



Cisco ONS 15200 Module Handbook

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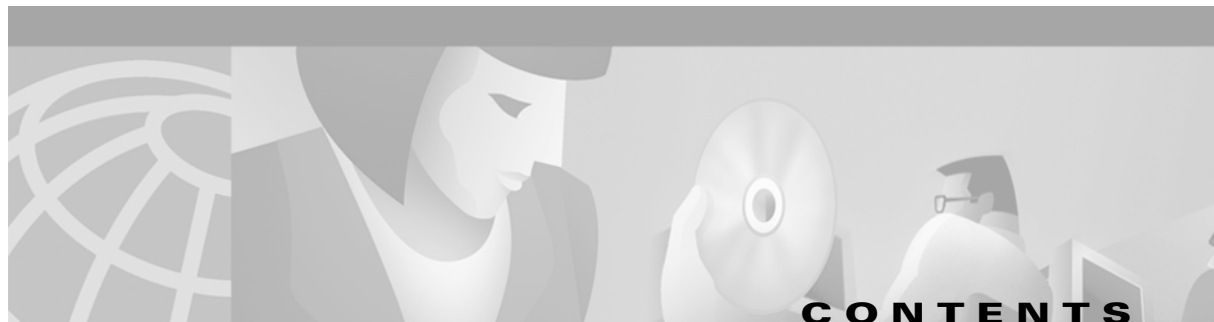
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Cisco ONS 15200 Module Handbook

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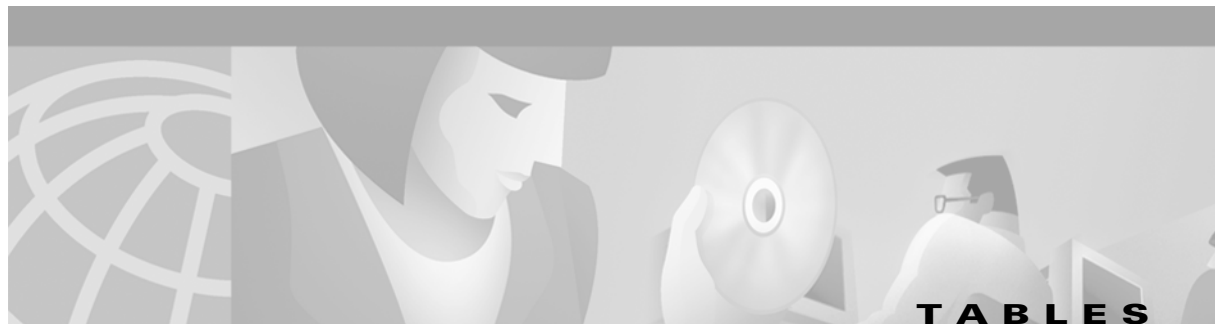
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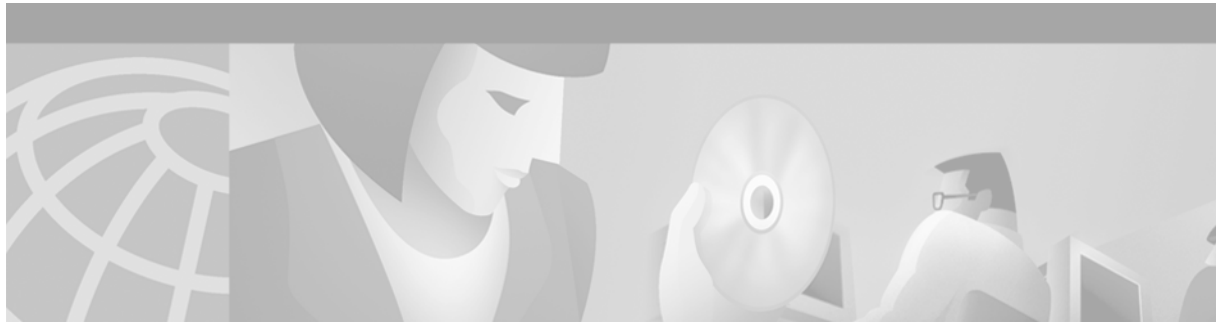
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About this Manual

The *Cisco ONS 15200 Module Handbook* provides module function, technical specifications, and general safety information for each ONS 15200 module. In addition, the handbook provides instructions for removing and replacing modules.

Manual Structure

The module handbook is organized into the following chapters:

- Chapter 1, “Safety Summary,” lists safety considerations and precautions that should be followed to ensure correct module operation and personal safety.
- Chapter 2, “Network Control Board Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Network Control Board (NCB) module.
- Chapter 3, “Communication Interface Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Communication Interface module (CIM).
- Chapter 4, “Client Layer Interface Port Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Client Layer Interface Port module (CLIP).
- Chapter 5, “Network Adaptation Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Network Adaptation module (NAM).
- Chapter 6, “Dummy Network Adaptation Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Dummy Network Adaptation module (DNAM).
- Chapter 7, “Line Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Line module (LM).
- Chapter 8, “Hub Filter Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Hub Filter module (HFM).
- Chapter 9, “Dummy Filter Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Dummy Filter module (DFM).
- Chapter 10, “Termination Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Termination module (TM).

- Chapter 11, “Bridge Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Bridge module (BM).
- Chapter 12, “Connection Module X,” provides a functional description, technical specifications, and removal and replacement procedures for the Connection Module X (CMX).
- Chapter 13, “Connection Module Y,” provides a functional description, technical specifications, and removal and replacement procedures for the Connection Module Y (CMY).
- Chapter 14, “Collector Filter Module,” provides a functional description, technical specifications, and removal and replacement procedures for the Collector Filter module (CFM).
- Appendix A, “Acronyms,” defines abbreviations used in the manual.

Applicable Standards

Cisco ONS 15200 system design, construction, and performance adhere to the following standards:

CFR 1040.10

ETS 300 019-1-1 (1992), class 1.1

ETS 300 019-1-2 (1992), class 2.3

ETS 300 019-1-3 (1992), class 3.1

ETS 300 132-2 (1996)

ETS 300 253 (1995)

ETS 300 386-1 (1994)

FCC Part 15

IEC 60825-1 (1993)

IEC 60825-2 (2000)

ITU-T G.652 (04/1997)

ITU-T G.655 (04/1999)

ITU-T G.783 (10/2000)

ITU-T G.825 (03/2000)

ITU-T G.872 (02/1999)

ITU-T G.957 (06/1999)

ITU-T G.958 (11/1994)

Telcordia GR-1089-CORE (01/1999)

Telcordia GR-63-CORE (10/1995)

Related Documentation

For additional hardware information about the ONS 15200 system, refer to the following documents:

- *Cisco ONS 15200 Product Description*
- *Cisco ONS 15200 Installation, Setup, and Test Manual*

Obtaining Documentation

The following sections provide sources for obtaining documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following URL:

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Optical networking-related documentation, including the *Cisco ONS 15200 Module Handbook*, is available in a CD-ROM package that ships with your product. The Optical Networking Product Documentation CD-ROM is updated as required and therefore may be more current than printed documentation. The CD-ROM package is available as a single package or as an annual subscription.

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- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

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<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

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If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

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To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.



Safety Summary

This chapter includes the critical, general, and recommended safety precautions for the Cisco ONS 15200 modules.

1.1 Critical Safety Warnings



Warning

This system may contain Class I levels of invisible laser radiation according to the Food and Drug Administration Code of Federal Regulations 21CFR1040.10 and Class 3A according to International Electrotechnical Commission (IEC). These codes state that Class I or Class 3A levels of direct laser radiation are considered an acute hazard to the skin and eyes.



Warning

Use protective glasses such as the Laser-Gard® Green CO2 (LGE Spectacle, LGS Goggle, LWG Wraparound, or LGF Full-View) or an equivalent type of covering equipment with an optical density greater than 2. Eye protection must cover a wavelength of 800 to 1800 nm. See your laser safety officer for more information.



Warning

The Multichannel Unit (MCU) is energized with -48 VDC power.



Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.



Warning

Do not look directly at the optical connector output beams when removing connectors. The beams can cause permanent eye damage.

1.2 General Safety Precautions

People who install, maintain, or operate ONS 15200 equipment should follow standard safety practices for working with electrical wiring and connectors. Installation and maintenance of the ONS 15200 should be performed only by people trained in electrical and laser safety.

1.3 Recommended Safety Precautions

Recommended safety precautions, procedures, and rules for working with the ONS 15200 include:

- Terminate all optical fiber jumper cable outputs properly before connecting the inputs.
- Disconnect the optical fiber jumper cable input connector before disconnecting the output connector. Ensure that the optical fiber jumper cable output is safely terminated before reconnecting the input.
- Handle fiber with care. Glass fiber is subject to breakage if mishandled. Injury or permanent equipment damage can result from using broken fiber.
- Observe standard precautions for handling devices sensitive to electrostatic discharge.
- Do not directly view the laser component of this product from the output source, the output connector, or unterminated fiber.
- Do not directly view the laser component of this product using an optical instrument without proper protective eyewear, filtering, or attenuation.
- Avoid physical exposure to the laser beam.

1.4 Safety Symbols and Labels

You must read and understand all warning labels before working with the equipment. Figure 1-1 shows the international symbol for laser radiation danger.

Figure 1-1 International laser radiation symbol





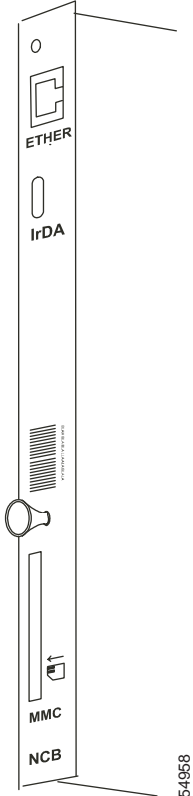
Network Control Board Module

This chapter describes the Cisco ONS 15200 Network Control Board (NCB) module. For information about software configuration, refer to the *Cisco ONS 15200 Command Line Interface Manual*.

2.1 Functional Description

Figure 2-1 shows the front panel of the NCB module.

Figure 2-1 Network Control Board front panel



2.1.1 Module Function

The NCB module is the central processor unit with all of its peripherals.

The SNM software on the NCB controls the Client Layer Interface Port (CLIP) modules on the internal bus. In addition to controlling all of the ONS 15200 system CLIP modules, the NCB module collects information about system status, alarms, parameters, and actions on the internal data bus. You can also store performance monitoring data on the NCB and upload the data to external media.

With certain limitations described below, you can configure one or two active NCBs as CLIP managers in a network; an NCB in a network that is not provisioned as an active manager of a CLIP can still inventory the CLIP. Both these functions are limited to a distance of two CAN bus extensions and two QPP jumps.

- The internal CAN bus can be extended with a CAN bus extension cable from one MCU or SCU to another co-located MCU or SCU to connect two or more co-located shelves to a logical network element (NE). (A maximum of four MCUs can be connected to form one logical NE; up to 60 DCN addresses are possible for CLIPs on one extended CAN bus.)
- A QPP jump is the logical connection of the in-band communication channel between a pair of two CLIPs forming one path.

Read the status of the NCB board and the entire subnetwork on the Communication Interface module (CIM) immediately beneath it.

Access the NCB board from the Ethernet port on the front panel or the MA port on the CIM. On the CIM, use the RS-232 adapter (P/N 72-2746); the EIA/TIA-232 interface requires the parameters in Table 2-1.

Table 2-1 EIA/TIA-232 Interface

Parameter	Condition
Baud rate	19.2 kbaud
Data bits	8
Parity	None
Stop bits	1
Flow control	None
ASCII settings	Send line end with line feed

2.1.2 Alarm and Supervisory Subunit

The NCB hosts the Subnetwork Manager (SNM) software. The SNM supervises the CLIP modules and manages the communication channels to other management systems.



Note

The CLIP modules, when powered on, synchronize with their respective mates. Traffic comes up without the assistance of an NCB.

2.1.3 Front-Panel Indicators, Connections, and Adjustments

Table 2-3 shows the NCB module connectors on the front panel.

Table 2-2 NCB connectors

Connector	Significance
ETHER	Ethernet connector (8-pole modular jack)
IrDA	not connected (for future releases)
MMC	not connected (for future releases)

Indicators for the NCB are visible on the front panel of the Communication Interface module (CIM). Table 2-3 shows the NCB module LEDs on the front panel of the CIM.

Table 2-3 CIM Panel NCB Signals

LED Color	Significance
Red	Critical or major alarm for the sub-network
Yellow	Minor alarm or warning for the sub-network
Green	NCB powered on

**Note**

When the red and yellow LEDs are flashing simultaneously, the NCB is rebooting. If the LEDs flash continuously, the NCB has made the maximum number of reboot attempts and has entered boot mode. Refer to the Cisco *ONS 15200 Command Line Interface Manual* for further information.

2.2 Technical Specifications

This section covers optical, electrical, environmental, and mechanical specifications for the NCB module. Optical specifications and default thresholds do not apply.

2.2.1 Electrical Specifications

Two independent external voltages are used:

- Primary source -48 VDC
- Secondary source -48 VDC

**Note**

The NCB has a lithium-battery backup that maintains the Real Time Clock (RTC) NCB functionality for 24 hours during a complete -48 VDC-power failure. The internal power supply charges the battery during normal use.

**Warning**

Dispose of the battery and/or the NCB in an environmentally friendly way. Ultimate disposal of the lithium battery and the NCB module must be handled according to all applicable international, national, and local laws and regulations.

2.2.2 Environmental Specifications

Table 2-4 lists the normal climate-related limits.

Table 2-4 NCB Environmental Specifications

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

2.2.3 Mechanical Specifications

Table 2-5 lists physical dimensions.

Table 2-5 NCB Module Physical Dimensions

Item	Dimension
Height	232 mm (9.1 in.)
Depth	215 mm (8.5 in.)
Width	20 mm (0.8 in.)
Weight	0.38 kg (0.8 lbs.)

2.3 Removing and Replacing an NCB Module

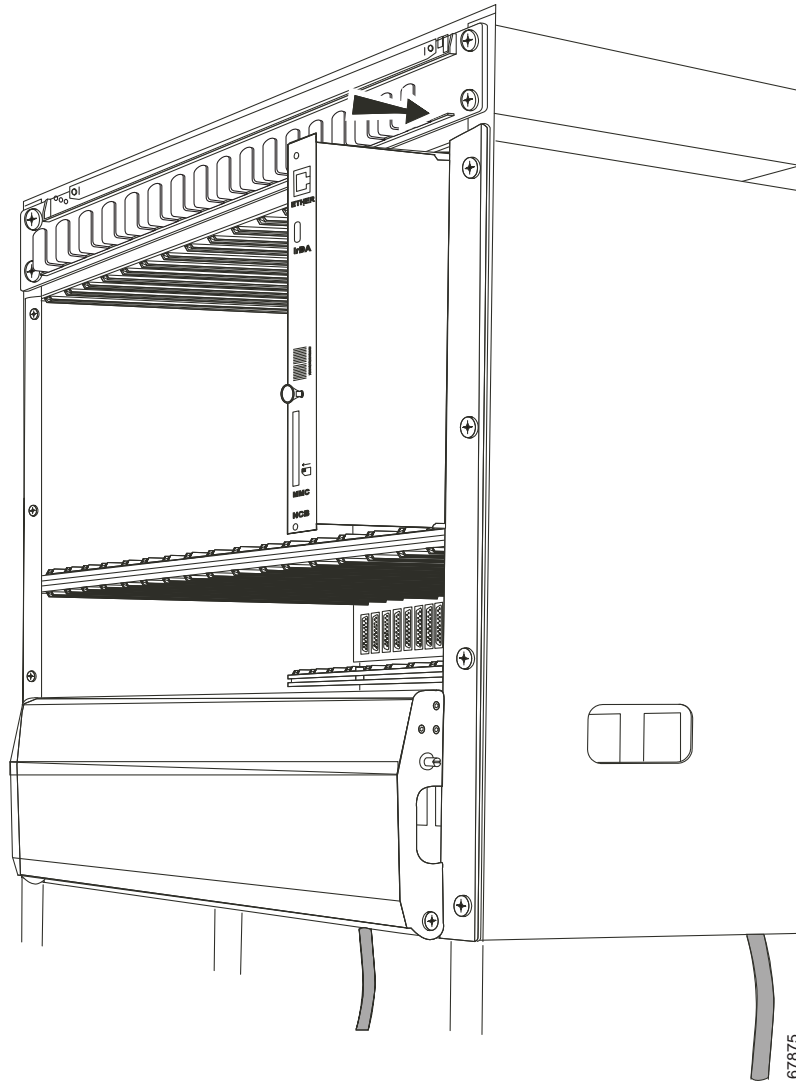
This section explains how to remove and replace NCB modules.

**Note**

Under normal circumstances, removing the NCB is non-service affecting.

The NCB module is positioned in Slot 17 in the Cisco ONS 15252 Multichannel Unit (MCU) as shown in Figure 2-2.

Figure 2-2 Mounting an NCB module



Procedure: Remove the Network Control Board

- Step 1** Back up all NCB files to a laptop or PC as described in the *Cisco 15200 Command Line Interface Manual* and in the “Back up Files from the Network Control Board” procedure on page 2-7.
- Step 2** Disconnect the front panel Ethernet cable from the NCB module.
- Step 3** Loosen the thumbscrews.



Note The NCB module screws are equipped with retainers.

- Step 4** Carefully remove the NCB module from the ONS 15252 MCU.

- Step 5** If you will not immediately replace the NCB, install a 20 mm (0.8")-wide dummy front where the NCB was removed from the ONS 15252 MCU.
-

Procedure: Determine the Parameters of the Existing Network Control Board

- Step 1** Open a Command (MS-DOS) Prompt window on your workstation. To do so, select **Start > Programs** and select **Command Prompt** (it may be under Accessories).
- Step 2** Telnet to the NCB. To do so, at the C:\> prompt, type `telnet <ipaddress>` where <ipaddress> is the IP address of the NCB. Press **Enter**. You should get a login prompt from the NCB
- Step 3** Log into the 15200 as an administrator user:
- At the NCB login prompt type a username with administrator privileges and press **Enter**.
 - At the password prompt type the password for the administrator user and press **Enter**.
- If the login is successful you should see the **NCB:>** prompt.



Note More than one user with the same username cannot be logged in at the same time. Each username can log in once per session.

- Step 4** Determine the current software and hardware version.
- At the **NCB:>** prompt type `configure system` and press **Enter**. You should now see the **NCB:=** prompt
 - At the **NCB:=** prompt type `version` and press **Enter**. Write down the NCB Revision number and the SNM Version Number.
- Step 5** List the files that reside in the NCB. To do so, at the **NCB:=** prompt, type `list 0` and press **Enter**. You will see the names of all the files that currently reside in the NCB. Record the number of files. In the next section of this procedure you will backup these files to your PC.
- Step 6** Determine if you need to defrag the NCB, i.e. if any of the files listed have the word “deleted” next to them. If none of the files listed have the word *[deleted]* next to the file name, skip this step.
- To remove files marked as deleted, at the **NCB:=** prompt, type `defrag 0` and press **Enter**. You will see the message “Defragmentation in progress...” This command will take up to 2 minutes to complete.



Note You must wait for this command to complete.

- When the process is complete, you will see the **NCB:=** prompt again. Type `list 0` and press **Enter**. Verify that no file shows the word *[deleted]* next to it.
- Step 7** Verify the IP configuration. To do so, at the **NCB:=** prompt type `ipconf` and press **Enter**. You will see the current NCB IP address, the subnet mask, and the gateway. Record this information for later use.
- Step 8** Logout of the NCB. To do so, at the **NCB:=** prompt, type `exit` and press **Enter**. At the **NCB:>** prompt, type `exit` and press **Enter**.

Procedure: Back up Files from the Network Control Board

Complete the following steps to backup all of the NCB files to your PC.

-
- Step 1** Open a Command Prompt window. To do so, select **Start > Programs** and select **Command Prompt** (it may be under **Accessories**).
- Step 2** Create a directory to save the backup files.
- At the `C:\>` prompt, type `mkdir <foldername>` and press **Enter** where `foldername` is the name of the directory you want to create.
 - Go to the directory that will hold the backup files. At the `C:>` prompt, type `cd <foldername>`, where `foldername` is the destination folder. Press **Enter**.
- Step 3** Open an FTP session to the NCB.
- At the `c:\foldername>` prompt, type `ftp <ipaddress>`, where `ipaddress` is the IP address of the 15200 system NCB. Press **Enter**.
 - At the **User** prompt, type an ONS 15200 username with administrator privileges, followed by the password. If the username and password are correct you should see a message showing that the username is logged in.
- Step 4** At the `ftp>` prompt, type `dir` and press **Enter**. You will see a list of all the files in the NCB.
- Step 5** Copy all the files in the NCB to the backup directory in your PC. Start with the file that contains the `snm.out` NCB software.
- At the `ftp>` prompt, type `bin` and press **Enter**.
 - At the `ftp>` prompt, type `get snm.out` and press **Enter**.
- Step 6** Back up the rest of the files that reside in the NCB to your PC.
- At the `ftp>` prompt type `ascii` and press **Enter**.
 - At the `ftp>` prompt type `get <filename>`, where `filename` is each of the files that reside in the NCB, except `snm.out`. Press **Enter**.
 - Repeat for each of the remaining files in the NCB. The only exception should be the `snm.out` file; you have already backed up this file.
- Step 7** In your PC or laptop open Windows Explorer and verify that all of the files originally listed in the NCB are now in the backup directory.
- Step 8** Once you verify that you have copied all the NCB files to the PC backup directory, close the ftp window. To do so, at the `ftp>` prompt, type `bye` and press **Enter**. This will take you back to the `c:\foldername>` prompt.



Note Always back up the `qdbn.cfg` file and the `snm.out` file.

Procedure: Replace the NCB

Before replacing the NCB, back up all files as described in the “Back up Files from the Network Control Board” procedure on page 2-7.

Step 1 Disconnect the Ethernet cable from the NCB module.

Step 2 Loosen the thumbscrews.



Note The NCB module screws are equipped with retainers.

Step 3 Carefully remove the NCB module from the ONS 15252 MCU.

Step 4 Align the replacement NCB module with the NCB module slot.

Step 5 Carefully insert the module into the slot.



Note Make sure that the backplane connector and the NCB module connector are correctly mated and that no optical fibers are pinched.

Step 6 Tighten the thumbscrews.

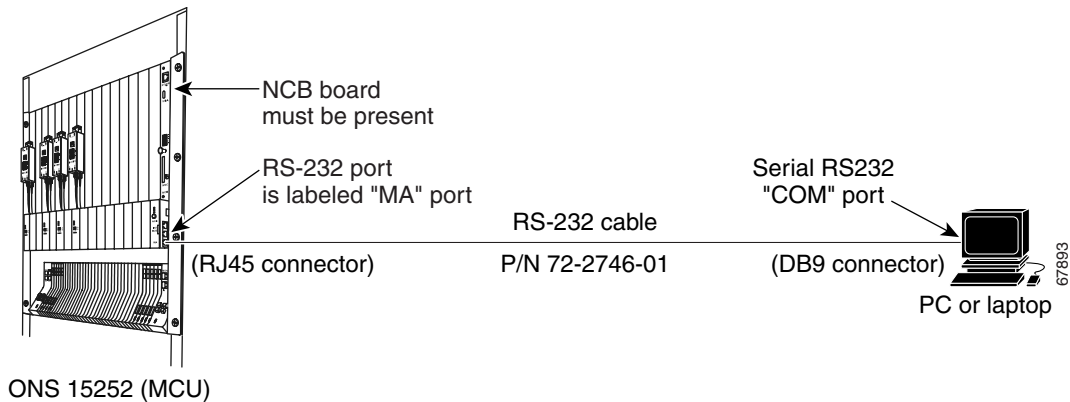
Step 7 Connect the Ethernet cable to the NCB module.

Procedure: Initialize the NCB

Step 1 Create an administrator user and assign an IP address, mask, and gateway to the new NCB. Use the CIM RS-232 cable (P/N 72-2746-01) provided with the system.

Step 2 Connect your PC or Laptop serial COM port to the ONS 15252 MCU management access (MA) port on the CIM board.

Figure 2-3 Connecting a CIM module and a laptop or PC



Step 3 Make sure that the connection to the NCB is has been terminated. Otherwise the Hyper Terminal cannot connect to the system.

Step 4 On the PC or laptop, open the terminal emulation program such as Hyper Terminal and configure the COM port.

Procedure: Configure the COM Port

- Step 1** Select **Start > Programs** and select **Accessories > Communication > Hyper Terminal**.
- Step 2** Press **Cancel**.
- Step 3** In the File pull-down menu, select **Properties** (the window is called “New Connection Properties”).
- Step 4** In Connect using, select the **COMx Port**. Press **Configure**.
- Step 5** In the “COMx properties” window, select:
- | | |
|--------------|------------|
| Baud rate | 19200 Baud |
| Data bits | 8 |
| Parity | None |
| Stop bits | 1 |
| Flow control | None |
- Step 6** Press **OK**.
- Step 7** In New Connection Properties, select the Settings menu.
- Step 8** Select **VT100** as the emulation.
- Step 9** Go to ASCII settings. Mark **Send line ends with line feeds** (all other fields are not marked). The Hyperterminal screen appears.
- Step 10** Press **Enter**. The system responds with a login prompt. Press **Enter** again. Because no password is needed press **Enter** a third time. You should now see the NCB:> prompt.



Note If you cannot see a response from the ONS 15252 MCU, try using a different COM port

- Step 11** Create a user with administrator privileges:
- At the NCB:> prompt, type `create user <user1>` and press **Enter**. The system responds with a “Created <user1>” message. The `user1:#` prompt appears on the screen.
 - At the `user1:#` prompt, type `password <password1>` and press **Enter** to create a password for a new user.
 - At the `user1:#` prompt, type `privileges administrator` and press **Enter**.
 - At the `user1:#` prompt, type `exit` and press **Enter**.
 - At the NCB:> prompt type `commit user <user1>`
- Step 12** Set the IP address of the NCB module.
- At the NCB:> prompt, type `configure system` and press **Enter**.
 - At the NCB:= prompt, type `ipconf <ipaddr> <subnet> <gateway>` where `ipaddr` is the chosen IP address, `subnet` the chosen subnet mask, and `gateway` the gateway for the new NCB. Press **Enter**.
 - At the NCB:= prompt, type `reboot` and press **Enter**.



Note The NCB reboot takes approximately 1 minute.

- Step 13** Disconnect the CIM RS-232 adapter cable.
- The Subnetwork Manager on the NCB module now has an IP address and can be accessed directly at the Ethernet port on the NCB module.

Figure 2-4 Hyperterminal NCB screen

```

155252 - HyperTerminal
File Edit View Call Transfer Help
[Icons]
NCB RS-232 interface
login:
password:
NCB:>create user myadmin
Created 'myadmin'
myadmin:#password myadmin
myadmin:#privileges administrator
myadmin:#exit
NCB:>commit user myadmin
NCB:>show user
-----+-----+-----
name           | privileges   | state
-----+-----+-----
myadmin        | administrator| offline
-----+-----+-----
NCB:>configure system
NCB:=ipconf 10.89.239.102 255.255.255.128 10.89.239.1
IP address set, please reboot
NCB:=reboot
System shutdown started...
Connected 2:50:14  VT100  19200 8-N-1  SCROLL  CAPS  NUM  Capture  Print echo
67892

```

Procedure: Restore the Configuration Files to the New NCB

This procedure explains how to copy all the files, except the `snm.out` and `qdfs.cfg` files, from the PC backup directory to the new NCB.



Note

We do not copy the `snm.out` and `qdfs.cfg` files to the new NCB because the new NCB should already have these files. These two files are installed at the factory.

- Step 1** Verify that your PC or laptop is connected to the Ethernet port on the NCB module.
- Step 2** Open a Command prompt window. To do so, select **Start >Programs** and select **Command Prompt** (it may be under Accessories).
- Step 3** Go to the directory where you backed up the original NCB files. To do so, at the `C:>` prompt type `cd <foldername>`, where `foldername` is the folder where the backed up files reside. Press **Enter**.
- Step 4** Start an ftp session to the NCB. To do so, at the `C:\foldername>` prompt type `ftp <ipaddress>`, where `ipaddress` is the IP address of the new NCB. Press **Enter**.
- Step 5** Log into the system.
 - a. At the NCB `ftp>` User login prompt, type the username of the administrator that you created in the “Initialize the NCB” procedure on page 2-8 and press **Enter**.

- b. At the password prompt, type the password and press **Enter**. You should receive a message saying that you were successful logging in.
- Step 6** Determine which files are already on the NCB. To do so, at the `ftp>` prompt type `dir` and press **Enter**. You will see a list of all files in the NCB. At minimum you should see the `snm.out` and `qdfs.cfg` files.
- Step 7** Type `ascii` and press **Enter**.
- Step 8** One at a time, move the files (except for `snm.out` and `qdfs.cfg`) from the backup directory to the new NCB. To do so, at the `ftp>` prompt, type `put <filename>` and press **Enter**, where `filename` is the file that you want to move from the backup directory to the new NCB. You should see a message showing that the file has been successfully transferred.



Note The `snm.out` and `qdfs.cfg` files are the only files not transferred to the new NCB.

- Step 9** Repeat Step 8 for each of the files that you wish to transfer to the new NCB. If the `snm.out` and the `qdfs.cfg` files are present on the original NCB, do not put these two files on the new NCB.
- Step 10** Verify that the new NCB shows the same files that the original NCB. To do so, at the `ftp>` prompt type `dir` and press **Enter**. Verify that you count the same number of files as were in the original NCB.
- Step 11** Close the `ftp` window. At the `ftp>` prompt, type `bye`.
- Step 12** Reboot the NCB for the downloaded configuration to take effect.
- a. Telnet to the NCB using the administrator username and password you created earlier (see the “Initialize the NCB” procedure on page 2-8).
 - b. At the `NCB:>` prompt, type `configure system` and press **Enter**.
 - c. At the `NCB:=` prompt, type `reboot` and press **Enter**.



Note The NCB reboot takes approximately 1 minute.

- d. Telnet to the new NCB with an administrator username that existed previously in the original NCB.



Note The user name you created in the “Initialize the NCB” procedure on page 2-8 is no longer valid after the reboot.

- Step 13** Check the new NCB software version.
- a. At the `NCB:>` prompt type `configure system` and press **Enter**.
 - b. At the `NCB:=` prompt type `version` and press **Enter**. Verify that the software version is the same as in the original NCB.
-

Communication Interface Module

This chapter describes the Communication Interface module (CIM).

The CIM is installed in the ONS 15252 MCU. The CIM extends the ONS 15252 MCU internal CAN bus to another ONS 15252 MCU or an ONS 15201 SCU. The extension of the CAN bus allows the configuration of several network elements into a larger functional unit.

Additionally, the CIM provides:

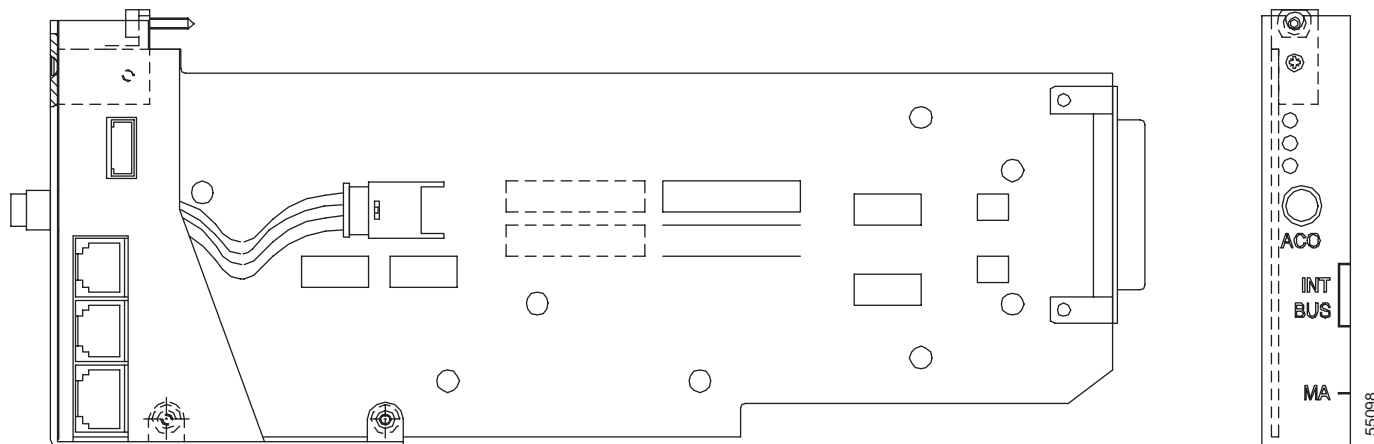
- Interface to the MM software package (with suitable hardware)
- Termination of the internal data bus (CAN bus)
- EIA/TIA-232 (NONE standard) access interface to the ONS 15252 MCU

The Network Control Board (NCB) transfers information to the CIM on the ONS 15252 MCU backplane.

3.1 Functional Description

This section provides a description of the CIM, illustrated in Figure 3-1.

Figure 3-1 CIM side view



3.1.1 Module Function

The CIM can extend the controller area network (CAN) bus of the ONS 15252 MCU to another MCU or to an ONS 15201 SCU. This arrangement allows several network elements (NEs) to work together as a larger functional unit.

The CIM is also the interface to the Maintenance Manager (MM) software package. This interface makes any PC equipped with required hardware a platform for ONS 15200 system surveillance, troubleshooting, and maintenance. A EIA/TIA-232 (NONE standard) port (Tx, Rx, Ground) is available on the CIM, which is accessible with an additional CIM adapter cable.



Note

The CIM is active, but does not include alarm or supervisory subunit functions.

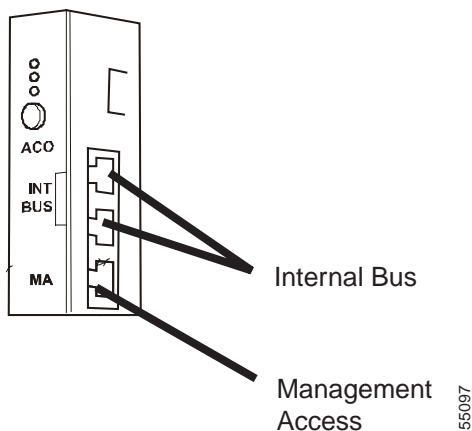
3.1.2 Front-Panel Indicators, Connections, and Adjustments

Figure 3-2 shows the position of the LEDs, the push button, and the connectors, which are described in Table 3-1 and Table 3-2.

Table 3-1 CIM Panel Connectors and Push Button

Connector	Significance
INT BUS	Internal Bus (CAN Bus) (6-pole modular jack)
MA	Management Access (8-pole modular jack)
ACO (Push Button)	Alarm Cut Off

Figure 3-2 CIM connectors



Three LEDs show NCB module signals on the front of the CIM (Table 3-2).

Table 3-2 CIM Panel NCB Signals

LED Color	Significance
Red	Critical or major alarm in the sub-network
Yellow	Minor alarm or warning in the sub-network
Green	NCB power on

3.2 Technical Specifications

This section covers electrical, environmental, and mechanical specifications for the CIM. Because the CIM is not an optical device, optical specifications and default thresholds do not apply.

3.2.1 Electrical Specifications

The power supply for the CIM is 4.5 VDC.

3.2.2 Environmental Specifications

Table 3-3 lists CIM climate-related limits during normal operation.

Table 3-3 CIM Climatic Limits

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

3.2.3 Mechanical Specifications

Table 3-4 lists CIM mechanical specifications.

Table 3-4 CIM Mechanical Specifications

Item	Specification
Height	95 mm (3.8 in.)

Table 3-4 CIM Mechanical Specifications (continued)

Item	Specification
Width	20 mm (0.8 in.)
Depth	250 mm (9.8 in.)
Weight	0.14 kg (0.3 lbs.)

3.3 Removing and Replacing a CIM

This section explains the removal and replacement procedures for the CIM. Make sure the replacement module and any supplies, such as tagging materials, are present on site before you begin the removal and replacement procedures.



Note

Under normal circumstances, removing the CIM is non-service affecting.



Warning

The ONS 15252 Multichannel Unit (MCU) is energized with -48 VDC power.



Caution

Static electricity can damage electro-optical modules. While handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

The CIM is installed in the ONS 15252 MCU. Only replace the CIM if it is malfunctioning. In that case, replace the CIM immediately.

Procedure: Remove the Communication Interface Module from the ONS 15252 MCU

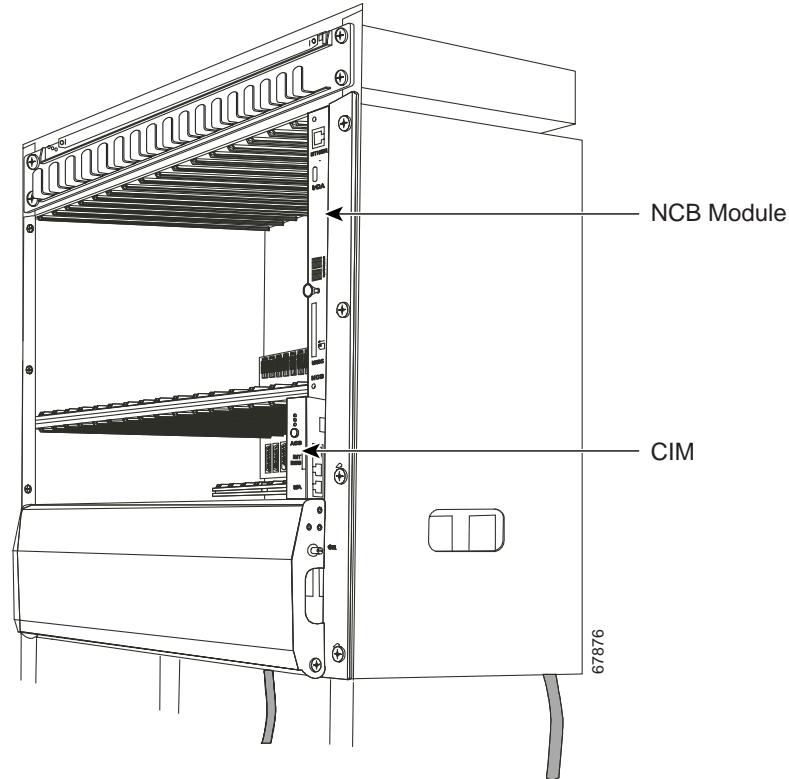


Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.

- Step 1** Use a slot or Phillips screwdriver to loosen the retaining screw on the CIM.
- Step 2** Remove the module from Slot 17 directly below the NCB module (see Figure 3-3).

Figure 3-3 CIM and NCB modules in an ONS 15252 MCU

**LEGEND**

CIM - Communication Interface Module

NCB Module - Network Controller Board module

Procedure: Replace the Communication Interface Module in the ONS 15252 MCU**Caution**

 Make sure the CIM is properly inserted into the ONS 15252 MCU guide rails.

- Step 1** Insert the CIM in Slot 17 directly below the NCB module (see Figure 3-3).
- Step 2** Fit the module properly in the short guiding rail on the bottom.
- Step 3** When the module is seated, use a slot or Phillips screwdriver to tighten the retaining screw.
-



Client Layer Interface Port Module

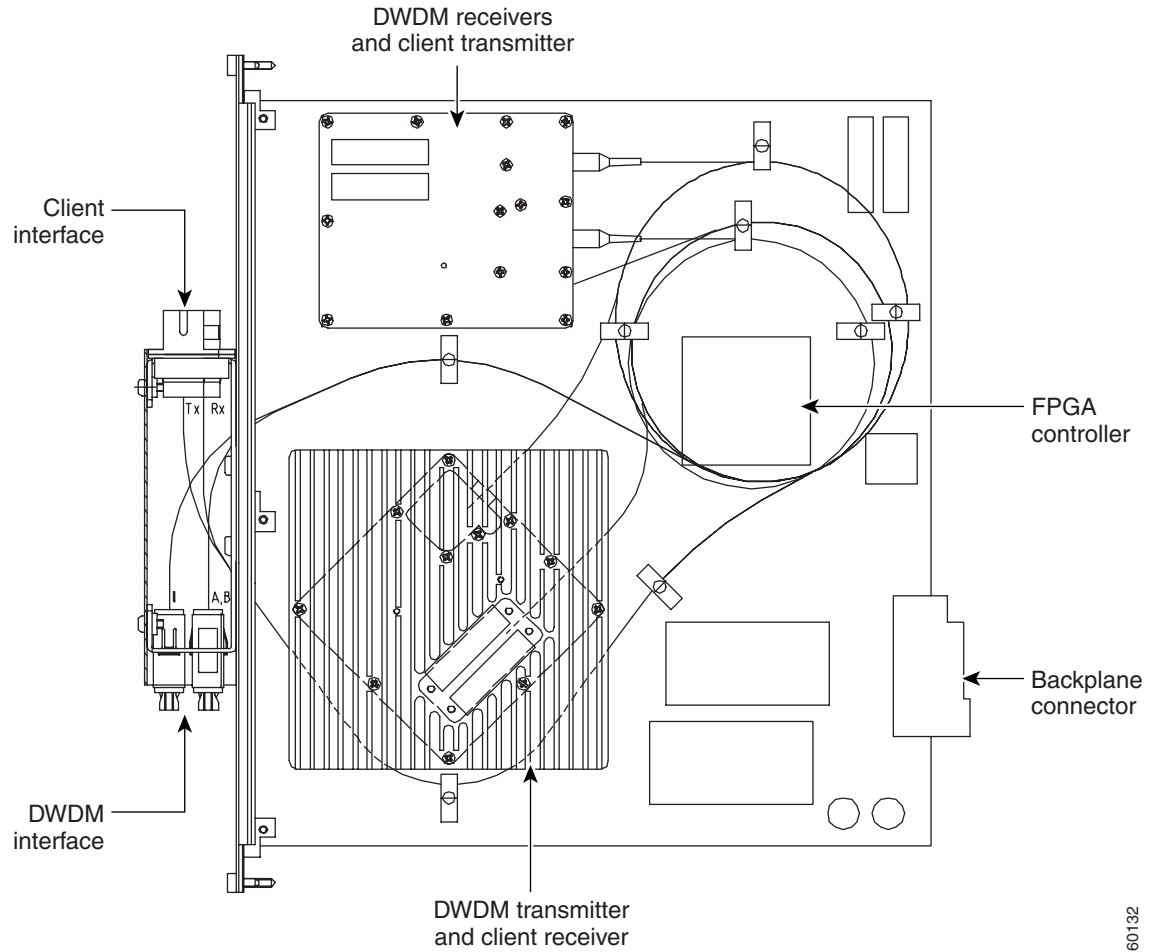
This chapter describes the Client Layer Interface Port (CLIP) module.

4.1 Functional Description

You can mount the CLIP module in either the ONS 15201 Single-Channel Unit (SCU) or the ONS 15252 Multichannel Unit (MCU).

- Figure 4-1 on page 4-2 shows the major components of the CLIP module.
- Figure 4-2 on page 4-2 shows the front-panel mounting for single-channel use (ONS 15201).
- Figure 4-3 on page 4-3 shows the rack mounting for multichannel use (ONS 15252).

Figure 4-1 Components of a CLIP module

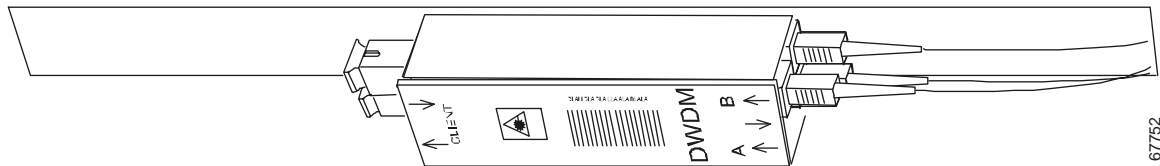


60132

LEGEND

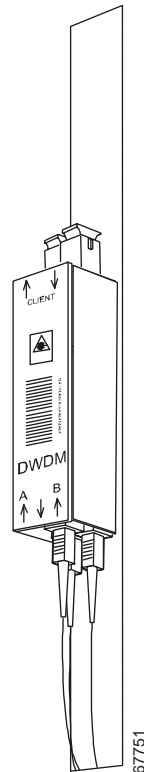
DWDM - dense wavelength division multiplexing
 FPGA - field-programmable gate array

Figure 4-2 A mounted ONS 15201 SCU CLIP module



67752

Figure 4-3 A mounted ONS 15252 MCU CLIP module



4.1.1 Module Function

The CLIP module controls the electro-optical and high-speed electronic circuits used for extraction and addition of a single wavelength signal in dense wave division multiplexing (DWDM) networks. The CLIP module is controlled through an amplitude-modulated signal superimposed on the traffic signal (Qeyton Proprietary Protocol QPP) and/or a Controller Area Network (CAN) electrical interface.

The CLIP module translates a designated incoming client-layer signal to a DWDM-layer signal with a designated wavelength and amplitude. Additionally, the CLIP module translates a designated DWDM-layer signal and provides an outgoing client-layer signal.

The CLIP with 3R function (see Table 4-3 on page 4-7) is available in four versions:

- 0 dBm transmit, unprotected
- +7 dBm transmit, unprotected
- 0 dBm transmit, fiber-protected
- +7 dBm transmit, fiber-protected

The protected and unprotected configurations of the CLIP module with 3R function (see Table 4-3 on page 4-7) are shown in Figure 4-4 on page 4-4. The unprotected CLIP module with 3R function does not have a receiver in the B port.

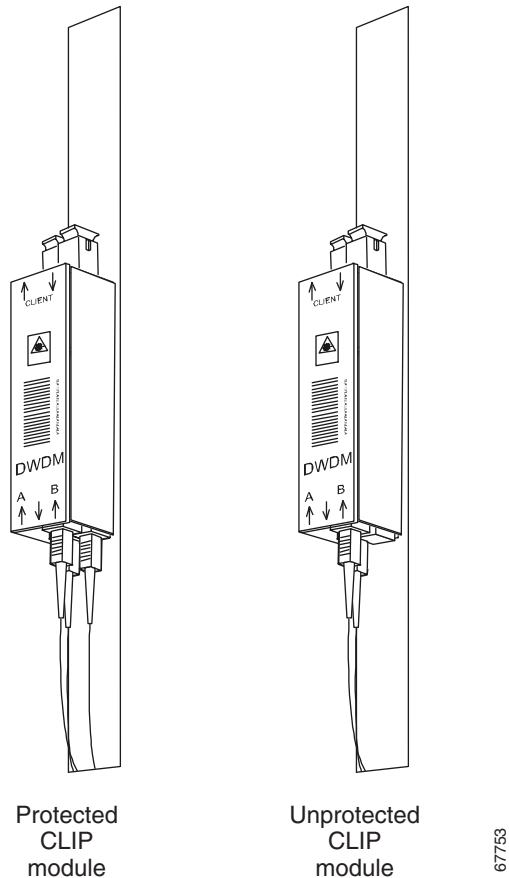
Release 1.1 provides a new CLIP module that incorporates both clocked (3R) and unclocked (2R) data regeneration. You can set the mode of operation (2R or 3R) using the Command Line Interface (CLI) or the Web Interface. Refer to the *Cisco ONS 15200 Command Line Interface Manual* or the *Cisco ONS 15200 Web Interface Software User Manual*.

In CLIP Summary, choose the appropriate data rate for 3R operation or choose pass-through for 2R operation between 100 MBps and 1.25 GBps. The new 2R/3R CLIP is fully compatible with the existing 3R CLIP. The CLIP with 2R/3R function (see Table 4-3 on page 4-7) is software-configurable for unprotected or fiber protected operation.

In addition, Release 1.1 provides two dispersion tolerances: 1800 ps/nm at +7 dBm, and 3000 ps/nm at 0dBm.

The CLIP module can be installed in Slots 1 to 16.

Figure 4-4 CLIP module in protected and unprotected configuration



LEGEND

CLIP - Client Line Interface Port module
DWDM - dense wavelength division multiplexing

4.1.2 Front-Panel Indicators, Connections, and Adjustments

In multichannel units (MCUs), use the LED indicators on the Network Adaptation module (NAM) to monitor CLIP operating parameters. (See Chapter 5, “Network Adaptation Module.”). In single-channel units (SCUs), the LED indicators are mounted on the SCU front panel. Monitored items include the alarms, power, and status. Table 4-1 on page 4-5 lists the conditions indicated by the LEDs. Figure 4-5 shows the LED indicators for the NAM in the MCU and SCU.

Figure 4-5 CLIP Indicators on the NAM front panel for MCU (left) and SCU (right)

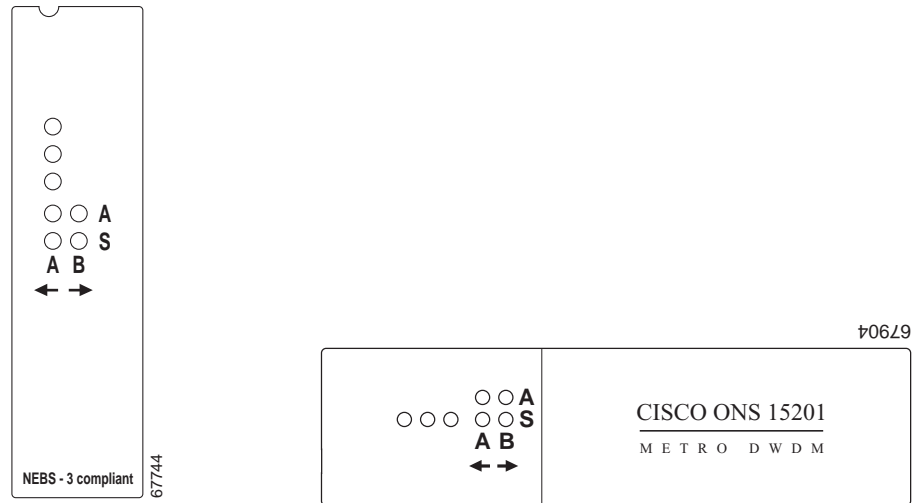


Table 4-1 CLIP LED Indicators (NAM and SCU)

LED	Orientation	Condition (When Lit)
Green	In line	DC power to CLIP module
Yellow		Minor alarm or warning
Red		Critical or major alarm
A and B	Horizontal (2x2 pattern)	Indicate the A and B sides of the DWDM system
A and S	Vertical	Indicate active (A) and standby (S) Note: The active side carries live traffic and the standby side provides a fail over path.

4.2 Technical Specifications

This section provides optical, electrical, environmental and mechanical specifications for the CLIP module. Default thresholds are also included.

4.2.1 Optical Specifications

Table 4-2 lists optical operating frequencies.

Table 4-2 CLIP Module Operating Frequencies

ITU Channel	Frequency (THz)	Wavelength (nm)
23	192.3	1558.98
25	192.5	1557.36
27	192.7	1555.75
29	192.9	1554.13
31	193.1	1552.52
33	193.3	1550.92
35	193.5	1549.32
37	193.7	1547.72
43	194.3	1542.94
45	194.5	1541.35
47	194.7	1539.77
49	194.9	1538.19
51	195.1	1536.61
53	195.3	1535.04
55	195.5	1533.47
57	195.7	1531.90

**Note**

The DWDM side (TxTP) has 1800 ps/nm dispersion tolerance with a 2.5 dB penalty for long reach, and a 3000 ps/nm dispersion tolerance with a 2.0 dB penalty for very long reach.

**Note**

The CLIPs in the 15200 system are printed on the faceplate, for example, V/2R3R/CHxx.

The printing V/2R3R/CHxx as in the example given above means:

- Vvery long range
- (Llong range)
- 2R3R2R/3R
- (3R3R)
- CHxxITU channel xx

The CLIPs are available in two different versions. (See Table 4-3.)

Table 4-3 CLIP Versions

Function	Dispersion tolerance	DWDM side optical output power	range/short form
3R	1800 ps/nm	+7 dBm	long/L
2R/3R	3000 ps/nm	0 dBm	very long/V (with external amplifier)



Note

The 2R function retransmits the optical signal with electrical regeneration and reshaping but without retiming. The 3R function regenerates, reshapes, and retimes the optical signal.

4.2.2 Electrical Specifications

At maximum operating temperature and input voltage, the CLIP module consumes 8 watts at most.

4.2.3 Environmental Specifications

Temperature and current characteristics for the CLIP module are listed in the next six tables. The bias currents specified are at calibration time.

Table 4-4 CLIP Peltier Current

Threshold	Percentage of maximum current
High alarm	95%
High warning	80%
Low warning	-80%
Low alarm	-95%

Table 4-5 CLIP Board Temperature

Threshold	Degrees Celsius
High alarm	80
High warning	70
Low warning	10
Low alarm	0

Table 4-6 DWDM Laser Temperature Deviation

Threshold	Degrees Celsius
High alarm	+2.5
High warning	+1.0
Low warning	-1.0
Low alarm	-2.5

Table 4-7 DWDM Laser Bias Current

Threshold	Percentage of calibration current
High alarm	200%
High warning	150%
Low warning	70%
Low alarm	40%

Table 4-8 Client Laser Bias Current

Threshold	Percentage of calibration current
High alarm	300%
High warning	200%
Low warning	50%
Low alarm	20%

Table 4-9 CLIP Operating Conditions

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

4.2.4 Default Thresholds

The default thresholds follow:

- The data rate is STM-16/OC-48.
- The switchmode (for protected channels) is automatic.
- Alarm suppression/inhibition is off.
- The optical transmitter output level (toward the client) is -9 dBm nominal.
- The optical receiver thresholds (from the client) are specified in Table 4-10.
- FDI switching enabled

Table 4-10 Client-Side Receiver Default Thresholds

Threshold	dBm
High alarm	-3
High warning	-6
Low warning	-16
Low alarm	-20

The optical transmitter output level (toward the DWDM line) is 0 dBm (nominal) for medium range, $+7$ dBm (nominal) for long range, and 0 dBm (nominal) for very long range.

The optical receiver thresholds (from the DWDM line) are specified in Table 4-11.

Table 4-11 DWDM-Side Receiver Default Thresholds

Threshold	dBm
High alarm	-8
High warning	-10
Low warning	-28
Low alarm	-31

4.2.5 Mechanical Specifications

Table 4-12 lists the physical dimensions of the CLIP module.

Table 4-12 CLIP Module Mechanical Specifications

Item	Dimension
Panel depth	264 mm (10.4 in.)
Panel height	263 mm (10.3 in.)
Panel width	25 mm (1.0 in.)

Table 4-12 CLIP Module Mechanical Specifications (continued)

Item	Dimension
Panel weight	0.84 kg (1.8 lbs.)

4.3 Removing and Replacing a CLIP Module

This section explains how to remove and replace the Client Layer Interface Port (CLIP) module for protected and unprotected channels. This module is used in both the ONS 15252 Multichannel Unit (MCU) and the ONS 15201 Single-Channel Unit (SCU). Figure 4-4 on page 4-4 shows an unprotected and a protected CLIP module.

The following removal and replacement procedures assume that you are removing and replacing the same type of CLIP module.

In applications with unprotected channels, the fiber on the B side of the CLIP is not connected to the NAM.

Install a protected CLIP module with a NAM that has a splitting ratio of 50/50, 10/90, or 90/10. Install an unprotected CLIP module with a NAM that has a splitting ratio of 100/0 or 0/100.



Caution

Be careful not to pull or make sharp bends in the optical fibers. Always clean and inspect MU or SC connectors with proper tools before inserting them into the adapters.

4.3.1 Removal Instructions

The following paragraphs describe the removal procedures for CLIP modules for both protected and unprotected channels.

Procedure: Remove the Protected Client Layer Interface Port Module

Before removing a CLIP module, you should retrieve and write down the switchmode, data rate, protect/unprotected mode, and FDI enabled/disabled settings for the CLIP module using the ONS 15200 web-based interface Path Summary screen. The default setting for datarate is STM-16/OC-48. To modify the settings, use the *Cisco ONS 15200 Web Interface Software User Manual*.

- Step 1** Disconnect the client-side optical fiber connectors from the CLIP module.
- Step 2** Protect the fiber ends with SC dust caps.
- Step 3** Plug the ports with SC dust plugs.
- Step 4** Disconnect the DWDM-layer Tx-to-CLIP module optical fiber.
- Step 5** Protect the connector with an MU fiber cap.
- Step 6** Plug the associated MU adapter on the CLIP module front panel with an MU dust plug.
- Step 7** Disconnect the DWDM receiver A-side and B-side optical fiber connectors from the CLIP module, one at a time.
- Step 8** Protect the connectors with MU fiber caps.
- Step 9** Plug the associated MU adapters on the CLIP module front panel with MU dust plugs.

- Step 10** Loosen the CLIP module mounting thumbscrews.
 - Step 11** Carefully remove the CLIP module from the ONS 15252 MCU or the ONS 15201 SCU. Make sure that the optical fibers are not harmed in the process.
 - Step 12** Install a CLIP module dummy front where the CLIP module was removed from the ONS 15252 MCU or the ONS 15201 SCU unit, unless you will replace it immediately.
-

Procedure: Remove an Unprotected Client Layer Interface Port Module

Before removing a CLIP module, you should retrieve and write down the switchmode, data rate, protect/unprotected mode, and FDI enabled/disabled settings for the CLIP module using the ONS 15200 web-based interface Path Summary screen. The default setting for datarate is STM-16/OC-48. To modify the settings, see the *Cisco ONS 15200 Web Interface Software User Manual*.

- Step 1** Disconnect the client-side optical fiber connectors from the CLIP module.
 - Step 2** Protect the fiber ends with dust caps.
 - Step 3** Plug the ports with SC dust plugs.
 - Step 4** Disconnect the DWDM-layer Tx-to-CLIP module optical fiber.
 - Step 5** Protect the connector with an MU fiber cap.
 - Step 6** Plug the associated MU adapter on the CLIP module front panel with an MU dust plug.
 - Step 7** Disconnect the DWDM receiver A-side optical fiber connector from the CLIP module.
 - Step 8** Protect the connector with an SC fiber cap.
 - Step 9** Plug the associated MU adapter on the CLIP module front panel with an MU dust plug.
 - Step 10** Loosen the CLIP module mounting thumbscrews.
 - Step 11** Carefully remove the CLIP module from the ONS 15252 MCU or the ONS 15201 SCU. Ensure that the optical fibers are not harmed in the process.
 - Step 12** Install a CLIP module dummy front where the CLIP module was removed from the ONS 15252 MCU or the ONS 15201 SCU unit, unless you will replace it immediately.
-

4.3.2 Replacement Instructions

The following paragraphs describe the replacement procedures for CLIP modules for both protected and unprotected channels.

Procedure: Replace the Protected Client Layer Interface Port Module

- Step 1** Remove the CLIP module dummy front from the ONS 15252 MCU or ONS 15201 SCU, if necessary.
- Step 2** Align the CLIP module with the CLIP module slot.
- Step 3** Carefully insert the CLIP module into the slot. Be sure that the backplane connector and the CLIP module connector are correctly mated and that no optical fibers are damaged in the process.

- Step 4** Tighten the CLIP module mounting thumbscrews.
- Step 5** Remove the DWDM receiver dust plug from the A-side MU adapter on the CLIP module front.
- Step 6** Remove the fiber cap from the A-side DWDM receiver optical fiber coming from the NAM (MCU) or CFM (SCU).
- Step 7** Clean and inspect the fiber end and insert it into the A-side MU adapter.
- Step 8** Remove the DWDM receiver dust plug from the B-side MU adapter on the CLIP module front.
- Step 9** Remove the fiber cap from the DWDM B-side optical fiber coming from the NAM or the CFM.
- Step 10** Clean and inspect the fiber end and insert it into the B-side MU adapter.
- Step 11** Remove the dust plug from the CLIP module DWDM-layer transmit MU adapter.
- Step 12** Remove the fiber cap from the DWDM-layer transmit fiber coming from the NAM or the CFM.
- Step 13** Clean and inspect the fiber end and insert it into the DWDM-layer transmit adapter on the CLIP module.
- Step 14** Remove the dust plug from the client-layer receive input on the CLIP module.
- Step 15** Remove the fiber cap from the client-layer optical fiber intended for the client-layer receive port.
- Step 16** Clean and inspect the fiber end and insert it into the client-layer receive port.
- Step 17** Remove the dust plug from the client layer transmit port.
- Step 18** Remove the fiber cap from the optical fiber intended for the client layer transmit port.
- Step 19** Clean and inspect the fiber end and insert it into the client layer transmit port.
- Step 20** Check the switchmode, data rate, protect/unprotected (2R/3R only) mode and FDI enabled/disabled (2R/3R only) settings of the 2R/3R CLIP. To modify the settings, see the *Cisco ONS 15200 Web Interface Software User Manual*.

Procedure: Replace an Unprotected Client Layer Interface Port Module

- Step 1** Remove the CLIP module dummy front from the ONS 15252 MCU or ONS 15201 SCU, if necessary.
- Step 2** Align the CLIP module with the CLIP module slot.
- Step 3** Carefully insert the CLIP module into the slot. Be sure that the backplane connector and the CLIP module connector are correctly mated and that no optical fibers are damaged in the process.
- Step 4** Tighten the CLIP module thumbscrews.
- Step 5** Remove the DWDM receiver dust plug from the A-side MU adapter on the CLIP module front.



Note Do not remove the B-side dust plug under any circumstances.

- Step 6** Remove the fiber cap from the DWDM receiver optical fiber coming from the NAM (MCU) or CFM (SCU).
- Step 7** Clean and inspect the fiber end and insert it into the A-side MU adapter.
- Step 8** Remove the dust plug from the DWDM-layer transmit MU adapter.
- Step 9** Remove the fiber cap from the DWDM-layer transmit fiber coming from the NAM or CFM.
- Step 10** Clean and inspect the fiber end and insert it into the DWDM-layer transmit port.

- Step 11** Remove the dust plug from the client-layer receive port.
 - Step 12** Remove the fiber cap from the optical fiber that is intended for the client-layer receive port.
 - Step 13** Clean and inspect the fiber end and insert it into the client-layer receive port or input adapter.
 - Step 14** Remove the dust plug from the client-layer transmit port.
 - Step 15** Remove the fiber cap from the optical fiber intended for the client-layer transmit port.
 - Step 16** Clean and inspect the fiber end and insert it into the CLIP module client-layer transmit port.
 - Step 17** Check the switchmode, data rate, protect/unprotected (2R/3R only) mode and FDI enabled/disabled (2R/3R only) settings of the 2R/3R CLIP. To modify the settings, see the *Cisco ONS 15200 Web Interface Software User Manual*.
-

4.3.3 Firmware Configuration

The EEPROM holds important information about identity, parameters, and calibration constants. The EEPROM has a size of 16 K and a serial interface.

■ Removing and Replacing a CLIP Module



Network Adaptation Module

This chapter describes the Network Adaptation module (NAM).

5.1 Functional Description

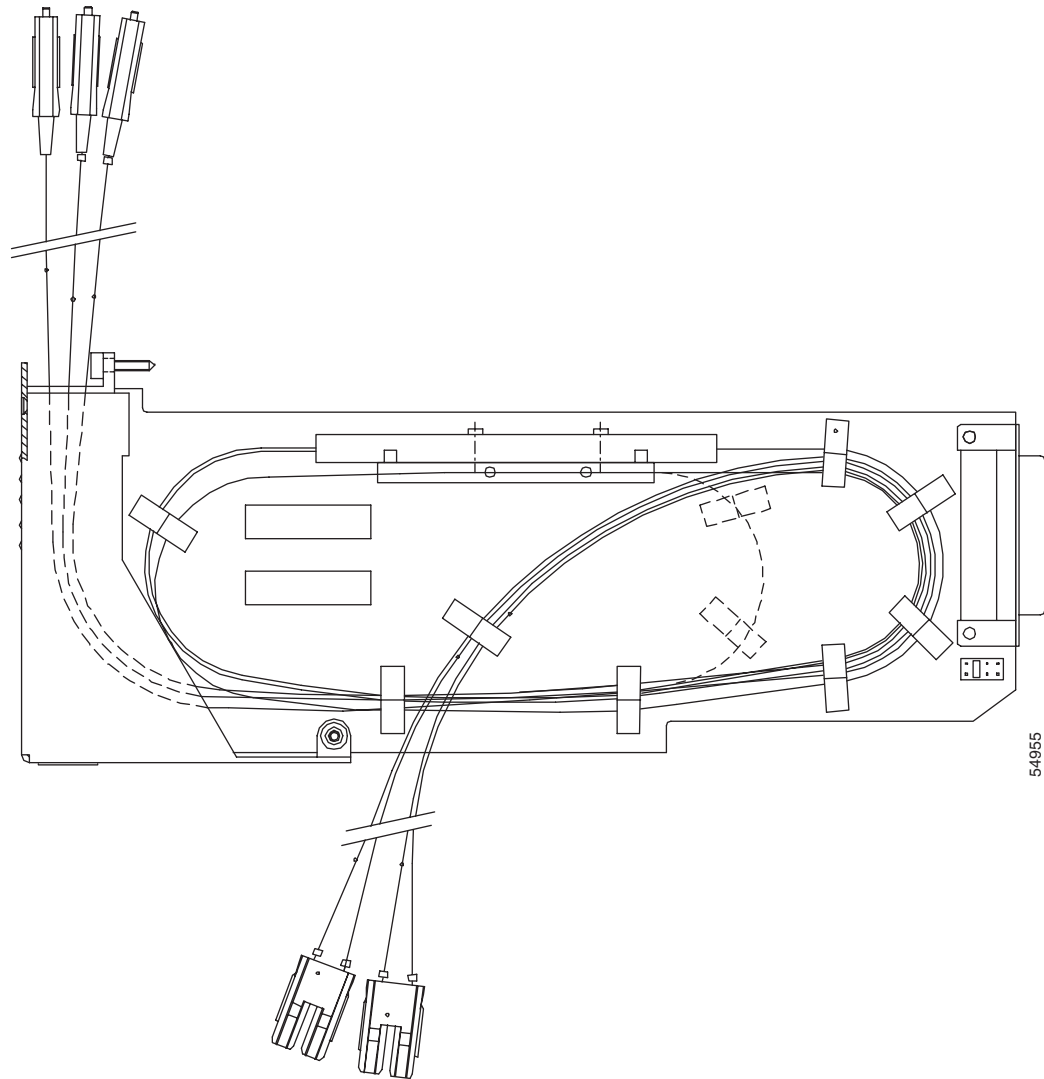
This section provides a description of the NAM, which is illustrated in Figure 5-1 on page 5-2.

The NAM extracts the output signal from the dense wavelength division multiplexing (DWDM) laser on the Client Layer Interface Port (CLIP) module and transfers it to the A side, the B side, or both sides. In optically protected systems, the NAM splits the output signal from the DWDM laser on the CLIP module and transfers it to the A and the B sides. The NAM can split the signal symmetrically (50/50) or asymmetrically (10/90 or 90/10). In optically unprotected systems, the NAM transfers the optical signal to the A or B side (100/0 or 0/100). The output splitting ratio is controlled by a fixed optical coupler and cannot be changed without replacing the NAM.

The NAM also transfers the incoming optical signal from another node to the receiver(s) of the CLIP module.

The LEDs on the front panel of the NAM display the status of the CLIP module that is mounted directly above it.

Figure 5-1 NAM module



Note

The NAM is active, but does not include alarm or supervisory subunit functions.

5.1.1 Front-Panel Indicators, Connections, and Adjustments

The NAM front-panel LEDs are used to monitor CLIP operating parameters. Monitored items include the alarms, power, and status. Figure 5-2 shows the front panel LEDs which are described in Table 5-1 on page 5-3.

Figure 5-2 NAM front panel

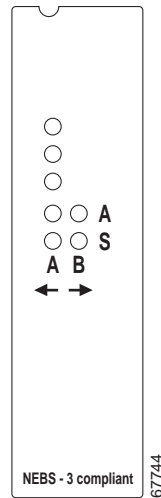


Table 5-1 NAM Indicators

LED	Orientation	Condition (When Lit)
Green	In line	DC power to CLIP module
Yellow		Minor alarm or warning
Red		Critical or major alarm
A and B	Horizontal (2x2 pattern)	Indicate dense wavelength division multiplexing (DWDM) side of the system
A and S	Vertical	Indicate active (A) and standby (S)—the active side carries live traffic and the standby side provides a fail-over path

5.1.2 NAM Configuration

A CLIP module is mounted directly above the NAM. Two (unprotected) or three (protected) fibers come from the NAM to the CLIP module front panel. The receiver fibers are labeled A and B.

Four DWDM-side fibers come from a protected NAM (two DWDM-side fibers from an unprotected NAM). These fibers are separated into two groups, labeled A and B. Each group includes one optical fiber connector (type MU) from the transmitter and one from a receiver, mounted in a duplex MU connector.

The duplex MU connector contains two fibers labeled A or B. The transmitting fibers include a label to indicate the coupling ratio (10, 50, or 90). This label helps you connect the fibers correctly to each Hub Filter module (HFM).

An unprotected NAM does not include an optical coupler. It has only two patch cords, one for the receiver and one for the transmitter. For unprotected CLIP modules, use the receiver labeled A for the received optical signal. Figure 5-3 is a block diagram of the NAM used in protected configurations. Figure 5-4 on page 5-4 is a block diagram of the NAM used in unprotected configurations.

Figure 5-3 Protected NAM block diagram

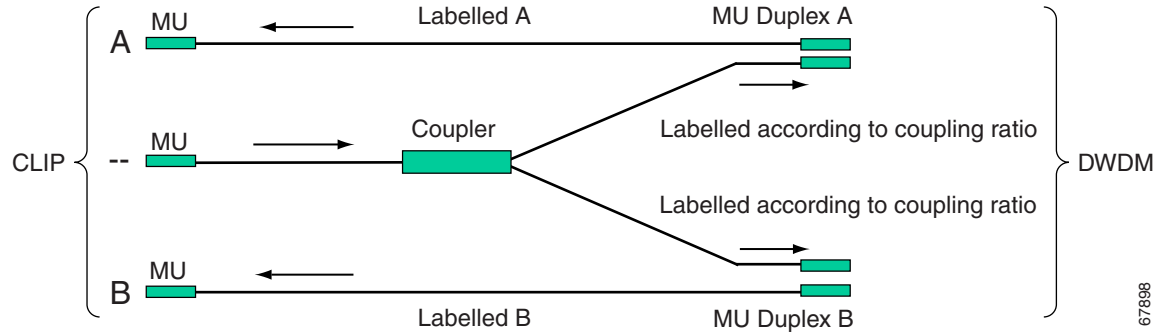
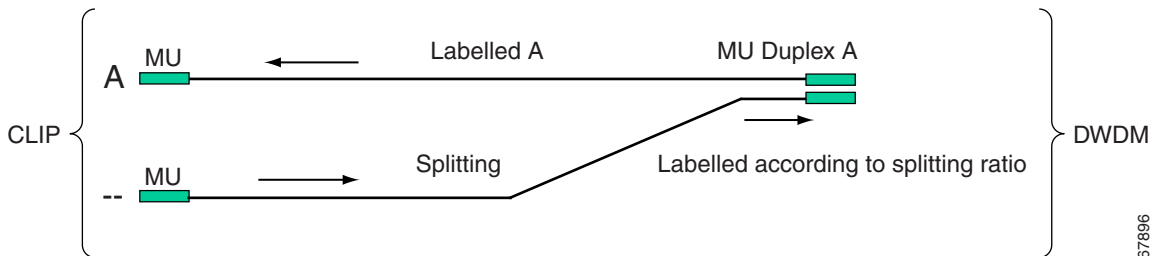


Figure 5-4 Unprotected NAM block diagram



Located on lower right-hand corner of the NAM module are 4-bit configuration header (jumpers) that the CLIP uses to identify the splitting ratio of the NAM. These jumpers display the split ratio in the web interface and the CLI. The jumpers are numbered 1 through 4. Table 5-2 lists the jumper setting for each splitting ratio.

Table 5-2 NAM Jumper Settings

Jumper	Splitting Ratio
1 and 4	0/100
1	10/90
2	50/50
3	90/10
4	100/0

5.2 Technical Specifications

This section covers environmental and mechanical specifications for the NAM. Although the NAM is an active device, optical and electrical specifications do not apply.

5.2.1 Environmental Specifications

Table 5-3 lists environmental specifications for the NAM during operating conditions.

Table 5-3 NAM Environmental Specifications

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

5.2.2 Mechanical Specifications

All NAMs consist of the following parts:

- Front panel
- NAM board; two small PCBs mounted in an aluminium frame, electrically connected with a flat cable
- Rear-panel electrical connector, 25-pole
- LEDs—one red (in line), one yellow (in line), and five green (one in line and four in a 2x2 matrix pattern)

Protected NAMs consist of the following additional parts:

- One SMF-fused 1 X 2 coupler (50/50 or 90/10) with 2.0-mm diameter SMF fiber (to obtain 90/10 and 10/90, you must label the fibers accordingly)
- Two MU duplex connectors (going to the DWDM/passive optics side, fusion spliced to the coupler)
- Three MU connectors (going to the CLIP, fusion spliced to the coupler)

Unprotected NAMs consist of the following additional parts:

- One MU duplex connector (going to the DWDM/passive optics side)
- Two 2.0-mm diameter SMF patch cords

Two MU connectors (going to the CLIP)

Table 5-4 lists NAM mechanical specifications.

Table 5-4 NAM Mechanical Specifications

Item	Specification
Height	96 mm (3.8 in.)
Width	25.4 mm (1.0 in.)

Table 5-4 NAM Mechanical Specifications (continued)

Item	Specification
Depth	234 mm (9.2 in.)
Weight	0.20 kg (0.4 lbs.) protected version 0.16 kg (0.35 lbs.) unprotected version

5.3 Removing and Replacing a NAM

This section explains how to remove and replace a NAM. Make sure you have the replacement module and any supplies, such as tagging materials, present on site before beginning the removal and replacement procedures.

The ONS 15252 Release 1.0.1 (Product No. 800-12162-03) or higher includes an updated NAM. The Release 1.01 NAM is designated with a “NEBS-3” print on the faceplate, whereas the previous version of the NAM does not have this faceplate print. The Release 1.01 or higher shelf requires the Release 1.01 NAM. You can also use Release 1.01 NAMs in the Release 1.0 shelf (Product No. 800-12162-02). For more information about the shelf versions, refer to the *Cisco ONS 15200 Product Description*.

Table 5-5 NAM Shelf compatibility

Shelf	NAM
Shelf 1.0	NAM 1.0
	NAM 1.0.1
Shelf 1.0.1	NAM 1.0.1



Caution

Placing NAMs without the NEBS-3 print into a Release 1.01 shelf may result in equipment damage. Such a configuration is not recommended nor supported by Cisco; it may void warranty.



Warning

The ONS 15200 is energized with -48 VDC power.



Caution

Static electricity can damage electro-optical modules. While handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove a Network Adaptation Module from the ONS 15252 MCU



Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.

**Warning**

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

-
- Step 1** At the associated Hub Filter module (HFM), press the button at the bottom and push the HFM slightly upward (about 10 mm [0.5 in.]) to expose two grooves on the HFM top. Remove the fiber from the two lateral grooves on top.
- If the NAM (channel) is protected, repeat Step 1 on the other side of the passive optical shelf.
- Step 2** Remove the MU duplex connector from one HFM at a time.
- Step 3** Put caps on the ends of the disconnected optical fiber jumper cables.
- Step 4** Put dust plugs in the MU adapters in the HFM.
- If the NAM is protected, repeat Steps 2, 3, and 4 on the other side of the passive optical shelf.
- Step 5** One at a time, disconnect the three (or two unprotected) MU connectors at the CLIP module:
- Put a fiber cap on the MU connector.
 - Put a fiber plug in the MU adapter in the CLIP.
- Step 6** Using a slot or Phillips screwdriver, loosen the NAM retaining screw.
- Step 7** Carefully remove the NAM from the slot.
- Step 8** If you are not going to replace a NAM, carefully insert a Dummy NAM into the slot.
-

Procedure: Replace a Network Adaptation Module in the ONS 15252 MCU

**Caution**

Before replacing a NAM, verify that the NAM is the appropriate release for the shelf assembly or equipment damage could result. For an ONS 15200 Release 1.01 shelf assembly (800-12162-03) the NAM front panel should display NEBS-3. For an ONS 15200 Release 1 shelf assembly (800-12162-02) the NAM will not be printed.

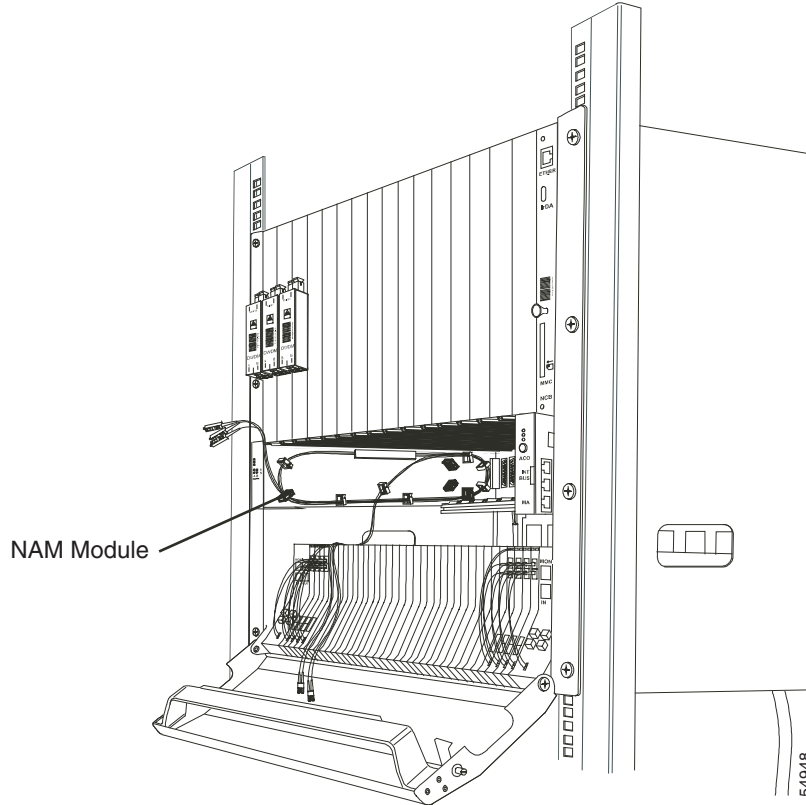
**Note**

If you are replacing a NAM, remove the currently installed NAM. If you are replacing a Dummy NAM, remove the Dummy NAM from the relevant NAM position.

**Note**

Before replacing the NAM, verify that the NAM jumpers are set to match the label on the NAM module. See Table 5-2 on page 5-4 for the NAM jumper settings.

Figure 5-5 NAM placement

**Warning**

Follow proper safety procedures when removing modules without switching off the relevant subrack.

**Warning**

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

Step 1

Align the NAM with the module slot in the ONS 15252 MCU immediately below the already-installed CLIP module.



Note Make sure that the NAM is properly inserted in the ONS 15252 MCU guide rails (in particular, the lower guiding rail).

Step 2

Carefully seat the NAM into the slot, making sure the backplane connector and the NAM connector are correctly mated and that no fibers are damaged.

**Caution**

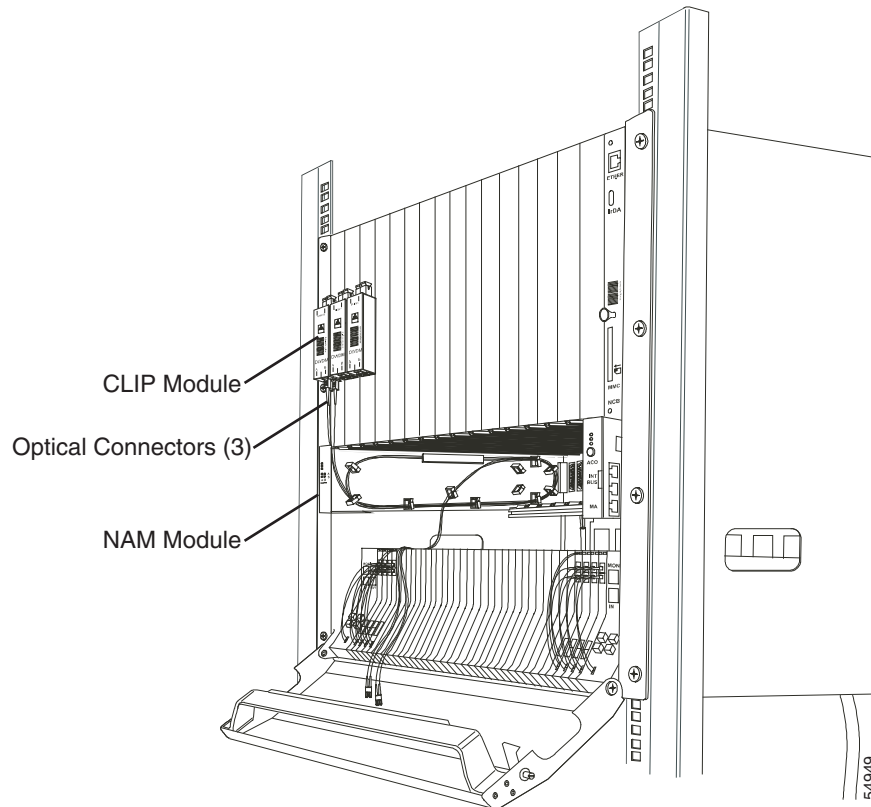
Be sure not to harm the optical fibers and connectors emerging from the NAM.

Step 3

Using a slot or Phillips screwdriver, tighten the NAM retaining screw.

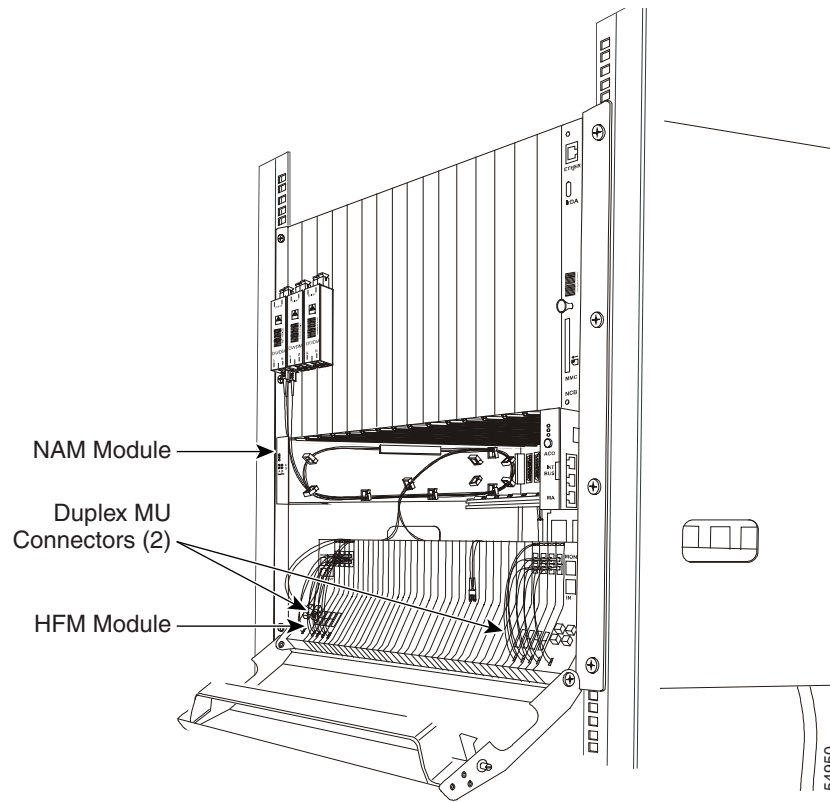
- Step 4** Connect the three (or two unprotected) MU connectors from the NAM to the three (or two unprotected) MU adapters in the corresponding CLIP module. Begin with the inner connectors, labeled A and B, and connect the outer transmitter connector last. Figure 5-6 shows a connected NAM and CLIP module.
- Step 5** Remove the dust cap from the relevant MU connector.
- Step 6** Clean and inspect the relevant MU connector.
- Step 7** Remove the dust plugs from the relevant MU adapter.

Figure 5-6 Connecting the NAM to the CLIP module



- Step 8** One at a time, remove dust plugs from the HFM and remove fiber caps from NAM duplex MU connectors.
- Step 9** Clean and inspect the optical fiber connectors.
- Step 10** Connect one (unprotected) or two (protected) duplex MU connectors from the NAM to the HFM (unprotected) or HFMs (protected). Use the labeling on the fiber to ensure that the A-side and the B-side of the node are not interchanged. Figure 5-7 shows a NAM connected to an HFM.

Figure 5-7 Connecting the NAM to the HFM A side



- Step 11** After connecting the NAM to the HFM, press the button at the HFM bottom and push the HFM slightly upward (about 10 mm [0.5 in.]) to expose two grooves on the HFM top.
- Step 12** Verify that the fiber is firmly fixed in the two lateral grooves on top of the HFM.
- Step 13** Snap the HFM back into place by pushing the button and gently pressing downwards, carefully not to damage any fiber.
- Step 14** In the case of a protected channel, repeat Steps 11, 12, and 13 for the other HFM.
- Step 15** Store excessive fiber in the space between the NAM and the ONS 15252 MCU passive optical shelf.
- Step 16** Close the lid over the passive optical shelf.



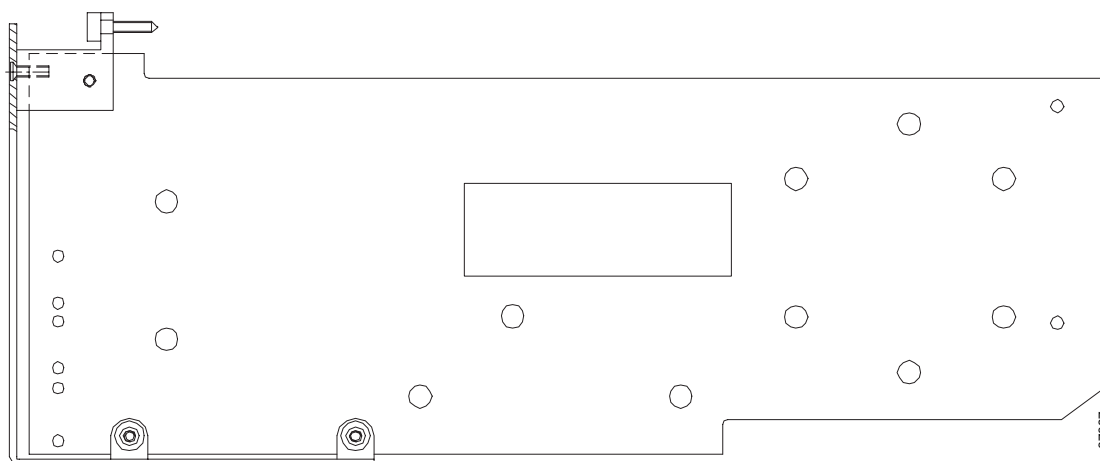
Dummy Network Adaptation Module

This chapter describes the Dummy Network Adaptation module (DNAM).

6.1 Functional Description

This section provides a description of the DNAM, which is illustrated in Figure 6-1.

Figure 6-1 DNAM side view



The DNAM fills the empty space (if any exists) in the ONS 15200 Multichannel Unit (MCU) between the NAM modules and the Communication Interface module (CIM). The DNAM is passive and does not include alarm or supervisory subunit functions, or front-panel indicators, connectors, or adjustments. In case of unequipped NAM slots, the DNAM ensures fulfillment of EMC requirements.

6.2 Technical Specifications

This section includes environmental and mechanical specifications for the DNAM. The DNAM is a passive device; therefore, optical and electrical specifications and default thresholds do not apply.

6.2.1 Environmental Specifications

Table 6-1 lists environmental specifications for the DNAM during operating conditions.

Table 6-1 DNAM Environmental Specification

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

6.2.2 Mechanical Specifications

The DNAM consists of one Network Adaptation module (NAM) dummy board with a dummy front panel.

Table 6-2 lists DNAM mechanical specifications.

Table 6-2 DNAM Mechanical Specifications

Item	Specification
Height	96 mm (3.8 in.)
Width	25.4 mm (1.0 in.)
Depth	234 mm (9.2 in.)
Weight	0.12 kg (0.26 lbs.)

6.3 Removing and Replacing a DNAM

This section explains how to remove and replace the DNAM. The replacement module and any supplies, such as tagging materials, should be present on site before beginning the removal and replacement procedures.



Warning

The ONS 15252 Multichannel Unit (MCU) is energized with -48 VDC power.



Caution

Static electricity can damage electro-optical modules. While handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove the Dummy Network Adaptation Module from an ONS 15252 MCU

The DNAM is installed in the ONS 15252 MCU just above the passive optical shelf.

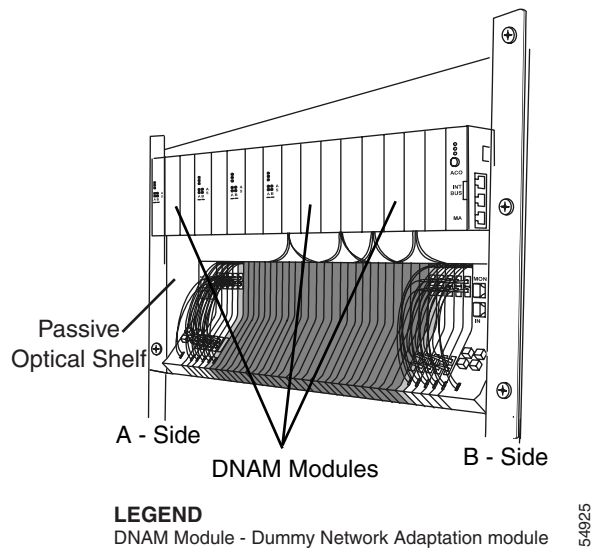
Figure 6-2 shows DNAM placement in the MCU.



Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.

Figure 6-2 Location of the DNAM in an ONS 15252



-
- Step 1** Using a slot or Phillips screwdriver, remove the screw securing the DNAM to the ONS 15252 MCU.
- Step 2** Remove the DNAM by pulling it out along the slot.
-

Procedure: Replace the Dummy Network Adaptation Module in an ONS 15252 MCU



Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.

-
- Step 1** Place the DNAM into the ONS 15252 MCU slot by aligning the card edge with the upper and lower guiding rails. The lower guiding rail is shorter and may require more care in alignment.
- Step 2** Slide the DNAM into the backplane. Take care not to damage the optical fiber.
- Step 3** Using a slot or Phillips screwdriver, tighten the retaining screw securing the DNAM in the ONS 15252 MCU.
-



Line Module

This chapter describes the Line module (LM).

7.1 Functional Description

The LM enables monitoring of input and output signals, with 10 percent of the light directed to the monitor outputs at the top of the front panel. The LM also converts from internal MU connectors to SC line connectors. There is typically one LM on the A-side of the ONS 15252 Multichannel Unit (MCU) and another on the B-side (for protected systems).

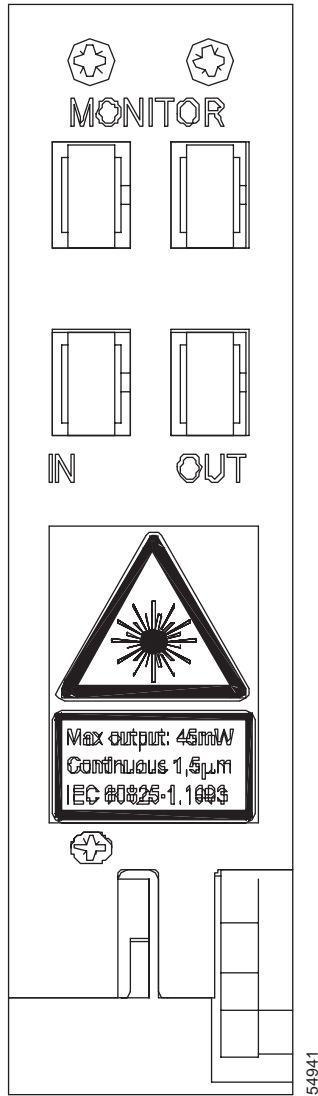
Figure 7-1 on page 7-2 illustrates the LM.



Note

The LM is passive and does not include alarm or supervisory subunit functions.

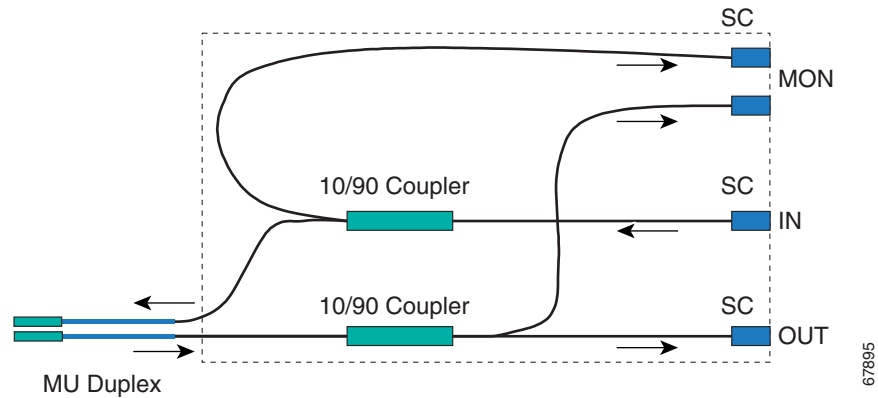
Figure 7-1 LM front view



The LM transfers the optical signal to and from the last HFM module and the DWDM layer. In the process, the optical signal present on the SC line connectors transfers to a duplex MU connector.

One LM is present on the A-side of the ONS 15252 MCU and another is present on the B-side. Figure 7-2 illustrates a block diagram of the LM.

Figure 7-2 LM block diagram



Note

LM connectors include two monitor ports, and one IN port and one OUT port.

7.2 Technical Specifications

This section covers optical, environmental, and mechanical specifications for the LM. The LM is a passive device; therefore, electrical specifications and default thresholds do not apply.

7.2.1 Optical Specifications

The maximum output power for the LM is 16.5 dBm when used in the ONS 15252 Multichannel Unit. For optical loss information, refer to Chapter 1 of the *Cisco ONS 15200 Product Description*.

7.2.2 Environmental Specifications

Table 7-1 lists environmental specifications for the LM during operating conditions.

Table 7-1 LM Environmental Specifications

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

7.2.3 Mechanical Specifications

The LM consists of the following parts:

- Two SMF fused couplers (10/90)
- Module hardware (enclosure, optical board, fiber holders, and front panel)
- MU duplex connector on the optical fiber protruding from the LM
- Adapters: four SC/SC

The fiber type is 0.9-mm diameter SMF except for the fiber close to the MU connector, which has a 2.0-mm jacket.

Table 7-2 lists LM mechanical specifications.

Table 7-2 LM Mechanical Specifications

Item	Specification
Height	133 mm (5.25 in.)
Width	35 mm (1.38 in.)
Depth	232 mm (9.13 in.)
Weight	0.34 kg (0.75 lbs.)



Note

When the LM monitor ports are not being used, they must be plugged with dust caps.

7.3 Removing and Replacing an LM

This section explains how to remove and replace the LM. Install the LM in the passive optical shelf of the ONS 15252 MCU (Figure 7-3 on page 7-5). Make sure the replacement module and any supplies, such as tagging materials, are present on site before beginning the removal and replacement procedures.



Warning

The ONS 15252 Multichannel Unit (MCU) is energized with -48 VDC power.



Caution

Static electricity can damage electro-optical modules. While handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove the Line Module from the Passive Optical Shelf



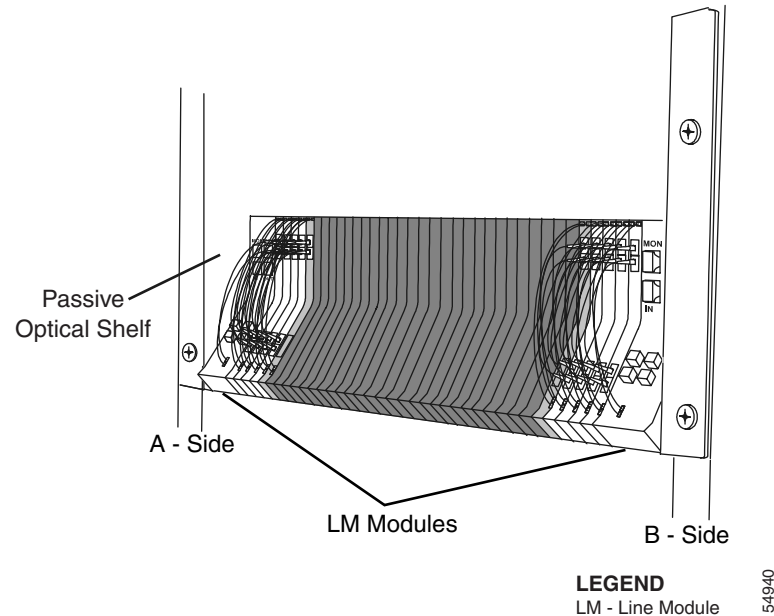
Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.

**Warning**

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

Figure 7-3 Location of the LM in the passive optical shelf



- Step 1** Open the passive optical shelf cover.
- Step 2** Disconnect the fiber that protrudes from the LM and connects to the adjacent Hub Filter module. The fiber ends with a duplex MU connector.
- Step 3** Put fiber end caps on the disconnected fiber.
- Step 4** Insert dust plugs into the Hub Filter module adapter.
- Step 5** Remove one or two Dummy Filter modules to create more work space.
- Step 6** Disconnect the DWDM-side optical fibers and protect the ends with fiber caps.
- Step 7** Put plugs in the holes of the fiber adapters on the LM.
- Step 8** Push at the bottom, pull upward, and carefully slide the LM out of the passive optical shelf (see Figure 7-3 on page 7-5 for the LM position).

**Caution**

Do not damage the optical fiber.

- Step 9** Insert enough Dummy Filter modules to fill the empty space left by the removed LM. Place the Dummy Filter modules in the middle to fill the passive optical shelf.
- Step 10** Close the passive optical shelf cover.

Procedure: Replace the Line Module in the Passive Optical Shelf



Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.



Warning

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

-
- Step 1** Open the passive optical shelf cover.
 - Step 2** Remove as many Dummy Filter modules as necessary to make space for the LM.
 - Step 3** Align the LM with the relevant position in the passive optical shelf and carefully slide the LM in. Make sure to fit together the crossbar at the shelf back with the groove on the LM back.
 - Step 4** Press the retainer button located at the bottom front of the LM and make sure the LM locks into place.
 - Step 5** Remove the plugs on the adjacent Hub Filter module to allow fiber insertion.
 - Step 6** Remove the dust caps from the two fibers extending from the LM.
 - Step 7** Clean and inspect the duplex MU connector.
 - Step 8** Connect the duplex MU connector to the adjacent Hub Filter module.



Note The following steps should be done one fiber at a time.

- Step 9** Remove the dust caps from the DWDM optical fiber cables.
 - Step 10** Remove the dust plugs on the adapter on the LM.
 - Step 11** Clean and inspect the connectors on the DWDM optical fiber cables.
 - Step 12** Connect the DWDM optical fiber cables to the LM.
 - Step 13** Close the passive optical shelf cover, being careful not to pinch or bend the DWDM optical fiber cables.
-

Hub Filter Module

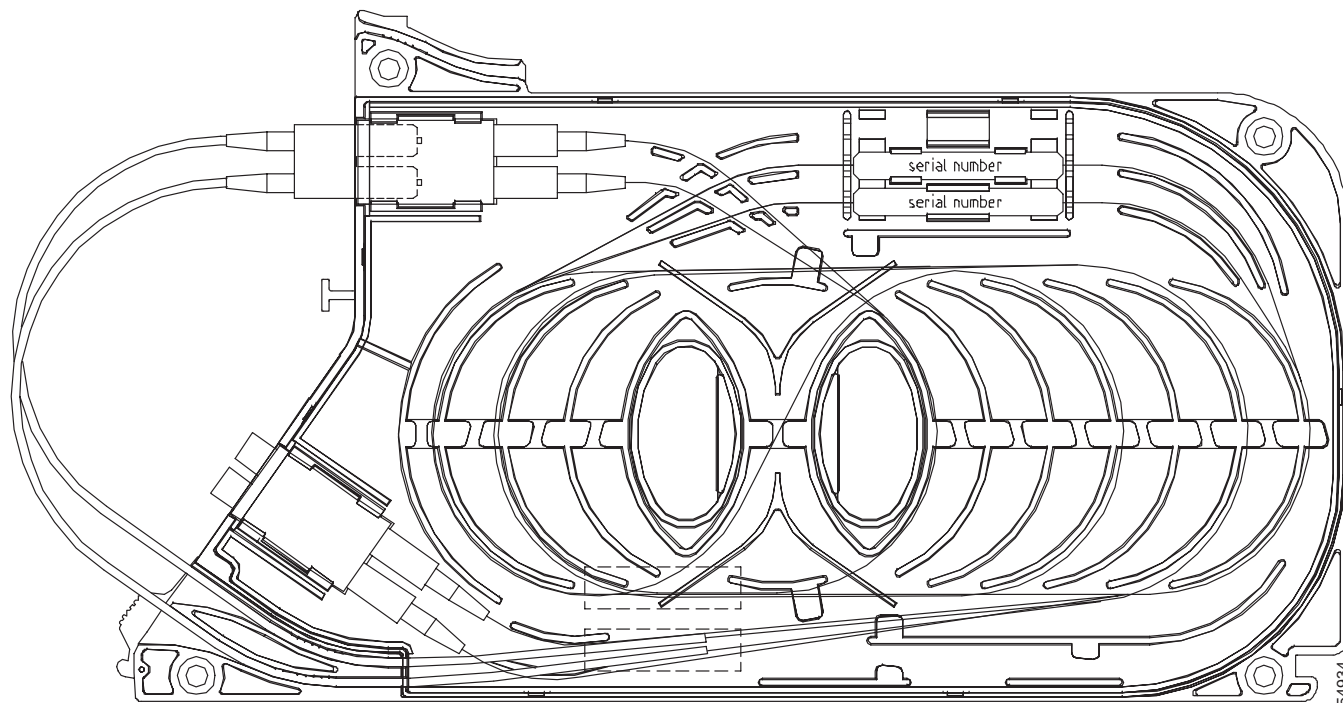
This chapter describes the Hub Filter module (HFM).

8.1 Functional Description

The HFM adds the output signal from the Client Layer Interface Port (CLIP) module to the optical line. The HFM also drops the incoming signal on the same International Telecommunication Union (ITU) channel to the CLIP module receivers (A or B).

Figure 8-1 illustrates the Hub Filter module.

Figure 8-1 HFM side view



Note The HFM is passive and does not include alarm or supervisory subunit functions.

In an optically-protected configuration, there are two HFMs on the same ITU channel, one on the A side and another on the B side. An unprotected configuration only uses one HFM, and the HFM is located on either the A or the B side of the ONS 15252 MCU.



Note

The front of the HFM displays the ITU grid wavelength. See Table 8-2 on page 8-2 for the ITU channels and frequencies.

The connectors used to add to the line and drop from the line are mounted in one MU duplex unit, and added/dropped at the lower duplex MU adapter on the HFM.

You should daisy chain the HFMs to transfer all wavelengths not yet stripped from the composite signal (drop) or to add the add signal to the outgoing composite signal. If the HFM is the last module in the daisy chain, then connect the connectors to either a Bridge module (BM), a Termination module (TM), a Connection Module X, or a Connection Module Y, depending on the configuration.



Note

HFM connectors include four MU optical fiber connectors (mounted inside two MU-MU duplex adapters) and two protruding fiber pigtails that end in a duplex MU-connector.

8.2 Technical Specifications

This section provides optical, environmental, and mechanical specifications for the HFM. The HFM is a passive device; therefore, electrical specifications and default thresholds do not apply.

8.2.1 Optical Specifications

Table 8-1 specifies general operating conditions.

Table 8-1 Operating Conditions

Parameter	Minimum	Maximum	Unit
Total operating range	1500	1600	nm
Channel spacing (nominal)		200	GHz

Table 8-2 lists optical operating frequencies.

Table 8-2 HFM Operating Frequencies

ITU Channel	Frequency (THz)	Wavelength (nm)
23	192.3	1558.98
25	192.5	1557.36
27	192.7	1555.75
29	192.9	1554.13
31	193.1	1552.52
33	193.3	1550.92

Table 8-2 HFM Operating Frequencies (continued)

ITU Channel	Frequency (THz)	Wavelength (nm)
35	193.5	1549.32
37	193.7	1547.72
43	194.3	1542.94
45	194.5	1541.35
47	194.7	1539.77
49	194.9	1538.19
51	195.1	1536.61
53	195.3	1535.04
55	195.5	1533.47
57	195.7	1531.90

For optical loss information, refer to Chapter 1 of the *Cisco ONS 15200 Product Description*.

8.2.2 Environmental Specifications

Table 8-3 lists environmental specifications for module operating conditions.

Table 8-3 HFM Module Environmental Specifications

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

8.2.3 Mechanical Specifications

The HFM consists of the following parts:

- One Add filter (ITU channel-specific) with associated fiber
- One Drop filter (ITU channel-specific) with associated fiber
- One HFM housing
- Two MU/MU duplex adapters with four MU connectors mounted inside
- One MU duplex connector

The module fiber diameter is 0.9 mm (0.04 in.) except for the 15 cm (6 in.) fiber protrusion (measured from the tip of the connector) which have a 2.0-mm (0.8 in.) jacket.

Table 8-4 lists HFM mechanical specifications.

Table 8-4 HFM Mechanical Specifications

Item	Specification
Height	133 mm (5.2 in.)
Width	10 mm (0.4 in.)
Depth	236 mm (9.3 in.)
Weight	0.16 kg (0.35 lbs.)

8.3 Removing and Replacing an HFM

This section explains how to remove and replace the HFM. The HFM is installed in the passive optical shelf of the ONS 15252 MCU. Make sure the replacement module and any supplies, such as tagging materials, are present on site before beginning the removal and replacement procedures. Figure 8-2 on page 8-5 illustrates HFM placement in the passive optical shelf.



Warning

The ONS 15252 Multichannel Unit (MCU) is energized with -48 VDC power.



Caution

Static electricity can damage electro-optical modules. While handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove the Hub Filter Module from the Passive Optical Shelf



Warning

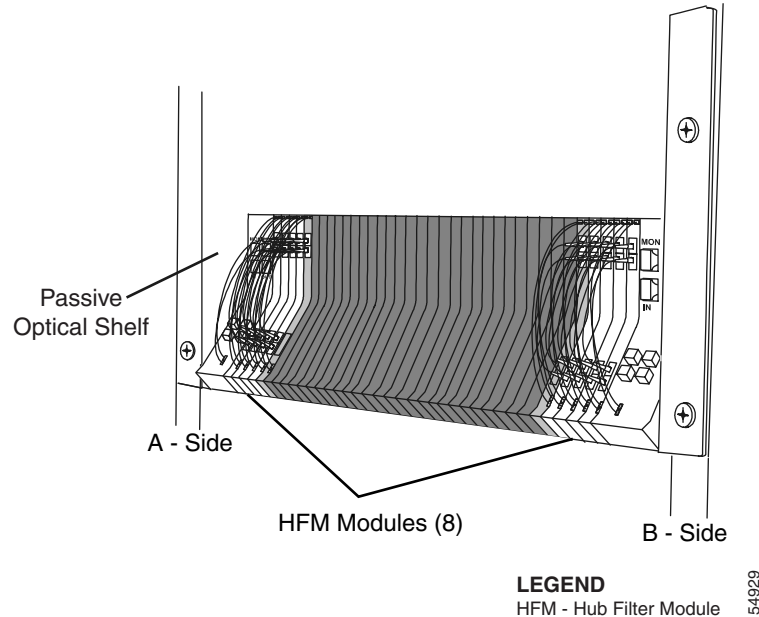
Follow proper safety procedures when removing modules without switching off the relevant subrack.



Warning

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

Figure 8-2 Location of the HFM in the passive optical shelf



Step 1 Open the passive optical shelf cover.



Note Remove one or two Dummy Filter modules to create more work space.

- Step 2** Disconnect the duplex MU connector going to and from the Network Adaptation module (NAM).
- Step 3** Cap the optical fiber ends.
- Step 4** Insert dust caps into the MU-MU adapter located on the HFM.
- Step 5** Push the button at the bottom of the HFM front panel, then push the HFM slightly upward (about 10 mm / 0.5 in.) to expose two lateral grooves on the top.
- Step 6** Remove the optical fiber from the two lateral grooves on top of the HFM.
- Step 7** Disconnect the duplex MU connector that is installed in the HFM. The duplex connector is on the optical fiber jumper cable that protrudes from the adjacent HFM.
- Step 8** Cap the optical fiber ends.
- Step 9** Disconnect the duplex MU connector installed in the adjacent HFM. The duplex connector is on the optical fiber jumper cable that protrudes from the HFM being removed.
- Step 10** Clean the disconnected optical fiber ends and install them in the HFM being removed.
- Step 11** Push the button at the bottom of the HFM front panel, then push the HFM slightly upward.
- Step 12** Carefully remove the HFM from the passive optical shelf.
- Step 13** Remove the optical fiber caps from the adjacent HFM jumper cable.
- Step 14** Clean the optical fiber connector.
- Step 15** Insert the connector into the next HFM.
- Step 16** Insert Dummy Filter modules in the middle of the passive optical shelf until it is filled.

Step 17 Close the passive optical shelf cover.

Procedure: Replace the Hub Filter Module in the Passive Optical Shelf



Warning

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

-
- Step 1** Open the passive optical shelf cover.
 - Step 2** Remove two or three DFM modules to create more work space.
 - Step 3** Remove the optical fiber jumper connector at the adjacent HFM (to the left on the A side or to the right on the B side).
 - Step 4** Cap the optical fiber ends.
 - Step 5** Slide in the new HFM, making sure there is interlock between the rear-mounted crossbeam in the MCU and the groove in the bottom of the HFM.
 - Step 6** Press at the bottom of the new HFM, applying downward pressure, and snap into place.
 - Step 7** Disconnect the duplex MU connector that is installed on the new HFM. The duplex connector is on the optical fiber jumper cable that protrudes from the new HFM.
 - Step 8** Clean the optical fiber MU duplex connector
 - Step 9** Connect the duplex MU connector to the adjacent HFM.
 - Step 10** After removing the fiber caps, clean the disconnected optical fiber ends removed in Step 3.
 - Step 11** Connect the duplex MU connector of step 3-10 to the HFM being installed. The duplex connector is on the optical fiber jumper cable that protrudes from the adjacent HFM.
 - Step 12** Remove the dust plugs from the second MU-MU adapter located on the HFM.
 - Step 13** Uncap the duplex MU connector of the associated NAM.
 - Step 14** Inspect the optical fiber connector and clean the optical fiber connector.
 - Step 15** Connect the duplex MU connector from the NAM to the HFM.
 - Step 16** Push the HFM slightly upward (about 10 mm / 0.5 inch) to expose two grooves on the top of the HFM.
 - Step 17** Position the optical fiber (at the correct length and bending radius) in the two lateral grooves on top of the HFM.
 - Step 18** Press the bottom of the HFM, applying downward pressure and snap carefully into place.
 - Step 19** For a protected channel, repeat steps 12-17 for the other side.
 - Step 20** Check that the fibers on top of the passive optical shelf are drawn in even curves without tight loops or kinks.
 - Step 21** Close the passive optical shelf cover.
-



Dummy Filter Module

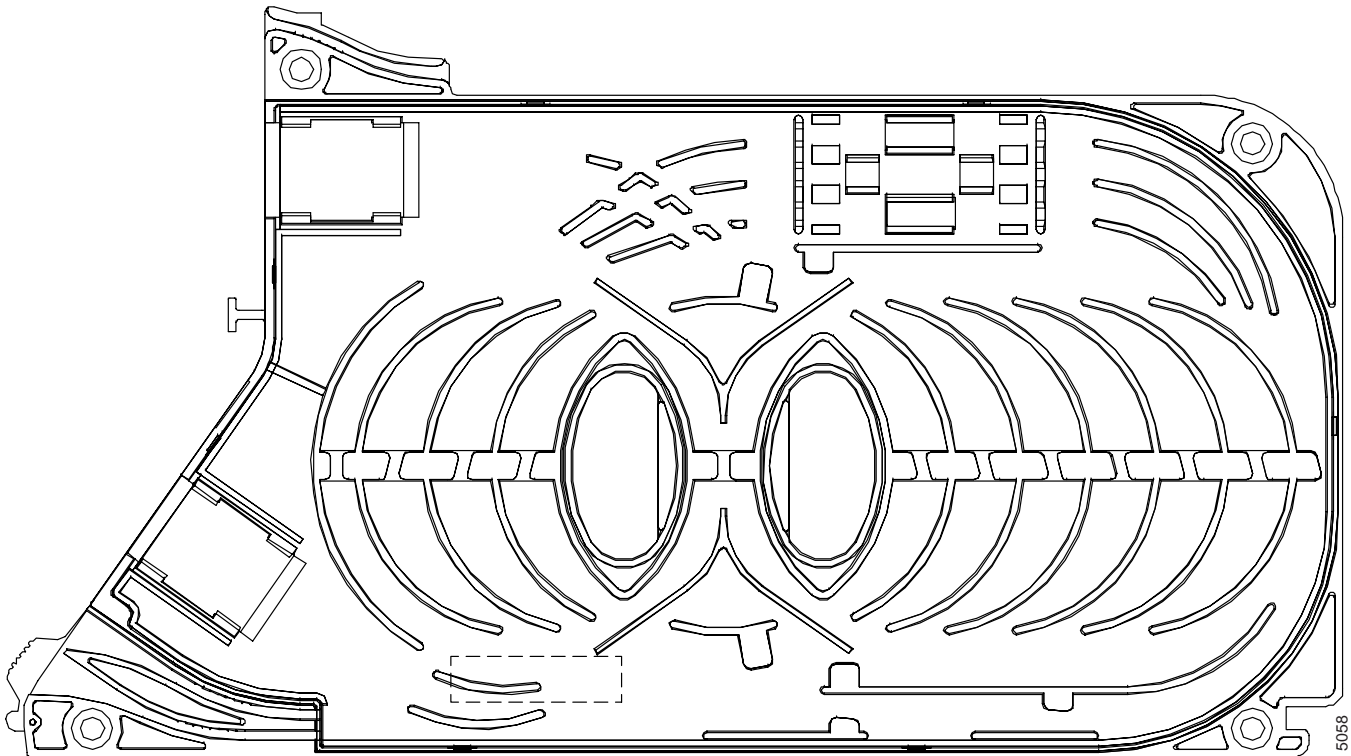
This chapter describes the Dummy Filter module (DFM).

9.1 Functional Description

The function of the DFM is to fill empty space (if any) in the passive optical shelf at the ONS 15252 Multichannel Unit (MCU). This space is typically between Termination modules (TM) or the two halves of the Bridge module (BM).

Figure 9-1 illustrates the DFM.

Figure 9-1 DFM side view



**Note**

The DFM is passive and does not include alarm or supervisory subunit functions. In addition, front-panel indicators, connectors, or adjustments are not associated with the DFM.

9.2 Technical Specifications

This section provides environmental and mechanical specifications for the DFM. The DFM is a passive device. Optical and electrical specifications and default thresholds do not apply.

9.2.1 Environmental Specifications

Table 9-1 lists environmental specifications for the DFM during operating conditions.

Table 9-1 DFM Environmental Specifications

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (acc. to GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (acc. to GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

9.2.2 Mechanical Specifications

Table 9-2 lists DFM mechanical specifications.

Table 9-2 DFM Mechanical Specifications

Item	Specification
Height	133 mm (5.2 in.)
Width	10 mm (0.4 in.)
Depth	236 mm (9.3 in.)
Weight	0.12 kg (0.26 lbs.)

9.3 Removing and Replacing a DFM

This section explains how to remove and replace the DFM. Install the DFM in the passive optical shelf. Make sure the replacement module and any supplies, such as tagging materials, are present on site before beginning the removal and replacement procedures. See Figure 9-2 for DFM placement in the shelf.


Warning

The Multichannel Unit (MCU) is energized with -48 VDC power.

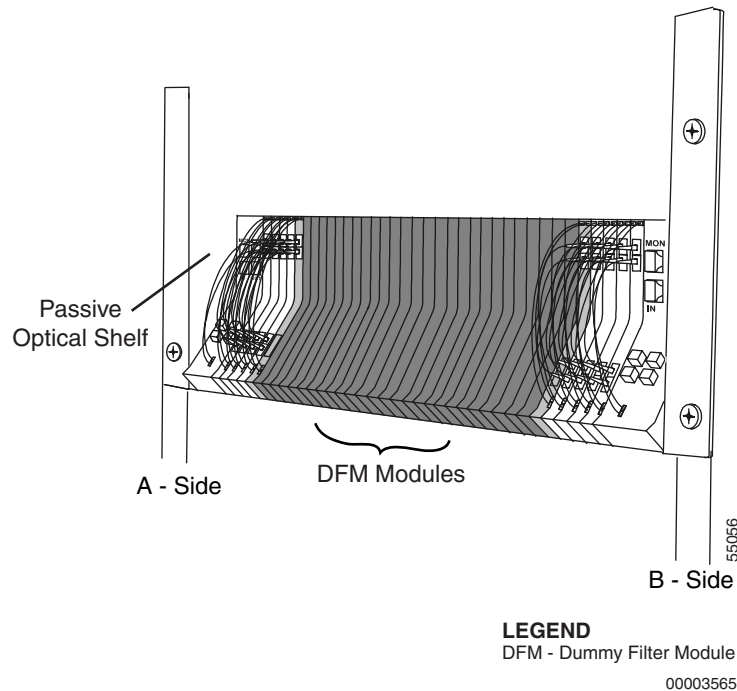

Caution

Static electricity can damage electro-optical modules. While handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove the Dummy Filter Module from the Passive Optical Shelf

- Step 1 Open the passive optical shelf cover.
- Step 2 Push the button at the bottom of the DFM.
- Step 3 Move the DFM upwards.
- Step 4 Carefully slide it toward you.
- Step 5 Remove the DFM from the passive optical shelf.
- Step 6 Close the passive optical shelf cover.

Figure 9-2 Location of the DFM in the passive optical shelf



Procedure: Replace the Dummy Filter Module in the Passive Optical Shelf

- Step 1** Open the passive optical shelf cover.
 - Step 2** Position the DFM in the passive optical shelf.
 - Step 3** Slide the DFM on the bottom so the rear MCU crossbeam fits into the groove in the back of the DFM.
 - Step 4** Push in the button at the module bottom to snap into place.
 - Step 5** Close the passive optical shelf cover.
-

Termination Module

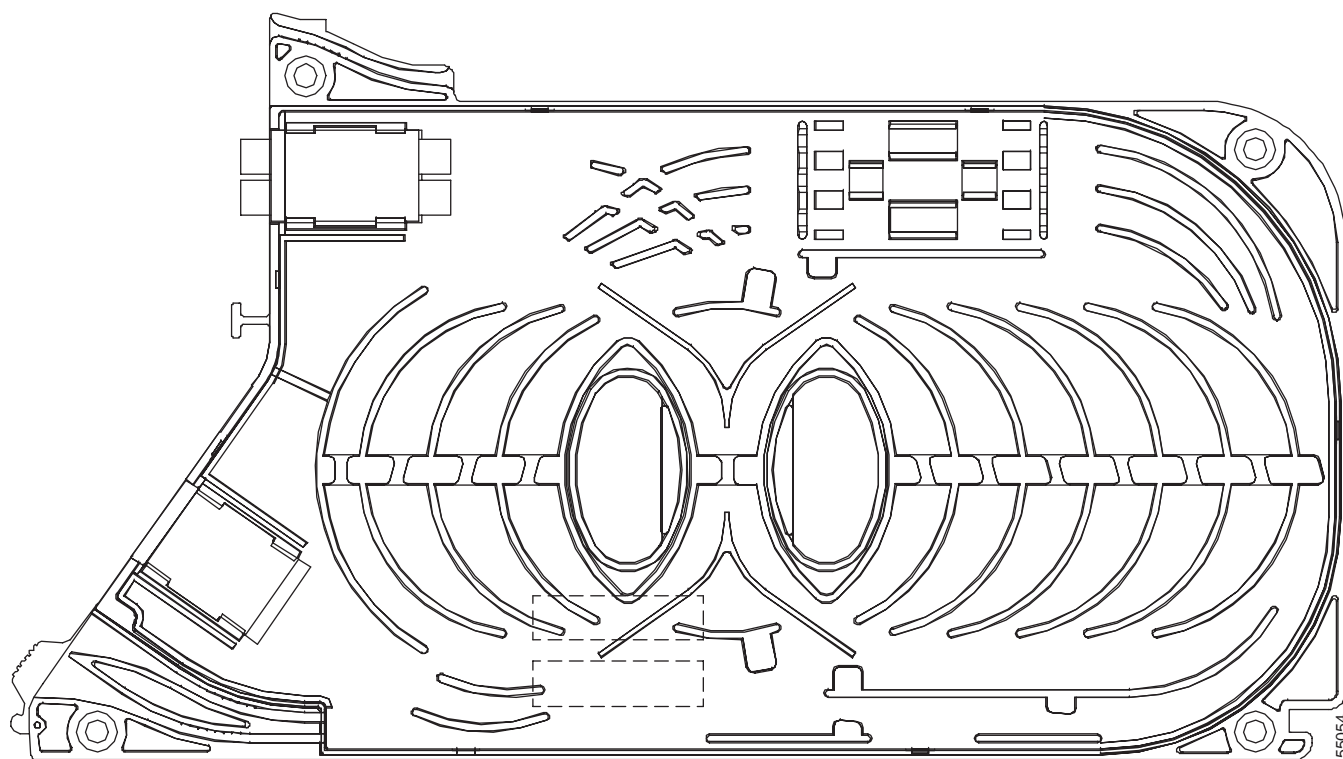
This chapter describes the Termination module (TM).

10.1 Functional Description

The TM terminates the optical signal in the ONS 15252 Multichannel Unit (MCU) after the signal has passed through the Hub Filter module (HFM) add/drop filters.

The TM terminates fiber connectors from the last HFM. Figure 10-1 shows the side-view of a TM.

Figure 10-1 TM side view




Note

The TM is passive and does not include alarm or supervisory subunit functions.



Note

 TM connectors include an MU-to-MU duplex adapter.

10.2 Technical Specifications

This section provides environmental and mechanical specifications for the TM. The TM is a passive device; therefore, optical and electrical specifications, as well as default thresholds, do not apply.

10.2.1 Environmental Specifications

Table 10-1 lists environmental specifications for the TM during operating conditions.

Table 10-1 *TM Environmental Specifications*

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

10.2.2 Mechanical Specifications

The TM consists of the following parts:

- Two MU dust caps (mounted inside the module)
- Two dust caps, externally mounted (to be removed at installation)
- One HFM housing
- One MU-to-MU duplex adapter

Table 10-2 lists TM mechanical specifications.

Table 10-2 *TM Mechanical Specifications*

Item	Specification
Height	133 mm (5.2 in.)
Width	10 mm (0.4 in.)
Depth	236 mm (9.3 in.)
Weight	0.13 kg (0.3 lbs.)

10.3 Removing and Replacing a TM

This section explains how to remove and replace the TM module. Install the TM in the passive optical shelf of the ONS 15252 MCU. Make sure the replacement and any supplies, such as tagging materials, are present on site before beginning the removal and replacement procedures. Figure 10-2 illustrates TM placement in the shelf.


Warning

The ONS 15252 Multichannel Unit (MCU) is energized with -48 VDC power.


Caution

Static electricity can damage electro-optical modules. When handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove the Termination Module from the Passive Optical Shelf

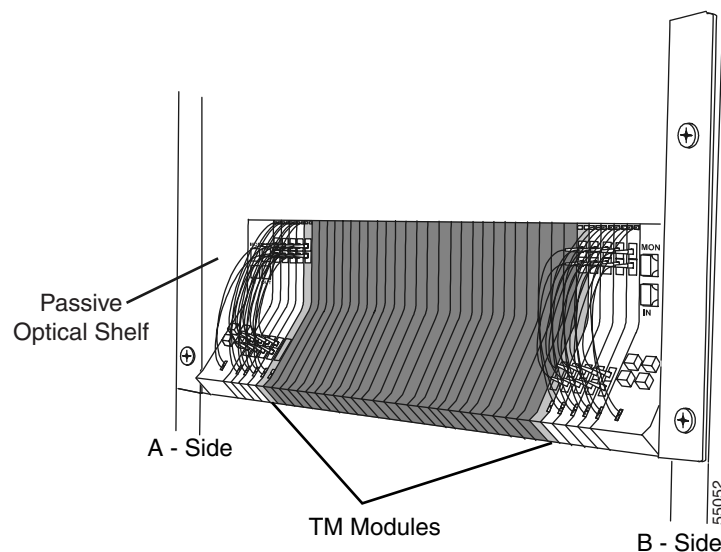

Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.


Warning

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

Figure 10-2 Location of the TM in the passive optical shelf



LEGEND

TM module - Termination Module

00003573

-
- Step 1** Open the passive optical shelf cover.
 - Step 2** Disconnect the TM optical connections.
 - Step 3** Put dust plugs in the MU optical adapters on the TM.
 - Step 4** Install protective caps on the optical fiber jumper cables disconnected from the TM.
 - Step 5** Push the button located at the bottom front of the TM.
 - Step 6** Raise the TM enough to pull it forward and out of the passive optical shelf.
 - Step 7** Carefully remove the TM from the passive optical shelf.



Note Be careful with the two fibers from the last Hub Filter module. Those fibers must be terminated, either by installing a new TM or inserting a BM, a CMX, or a CMY module.

- Step 8** Close the passive optical shelf cover.
-

Procedure: Replace the Termination Module in the Passive Optical Shelf



Note Replace a TM only when a new TM is required, or when you need a TM to replace an earlier BM, CMX or CMY module.



Warning Follow proper safety procedures when removing modules without switching off the relevant subrack.



Warning Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

-
- Step 1** Open the passive optical shelf cover.
 - Step 2** If needed, make room at the end of the Hub Filter module (HFM) row by removing a Dummy Filter module (DFM).



Note To lock the TM effectively, you must slide the TM on the bottom of the passive optical shelf. Failure to do so may cause the TM to pop up. If popped up, the TM will not align properly with the rest of the modules.

- Step 3** Carefully position the TM into the passive optical shelf.
- Step 4** Push the TM retainer located at the bottom front of the TM.
- Step 5** Snap the TM into place by pressing gently downwards.
- Step 6** Remove the dust caps from MU adapters located on the TM front panel.
- Step 7** Remove the dust plugs from the MU duplex connector located on the fiber optical jumper cable coming from the adjacent HFM.

- Step 8** Clean and inspect the MU duplex connector.
 - Step 9** Connect the MU duplex connector to the TM using the MU adapter.
 - Step 10** Close the passive optical shelf cover.
-

Bridge Module

This chapter describes the Bridge module (BM).

11.1 Functional Description

The BM enables traffic from the A-side or B-side to pass through the ONS 15200 Multichannel Unit (MCU). The BM allows the portion of the optical signal not intended for the node to bypass the nodes. The BM allows traffic from the A-side to pass through the MCU and exit on the B-side and vice versa (i.e., traffic from the B-side passes through the MCU and exits on the A-side).

Figure 11-1 illustrates the BM.

Figure 11-1 BM side view

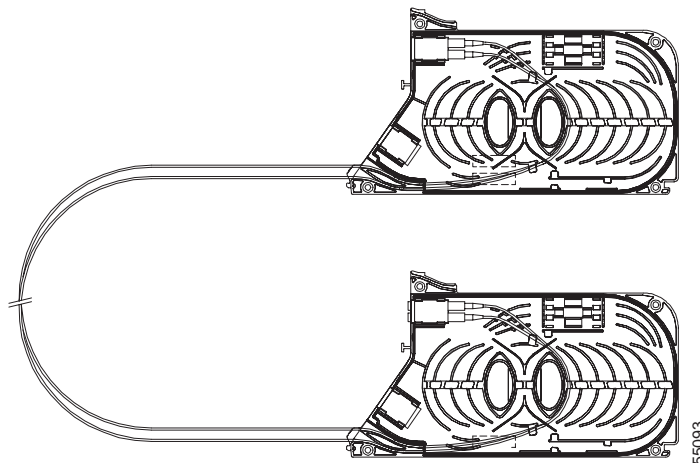
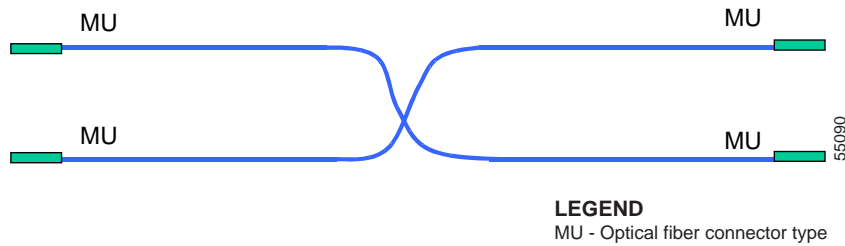


Figure 11-2 illustrates a block diagram of the BM. Note that the fibers in the BM are crossed and not coupled straight.

Figure 11-2 BM block diagram



If the BM is not used, Termination modules (TMs) are used instead to prevent reflections. A Connection Module X can also replace the BM.



Note

The BM is passive and does not include alarm or supervisory subunit functions.



Note

BM connectors include two dual MU-MU adapters (female), two MU-MU patch cords and two plastic housings to hold the MU-MU adapters.

11.2 Technical Specifications

This section provides environmental and mechanical specifications for the BM. The BM is a passive device; therefore, optical and electrical specifications, as well as default thresholds, do not apply.

11.2.1 Environmental Specifications

Table 11-1 describes BM climatic limits during normal operation.

Table 11-1 BM Climatic Limits

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

11.2.2 Mechanical Specifications

Table 11-2 lists BM mechanical specifications.

Table 11-2 BM Mechanical Specifications

Item	Specification
Height	133 mm (5.2 in.)
Width	20 mm (0.8 in.)
Depth	236. mm (9.3 in.)
Weight	0.28 kg (0.62 lbs.)

The BM consists of the following parts:

- Two single-mode fiber (SMF) patch chords (2.0 mm diameter) with type MU optical fiber connectors
- Two Hub Filter module (HFM) housings
- Two MU/MU duplex adapters
- Four MU plugs, to be removed at installation

The BM uses two 2-m (47-inch) SMF patch cords.

11.3 Removing and Replacing a BM

This section explains how to remove and replace the BM. Install the BM in the passive optical shelf of the ONS MCU 15252 unit when you plan to configure the ONS 15200 system in the mesh configuration. Make sure the replacement unit and any supplies, such as tagging materials, are present on site before beginning the removal and replacement procedures. Figure 11-3 shows BM placement in the shelf.



Warning

The Multiple Channel Unit (MCU) is energized with -48 VDC power.



Caution

Static electricity can damage electro-optical modules. While handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove the Bridge Module and Replace it With Two TMs



Warning

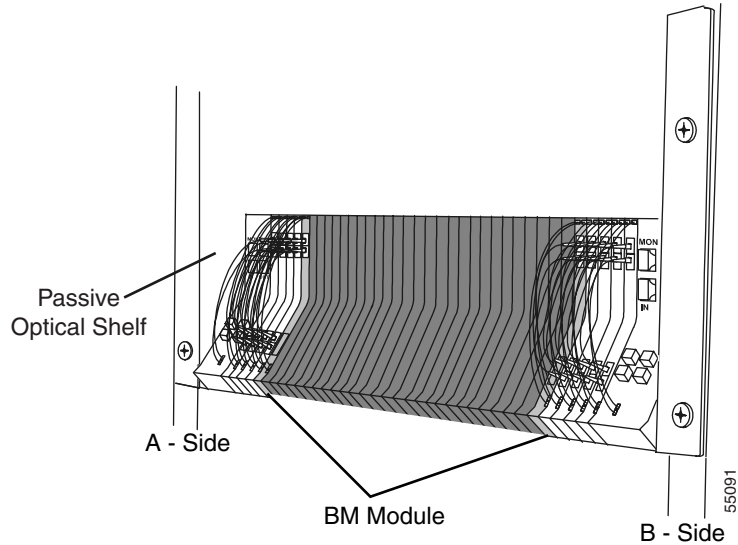
Follow proper safety procedures when removing modules without switching off the relevant subrack.



Warning

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

Figure 11-3 Location of the BM in the passive optical shelf



LEGEND

BM module - Bridge Module

00003556.eps

-
- Step 1** Open the passive optical shelf cover.
- Step 2** Disconnect the dual MU connectors from the A-side and the B-side of the BM.
- Step 3** Push the retainer button located on the bottom front of the BM.



Note Put dust plugs in the MU optical adapters on the BM.



Caution Install protective caps on the optical fiber jumper cables disconnected from the BM.

- Step 4** Raise the BM enough to pull it forward and out of the passive optical shelf one half at a time.
- Step 5** Carefully remove the BM from the passive optical shelf. (See Figure 11-3 for the BM position.)
- Step 6** Position two Terminal modules (TM) into the passive optical shelf, one adjacent to the A-side on the far right, and the other adjacent to the B-side on the far left.
- Step 7** Press each TM retainer located at the bottom front of the TM.
- Step 8** Snap each TM into place.
- Step 9** Remove the dust plugs from MU adapters located on the front panel of the TM.
- Step 10** Remove the dust caps from the MU duplex connectors. These are located on the fiber optical jumper cables coming from the adjacent Hub Filter modules (HFMs).
- Step 11** Clean and inspect the MU duplex connectors.
- Step 12** Connect an MU duplex connector to each MU adapter to terminate the fibers normally.

- Step 13** Close the passive optical shelf cover.
-

Procedure: Replace the Bridge Module in the Passive Optical Shelf



Warning Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

- Step 1** Open the passive optical shelf cover.
- Step 2** Disconnect the inputs on the two TMs associated with the BM slot.
- Step 3** Put dust plugs in the MU optical adapters on the TMs.
- Step 4** Install protective caps on the optical fiber jumper cables disconnected from the TMs.
- Step 5** Push the individual retainer buttons located at bottom front of the TMs.
- Step 6** Raise the TMs enough to pull them forward and out of the passive optical shelf.
- Step 7** Carefully remove the TMs from the passive optical shelf.



Note There are two ports on the BM, both with dual input/output MU connectors.

- Step 8** Position the BM into the passive optical shelf (Figure 11-3). Push the button on the bottom, press gently downwards, and snap into place.
- Step 9** Remove the adapter dust plugs and optical fiber end caps on fibers that are to be connected to the BM.
- Step 10** Clean the dual MU connectors on the optical fiber jumpers.
- Step 11** Connect the dual MU connector on the A-side.
- Step 12** Connect the dual MU connector on the B-side.
- Step 13** Raise both halves of the BM, to expose the lateral grooves. Insert the fiber in them, while maintaining a good bending radius (not less than 35 mm). Carefully snap back into place.
- Step 14** Close the passive optical shelf cover.
-



Connection Module X

This chapter describes the Connection Module X (CMX).

12.1 Functional Description

The CMX connects the filters in two ONS 15252 Multichannel Units (MCU). The CMX is, in principle, a Bridge module (BM) with longer fibers. The CMX passes traffic on wavelengths not dropped in the first ONS 15252 MCU to the second ONS 15252 MCU and vice versa. The CMX connects A-side filter banks in one chassis to B-side filter banks in another chassis. This crossover is needed for systems using more than 16 Client Layer Interface Port (CLIP) boards in the MCU. If you do not use a CMX, you can use two Termination modules (TMs) to terminate the MU connectors on the last HFMs.

Figure 12-1 on page 12-2 illustrates a CMX.

Figure 12-1 CMX side view

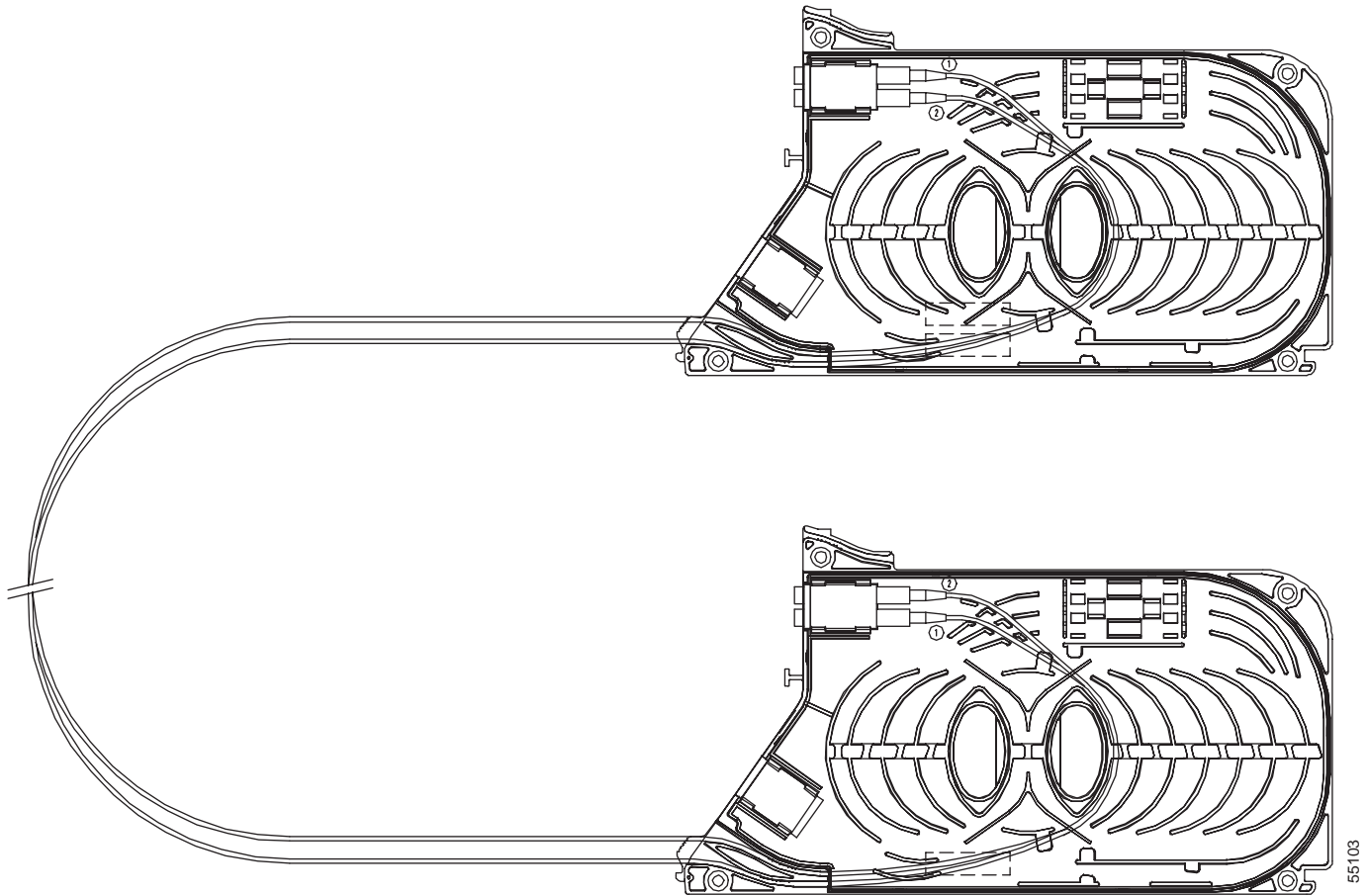
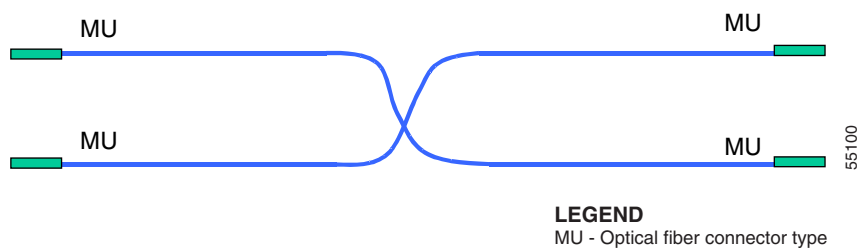


Figure 12-2 illustrates a block diagram of the CMX. Note that the fibers in the CMX are crossed and not coupled straight.

Figure 12-2 CMX block diagram



Note

The CMX is passive and does not include alarm or supervisory subunit functions.



Note

CMX module connectors include an input optical fiber duplex adapter (type MU connector) and an output MU duplex adapter.

12.2 Technical Specifications

This section provides environmental and mechanical specifications for the CMX module. The CMX module is a passive device; therefore, optical and electrical specifications, as well as default thresholds do not apply.

12.2.1 Environmental Specifications

Table 12-1 lists environmental specifications for the CMX module during operating conditions.

Table 12-1 CMX Environmental Specifications

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

12.2.2 Mechanical Specifications

The CMX module consists of the following parts:

- Two 2.0-mm diameter SMF patch cords with optical fiber connectors (type MU)
- Two HFM housings
- Two MU/MU duplex adapters
- Four dust plugs to be removed at installation

The CMX module uses two 5.0 m (16.40 feet) SMF patch cords. Table 12-2 lists CMX module mechanical specifications.

Table 12-2 CMX Mechanical Specifications

Item	Specification
Height	133 mm (5.2 in.)
Width	20 mm (0.8 in.)
Depth	236 mm (9.3 in.)
Weight	0.34 kg (0.8 lbs.)

12.3 Removing and Replacing a CMX

This section explains how to remove and replace the CMX. Install the CMX module in the passive optical shelf of the ONS 15252 MCU when you are planning to setup the ONS 15200 system in the mesh configuration. Make sure the replacement modules and any supplies, such as tagging materials, are present on site before beginning the removal and replacement procedures.



Warning

The ONS 15252 Multichannel Unit (MCU) is energized with -48 VDC power.



Caution

Static electricity can damage electro-optical modules. When handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove the Connection Module X from the Passive Optical Shelf

The CMX half replaces a TM in the ATO system (used to hold the duplex MU-MU connector).



Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.



Warning

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

- Step 1** Open the passive optical shelf covers of the ONS 15252 MCUs that are connected.
- Step 2** Disconnect the duplex MU connector attached to the first CMX half.
- Step 3** Put dust caps on the duplex MU connector.
- Step 4** Put dust plugs in the adapters on the CMX.
- Step 5** Raise the CMX half to expose the lateral grooves, and remove the fiber. Also, remove the fiber from the lateral grooves of the DFM between the LM and the first HFM.
- Step 6** Push the button at the bottom of the CMX front panel to release it from the passive optical shelf. Move the CMX upward and slide it out of the passive optical shelf.
- Step 7** Insert a Dummy Filter module (DFM) into the available space to fill the passive optical shelf.
- Step 8** Repeat Steps 2 – 7 for the other side of the CMX located in the additional MCU.
- Step 9** Close the doors of the passive optical shelves.

Procedure: Replace the Connection Module X in the Passive Optical Shelf



Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.

**Warning**

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

-
- Step 1** Open the passive optical shelf covers of the ONS 15252 MCUs that are to be connected.
- Step 2** Remove the TM from the passive optical shelf to make lateral space:
- Disconnect the connector from the adapter.
 - Put dust caps on the MU-MU duplex connector.
 - Put dust plugs in MU-MU duplex adapter.
 - Press the button on bottom of the TM and press upwards and towards you to remove the TM.
- Step 3** Place a CMX half in the passive optical shelf at the end of the row of HFM modules where the TM was removed. Make sure the slot on the back of the module interlocks with the crossbeam located in the passive optical shelf.
- Step 4** Push the front panel button to snap the CMX into place.
- Step 5** Remove the dust plugs from the MU-MU duplex adapter in the CMX.
- Step 6** Remove the dust caps located on the optical fiber MU-MU duplex connector.
- Step 7** Clean, inspect, and insert the MU duplex connector from the adjacent HFM in the CMX half.
- Step 8** Guide the optical fiber cable from the CMX through the lateral grooves on the sides (top front) of the CMX and out through similar grooves on a DFM adjacent to the LM.



Note If there is not a DFM adjacent to the LM, insert a DFM.

- Step 9** Guide the fiber from the CMX through the lateral opening in the hinged cover.
- Step 10** Repeat Steps 2 – 9 for the other side of the CMX.
- Step 11** Close the cover, making sure no fiber is pinched in the process.
-

Connection Module Y

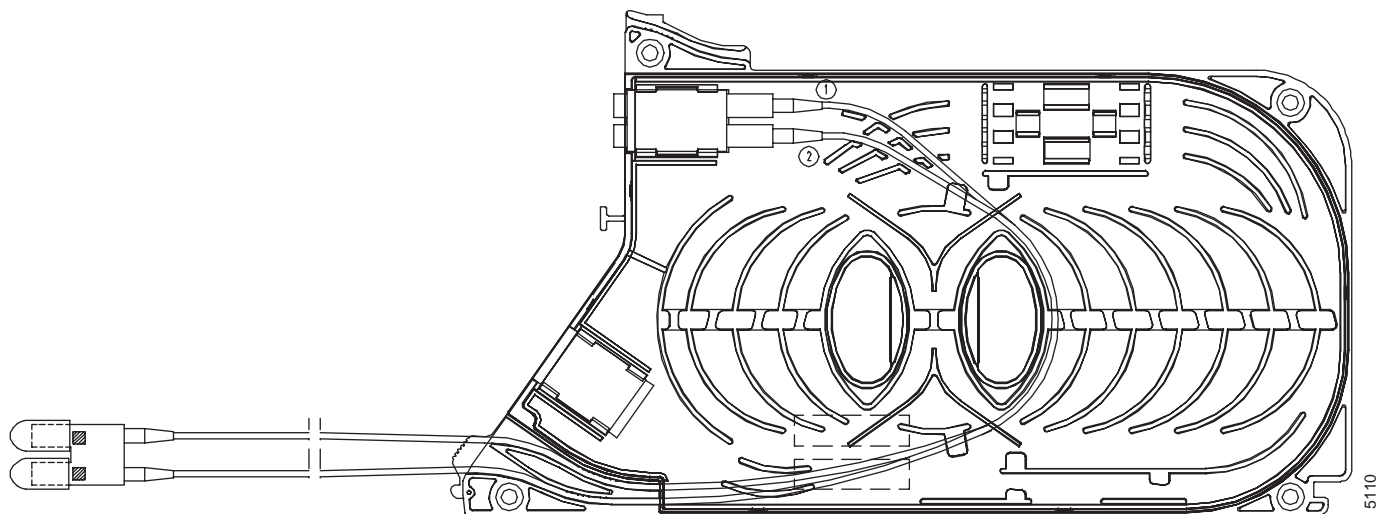
This chapter describes the Connection Module Y (CMY).

13.1 Functional Description

The CMY connects the filters in two ONS 15252 MCUs. The CMY is, in principle, an extension of the fibers from a Hub Filter module (HFM) module. The CMY connects an A-side filter bank to another A-side filter bank or a B-side filter bank to another B-side filter bank between chassis. The connection permits the extension of the passive optical shelf.

Figure 13-1 illustrates the CMY.

Figure 13-1 CMY side view



The CMY module provides a bridge between the A-side of one ONS 15252 MCU to the A-side of a second ONS 15252 MCU. The CMY also provides a bridge between the B-side of one ONS 15252 MCU to the B-side of a second ONS 15252 MCU.

This configuration is needed for systems using more than 16 Client Layer Interface Port (CLIP) modules in the ONS 15252 MCU. The fibers from the CMY to the HFM are coupled straight into an MU duplex connector.

**Note**

The CMY is passive and does not include alarm or supervisory subunit functions.

**Note**

CMY module connectors include an input optical fiber duplex adapter (MU) and an output MU duplex connector.

13.2 Technical Specifications

This section provides environmental and mechanical specifications for the CMY module. The CMY module is a passive device; therefore, optical and electrical specifications, as well as default thresholds, do not apply.

13.2.1 Environmental Specifications

Table 13-1 lists environmental specifications for the CMY module during operating conditions.

Table 13-1 CMY Module Environmental Specifications

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

13.2.2 Mechanical Specifications

The CMY module consists of the following parts:

- Two 2.0-mm diameter SMF patch cords with optical fiber connectors (type MU)
- One HFM housing
- One MU/MU duplex adapter
- One MU/MU duplex connector housing
- Two dust plugs to be removed at installation

The CMY module uses two 5.0 m (16.40 feet) SMF patch cords. Table 13-2 lists CMY module mechanical specifications.

Table 13-2 CMY Module Mechanical Specifications

Item	Specification
Height	133 mm (5.24 in.)
Width	10 mm (0.4 in.)
Depth	236 mm (9.30 in.)
Weight	0.18 kg (0.4 lbs.)

13.3 Removing and Replacing a CMY

This section explains how to remove and replace the CMY. Install the CMY in the passive optical shelf of the ONS 15252 MCU. Make sure the replacement module and any supplies, such as tagging materials, are present on site before beginning the removal and replacement procedures. Figure 13-1 on page 13-1 shows a CMY.



Warning

The ONS 15252 Multiple Channel Unit (MCU) is energized with -48 VDC power.



Caution

Static electricity can damage electro-optical modules. When handling electro-optical modules, wear a grounding wrist strap to discharge the static buildup. Wrist straps are designed to prevent static electricity damage to equipment.

Procedure: Remove the Connection Module Y from the Passive Optical Shelf



Warning

Follow proper safety procedures when removing modules without switching off the relevant subrack.



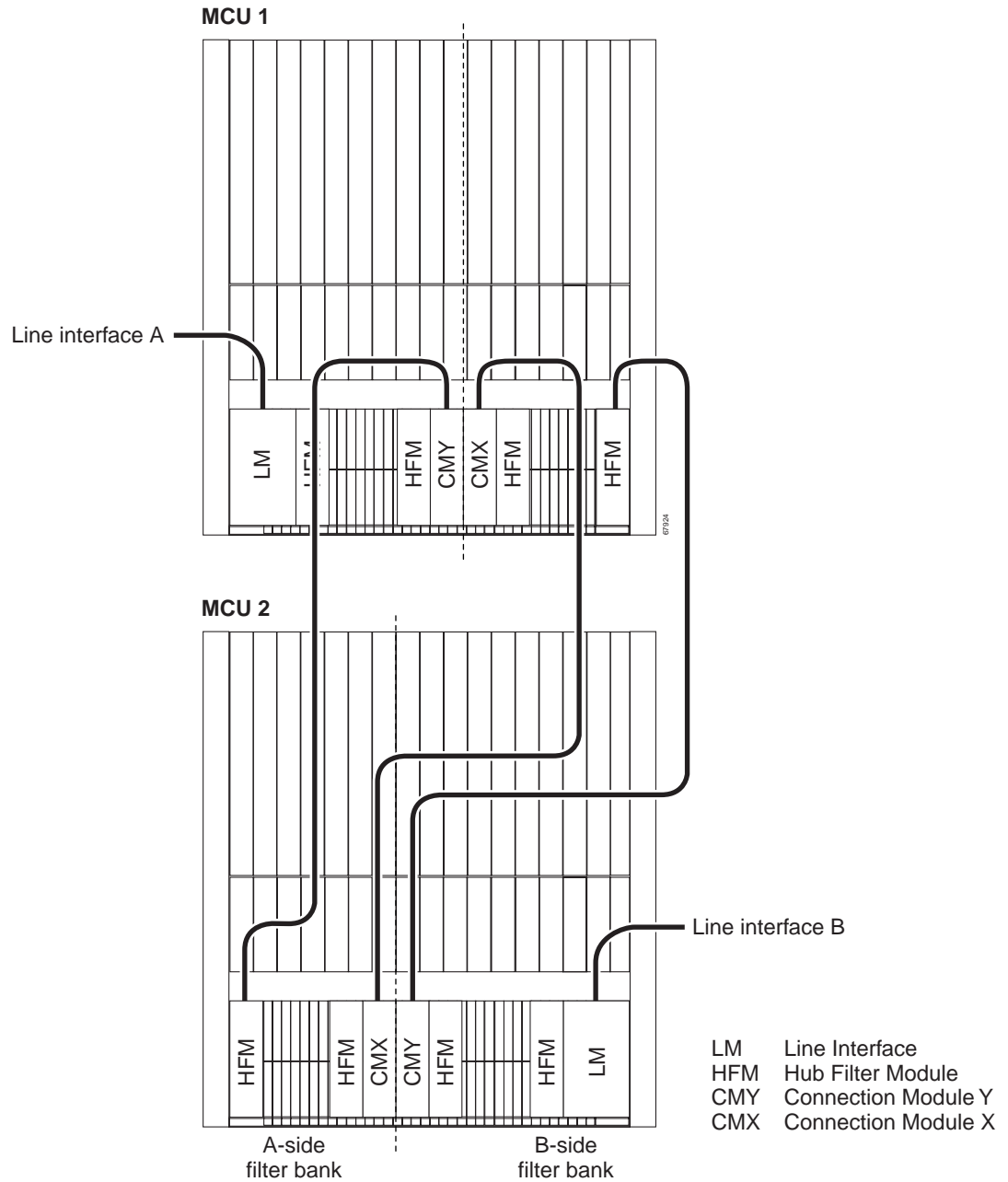
Warning

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

- Step 1** Open the passive optical shelf covers of the two ONS 15252 MCUs that are colocated.
- Step 2** Remove the CMY duplex MU connector from the HFM in MCU 2 see Figure 13-2 on page 13-5.
- Step 3** Put dust caps on the CMY duplex MU ends.
- Step 4** Put dust plugs in the adapters on the Hub Filter module (HFM) from which the connectors were removed in Step 2.
- Step 5** Remove the HFM duplex MU connector adjacent to the CMY from the CMY body housing in MCU 1. Cap the connector and plug the adapter.
- Step 6** Push the button at the bottom of the CMY front panel to release it from the passive optical shelf. Move the CMY upward and slide it out of the passive optical shelf.

- Step 7** Insert a TM in the available space to fill the passive optical shelf:
- a. Remove the dust plugs from the MU-MU duplex adapter of the inserted TM.
 - b. Remove the dust caps from the MU-MU duplex connector of the adjacent HFM (Step 5).
 - c. Clean and inspect the connector.
 - d. Insert the connector in the adapter.
- Step 8** If applicable, repeat Steps 2 – 7 for the CMY located in MCU 2.
- Step 9** Close the doors of the passive optical shelves.
-

Figure 13-2 CMY connections between two MCUs



Procedure: Install a Connection Module Y in the Passive Optical Shelf

 **Warning**

Follow proper safety procedures when removing modules without switching off the relevant subrack.

**Warning**

Do not look directly at the optical connector output beams during connector removal. The beams can cause permanent eye damage.

-
- Step 1** Open the passive optical shelf covers of the two ONS 15252 MCUs that are connected.
- Step 2** Remove a TM from the passive optical shelf **MCU 1** to make lateral space:
- Disconnect the MU-MU duplex connector from the adapter.
 - Put dust caps on the MU-MU duplex connector.
 - Put dust plugs in the MU-MU duplex adapter.
 - Press the button on bottom of the TM and press upwards and towards you to remove the TM.
- Step 3** Position the CMY in the passive optical shelf of MCU 1 at the end of the row of HFM modules where you removed the TM. Be sure the groove on the back of the module interlocks with the crossbeam located in the passive optical shelf.
- Step 4** Snap the CMY into place by pressing at the button at the bottom of the CMY front panel.
- Step 5** Remove the dust plugs from the CMY optical fiber adapter.
- Step 6** Remove dust caps from the MU duplex connector from the adjacent HFM.
- Step 7** Clean, inspect, and insert the MU duplex connector into the CMY.
- Step 8** Raise the CMY half to expose the lateral grooves and guide the fibers through the lateral grooves. Push the button at the bottom of the CMY front panel to snap the CMY into place.
- Step 9** Insert a DFM adjacent to the LM, and move the fibers in front of the passive optical shelf using the lateral grooves.
- Step 10** Guide the fiber through the lateral opening in the hinged cover without pinching the fiber. If needed, you can use the fiber holder included in the MCU accessory kit to guide the fiber.
- Step 11** Repeat Steps 2 – 10 for a second CMY, if required.
- Step 12** Close the covers, making sure no fiber is pinched in the process.
-



Collector Filter Module

This chapter describes the Collector Filter module (CFM).

14.1 Functional Description

The CFM transfers optical signals between the DWDM side of the ONS 15201 Single-Channel Unit (SCU) and the Client Layer Interface Port (CLIP) module. It also transfers the part of the signal not intended for the SCU to the opposite port on the other side. Only one CFM is used in each collector node.

The CFM adds the output signal from the CLIP DWDM laser to the optical line. The CFM also drops the incoming signal from the same ITU channel. In protected mode, this signal goes to the A and B receivers on the ONS 15201 CLIP module. In unprotected mode, this signal goes to the A receiver only.

Channels that are not dropped by the CFM pass through to the SCU. Refer to Chapter 1 of the *Cisco ONS 15200 Product Description* for optical loss information.

If the wavelength is not stripped off and sent to the CLIP, the A-side IN goes to the B-side OUT, the B-side IN goes to the A-side OUT.



Note

The CFM does not use any alarm or supervisory interconnections.

The following tables show how the CFM is connected to the SCU. For detailed optical hookup and testing procedures, refer to the *Cisco ONS 15200 Installation, Setup, and Test Manual*.



Caution

Remember to always clean the fiber optic connectors before inserting them into the adapters.

Table 14-1 shows the placement of the SC connectors (numbered 1, 2, 3 and 4) for the different ONS 15201 SCU split ratios.

Table 14-1 SC Connections—CFM to SCU

SCU Type	CFM Type	A Input	A Output	B Input	B Output
A-100/B-0	100/0 + 0/100	1	2	3	4
A-90/B-10	90/10 + 10/90	3	4	1	2
A-50/B-50	50/50 + 50/50	3	4	1	2
A-10/B-90	90/10 + 10/90	1	2	3	4

Table 14-1 SC Connections—CFM to SCU (continued)

SCU Type	CFM Type	A Input	A Output	B Input	B Output
A-0/B-100	100/0 + 0/100	3	4	1	2

**Note**

Never use the CLIP B-side IN in an unprotected system.

The MU cables are connected on the front panel of the CLIP module. Table 14-2 explains how to connect the MU connectors (labeled A, B, 90, 10). The unlabeled optical fiber jumper cable transmits the dropped optical signal from the CFM to the CLIP module.

Table 14-2 MU Connections—CFM to CLIP

SCU Type	CFM Type	CLIP Input A	CLIP Input B
A-100 / B-0	100/0 + 0/100	A	never used
A-90 / B-10	90/10 + 10/90	90	10
A-50 / B-50	50/50 + 50/50	A	B
A-10 / B-90	90/10 + 10/90	10	90
A-0 / B-100	100/0 + 0/100	A	never used

14.2 Technical Specifications

This section provides optical, environmental, and mechanical specifications for the CFM. Electrical specifications and default thresholds do not apply.

14.2.1 Optical Specifications

Table 14-3 specifies general operating conditions.

Table 14-3 CFM Operating Conditions

Parameter	Nominal	Unit
Channel spacing	200	GHz
Channel width	0.40	nm

Table 14-4 lists optical operating frequencies.

Table 14-4 CFM Operating Frequencies

ITU Channel	Frequency (THz)	Wavelength (nm)
23	192.3	1558.98
25	192.5	1557.36
27	192.7	1555.75

Table 14-4 CFM Operating Frequencies (continued)

ITU Channel	Frequency (THz)	Wavelength (nm)
29	192.9	1554.13
31	193.1	1552.52
33	193.3	1550.92
35	193.5	1549.32
37	193.7	1547.72
43	194.3	1542.94
45	194.5	1541.35
47	194.7	1539.77
49	194.9	1538.19
51	195.1	1536.61
53	195.3	1535.04
55	195.5	1533.47
57	195.7	1531.90

For optical loss information, refer to Chapter 1 of the *Cisco ONS 15200 Product Description*.

14.2.2 Environmental Specifications

Table 14-5 lists CFM climatic limits during normal operation.

Table 14-5 CFM Climatic Limits

Item	Specification
Normal operating temperature	+5°C to +40°C (41°F to 104°F)
Short term operating temperature for equipment shelves (per GR-63, NEBS level 3)	-5°C to +55°C (23°F to 131°F)
Rate of temperature change	30°C/h (54°F/h)
Normal operating relative humidity	5 to 85%, but not to exceed 0.024 kg water per kg dry air
Short term operating relative humidity (per GR-63, NEBS level 3)	5 to 90%, but not to exceed 0.024 kg water per kg dry air

14.2.3 Mechanical Specifications

The Collector Filter module consists of the following parts:

- Protected Channel version
 - Two Add filters (ITU channel-specific)
 - Two Drop filters (ITU channel-specific)
 - One 1 X 2 fused coupler

- Four fiber splices
- One CFM housing
- Unprotected Channel version
 - One Add filters (ITU channel-specific)
 - One Drop filters (ITU channel-specific)
 - One CFM housing

The fiber type is 0.9-mm diameter SMF. The filters use SC and MU connectors. The coupler uses one MU connector. The two-fiber side of the coupler is always fusion spliced.

Table 14-6 lists the CFM mechanical specifications.

Table 14-6 CFM Mechanical Specifications

Item	Specification
Height	10 mm (0.4 in.)
Width	152 mm (6.0 in.)
Depth	160 mm (6.3 in.)
Weight	0.18 kg (0.40 lbs.)

14.3 Removing and Replacing a CFM

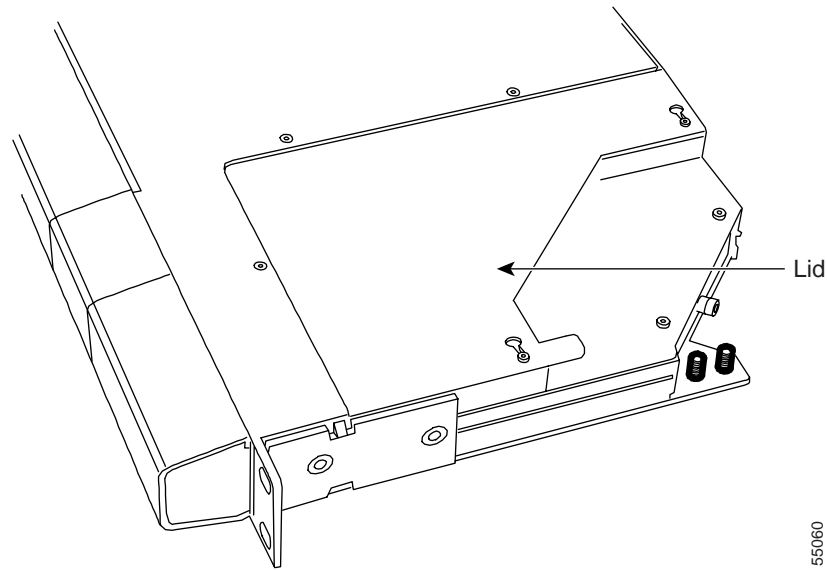
This section explains how to replace and remove the CFM. This module is used only in the ONS 15201 Single-Channel Unit (SCU).

Procedure: Remove the Collector Filter Module from the ONS 15201 SCU

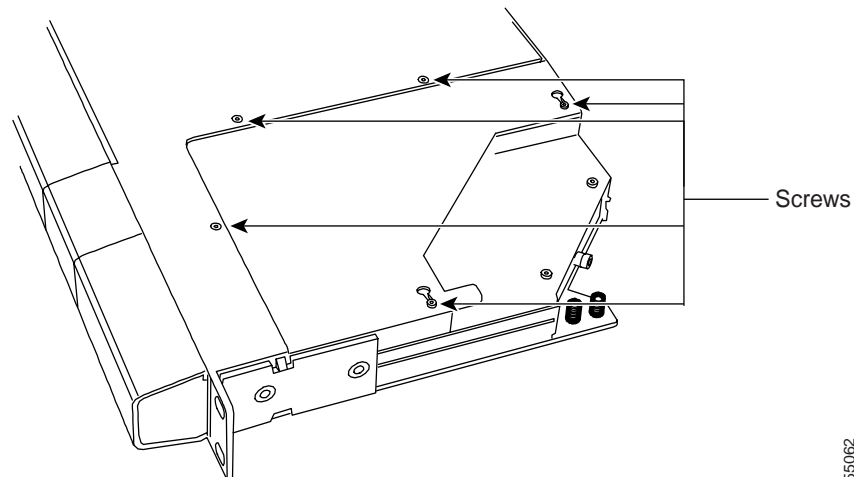


Caution Be careful not to pull the optical fibers or make sharp bends in the fibers. Always clean and inspect the MU or SC connectors before inserting them into the adapters.

Step 1 Locate the lid on top of the ONS 15201 SCU (Figure 14-1).

Figure 14-1 ONS 15201 SCU lid

Step 2 Loosen the five screws on the right side (shown in Figure 14-2).

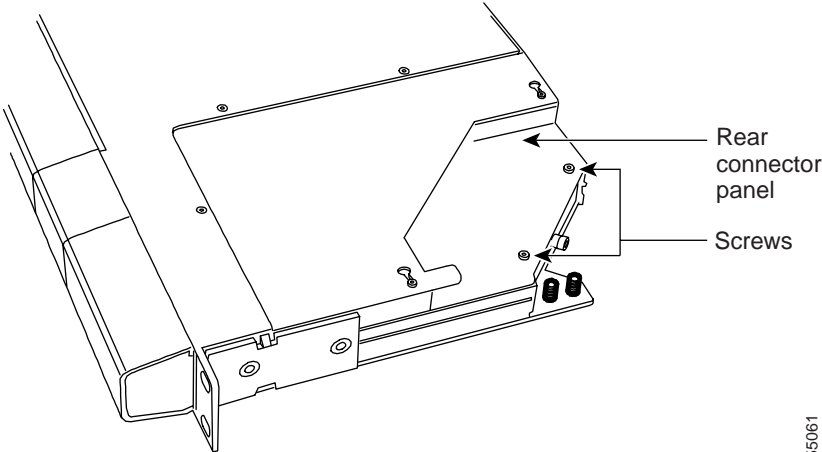
Figure 14-2 Screws on a CFM

Step 3 Remove the lid.

Step 4 Remove the two screws that hold the rear connector panel in place (shown in Figure 14-3).

Step 5 Remove the rear connector panel.

Figure 14-3 CFM rear connector panel



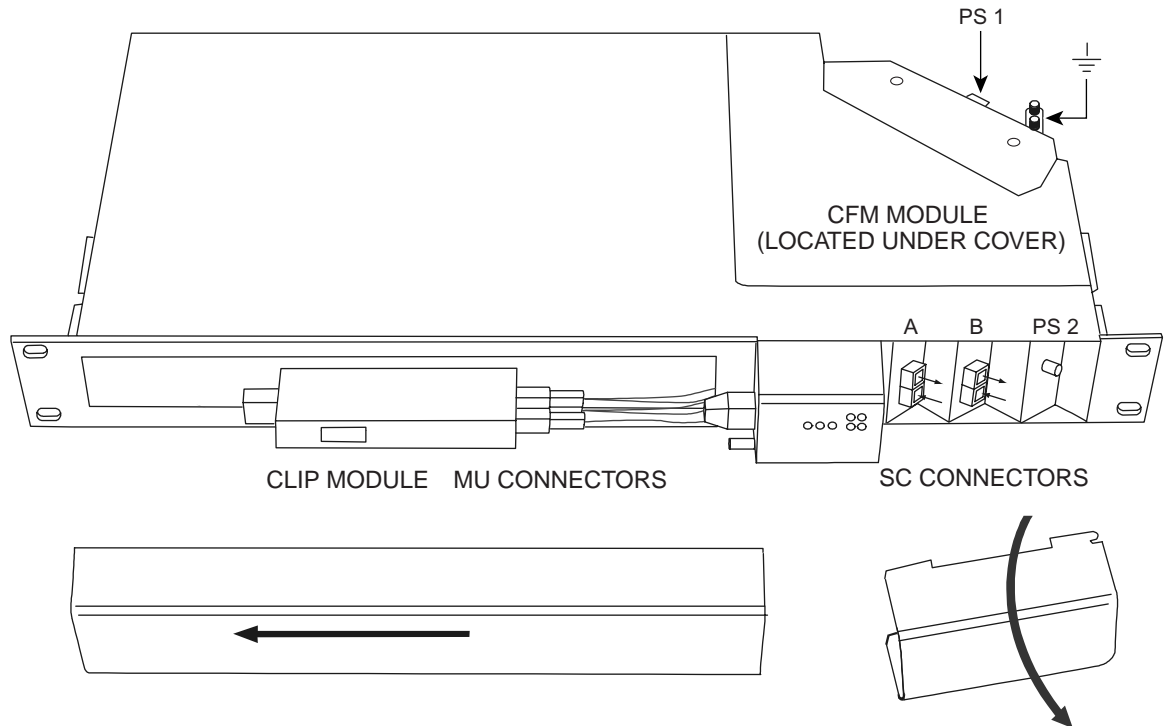
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Step 6 Remove the left-front panel cover of the ONS 15201 SCU, as shown in Figure 14-4.



Note The SCU Front Panel illustration in Figure 14-4 shows A and B line connections on the front. Also shown is an optional rear placement of these connections. The rear connections may not be present on the equipment.

Figure 14-4 ONS 15201 SCU front panel

**LEGEND**

CFM - Collector Filter Module
 CLIP - Client Line Interface Port module
 MU - Optical fiber connector type
 PS 1 - Power Supply One
 PS 2 - Power Supply Two

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- Step 7** Remove the four retaining screws from the CFM.
- Step 8** Disconnect the CFM optical connectors one at a time and put dust caps on them.



Caution Always put dust plugs on the adapters where the connectors were previously installed.


- Step 9** Carefully lift and remove the CFM from the ONS 15201 SCU.
- Step 10** Replace the cover (if you do not plan to replace the CFM in the near future).

Procedure: Replace the Collector Filter Module in the ONS 15201 SCU




Caution Be careful not to bend the MU cables excessively during this procedure.

- Step 1** On the front panel of the ONS 15201 SCU, remove the blind plugs on the inside of the SC/SC adapters.
- Step 2** Make sure that the ribbon cable from the backplane lies flat on the bottom of the SCU and that it is stretched forward as much as possible.

 **Caution** Be careful not to damage the optical fiber cables while inserting the module.

- Step 3** Carefully insert the CFM into the ONS 15201 SCU. Guide the MU connectors to come out on the front of the SCU.
- Step 4** Align the four holes in the CFM case with the four module stand-offs located inside the ONS 15201 SCU. When properly aligned the module stand-offs will fit into the holes in the CFM case.
- Step 5** Fasten the CFM to the module stand-offs with four retaining screws.
- Step 6** Clean and inspect the optical connectors one at a time before they are connected.

 **Note** It is critical to always clean the connectors before mating them with other connectors.

- Step 7** Connect the CFM optical fiber jumper cables to the A-side and B-side adapters (SC to SC) in accordance with the labels located on the cables and Figure 14-5 through Figure 14-9.

 **Note** For detailed instructions on connecting the CFM optical fiber, refer to the *Cisco ONS 15200 Installation, Setup, and Test Manual*.

Figure 14-5 displays the connection information for the 90/10 optical signal split ratio.

Figure 14-5 90/10 split ratio (protected) connections

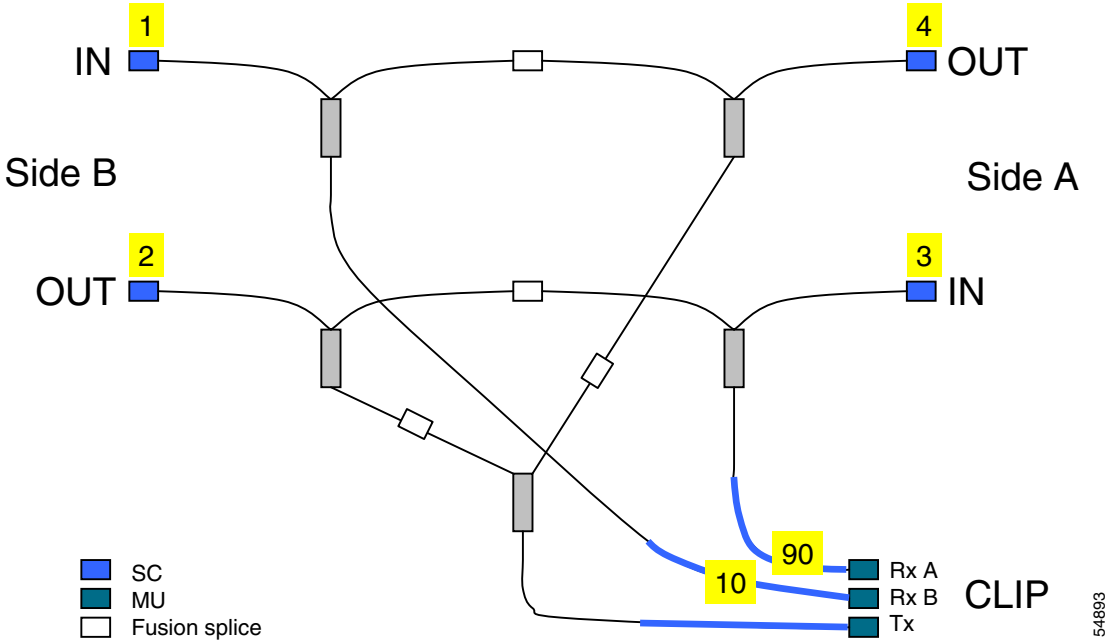
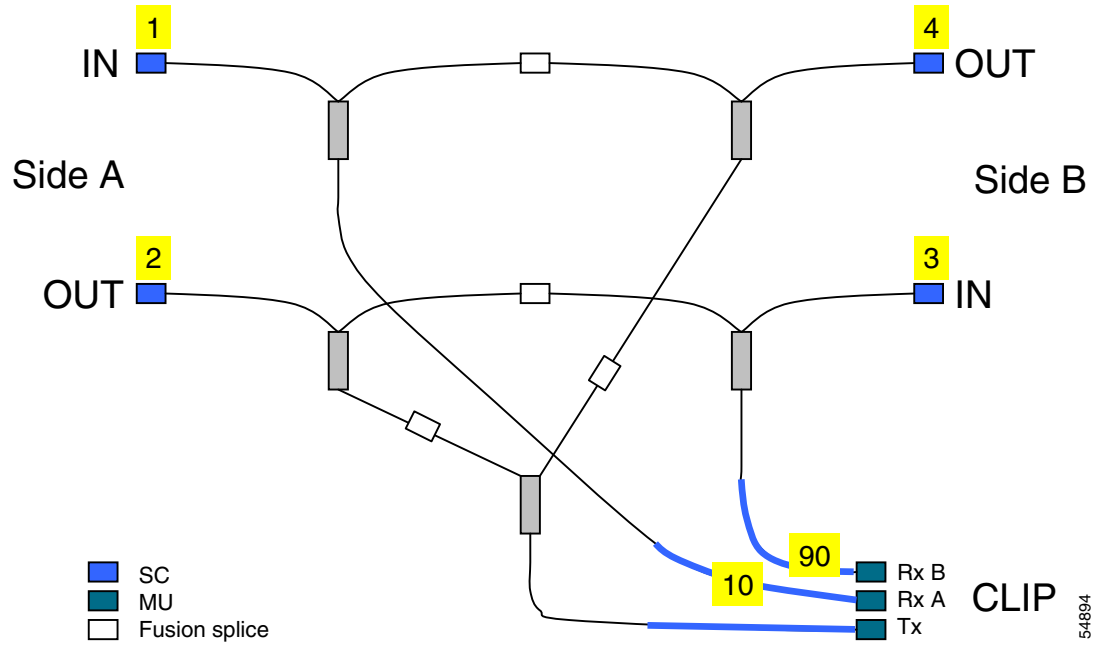


Figure 14-6 displays the connection information for the 10/90 optical signal split ratio.

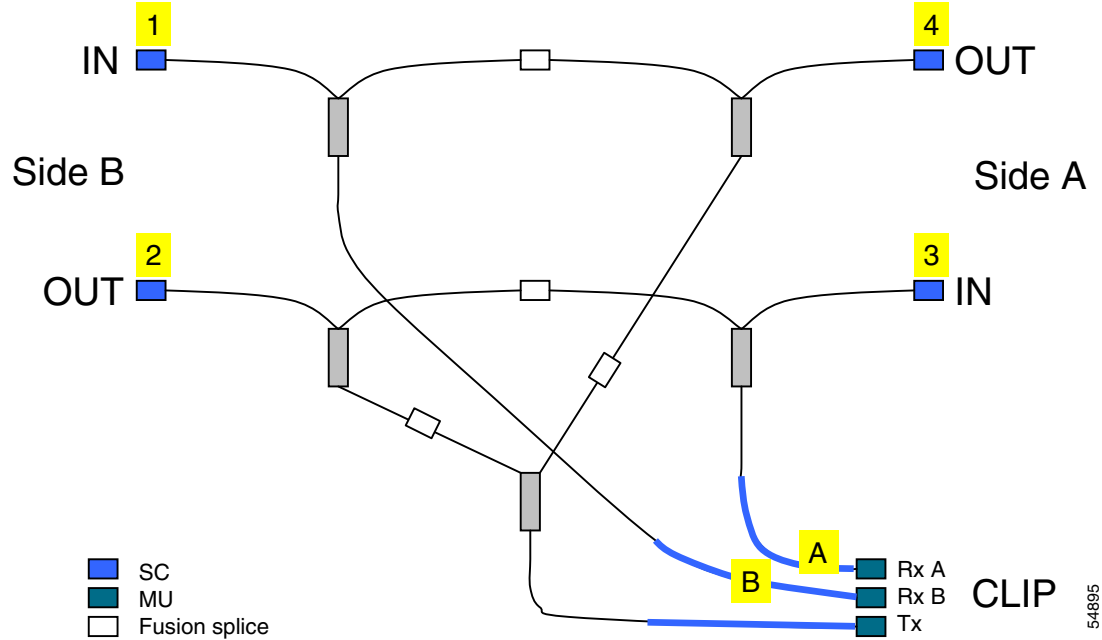
Figure 14-6 10/90 split ratio (protected) connections



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Figure 14-7 shows the 50/50 optical signal split ratio connections.

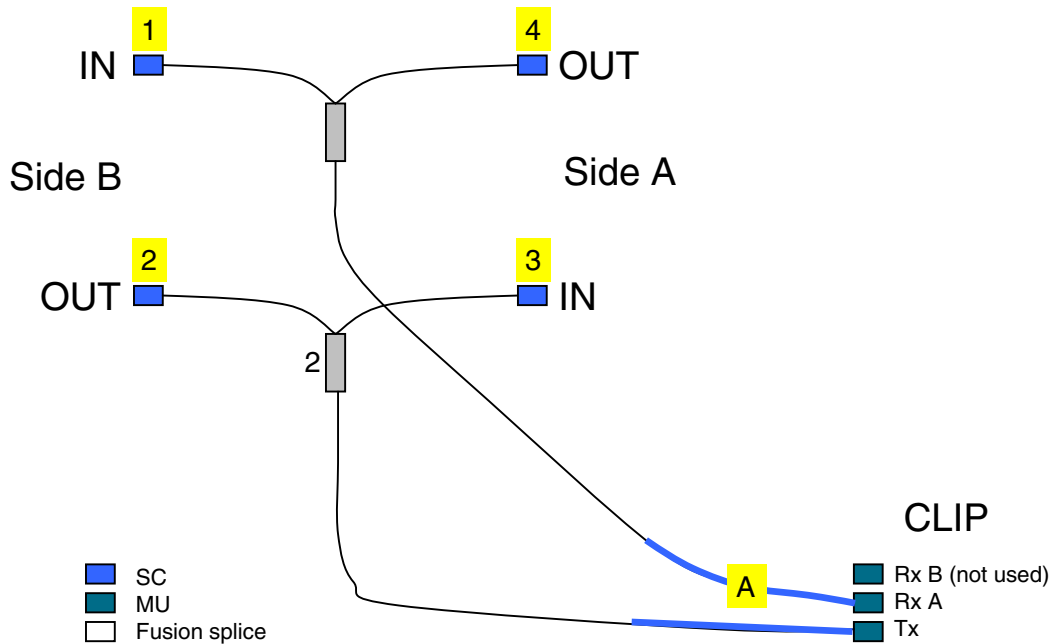
Figure 14-7 50/50 split ratio (protected) connections for a CFM



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Figure 14-8 shows the 0/100 optical signal split ratio connections.

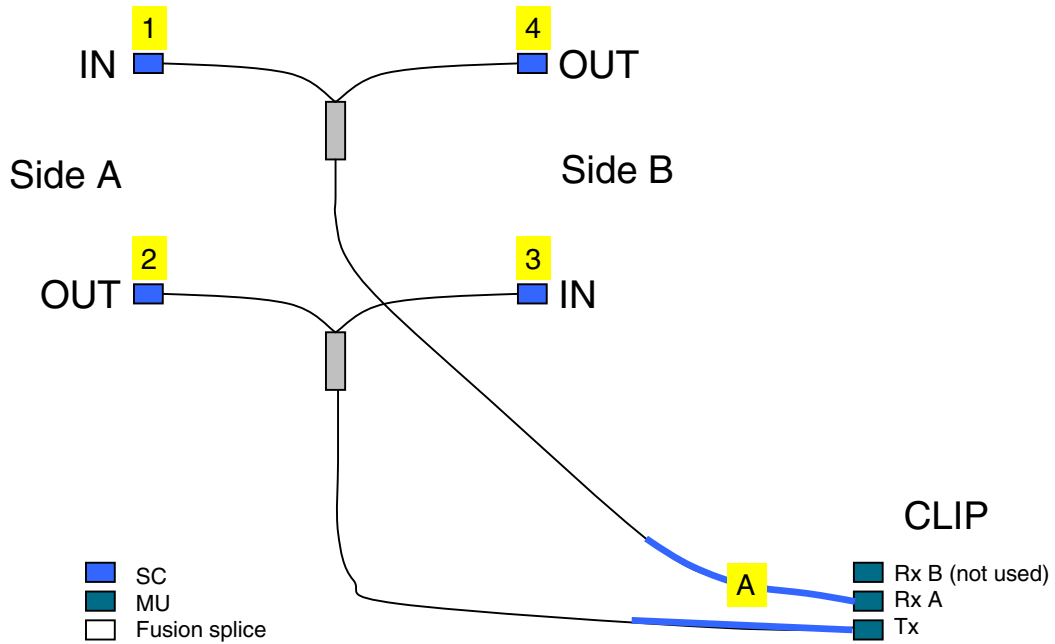
Figure 14-8 0/100 split ratio (unprotected) connections for a CFM



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Figure 14-9 shows the 100/0 optical signal split ratio connections.

Figure 14-9 100/0 split ratio (unprotected) connections for a CFM



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- Step 8** Route the CFM to the CLIP module optical adapters through the opening in the front panel of the ONS 15201 SCU.
- Step 9** Align the rear connector cover with its retaining screws.
- Step 10** Install the connector cover by pushing down on it and sliding it forward.

- Step 11** Using a slot or Phillips screwdriver, tighten the connector cover retaining screws.
 - Step 12** Align the CFM access lid with its retaining screws.
 - Step 13** Install the CFM access lid by pushing down on it and sliding it to the left.
 - Step 14** Using a slot or Phillips screwdriver, tighten the retaining screws on the CFM access lid.
-



Acronyms

The following list defines acronyms and other abbreviations used in this handbook.

Numerics

10BaseT

Standard 10 megabits per second local area network over unshielded twisted pair copper wire

100BaseT

Standard 100 megabits per second ethernet network

2R

Reshaping and regeneration

3R

Reshaping and regeneration and retiming

A

A

A-side

ACO

Alarm Cutoff

ADM

Add-Drop Multiplex

ANSI

American National Standards Institute

APD

Avalanche photo diode

APS

Automatic protection swiching

ATM

Asynchronous transfer module

ATO

Assembled to order

B**B**

B-side

BER

Bit error rate

Bits/s

Bits per second (see also bps)

BLSR

Bidirectional line switched ring

BM

Bridge module

BOL

Beginning of life

bps

Bits per second (see also Bits/s)

C**C**

Celsius

CAN

Controller area network

CFM

Collector Filter module

CFR

Code of Federal Regulations

CIM

Communication Interface module

CLEI

Common language equipment identifier code

CLIP

Client Layer Interface Port module

CMX

Connection Module X

CMY

Connection Module Y

CPE

Customer premises environment

D**dB**

decibel

dBm

decibel referring to 1 milliwatt

DCC

Data communication channel

DCN

Data communication network

DFM

Dummy Filter module

DNAM

Dummy Network Adaptation module

DRAM

Dynamic random access memory

DWDM

Dense wavelength division multiplexing

E**EDFA**

Erbium doped fiber amplifier

EIA

Electronic Industries Association

EMC

Electromagnetic compatibility

EMI

Electromagnetic interference

EOL

End of life

ESD

Electrostatic discharge

ETS

European Telecommunications Standard

ETSI

European Telecommunications Standard Institute

F**F**

Fahrenheit

FCC

Federal Communications Commission

FDI

Forward Defect Indication (this signal is used to activate the switching to the protection path)

G**GMT**

Greenwich Mean Time (historic expression for Universal Time Coordinated UTC)

H**HA**

High-Alarm

HAT

High-Alarm Threshold

HDLC

High-level data link control

HFM

Hub Filter module

HTML

Hypertext markup language

HW

High-Warning

HWT

High-Warning Threshold

I**ID**

Identifier

IEC

International Electrotechnical Commission

IEEE

Institute of Electrical and Electronics Engineers

I/O

Input/Output

IP

Internet protocol

IrDA

Infrared Data Association™

ITU

International Telecommunications Union

ITU-T

International Telecommunications Union, Telecommunication standards sector

L**LA**

Low-Alarm

LAN

Local area network

LAT

Low-Alarm Threshold

LCD

Liquid crystal display

LM

Line module

LOC

Loss of channel (i.e. in case of protected operation: failure on both working and protection paths)

LW

Low-Warning

LWT

Low-Warning Threshold

M**Mbps**

Megabits per second

MCU

Multichannel Unit

MHz

Megahertz

N**NAM**

Network adaptation module

NCB

Network Control Board

NE

Network element

NEBS

Network Equipment Building Standard

Neid

Network Element Identifier

NFPA

National Fire Protection Association

NMS

Network management system

NVRAM

Non-volatile random access memory

O**OC**

Optical carrier

OC-3

Optical carrier, level 3 (same bit rate as STM-1)

OC-12

Optical carrier, level 12 (same bit rate as STM-4)

OC-48

Optical carrier, level 48 (same bit rate as STM-16)

ONS

Optical networking system

P**P**

Protection

PC

Personal Computer

PIN-Diode

P-intrinsic-N diode (optical detector diode)

PM

Performance Monitor

Q**QPP**

Qeyton proprietary protocol

R**RAM**

Random access memory

RJ-12

Registered jack #12 (6-pin)

RJ-45

Registered jack #45 (8-pin)

RS-232

Recommended standard #232 (ANSI electrical interface for serial communication)

Rx

Receive

S**SCU**

Single-Channel Unit

SDH

Synchronous digital hierarchy

SMF

Single-mode fiber

SNM

Sub-Network Manager

SNMP

Simple Network Management Protocol

SNTP

Simple Network Timing Protocol

SONET

Synchronous optical network

STM

Synchronous transport module

STM-1

Synchronous transport module, level 1 (same bit rate as OC-3)

STM-4

Synchronous transport module, level 4 (same bit rate as OC-12)

STM-16

Synchronous transport module, level 16 (same bit rate as OC-48)

T**TAC**

Technical Assistance Center

TCP/IP

Transmission control protocol / Internet protocol

THz

Terahertz

TIA

Telecommunication Industry Association

TM

Termination module

TMN

Telecommunication management network

Tx

Transmit

U**UL**

Underwriters' Laboratories

URL

Uniform Resource Locator (Internet address, including specific document location)

UTC

Universal Time Coordinated (formerly known as Greenwich Mean Time GMT)

W**W**

Watts

WAN

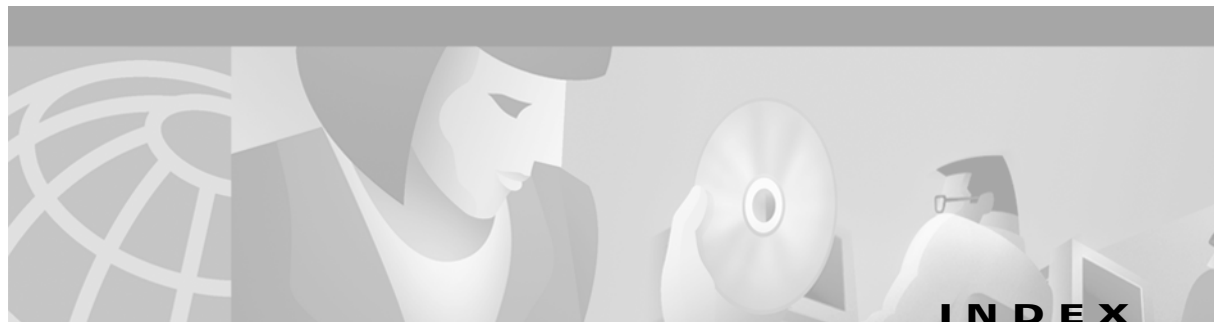
Wide area network

WWW

World Wide Web

X**XC**

Cross connect



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BM

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- environmental specifications 11-2
- mechanical specifications 11-2
- removal 11-3
- replacement 11-5
- technical specifications 11-2

Bridge Module *see* BM

C

CFM

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- environmental specifications 3-3
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- mechanical specifications 3-3
- module function 3-2
- removal 3-4
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- technical specifications 3-3

Client Layer Interface Port module *see* CLIP

CLIP

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CMX

- description 12-1
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CMY

- description 13-1
- environmental specifications 13-2
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Collector Filter Module *see* CFM

Communication Interface Module *see* CIM

Connection Module X *see* CMX

Connection Module Y *see* CMY

D

DFM

- description 9-1
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DNAM

- description 6-1
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Dummy Filter Module *see* DFM

Dummy Network Adaptation Module *see* DNAM

H

HFM

- description 8-1
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Network Adaptation Module *see* NAM

Network Control Board module *see* NCB

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T

Termination Module *see* TM

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