - block diagram [2-115](#)
 - description [2-113](#)
-
- ## M
- MAC address
 - AIP [1-30](#)
 - proxy ARP [8-4](#)
 - Maintenance user

- faceplate [2-114](#)
- LEDs [2-115](#)
- port calibration [2-115](#)
- port-level indicators [2-116](#)
- power monitoring [2-115](#)
- power requirements [A-5](#)
- specifications [A-37](#)
- modem interface [A-2](#)
- modifying
 - See also* changing
 - alarm profiles [9-9](#)
- monitoring
 - performance. *See* performance monitoring
 - power [2-29](#)
 - ROADM power equalization [4-12](#)
 - thresholds with MIBs [11-7](#)
- mounting brackets, description [1-4](#)
- MPLS [8-35](#)
- MS-BBE parameter definition [10-24](#)
- MS-BBER parameter definition [10-24](#)
- MS-EB parameter definition [10-24](#)
- MS-ES parameter definition [10-24](#)
- MS-ESR parameter definition [10-25](#)
- MS-ISC-100T card
 - description [2-30](#)
 - EAPs [1-36](#)
 - faceplate [2-32](#)
 - LEDs [2-32](#)
 - port assignments [2-31](#)
 - power requirements [A-5](#)
 - specifications [A-11](#)
- MS-SES parameter definition [10-25](#)
- MS-SESR parameter definition [10-25](#)
- MS-UAS parameter definition [10-25](#)
- multi-hubbed rings [4-3](#)
- multiplexer cards
 - See* 32MUX-O card
 - See* 4MD-xx.x card
 - See* DWDM cards
- multiplex section PM parameters [10-16](#)
- multishelf
 - alarming [9-16](#)
 - configuring multishelf alarms [9-15](#)
 - correlated alarms [9-17](#)
 - DCC/GCC/OSC terminations [3-15](#)
 - EAPs [1-36](#)
 - moving from multishelf to shelf view [9-16](#)
 - node configuration [3-14](#)
 - node description [3-13](#)
 - node layout [3-15](#)
 - secure mode [3-1](#)
 - viewing alarmed entities [9-16](#)
- multishelf view
 - Alarms tab [5-12](#)
 - card colors in [5-10](#)
 - Circuits tab [5-12](#)
 - Conditions tab [5-12](#)
 - description [5-9](#)
 - FMEC colors in [5-10](#)
 - History tab [5-12](#)
 - illustration [5-9](#)
 - Inventory tab [5-13](#)
 - Maintenance tab [5-13](#)
 - moving to shelf view [9-16](#)
 - port colors in [5-11](#)
 - Provisioning tab [5-12](#)
 - shortcuts [5-12](#)
- MXP_2.5G_10E_C card
 - See also* MXP cards
 - ALS [2-153](#)
 - block diagram [2-148](#)
 - client interface monitoring [2-150](#)
 - client interfaces [2-148](#)
 - description [2-146](#)
 - DWDM interface [2-148](#)
 - E-FEC [2-146, 2-150](#)
 - faceplate [2-148](#)
 - features [2-146](#)

- jitter [2-154](#)
 - lamp test [2-154](#)
 - LEDs, card-level [2-154](#)
 - LEDs, port-level [2-154](#)
 - multiplexing function [2-149](#)
 - onboard traffic generation [2-154](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-23, 10-24](#)
 - power requirements [A-6](#)
 - SONET/SDH overhead byte processing [2-150](#)
 - specifications [A-49](#)
 - timing synchronization [2-149](#)
 - trunk wavelengths [2-151, A-50](#)
 - wavelength identification [2-151](#)
 - Y-cable protection [2-149, 2-169](#)
- MXP_2.5G_10E_L card**
- See also* MXP cards
- ALS [2-153](#)
 - block diagram [2-148](#)
 - client interface monitoring [2-150](#)
 - client interfaces [2-148](#)
 - description [2-146](#)
 - DWDM interface [2-148](#)
 - E-FEC [2-146, 2-150](#)
 - faceplate [2-148](#)
 - features [2-146](#)
 - jitter [2-154](#)
 - lamp test [2-154](#)
 - LEDs, card-level [2-154](#)
 - LEDs, port-level [2-154](#)
 - multiplexing function [2-149](#)
 - onboard traffic generation [2-154](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-23, 10-24](#)
 - power requirements [A-6](#)
 - SONET/SDH overhead byte processing [2-150](#)
 - specifications [A-52](#)
 - timing synchronization [2-149](#)
 - trunk wavelengths [2-152, A-53](#)
- MXP_2.5G_10E card**
- See also* MXP cards
- ALS [2-144](#)
 - block diagram [2-141](#)
 - client interface monitoring [2-143](#)
 - client interfaces [2-141](#)
 - description [2-138](#)
 - DWDM interface [2-141](#)
 - E-FEC [2-139, 2-142](#)
 - faceplate [2-140](#)
 - features [2-139](#)
 - jitter [2-145](#)
 - lamp test [2-145](#)
 - LEDs [2-145](#)
 - multiplexing function [2-141](#)
 - NE defaults [C-4, C-78](#)
 - onboard traffic generation [2-145](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-23, 10-24](#)
 - port-level LEDs [2-145](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23, 8-24](#)
 - SONET/SDH overhead byte processing [2-143](#)
 - specifications [A-48](#)
 - timing synchronization [2-142](#)
 - trunk wavelengths [2-143](#)
 - wavelength identification [2-143](#)
 - Y-cable protection [2-142, 2-169](#)
- MXP_2.5G_10G card**
- See also* MXP cards
- ALS [2-137](#)
 - block diagram [2-137](#)
 - description [2-134](#)
 - faceplate [2-136](#)
 - LEDs [2-138](#)
 - NE defaults [C-8, C-82](#)
 - OTN provisioning [10-11](#)

- PM parameters [10-2, 10-6, 10-24](#)
 - port-level LEDs [2-138](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23, 8-24](#)
 - specifications [A-41](#)
 - termination modes [2-172](#)
 - timing synchronization [2-137](#)
 - Y-cable protection [2-137, 2-169](#)
- MXP_MR_10DME_C card**
- See also* MXP cards
 - ALS [2-163](#)
 - block diagram [2-165](#)
 - client interface data rates [2-162](#)
 - description [2-161](#)
 - E-FEC [2-163](#)
 - faceplates [2-165](#)
 - features [2-163](#)
 - LEDs [2-168](#)
 - NE defaults [C-23, C-96](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-23, 10-24](#)
 - port-level LEDs [2-169](#)
 - power requirements [A-6](#)
 - specifications [A-55](#)
 - trunk wavelengths [2-166](#)
 - wavelength identification [2-165](#)
 - Y-cable protection [2-169](#)
- MXP_MR_10DME_L card**
- See also* MXP cards
 - ALS [2-163](#)
 - block diagram [2-165](#)
 - client interface data rates [2-162](#)
 - description [2-161](#)
 - E-FEC [2-163](#)
 - faceplates [2-165](#)
 - features [2-163](#)
 - LEDs [2-168](#)
 - NE defaults [C-23, C-96](#)
 - OTN provisioning [10-11](#)
- PM parameters [10-2, 10-6, 10-23, 10-24](#)
 - port-level LEDs [2-169](#)
 - power requirements [A-6](#)
 - specifications [A-57](#)
 - trunk wavelengths [2-167](#)
 - wavelength identification [2-165](#)
 - Y-cable protection [2-169](#)
- MXP_MR_2.5G card**
- See also* MXP cards
 - ALS [2-160](#)
 - block diagram [2-159](#)
 - client interface data rates [2-156](#)
 - description [2-155](#)
 - faceplate [2-158](#)
 - LEDs [2-160](#)
 - NE defaults [C-15, C-88](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-9, 10-12, 10-20, 10-22, 10-23, 10-24](#)
 - port-level LEDs [2-160](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23](#)
 - specifications [A-45](#)
 - versions [2-155](#)
 - Y-cable protection [2-169](#)
- MXP cards**
- See also* individual MXP card names
 - ALS [4-15](#)
 - performance monitoring [10-2](#)
 - port requirements for provisionable patchcords [8-24](#)
 - port service state transitions [B-18 to B-22](#)
 - power requirements [A-6](#)
 - protection [2-169 to 2-171](#)
 - provisionable patchcords [8-23](#)
 - service state transitions [B-13 to B-18](#)
 - specifications [A-39 to A-68](#)
 - suppressing TCAs [9-17](#)
 - suppression of TCAs due to LOS and LPF alarms [10-2](#)

- types [2-3](#)
- MXPP_MR_2.5G card
 - See also* MXP cards
 - ALS [2-160](#)
 - block diagram [2-159](#)
 - client interface data rates [2-156](#)
 - description [2-155](#)
 - faceplate [2-158](#)
 - LEDs [2-160](#)
 - NE defaults [C-19, C-92](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-9, 10-12, 10-20, 10-22, 10-23, 10-24](#)
 - port-level LEDs [2-160](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23](#)
 - specifications [A-45](#)
 - splitter protection [2-170](#)
 - versions [2-155](#)

N

NE defaults

- ANSI card default settings [C-2](#)
- ANSI node default settings [C-60](#)
- CTC defaults [C-75](#)
- description [C-1](#)
- ETSI card default settings [C-77](#)
- ETSI node default settings [C-133 to C-146](#)

networks

- APC [4-9](#)
- gain tilt compensation (without ROADMs nodes) [4-26](#)
- gain tilt compensation (with ROADMs nodes) [4-28](#)
- managing gain [4-23](#)
- optical performance [4-7](#)
- optical safety [4-14](#)
- timing example [7-2](#)

network view

- Alarms tab [5-14, 6-4](#)

- Circuits tab [5-15, 6-4](#)

- Conditions tab [5-14, 6-4](#)

- description [5-14](#)

- History tab [5-15, 6-4](#)

- logical network view feature [5-14](#)

- Maintenance tab [5-15, 6-5](#)

- node colors in [5-15](#)

- node status (icon colors) [5-15](#)

- Provisioning tab [5-15, 6-5](#)

- security levels per tab [6-4](#)

- NIOS parameter definition [10-18](#)

node

- 1+1 protected flexible terminal [3-31](#)

- amplified TDM [3-43](#)

- ANSI NE defaults [C-60](#)

- APC [4-9](#)

- ETSI NE defaults [C-133 to C-146](#)

- hybrid [3-31](#)

- hybrid line amplifier [3-41](#)

- hybrid OADM [3-40](#)

- hybrid terminal [3-38](#)

- locked in secure mode [8-22](#)

- scalable terminal [3-35](#)

- timing parameters [7-1](#)

- node services protocol. *See* NSP

node view

- Alarms tab [5-13, 6-2](#)

- card colors in [5-10](#)

- Circuits tab [5-13, 6-2](#)

- Conditions tab [5-13, 6-2](#)

- description [5-9](#)

- FMEC colors in [5-10](#)

- History tab [5-13, 6-2](#)

- Inventory tab [5-13, 6-3](#)

- Maintenance tab [5-13, 6-4](#)

- port colors in [5-11](#)

- Provisioning tab [5-13, 6-2](#)

- security levels per tab [6-2](#)

- shortcuts [5-12](#)

NPJC-Pdet parameter [10-26](#)
 NPJC-Pgen parameter [10-26](#)
 NSP [4-2](#)

O

OADM band filter cards
 See AD-1B-xx.x card
 See AD-4B-xx.x card
 See DWDM cards

OADM node

 ANS parameters [3-55](#)
 cabling [3-24](#)
 description [3-4](#)
 hybrid [3-40](#)
 linear configuration [4-6](#)

OAM&P access [5-7](#)

OCHCC [4-29](#)

 channel management [4-30](#)

OCHNC

 channel management [4-30](#)
 circuits [4-29](#)
 service state transitions [B-12 to B-13](#)

OCH trail [4-29](#)

ONE_GE payload performance parameters [10-9](#)

open GNE [8-28](#)

Open Shortest Path First. *See* OSPF

OPR-AVG parameter definition [10-18](#)

OPR-MAX parameter definition [10-18](#)

OPR-MIN parameter definition [10-18](#)

OPR parameter definition [10-18](#)

OPT-AMP-L card

 ALS [2-60, 4-21](#)
 APC [4-9](#)
 description [2-59](#)
 faceplate [2-60](#)
 fiber cut scenario [4-21](#)
 LEDs [2-62](#)
 PM parameters [10-13](#)

 port calibration [2-61](#)
 power monitoring [2-61](#)
 power requirements [A-5](#)
 specifications [A-15](#)

OPT-AVG parameter definition [10-18](#)

OPT-BST card

 alarm profiles [9-12](#)
 ALS [2-49, 4-16](#)
 APC [4-9](#)
 block diagram [2-50](#)
 description [2-48](#)
 faceplate [2-49](#)
 fiber cut scenario [4-16](#)
 gain tilt control [4-24](#)
 LEDs [2-51](#)
 NE defaults [C-60, C-133](#)
 PM parameters [10-13](#)
 port calibration [2-50](#)
 power monitoring [2-50](#)
 power requirements [A-5](#)
 service state transitions [B-4](#)
 specifications [A-14](#)

OPT-BST-E card

 ALS [2-52, 4-16](#)
 APC [4-9](#)
 block diagrams [2-54](#)
 description [2-51](#)
 faceplate [2-53](#)
 fiber cut scenario [4-16](#)
 gain tilt control [4-24](#)
 LEDs [2-55](#)
 port calibration [2-54](#)
 power monitoring [2-54](#)
 service state transitions [B-4](#)
 specifications [A-14](#)

OPT-BST-L card

 ALS [2-56, 4-20](#)
 APC [4-9](#)
 description [2-55](#)

- faceplate [2-57](#)
- fiber cut scenario [4-20](#)
- LEDs [2-58](#)
- NE defaults [C-60, C-133](#)
- PM parameters [10-13](#)
- port calibration [2-58](#)
- power monitoring [2-58](#)
- power requirements [A-5](#)
- service state transitions [B-4](#)
- specifications [A-15](#)
- optical add/drop multiplexer
 - See* 32WSS card
 - See* 32WSS-L card
 - See* AD-1B-xx.x card
 - See* AD-1C-xx.x card
 - See* AD-2C-xx.x card
 - See* AD-4B-xx.x card
 - See* AD-4C-xx.x card
 - See* DWDM cards
 - See* OADM node
- optical amplifier cards
 - See* DWDM cards
 - See* OPT-AMP-L card
 - See* OPT-BST card
 - See* OPT-BST-E card
 - See* OPT-BST-L card
 - See* OPT-PRE card
- optical band PM parameters [10-14](#)
- optical channel PM parameters [10-14](#)
- optical line PM parameters [10-14](#)
- optical mesh card. *See* MMU card
- optical payload port service state transitions [B-8 to B-10](#)
- optical performance [4-7](#)
- optical ports, requirements for provisionable patchcords [8-24](#)
- optical service channel. *See* OSC
- optical service channel cards
 - See* DWDM cards
 - See* OSC-CSM card
- See* OSCM card
- optics PM parameters [10-13](#)
- Optics PM window [10-4](#)
- OPT-MAX parameter definition [10-18](#)
- OPT-MIN parameter definition [10-18](#)
- OPT parameter definition [10-18](#)
- OPT-PRE card
 - APC [4-9](#)
 - block diagrams [2-47](#)
 - description [2-45](#)
 - faceplate [2-46](#)
 - gain tilt control [4-24](#)
 - LEDs [2-48](#)
 - PM parameters [10-13](#)
 - port calibration [2-47](#)
 - power monitoring [2-47](#)
 - power requirements [A-5](#)
 - service state transitions [B-4](#)
 - specifications [A-13](#)
- OPWR-AVG parameter definition [10-18](#)
- OPWR-MAX parameter definition [10-18](#)
- OPWR-MIN parameter definition [10-18](#)
- orderwire
 - description [2-28](#)
 - OSCM and OSC-CSM cards [2-37](#)
 - pin assignments [2-29](#)
- OSC
 - description [2-37](#)
 - link termination cabling [3-15](#)
 - port service state transitions [B-10 to B-12](#)
 - terminations in a multishelf node [3-15](#)
- OSC-CSM card
 - ALS [2-40, 4-18](#)
 - block diagram [2-42](#)
 - description [2-40](#)
 - faceplate [2-41](#)
 - fiber cut scenario [4-18](#)
 - LEDs [2-44](#)
 - NE defaults [C-59, C-132](#)

- PM parameters [10-16](#)
 - PM read points [10-16](#)
 - power monitoring [2-43](#)
 - power requirements [A-5](#)
 - service state transitions [B-4](#)
 - specifications [A-12](#)
 - OSCM card
 - description [2-37](#)
 - faceplate [2-38](#)
 - LEDs [2-39](#)
 - NE defaults [C-58, C-131](#)
 - PM parameters [10-16](#)
 - PM read points [10-16](#)
 - power monitoring [2-39](#)
 - power requirements [A-5](#)
 - service state transitions [B-4](#)
 - specifications [A-12](#)
 - OSC regeneration node
 - cabling [3-22](#)
 - description [3-12](#)
 - OSI
 - and MSTP [8-31 to 8-34](#)
 - networking and TCP/IP [8-30](#)
 - overview [8-30](#)
 - OSNR, network applications [4-2](#)
 - OSPF
 - alternative to static routes [8-8](#)
 - IP addressing scenario [8-10](#)
 - IP networking overview [8-2](#)
 - provisionable patchcords [8-23](#)
 - OTDR [4-13](#)
 - OTN layer
 - default settings [C-3](#)
 - PM parameters [10-12](#)
 - provisioning PM parameters [10-11](#)
 - trunk-side PMs [10-13](#)
 - OTN PM window [10-10](#)
 - OXC node. *See* LMP
-
- P**
- passive OADM node [4-5](#)
 - patch-panel tray
 - deep [1-43](#)
 - managing fiber with [1-42](#)
 - standard [1-42](#)
 - path overhead, clocking differences [10-26](#)
 - Payload PM window [10-5](#)
 - PCM [2-28](#)
 - PC setup
 - CTC software installation [5-3](#)
 - requirements [5-4](#)
 - performance, optical [4-7](#)
 - performance monitoring
 - 10GE parameter definitions [10-20](#)
 - 8b10b parameter definitions [10-17](#)
 - bit errors corrected parameter [10-17](#)
 - DWDM cards [10-13](#)
 - FEC parameter definitions [10-22](#)
 - MIBs [11-7](#)
 - MIB statistics table [11-8](#)
 - MXP cards [10-2](#)
 - optics parameter definitions [10-17](#)
 - parameters. *See* PM parameters
 - SDH PM parameter definitions [10-24](#)
 - SONET PM parameter definitions [10-23](#)
 - thresholds [10-2](#)
 - TXP cards [10-2](#)
 - pin assignments
 - AEP [1-33](#)
 - alarms, ANSI [1-50](#)
 - overview (ANSI) [1-49](#)
 - ping [8-2](#)
 - PM parameters
 - FC1G on the client port [10-9](#)
 - FEC near end [10-13](#)
 - FEC trunk side [10-13](#)
 - full RMON statistics [10-8](#)

- GE or FC payload performance [10-8](#)
 - GFP-T payload on the GFP port [10-9](#)
 - line [10-16](#)
 - multiplex section [10-16](#)
 - ONE_GE or FC1G payload performance [10-9](#)
 - optical amplifier line [10-13](#)
 - optical band [10-14](#)
 - optical channel [10-14](#)
 - optical line [10-13, 10-14](#)
 - optics [10-16](#)
 - optics and 8b10b [10-13](#)
 - OTN layer [10-12](#)
 - regeneration section [10-16](#)
 - SDH layer far-end [10-7](#)
 - SDH layer near-end [10-7](#)
 - section [10-16](#)
 - SONET layer far-end [10-7](#)
 - SONET layer near-end [10-7](#)
 - POH. *See* path overhead
 - pointer justification counts [10-26](#)
 - popup data [5-12](#)
 - ports
 - provisioning options [10-6](#)
 - TL1 [5-4](#)
 - power
 - fan-tray assembly requirements [1-47](#)
 - monitoring [2-29](#)
 - specifications [A-4](#)
 - specifications by card [A-5](#)
 - supply [1-48](#)
 - PPJC-Pdet parameter [10-26](#)
 - PPJC-Pgen parameter [10-26](#)
 - protocols
 - IP [8-1](#)
 - Proxy ARP. *See* Proxy ARP
 - SSM [7-3](#)
 - provisionable patchcords
 - client-to-client ports [8-24](#)
 - description [8-23](#)
 - external vs. internal [8-23](#)
 - optical port requirements [8-24](#)
 - trunk-to-trunk ports [8-24](#)
 - provisioning
 - external alarms [9-13](#)
 - options for ports [10-6](#)
 - proxy server [8-12](#)
 - transponder and muxponder PMs [10-11](#)
 - WDM-ANS [3-51](#)
 - Provisioning user
 - default timeout [6-6](#)
 - network view privileges [6-4](#)
 - node view privileges [6-2](#)
 - obtaining Superuser privileges [6-5](#)
 - Proxy ARP
 - description [8-2](#)
 - enabling an ONS 15454 gateway [8-4](#)
 - use with static routes [8-6](#)
 - proxy server
 - gateway settings, description [8-13](#)
 - IP addressing scenario [8-12](#)
 - provisioning [8-12](#)
 - PST [B-1](#)
 - PSTQ [B-1](#)
-
- ## R
- rack
 - bay assembly [1-6](#)
 - installation overview (ANSI) [1-3](#)
 - installation overview (ETSI) [1-6](#)
 - mount a single node (ANSI) [1-5](#)
 - mount a single node (ETSI) [1-7](#)
 - mount multiple nodes (ANSI) [1-5](#)
 - mount multiple nodes (ETSI) [1-8](#)
 - reversible mounting bracket [1-4](#)
 - RADIUS
 - authentication [6-8](#)
 - overview [6-7](#)

- shared secrets [6-8](#)
 - rear cover [1-29](#)
 - regeneration node. *See* OSC regeneration node
 - regeneration section PM parameters [10-16](#)
 - remote access [5-7](#)
 - remote network monitoring. *See* RMON
 - removing
 - front door (ANSI) [1-23](#)
 - front door (ETSI) [1-24](#)
 - replacing the AIP [1-30](#)
 - Retrieve user
 - default timeout [6-6](#)
 - network view privileges [6-4](#)
 - node view privileges [6-2](#)
 - retrieving
 - alarm and condition history [9-7](#)
 - conditions [9-5](#)
 - revert [5-19](#)
 - rings
 - any-to-any [4-4](#)
 - hubbed rings [4-2](#)
 - meshed DWDM [4-5](#)
 - multihubbed [4-3](#)
 - RJ-11 connector [2-29](#)
 - RMON
 - alarm group [11-23](#)
 - Ethernet history group [11-23](#)
 - Ethernet statistics group [11-21](#)
 - event group [11-26](#)
 - history control group [11-22](#)
 - MIB support [11-21](#)
 - over DCC [11-20](#)
 - overview [11-20](#)
 - PM parameter definitions [10-20](#)
 - PPM parameters [10-8](#)
 - supported OIDs [11-24 to 11-25](#)
 - ROADM
 - 32DMX card [2-73](#)
 - 32DMX-L card [2-77](#)
 - 32WSS card [2-79](#)
 - 32WSS-L card [2-84](#)
 - card requirements [2-73, 2-77](#)
 - gain tilt control [4-28](#)
 - monitoring power equalization [4-12](#)
 - MXP_2.5G_10E_C and MXP_2.5G_10E_L cards [2-149](#)
 - MXP_2.5G_10E card [2-141](#)
 - node ANS parameters [3-56](#)
 - node cabling [3-28](#)
 - node description [3-8](#)
 - routing cables [1-39](#)
 - routing table [8-24](#)
 - RS-BBE parameter definition [10-25](#)
 - RS-BBER parameter definition [10-25](#)
 - RS-EB parameter definition [10-25](#)
 - RS-ES parameter definition [10-25](#)
 - RS-ESR parameter definition [10-25](#)
 - RS-SES parameter definition [10-25](#)
 - RS-SESR parameter definition [10-25](#)
 - RS-UAS parameter definition [10-25](#)
 - Running Disparity Count parameter definition [10-22](#)
 - rxControlFrames parameter definition [10-22](#)
 - rxFrames parameter definition [10-22](#)
 - rxLinkReset parameter definition [10-22](#)
 - Rx Optical Pwr (Avg,dBm) parameter definition [10-5](#)
 - Rx Optical Pwr (Max,dBm) parameter definition [10-5](#)
 - Rx Optical Pwr (Min,dBm) parameter definition [10-5](#)
 - rxPauseFrames parameter definition [10-22](#)
 - rxTotalPkts parameter definition [10-22](#)
 - rxUnknownOpcodeFrames parameter definition [10-22](#)
-
- ## S
- safety
 - ALS [4-14](#)
 - finding information about [xlvii](#)
 - labels [2-13](#)
 - SDH

- far-end PM parameters [10-7](#)
 - near-end PM parameters [10-7](#)
 - TCAAs [9-19](#)
- section PM parameters [10-16](#)
- secure mode
 - backplane IP address [8-20](#)
 - behavior of locked and unlocked nodes [8-22](#)
 - examples [8-20 to 8-22](#)
 - IP addressing scenario [8-19](#)
 - multishelf configurations [3-1](#)
- secure shell [6-6](#)
- security
 - idle user timeout [6-6](#)
 - IP addressing with secure mode enabled [8-19](#)
 - policies [6-5](#)
 - requirements [6-2](#)
 - Superuser privileges [6-5, 6-6](#)
 - tasks per tab [6-2, 6-4](#)
 - user level definitions [6-1](#)
 - viewing information about [5-10](#)
- SEF-S parameter definition [10-24](#)
- service states. *See* states
- SES-L parameter definition [10-24](#)
- SES-PM parameter definition [10-20](#)
- SESR-PM parameter definition [10-20](#)
- SESR-SM parameter definition [10-19](#)
- SES-SM parameter definition [10-19](#)
- SES-S parameter definition [10-24](#)
- SFPs
 - specifications [A-68](#)
- shelf assembly
 - ANSI, bay assembly [1-6](#)
 - ANSI, description [1-3](#)
 - ANSI, dimensions [1-4, A-4](#)
 - ETSI, description [1-6](#)
 - ETSI, dimensions [1-7, A-4](#)
 - ETSI, mounting [1-7](#)
 - specifications [A-1](#)
- shelf view
 - Alarms tab [5-13](#)
 - Circuits tab [5-13](#)
 - Conditions tab [5-13](#)
 - entering from multishelf [9-16](#)
 - History tab [5-13](#)
 - Inventory tab [5-13](#)
 - Maintenance tab [5-13](#)
 - Provisioning tab [5-13](#)
 - shortcuts [5-12](#)
- shutdown, automatic laser. *See* ALS
- Simple Network Management Protocol. *See* SNMP
- single-span link, description [4-7](#)
- slots
 - fiber management [1-40](#)
 - FMEC slots [1-31](#)
 - overview [1-53](#)
 - requirements [1-55](#)
 - unused slots [1-2](#)
- Small Form-factor Pluggables. *See* SFPs
- SNMP
 - See also* traps
 - community names [11-17](#)
 - components [11-2](#)
 - external interfaces [11-4](#)
 - message types [11-4](#)
 - MIBs [11-5](#)
 - overview [11-1](#)
 - proxy over firewalls [11-19](#)
 - RMON [11-20 to 11-26](#)
 - trap content [11-9](#)
 - version support [11-4](#)
- SONET
 - far-end PM parameters [10-7](#)
 - near-end PM parameters [10-7](#)
 - TCAAs [9-19](#)
- span loss
 - description [4-9](#)
 - verifying [4-13](#)
- SPE [10-26](#)

splitter protection
 description [2-170](#)
 TXP_MR_2.5G and TXPP_MR_2.5G cards [2-133](#)

SSH [6-6](#)

SSM [7-3](#)

SST [B-1](#)

ST3 clock [7-1](#)

states
 administrative [B-2](#)
 port service states [5-11](#)
 service [B-1](#)
 service state transitions [B-3 to B-22](#)

static route IP addressing scenario [8-8](#)

subnet
 CTC and nodes on different subnets [8-3](#)
 CTC and nodes on same subnet [8-2](#)
 multiple subnets on the network [8-7](#)
 using static routes [8-8](#)
 with dual GNEs [8-17](#)
 with Proxy ARP [8-4, 8-5](#)

subnet mask
 24-bit [8-25](#)
 32-bit [8-26](#)
 description [8-9](#)
 routing table [8-24](#)

Superuser
 default timeout [6-6](#)
 network view privileges [6-4](#)
 node view privileges [6-2](#)
 transferring privileges to Provisioning users [6-5](#)

suppressing
 alarms [9-15](#)
 TCAs on TXP/MXP cards [9-17](#)

synchronization status messaging. *See* SSM

synchronizing alarms [9-4](#)

synchronous payload envelope. *See* SPE

T

tabs
 card view [5-17](#)
 multishelf view [5-12, 5-13](#)
 network view [5-14, 5-15, 6-4 to 6-5](#)
 node view [5-13, 6-2 to 6-4](#)
 overview [5-7](#)
 shelf view [5-13](#)

TCAs
 description [10-2](#)
 ITU-T G.709 framing [9-18](#)
 SDH framing [9-19](#)
 SONET framing [9-19](#)
 suppressed by LOS and LOF alarms [10-2](#)
 suppressing on TXP/MXP cards [9-17](#)

TCC2 card
 block diagram [2-18](#)
 card-level indicators [2-19](#)
 database back up [5-19](#)
 description [2-17](#)
 faceplate [2-18](#)
 functionality [2-18](#)
 modem interface [A-2](#)
 network-level indicators [2-19](#)
 power requirements [A-5](#)
 redundant installation [2-19](#)
 soft reset [5-18](#)
 software installation overview [5-1](#)
 specifications [A-7](#)
 TL1 craft interface [A-2](#)

TCC2P card
 block diagram [2-22](#)
 database back up [5-19](#)
 description [2-21](#)
 faceplate [2-22](#)
 functionality [2-23](#)
 LEDs [2-24](#)
 modem interface [A-2](#)

- network-level LEDs [2-24](#)
- power requirements [A-5](#)
- secure mode [8-20](#)
- soft reset [5-18](#)
- software installation overview [5-1](#)
- specifications [A-7](#)
- TL1 craft interface [A-2](#)
- TCP/IP [8-30](#)
- TDM node, amplified [3-43](#)
- Telcordia
 - alarm severity standard [9-8](#)
 - performance monitoring documents [10-1](#)
 - TXP_MR_10E_C card compliance [A-62](#)
 - TXP_MR_10E card compliance [A-61](#)
 - TXP_MR_10G card compliance [A-40](#)
- TE links. *See* LMP
- temperature specifications [A-6](#)
- terminal loopback (CTC indicator) [5-12](#)
- terminal node
 - 1+1 protected flexible [3-31](#)
 - ANS parameters [3-54](#)
 - cabling [3-20](#)
 - description [3-3](#)
 - flexible channel count ANS parameters [3-54](#)
 - hybrid [3-38](#)
 - linear configuration [4-6](#)
 - scalable [3-35](#)
 - single-span link [4-7](#)
- termination modes [2-172](#)
- third-party equipment [1-2](#)
- threshold crossing alerts. *See* TCAs
- thresholds
 - ANSI defaults [C-3](#)
 - monitoring with MIBs [11-7](#)
 - performance monitoring [10-2](#)
 - PM MIB tables [11-7](#)
- Time Last Cleared parameter definition [10-22](#)
- timing
 - connections [1-52](#)
 - network timing example [7-2](#)
 - node timing parameters [7-1](#)
 - specifications [A-3](#)
 - SSM [7-3](#)
 - synchronization for the MXP_2.5G_10E_C card [2-149](#)
 - synchronization for the MXP_2.5G_10E_L card [2-149](#)
 - synchronization for the MXP_2.5G_10E card [2-142](#)
 - synchronization for the MXP_2.5G_10G card [2-137](#)
- TL1
 - AID in CTC [9-7](#)
 - commands [5-4](#)
 - connection [5-7](#)
 - craft interface connection [1-53](#)
 - interface specifications [A-2](#)
 - port [5-4](#)
- traffic
 - on a single span link [4-7](#)
 - routing [8-24](#)
- traps
 - generic [11-9](#)
 - IETF [11-9](#)
 - variable bindings [11-10 to 11-17](#)
- txBytes parameter definition [10-22](#)
- txFrames parameter definition [10-22](#)
- Tx Optical Pwr (Avg,dBm) parameter definition [10-5](#)
- Tx Optical Pwr (Max,dBm) parameter definition [10-5](#)
- Tx Optical Pwr (Min,dBm) parameter definition [10-5](#)
- TXP_MR_10E_C card
 - See also* TXP cards
 - ALS [2-127](#)
 - block diagram [2-125](#)
 - client interface [2-126](#)
 - client-to-trunk mapping [2-127](#)
 - description [2-124](#)
 - DWDM trunk interface [2-126](#)
 - E-FEC [2-127](#)
 - faceplate [2-125](#)

- features [2-125](#)
 - LEDs [2-128](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-7, 10-20, 10-22, 10-23, 10-24](#)
 - port-level LEDs [2-128](#)
 - power requirements [A-6](#)
 - specifications [A-62](#)
 - trunk wavelengths [A-63](#)
 - Y-cable protection [2-126](#)
- TXP_MR_10E_L card
- See also* TXP cards
 - ALS [2-127](#)
 - block diagram [2-125](#)
 - client interface [2-126](#)
 - client-to-trunk mapping [2-127](#)
 - description [2-124](#)
 - DWDM trunk interface [2-126](#)
 - E-FEC [2-127](#)
 - faceplate [2-125](#)
 - features [2-125](#)
 - LEDs [2-128](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-7, 10-20, 10-22, 10-23, 10-24](#)
 - port-level LEDs [2-128](#)
 - power requirements [A-6](#)
 - specifications [A-65](#)
 - trunk wavelengths [A-66](#)
 - Y-cable protection [2-126](#)
- TXP_MR_10E card
- See also* TXP cards
 - ALS [2-123](#)
 - block diagram [2-121](#)
 - client interface [2-121](#)
 - client-to-trunk mapping [2-123](#)
 - description [2-120](#)
 - DWDM trunk interface [2-121](#)
 - E-FEC [2-122](#)
 - faceplate [2-121](#)
 - features [2-120](#)
 - LEDs [2-123](#)
 - NE defaults [C-29, C-102](#)
 - OTN provisioning [10-11](#)
 - PM parameters [10-2, 10-6, 10-7, 10-20, 10-22, 10-23, 10-24](#)
 - port-level LEDs [2-124](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23, 8-24](#)
 - specifications [A-60](#)
 - Y-cable protection [2-122, 2-169](#)
- TXP_MR_10G card
- See also* TXP cards
 - ALS [2-119](#)
 - block diagram [2-118](#)
 - description [2-116](#)
 - faceplate [2-118](#)
 - LEDs [2-119](#)
 - NE defaults [C-34, C-108](#)
 - OTN provisioning [10-12](#)
 - PM parameters [10-2, 10-6, 10-7, 10-23, 10-24](#)
 - PM read points [10-4](#)
 - port-level LEDs [2-119](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23, 8-24](#)
 - specifications [A-39](#)
 - Y-cable protection [2-118, 2-169](#)
- TXP_MR_2.5G card
- See also* TXP cards
 - ALS [2-133](#)
 - block diagram [2-132](#)
 - description [2-128](#)
 - faceplate [2-130](#)
 - ITU-T G.709 [2-129](#)
 - LEDs [2-133](#)
 - NE defaults [C-40, C-113](#)
 - OTN provisioning [10-12](#)
 - PM parameters [10-2, 10-6, 10-8, 10-23, 10-24](#)
 - port-level LEDs [2-134](#)
 - power requirements [A-6](#)
 - provisionable patchcords [8-23, 8-24](#)

specifications [A-43](#)
 splitter protection [2-133](#)
 Y-cable protection [2-132, 2-169](#)

TXP cards

See also individual TXP card names

ALS [4-15](#)

performance monitoring [10-2](#)

port requirements for provisionable patchcords [8-24](#)

port service state transitions [B-18 to B-22](#)

power requirements [A-6](#)

protection [2-169 to 2-171](#)

provisionable patchcords [8-23](#)

service state transitions [B-13 to B-18](#)

specifications [A-39 to A-68](#)

suppressing TCAs [9-17](#)

suppression of TCAs due to LOS and LPF alarms [10-2](#)

types [2-3](#)

TXPP_MR_2.5G card

See also TXP cards

ALS [2-133](#)

block diagram [2-132](#)

description [2-128](#)

faceplate [2-130](#)

ITU-T G.709 [2-129](#)

LEDs [2-133](#)

NE defaults [C-48, C-122](#)

OTN provisioning [10-11](#)

PM parameters [10-2, 10-8, 10-23, 10-24](#)

port-level LEDs [2-134](#)

power requirements [A-6](#)

provisionable patchcords [8-23, 8-24](#)

specifications [A-43](#)

splitter protection [2-133, 2-170](#)

Y-cable protection [2-132](#)

txTotalPkts parameter definition [10-22](#)

U

UAS-L parameter definition [10-24](#)
 UAS-PM parameter definition [10-20](#)
 UAS-SM parameter definition [10-19](#)
 UDC [2-29](#)
 UNC-WORDS parameter definition [10-18](#)
 UNC-Words parameter definition [10-23](#)
 UNIX

- software installation description [5-3](#)
- workstation requirements [5-4](#)

user data channel. *See* UDC

user-defined alarms

- See* external alarms
- See* external controls

users, security level definitions [6-1](#)

V

verifying span loss [4-13](#)
 viewing

- alarm counts on the LCD [9-2](#)
- alarm history [9-6](#)
- alarms [9-2, 9-4](#)
- conditions [9-5](#)
- DCC connections [5-15](#)
- login node groups [5-14](#)
- multishelf alarmed entities [9-16](#)
- security information [5-10](#)

views

- See* card view
- See* multishelf view
- See* network view
- See* node view

virtual links. *See* provisionable patchcords

virtual wires [9-14](#)

VOA

- adjusting with ANS [3-46](#)
- correct with APC [4-9](#)

degrade or fail alarm [4-10](#)

gain tilt control [4-24](#)

in the OSCM card [2-39](#)

VPC parameter definition [10-18](#)

W

WAN [8-2](#)

warnings

definition of [v-xlii to v-xlvi](#)

finding information about [xlvii](#)

laser [1-26, 1-27](#)

wavelengths, patch-panel ports [1-43](#)

WDM-ANS provisioning [3-51](#)

Y

Y-cable protection

applicable MXP and TXP cards [1-16](#)

block diagram [1-14](#)

connector mapping and labeling [1-15](#)

description [1-9, 2-169](#)

managing fibers [1-44](#)

managing multiple modules [1-17](#)

module configuration [1-13](#)

module tray [1-17](#)

MXP_2.5G_10E_C card [2-149](#)

MXP_2.5G_10E_L card [2-149](#)

MXP_2.5G_10E card [2-142](#)

MXP_2.5G_10G card [2-137](#)

port label [1-18](#)

port mapping [1-15, 1-16](#)

TXP_MR_10E_C card [2-126](#)

TXP_MR_10E_L card [2-126](#)

TXP_MR_10E card [2-122](#)

TXP_MR_10G card [2-118](#)

TXP_MR_2.5G card [2-132](#)

TXPP_MR_2.5G card [2-132](#)