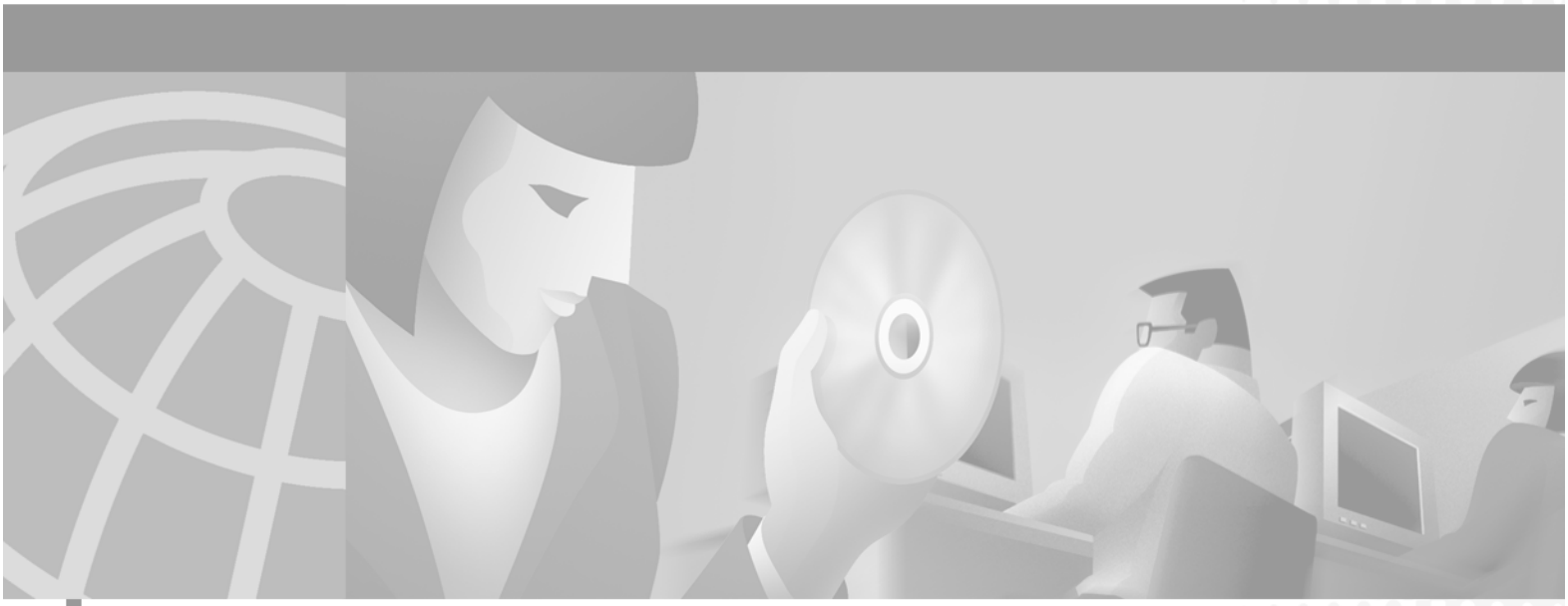

Cisco ONS 15200 Product Description

Release 1.1
January 2002

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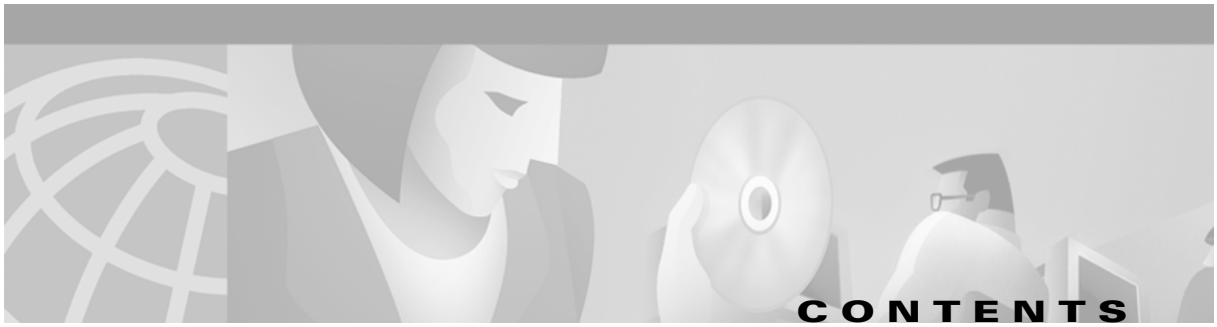
Cisco ONS 15200 Product Description



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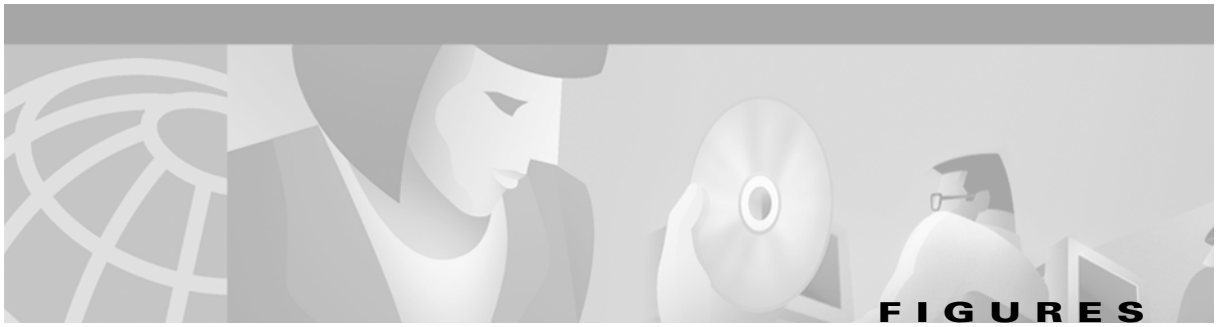
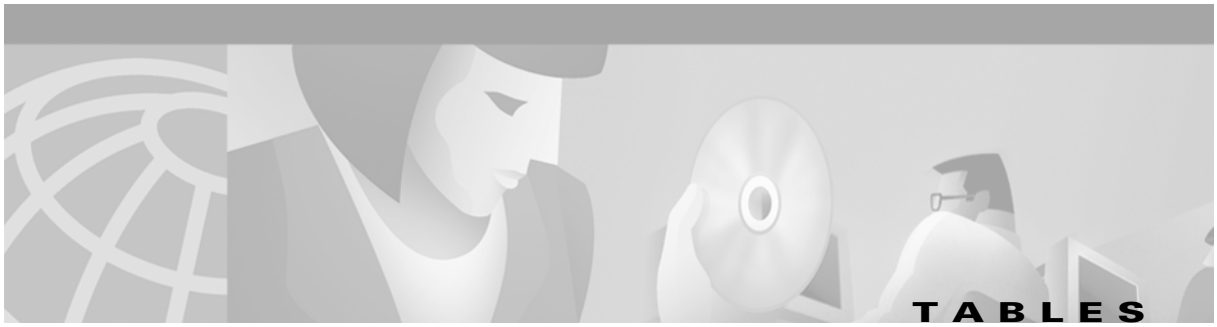


FIGURES



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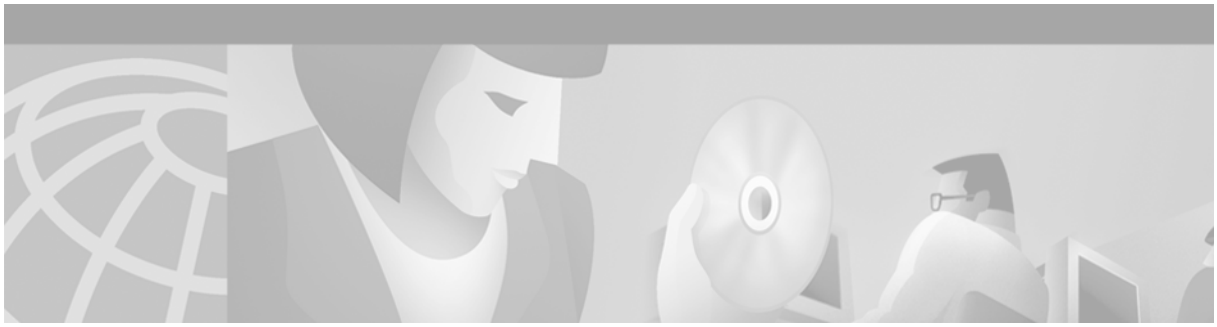

About this Manual

This *Cisco ONS 15200 Product Description* summarizes the Cisco ONS 15200 system architecture, management, and performance. Software, components, modules, mechanical specifications, and installation information are also covered. For detailed information about these topics, refer to the documents in the Related Documentation section.

Manual Structure

The manual is organized as follows:

- Chapter 1, "Product Technology," explains the principles of dense wavelength division multiplexing (DWDM) and describes how these principles apply in the ONS 15200 system.
- Chapter 2, "Product Configurations," describes the operation of each available site type.
- Chapter 3, "Product Hardware," provides information about the physical equipment in the ONS 15200 system, including dimensions, subracks, power, and grounding. It also contains compliance information and environmental, safety, and electromagnetic compatibility regulations.
- Chapter 4, "Operation, Administration, and Maintenance," provides information about administering and supervising ONS 15200 optical units, network elements, and links. It also presents information about performance management, software, and other administrative features, such as alarms, available with the ONS 15200 system.
- Chapter 5, "Module Descriptions,"describes each module that is available with the ONS 15200 system.
- Chapter 6, "Engineering Specifications," provides general specifications for the ONS 15200 system.
- Appendix A, "Acronyms," defines acronyms and other abbreviations used in the manual.

Related Documentation

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

- *ONS 15200 Installation, Setup, and Test Manual*
- *Cisco ONS 15200 Module Handbook*

For additional software information, refer to the following documents:

- *Cisco ONS 15200 Maintenance Manager Installation and Operations Guide*

- *Cisco ONS 15200 Web Interface Software User Manual*
- *Cisco ONS 15200 Command Line Interface Manual*

Relevant Standards

The following standards apply to the ONS 15200:

- CFR 1040.10 (1997)
- EN 60 950
- 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)
- LVD 73/23/ECC
- FCC Part 15
- IEC 60825-1 (1993)
- IEC 60825-2 (2000)
- ITU-T G.652 (1997)
- ITU-T G.655 (1996)
- ITU-T G.692
- ITU-T G.825 (1993)
- ITU-T G.957 (1995)
- ITU-T G.958 (1995)
- ITU-T G.972 (1999)
- Telcordia GR-63-CORE
- Telcordia GR-1089-CORE
- Telcordia SR-3580
- UL 1950

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: http://www.cisco.com

Translated documentation is available at the following URL:

http://www.cisco.com/public/countries_languages.shtml

Optical Networking Product Documentation CD-ROM

Optical networking-related documentation, including the *Cisco ONS 15200 Product Description*, 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 it 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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- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco corporate headquarters (California, USA) at 408 526-7208 or, in North America, by calling 800 553-NETS(6387).

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The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- 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.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

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:

http://www.cisco.com/register/

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:

http://www.cisco.com/tac/caseopen

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

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

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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.

CHAPTER 1

Product Technology

This chapter presents the general system technology and the available protection architectures for Cisco's dense wavelength division multiplexing (DWDM) metro system, the Cisco ONS 15200.

1.1 Optical System Description

The ONS 15200 DWDM metro system transports data over wavelengths using fiber-optic cables. The ONS 15200 operates in the 1550 nm transmission window. Over a single optical fiber pair, the ONS 15200 can carry up to sixteen channels of data in the following bit rates and formats:

- 155 Mbps – SONET OC-3 or SDH STM-1
- 622 Mbps – SONET OC-12 or SDH STM-4
- 2.5 Gbps – SONET OC-48 or SDH STM-16
- 100 Mbps – 1.25 Gbps, pass-through mode/2R operation

Protected or unprotected data can transmit over the ONS 15200.

The optical layer is independent of the electronic protocol that is external to the ONS 15200 system. You can use any higher-level protocol, including proprietary products, within the ONS 15200 system. Any protocol used must fulfill the requirements listed in this book, including the bit rates listed in this section.

1.2 Optical Channels

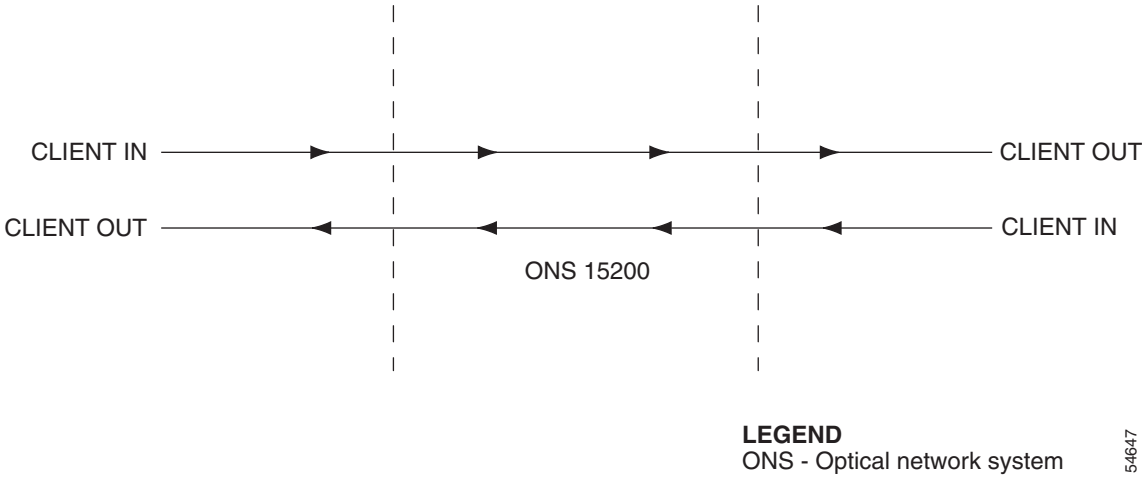
In the ONS 15200 system, optical channels transport information between two client-layer interface ports. All optical channels in the ONS 15200 system are duplex channels, which means that traffic flows in both directions. The optical channels can be unprotected, as described in the "Unprotected Channels" section on page 1-1, or protected, as described in the "Protected Channels" section on page 1-2.

1.2.1 Unprotected Channels

In an unprotected channel, protection fiber is not available. Only one fiber sends traffic to the client layer of the receiving node. You can use unprotected channels where protection is not needed or if the client layer provides protection. Cisco recommends that you only use protection in one layer and avoid

potentially conflicting protection schemes. You can add protection in the client layer described in the "Physical Layout" section on page 3-5. Figure 1-1 displays an example of ONS 15200 unprotected channels.

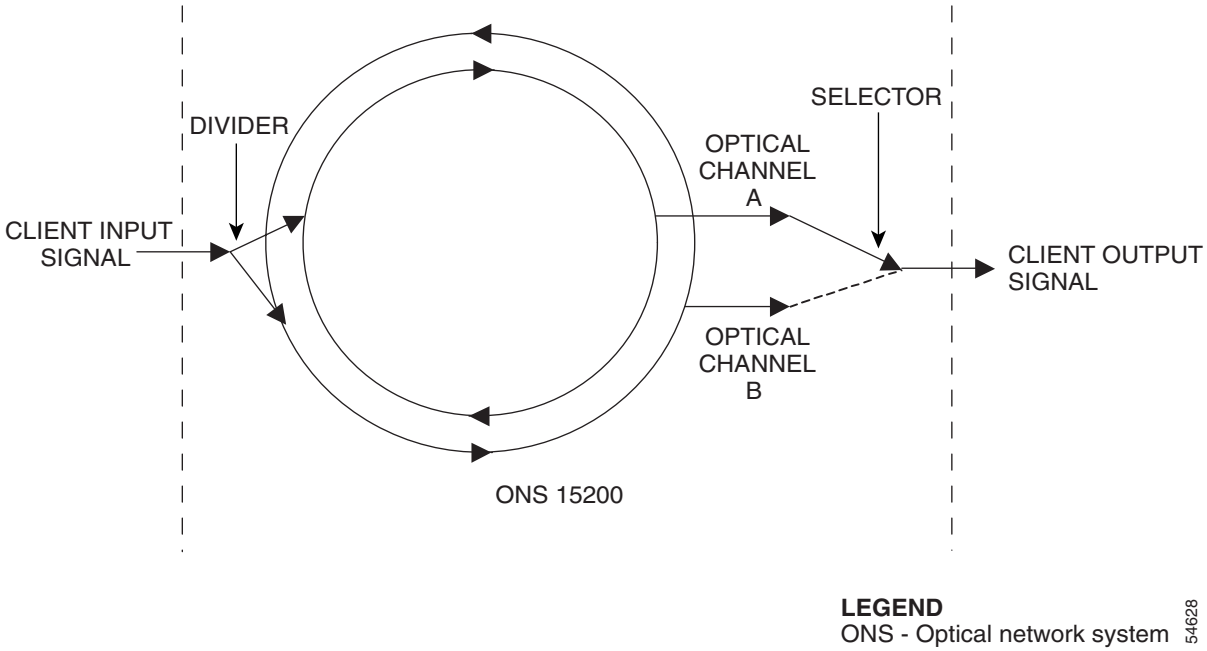
Figure 1-1 Unprotected channels in an ONS 15200 system



1.2.2 Protected Channels

In optically-protected channels, data traffic flows in two physically separated streams to the receiving node. The configuration of the receiving node determines which traffic flow is transferred to the client layer of the receiving node. Figure 1-2 displays an example of optical fiber-protected channels in an ONS 15200 system. This form of optical channel protection is rapid and provides continued system coverage in case of fiber breaks between nodes.

Figure 1-2 Optically-fiber protected channels in an ONS 15200 system



Client-layer protection schemes for the ONS 15200 are:

- SONET/SDH ADM rings—Traffic travels in two directions between any two nodes. If one route fails, the alternate route continues to transport the traffic.
- Client-layer 1+1 APS—Two separate connections exist between two client-layer interfaces. One of the connections is standby and is used only when the active connection fails.
- Layer 3 load sharing—Two routes transport traffic from one client to a dual home node (see Chapter 2, "Product Configurations" for a description of the dual home node configuration). The routes are used below their maximum capacity. If one of the two routes fails, the traffic shifts to the other route.

1.2.3 Software Configurable Protection

In Release 1.1, the 2R/3R (unclocked/clocked) Client Layer Interface Port (CLIP) module is user configurable for unprotected or fiber protected operation.

CHAPTER 2

Product Configurations

This chapter describes common Cisco ONS 15200 network configurations. All modules mentioned in this chapter are described in more detail in Chapter 5, "Module Descriptions."

2.1 ONS 15200 Network Configurations

The ONS 15200 operates in several network configuration arrangements. All ONS 15200 configurations consist of one or more ONS 15252 Multichannel Units (MCU) or ONS 15201 Single-Channel Units (SCUs). The following information describes some standard ONS 15200 network configurations, including:

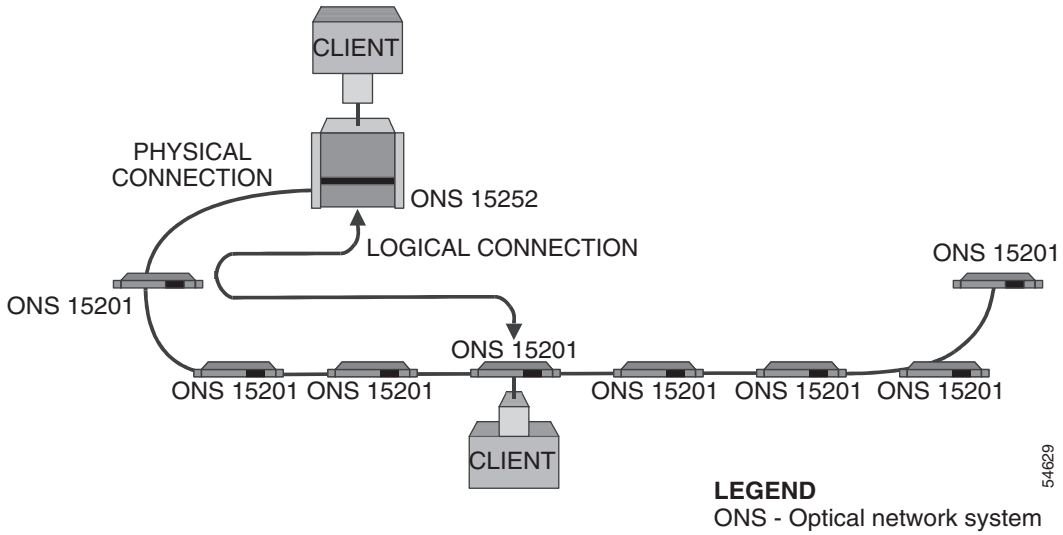
2.1.1 Bus Configuration

In an ONS 15200 system bus configuration, wavelength channels link an ONS 15252 MCU to ONS 15201 SCUs. Use this configuration only in networks where optical-layer fiber protection is unnecessary. It is possible to configure the bus configuration for layer-3 load-sharing protection or client layer 1+1 APS, but the two data traffic flows would need to share the same optical fiber path, and therefore protection would be incomplete.

In the bus configuration, the Client Layer Interface Port (CLIP) modules located in the ONS 15252 MCU and in each ONS 15201 SCU exchange data. Figure 2-1 illustrates the ONS 15200 system bus configuration.

Note The physical connection in Figure 2-1 consists of two fiber-optic cables.

Figure 2-1 An ONS 15200 bus configuration linking an ONS 15252 MCU to eight ONS 15201 SCUs



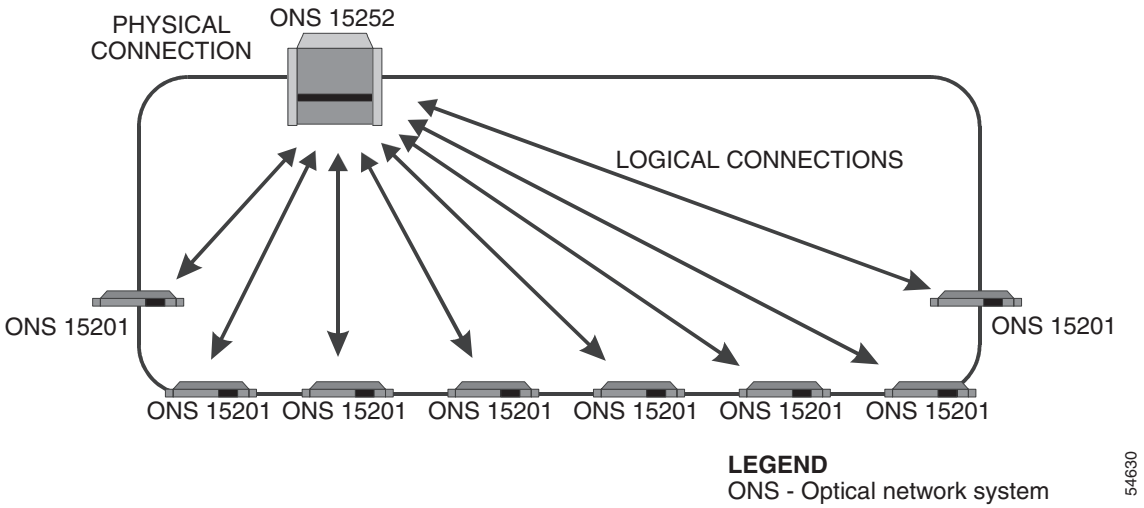
2.1.2 Ring Configuration

In the ONS 15200 ring configuration, wavelength channels exist between an ONS 15252 MCU and several ONS 15201 SCUs. A CLIP module installed in the ONS 15252 MCU exchanges data with an associated CLIP module installed in an ONS 15201 SCU.

You can install the ring configuration with or without fiber-optic protection. The ring configuration supports SONET or SDH ring protection and 1+1 APS client-layer protection.You can also arrange the ring configuration to use layer-3 load sharing. Figure 2-2 illustrates the ring configuration with hubbed traffic.

Note The physical connection in Figure 2-2 consists of two fiber-optic cables.

Figure 2-2 Ring configuration with hubbed traffic



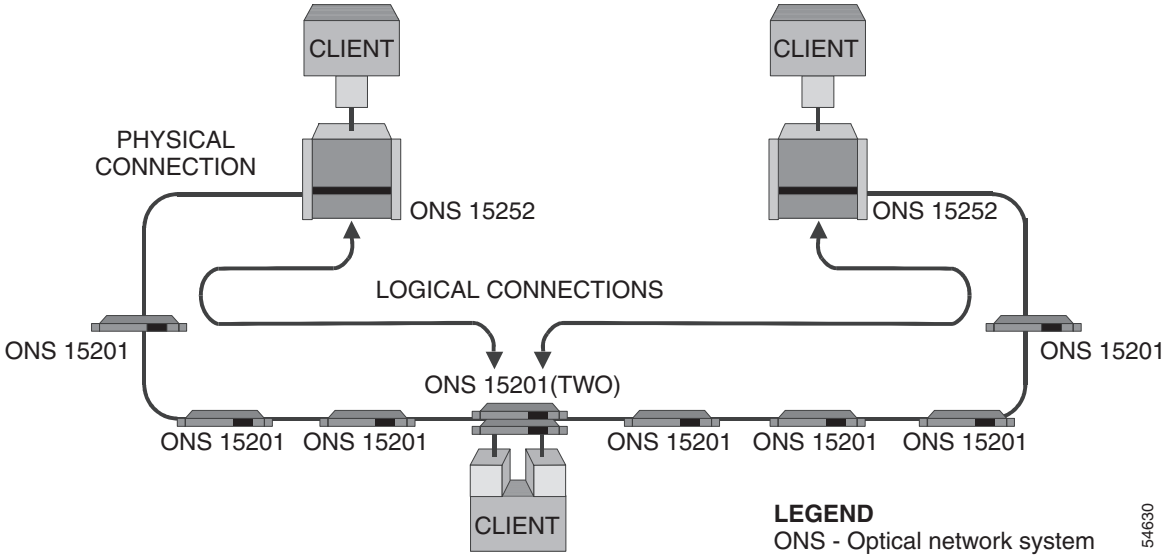
2.1.3 Dual-Home Configuration

In the dual-home configuration, a pair of ONS 15201 SCUs share the total data traffic load between two different fiber-optic cable (fiber) routes. The pair of ONS 15201 SCUs can use identical or different wavelength channels to communicate with their respective ONS 15252 MCUs. Using identical wavelength channels conserves network resources. In addition to load sharing, the dual-home configuration provides traffic protection in the electronic client-layer domain. If one fiber route is lost, the data traffic shifts to the other fiber route in the client layer.

In addition to protecting traffic at the client layer, the dual-home configuration protects the ONS 15200 system against single MCU or SCU failures. Figure 2-3 illustrates the ONS 15200 dual-home configuration.

Note The physical connection in Figure 2-3 consists of two fiber-optic cables.

Figure 2-3 Dual-home configuration



2.1.4 Multichannel Point-to-Point Configuration

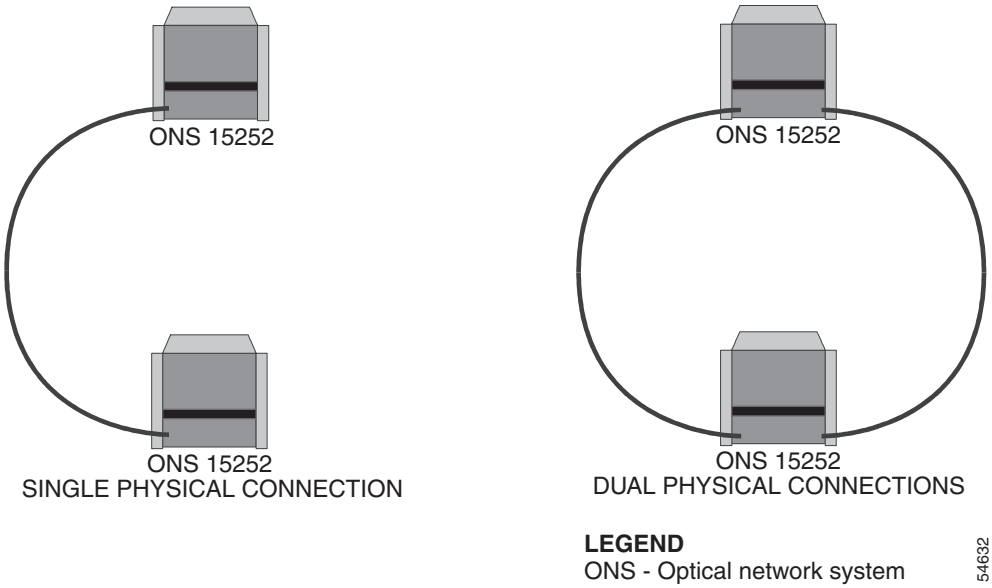
In the ONS 15200 multichannel, point-to-point configuration, multiple wavelength channels exist between a pair of ONS 15252 MCUs. You can set up the multichannel point-to-point configuration with or without optical-layer protection. Configuring optical-layer protection requires dual fiber routes.

In the ONS 15200 multichannel, point-to-point configurations, dual fiber routes send information along two separate fiber routes. The dual physical route configuration supports SONET or SDH add/drop multiplexer (ADM) protection and client-layer 1+1 APS protection.

Cisco does not recommend implementing layer-3 load-sharing protection in a multichannel point-to-point configuration because the two network fiber routes need to share an ONS 15252 MCU, and any failure of the ONS 15252 MCU would cause both routes to disappear simultaneously. Figure 2-4 illustrates the ONS 15200 multichannel, point-to-point configurations.

Note The physical connection in Figure 2-4 consists of two fiber-optic cables.

Figure 2-4 Multichannel point-to-point configurations, single and dual connections



2.1.5 Ring Configuration with Hubbed and Meshed Traffic

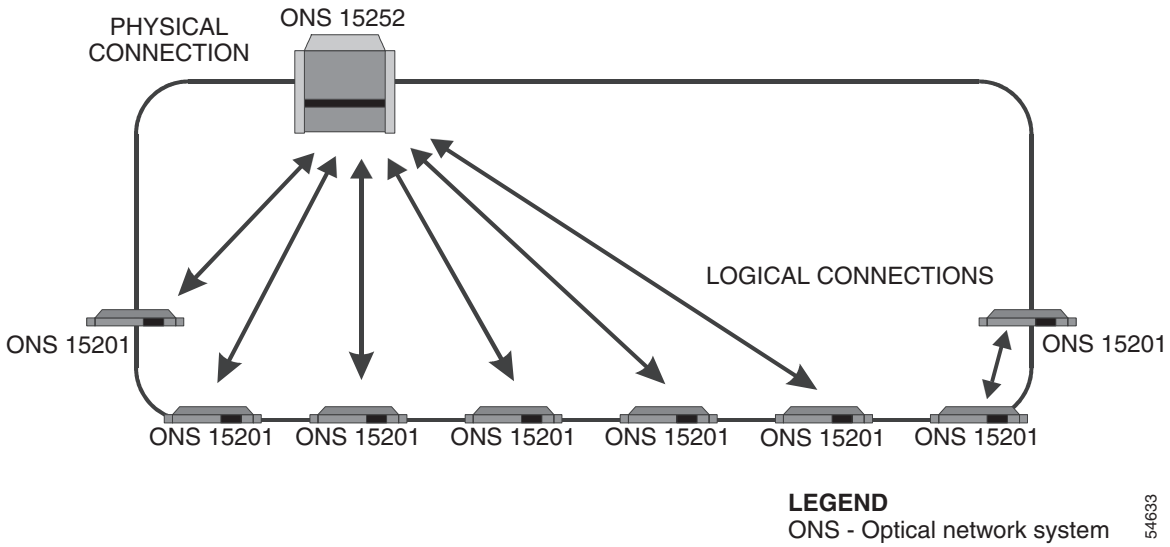
In the ONS 15200 ring configuration with hubbed and meshed traffic, two ONS 15201 SCUs communicate with each other. You can use either unit in a direct point-to-point configuration through a control area network (CAN) bus connection as shown in Figure 2-5, or with a noninterfering ONS 15252 MCU. If you use an ONS 15252 MCU, the MCU must have an installed Bridge module (BM).

To manage a mesh configuration, use the Maintenance Manager (MM) software and associated hardware or use a CAN bus extension cable to connect one of the ONS 15201 SCUs using the meshed channel to the ONS 15252 MCU. An ONS 15201 SCU connected in this way will be on the same logical CAN bus as the ONS 15252 MCU.

In the mesh configuration, you can configure SONET or SDH ADM ring protection on the client side of the meshed channel. If you use client-layer 1+1 APS protection, you must replace each of the ONS 15201 SCUs with a pair of ONS 15201 SCUs transmitting in opposite directions. Figure 2-5 illustrates the ONS 15200 ring configuration with hubbed and meshed traffic.

Note The physical connection in Figure 2-5 consists of two fiber-optic fiber cables.

Figure 2-5 Ring configuration with hubbed and meshed traffic



2.1.6 Full-Mesh Configuration

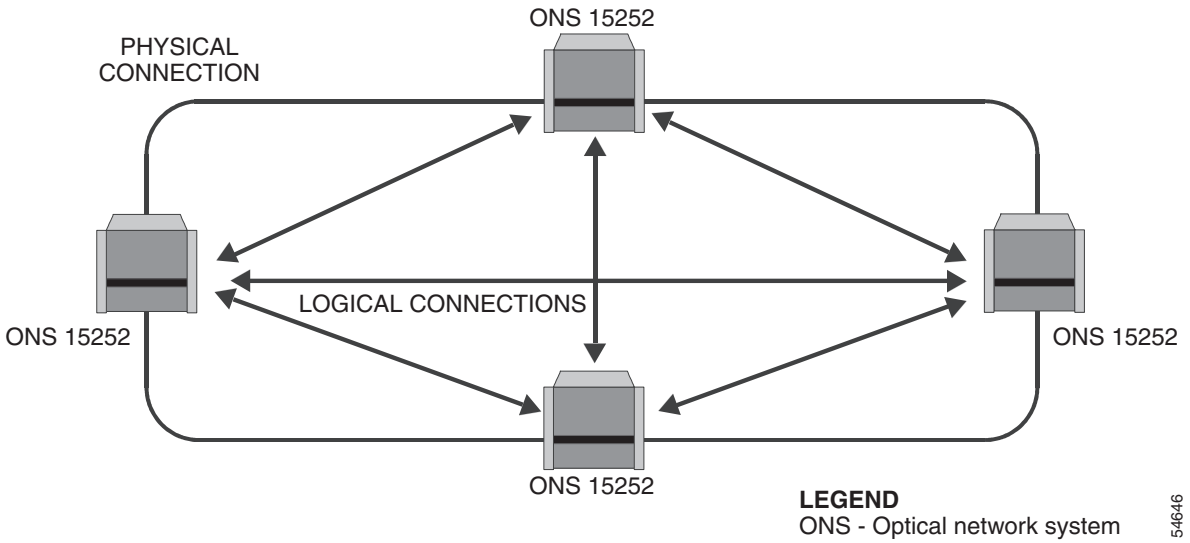
In the ONS 15200 full-mesh configuration, all ONS 15252 MCUs communicate with each other.

A single Network Control Board (NCB) module located in one of the ONS 15252 MCUs manages the full-mesh configuration. The NCB modules in the other ONS 15252 MCUs are not used; an NCB front cover replaces them.

In the full-mesh configuration, you can configure SONET or SDH ADM ring protection on the client side of the units. Layer-3 load sharing is supported. To implement client-layer 1+1 APS protection, you must replace each of the units with a pair of units transmitting in opposite directions of the ring. Figure 2-6 illustrates the ONS 15200 full-mesh configuration.

Note The physical connection in Figure 2-6 consists of two fiber-optic cables.

Figure 2-6 Four ONS 15252 MCUs in a full-mesh configuration



2.2 Network Protection

Release 1.1 provides the Forward Defect Indication (FDI) switch (fdi_switch), which can be enabled or disabled. When fdi_switch is enabled, the FDI alarm causes the traffic to switch paths. A CLIP receives the FDI alarm if and only if its companion CLIP loses its client-side input signal. The severity of the FDI alarm is minor.

CHAPTER 3

Product Hardware

This chapter describes the Cisco ONS 15200 mechanical components. It also provides electrical, electromagnetic, and safety information about the ONS 15200.

3.1 Modularity and Ancillary Equipment

Equipment in the ONS 15200 system is modular in design. Each system function is carried out by modules located in either an ONS 15252 MCU or an ONS 15201 SCU. Sites in the ONS 15200 system consist of either an ONS 15252 MCU, an ONS 15201 SCU, or a combination of the two. ONS 15200 site configurations may also include a power distribution panel (PDP).

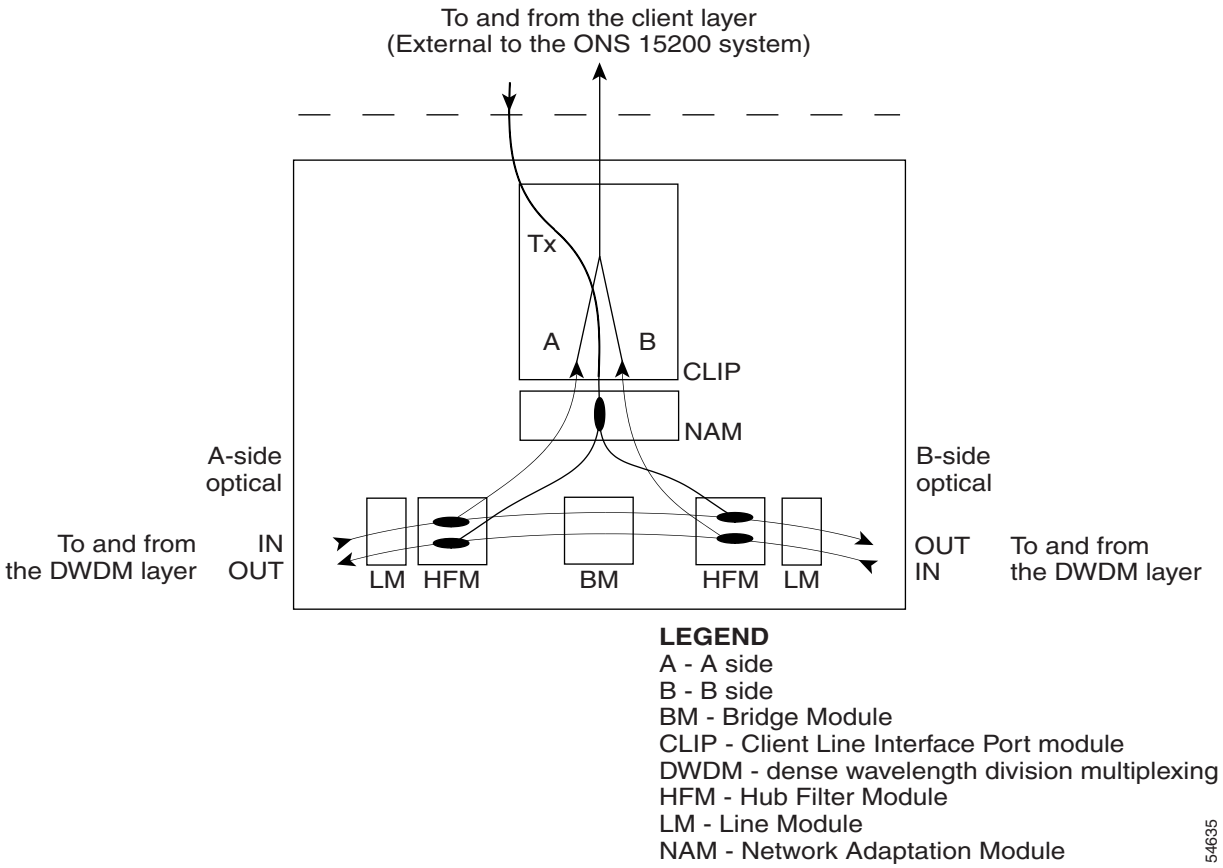
3.1.1 ONS 15252 MCU

The ONS 15252 MCU communicates with the other nodes in the ONS 15200 system on one or several channels. Each channel occupies a wavelength, and some ONS 15200 system configurations reuse a wavelength. As shown in Figure 3-1, several channels of information, each occupying a wavelength, enter the node from the DWDM layer. Each channel can enter the ONS 15252 MCU from the A side, the B side, or the A side and B side.

The ONS 15252 MCU communicates with the other nodes in the ONS 15200 system on one or more wavelengths. Information originates at the ONS 15252 MCU Client Layer Interface Port (CLIP) module. For optically-protected channels, the Network Adaptation module (NAM) splits the information and transmits it in opposite directions through two Hub Filter Modules (HFMs) and two Line Modules (LMs) at a specific wavelength.

For unprotected channels, the NAM transmits the information to either an A-side HFM or a B-side HFM and then through the associated LM. Information carried on a wavelength intended for another ONS 15200 site passes through the ONS 15252 MCU without interference except for the insertion loss of the ONS 15252 MCU, if a BM or a CMX is used. If the ONS 15252 MCU is equipped with Termination modules (TMs) instead of a BM, the TMs block any wavelength or channel not dropped to the ONS 15252 MCU.

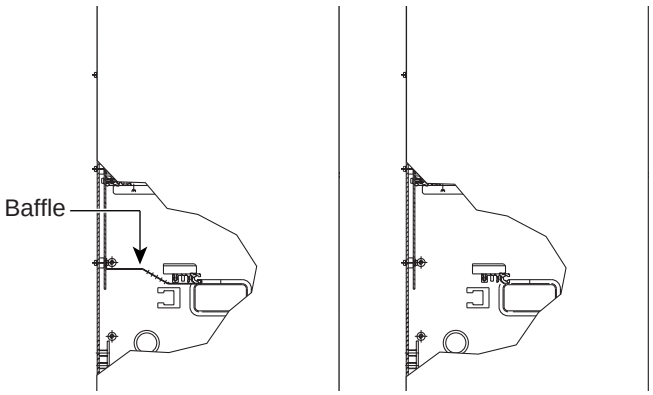
Figure 3-1 Functional view of the ONS 15252 Multichannel Unit (protected version)



Two versions of the ONS 15252 MCU mechanical shelf exist: Release 1.0 and Release 1.0.1. Cisco currently ships only the Release 1.0.1 shelf and no longer ships the Release 1.0 shelf.

Release 1.0.1 and later shelves includes a baffle**.** The baffle is a partially-perforated, angled metal plate that is mounted below and behind the metal support beam and is mechanically attached to the back of the shelf. It runs the width of the shelf. To view the baffle, look up through the ventilation cavities at the back of the shelf. Figure 3-2 illustrates a shelf with a bafffe (Release 1.0.1), and a shelf without a baffle (Release 1.0).

Figure 3-2 Release 1.0.1 (and later) shelf baffle compared to the Release 1.0 shelf without baffle



ONS 15252 Releases 1.0.1 and later include a fan unit. Before using the Release 1.0.1 shelf, you must install the fan unit. Do not use the fan unit with a Release 1.0 shelf. See the "Fan Unit" section on page 3-4 for more information about the fan unit.

Caution You must install the fan unit in a Release 1.0.1 shelf. Running the Release 1.0.1 shelf without the fan unit will result in a unit that is not compliant to any specifications, nor is warranted or supported by Cisco. In addition, such usage may result in equipment damage.

Caution Do not install the fan unit in a Release 1.0 shelf. Running the Release 1.0 shelf with a fan unit will result in a unit that is not compliant to any specifications, nor is warranted or supported by Cisco. In addition, such usage may result in equipment damage.

ONS 15252 Releases 1.0.1and later include an updated Network Adaptation module (NAM). The Release 1.0.1 NAM has a "NEBS-3 compliant" label on the faceplate, whereas the previous version of the NAM does not have a faceplate label. The Release 1.0.1 shelf requires the Release 1.0.1 NAM. You can also use Release 1.0.1 NAMs in the Release 1.0 shelf. See the *Cisco ONS 15200 Module Handbook* for more information about the NAM.

Caution Placing NAMs without the "NEBS-3 compliant" label into an Release 1.0.1 shelf may result in equipment damage.

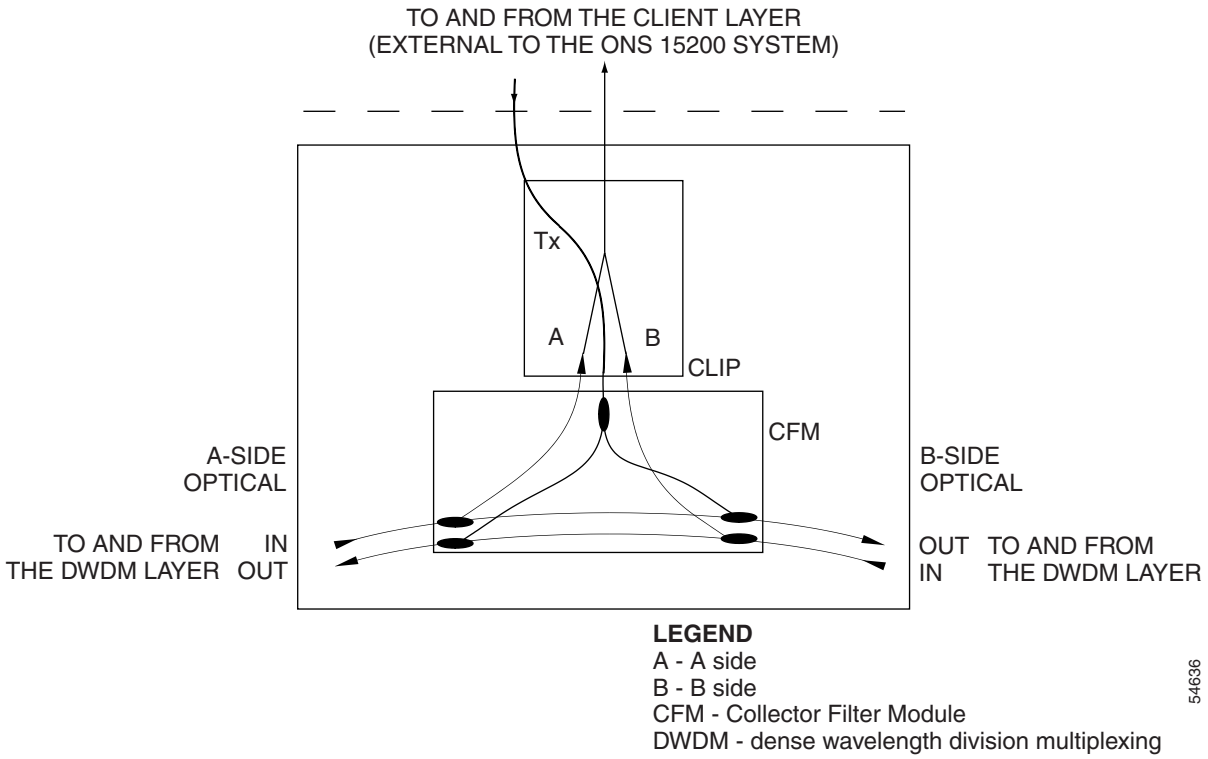
3.1.2 ONS 15201 SCU

The ONS 15201 SCU communicates with the other nodes in the ONS 15200 system on a specific wavelength or channel. The SCU uses a single CLIP module. From the DWDM layer, several channels of information, each occupying a wavelength, enter the ONS 15201 SCU. Each DWDM channel of information can enter the ONS 15201 SCU from the A side, the B side, or the A side and B side.

The Collector Filter module (CFM) drops and transfers the specific channel or wavelength intended for the ONS 15201 SCU to the CLIP module. For protected channels, the CFM drops the channel from the A side and B side. For unprotected channels, the CFM drops the channel from either the A side or B side.

The CLIP transfers information originating at the ONS 15201 to the CFM for protected channels. The CFM splits the information and transmits it at a specific wavelength or channel in opposite directions on the A side and B side. The CFM does not split unprotected channels; it transmits them directly to either the A side or B side. Information carried on a wavelength or channel intended for another ONS 15200 node passes through the ONS 15201 SCU without interference except for the insertion loss caused by the unit. Figure 3-3 shows a functional representation of an ONS 15201 SCU.

Figure 3-3 A functional view of the ONS 15201 SCU



3.1.3 Power Distribution Panel

ONS 15200 site configurations can include a power distribution panel (PDP). The PDP distributes power to the ONS 15200 site and provides power redundancy. It uses input and output fusing to provide system protection.

3.1.4 Fan Unit

All Release 1.0.1 (or later) ONS 15252 MCU site configurations require a fan unit mounted above the ONS 15252 MCU in the equipment rack; Release 1.0 shelves do not use the fan unit. The fan unit contains eight small fans that run simultaneously at constant speed. The fans push air down through the MCU to cool the CLIP modules. The fan unit is powered by its own dual -48 VDC power inlets independently of the MCU. If the fan unit fails, it generates an alarm to indicate multi- or single-fan failure. Located on the front panel of the fan unit are three LEDs to indicate alarm status. Table 3-1 lists the LED status and cause of alarm.

Table 3-1 Fan Unit LED Status

LED	Status	Cause
Red	Major alarm	Multi-fan failure
Yellow	Minor alarm	Single-fan failure and/or single 48 VDC failure
Green	Normal	Power on

Caution You must install the fan unit in a Release 1.0.1 shelf. Running the Release 1.0.1 shelf without the fan unit will result in a unit that is not compliant to any specifications, nor is warranted or supported by Cisco. In addition, such usage may result in equipment damage.

Caution Do not install the fan unit in a Release 1.0 shelf. Running the Release 1.0 shelf with a fan unit will result in a unit that is not compliant to any specifications, nor is warranted or supported by Cisco. In addition, such usage may result in equipment damage.

3.1.5 Fiber Organizer

The fiber organizer distributes the client fiber-optic cables to the ONS 15252 MCU CLIP modules. Additionally, the fiber organizer provides tension relief for the client fiber-optic cables. You can also install a fiber organizer between additional ONS 15252 MCUs or ONS 15201 SCUs located at a site. A fiber organizer is always included with an ONS 15252 MCU.

You can place the fiber organizer on the fan unit front. This placement does not interfere with fan unit filter replacement.

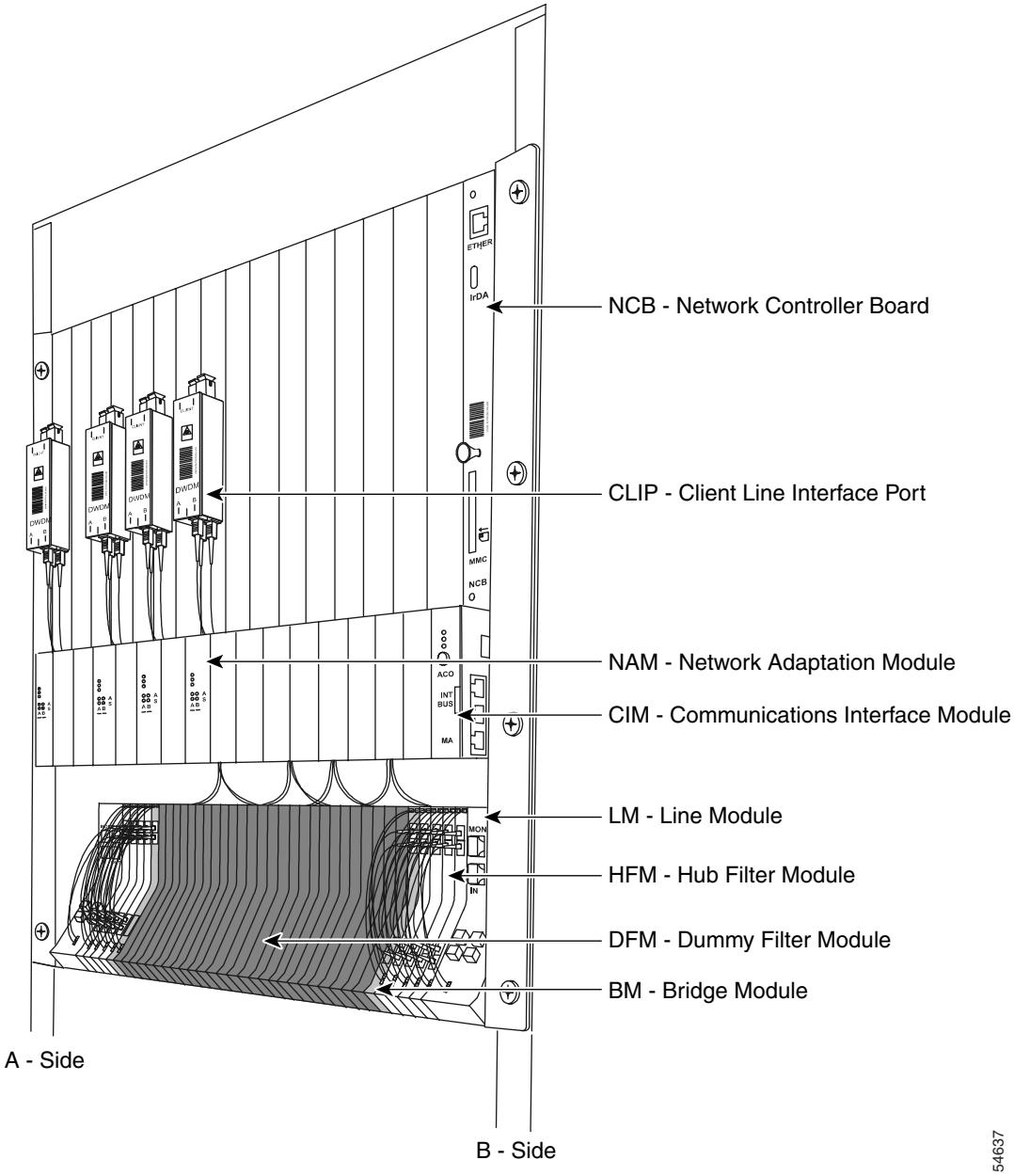
3.2 Physical Layout

This section describes the physical configuration of the ONS 15252 MCU and ONS 15201 SCU.

3.2.1 ONS 15252 MCU Physical Configuration

The ONS 15252 MCU physical configuration consists of a Network Control Board (NCB) module, Network Adaptation modules (NAMs), a Communication Interface module (CIM), Client Layer Interface Port (CLIP) modules, Hub Filter modules (HFMs), a pair of Line modules (LMs), and one Bridge module (BM) (see Figure 3-4). A pair of Termination modules (TMs) replace the BM when all optical signal channels or wavelengths are dropped at the ONS 15252 MCU. Additionally, when multiple ONS 15252 MCUs are interconnected, Connection Module X (CMX) and/or Connection Module Y (CMY) replace the BM. The type of connection module used depends on the specific ONS 15200 system configuration.

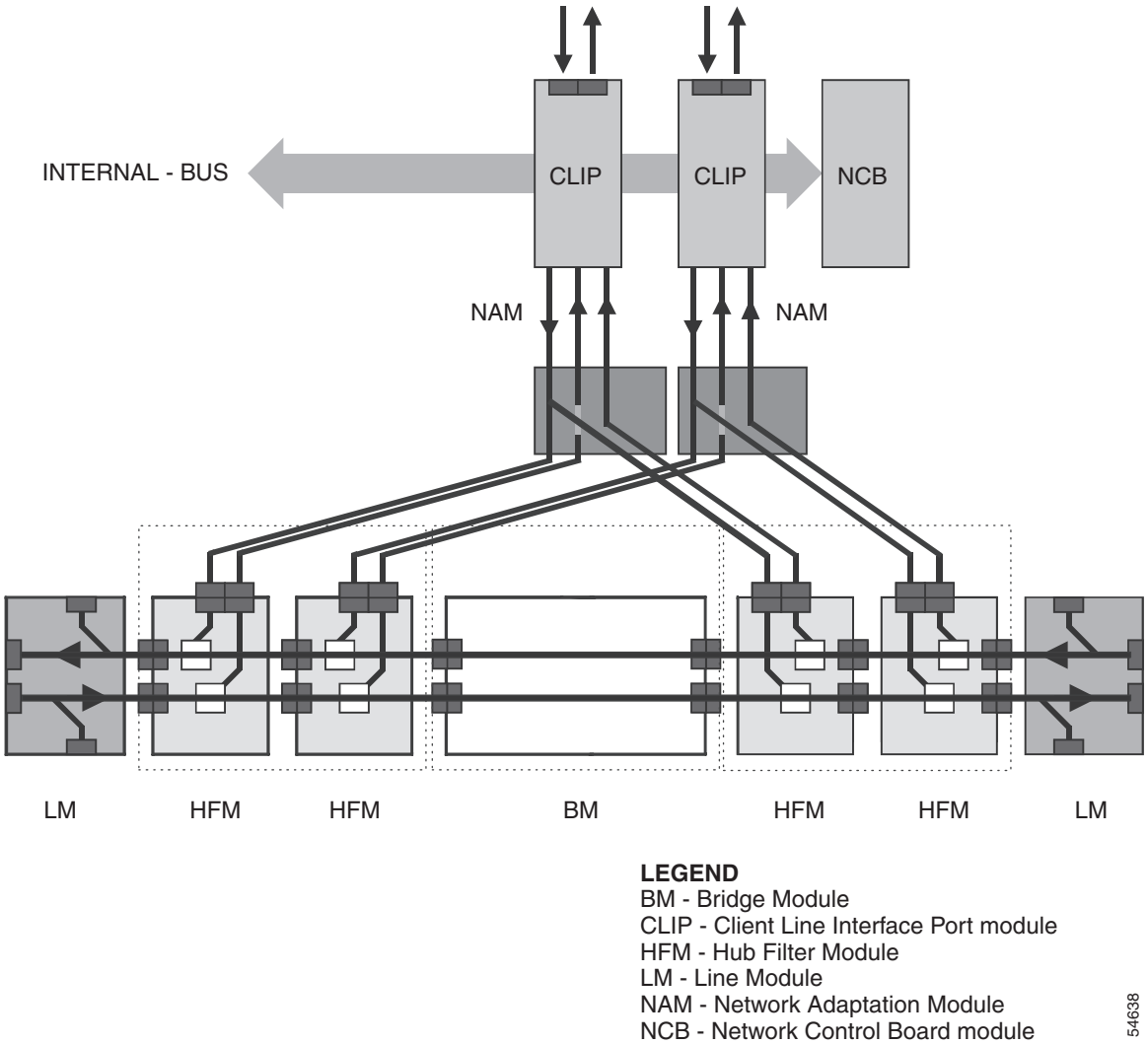
Figure 3-4 Configuration of the ONS 15252 Multichannel Unit



The lower portion of the ONS 15252 MCU is referred to as the passive optical shelf. The passive optical shelf has an A side and B side. The A side of the ONS 15252 MCU is located on the left side of the passive optical shelf, as seen from the front. The A-side LM contains one line IN port (FC), one line OUT port (FC), and two line-monitoring ports (SC). The line-monitoring ports make it possible to monitor the A-side incoming and outgoing DWDM optical signals.

The B side of the ONS 15252 MCU is located on the right side of the passive optical shelf, as seen from the front. The B-side LM contains one line IN port (FC), one line OUT port (FC), and two line-monitoring ports (SC). The line-monitoring ports make it possible to monitor the B-side incoming and outgoing DWDM optical signals. The passive optical shelf also contains the A-side and B-side HFMs and TMs, BMs, CMXs, or CMYs in various combinations. Figure 3-5 shows the typical arrangement of the modules.

Figure 3-5 Typical arrangement of the ONS 15252 MCU modules

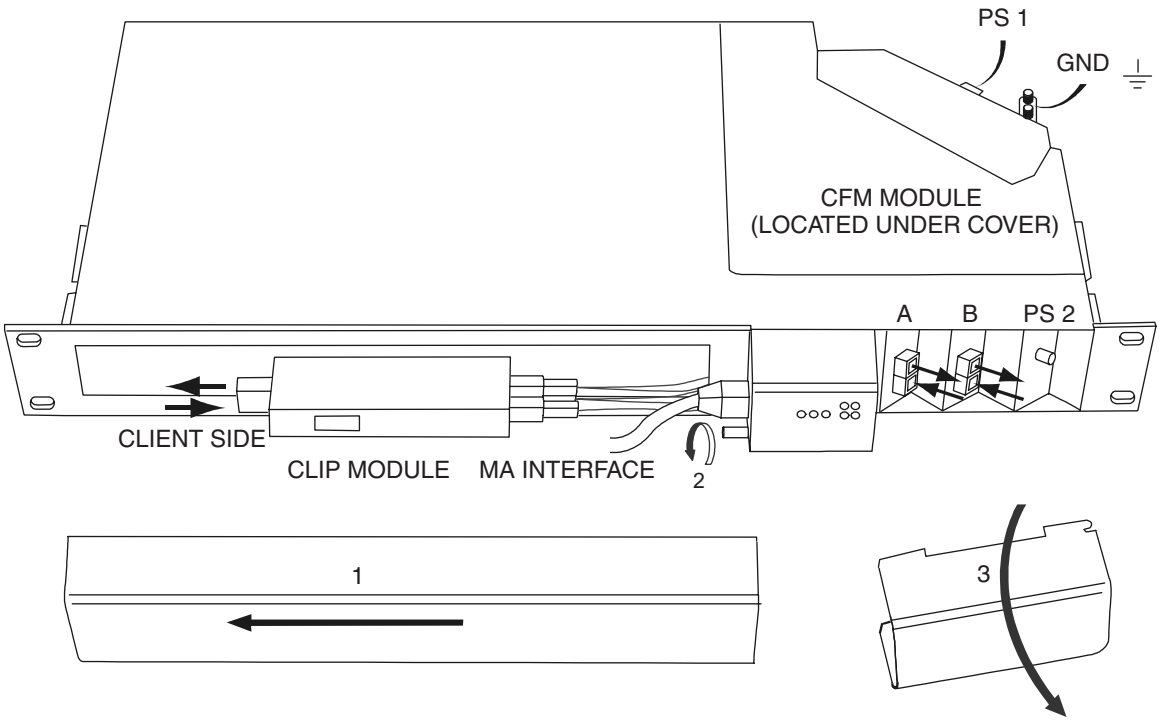


3.2.2 ONS 15201 SCU Physical Configuration

The ONS 15201 SCU physical configuration consists of a CLIP module and a CFM (Figure 3-6). The A side of the ONS 15201 SCU is the two far-left optical line connectors on the front or back of the ONS 15201 SCU. The B side of the ONS 15201 SCU is the two far-right optical line connectors on the front or back of the ONS 15201 SCU. The ONS 15201 SCU is normally delivered with optical connections on the front (SC type). Optionally, you can order the ONS 15201 SCU with the optical connections on the back of the unit (FC type). Back placement is optional for SC connectors.

Note You can order the ONS 15201 SCU with optical connectors located on either the front or the back of the unit but not on both the front and back.

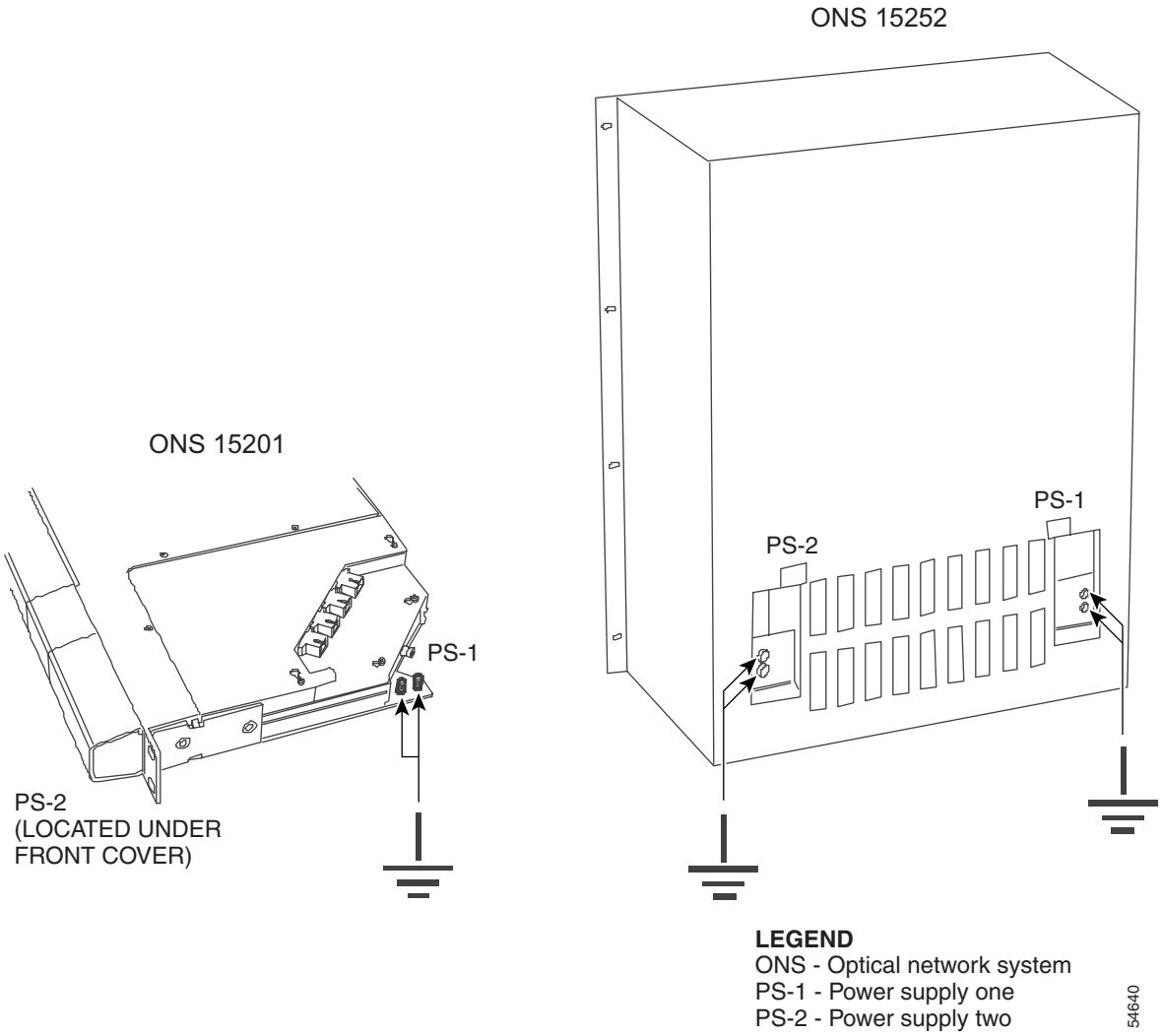
Figure 3-6 Physical layout of the ONS 15201 SCU



3.3 Power and Grounding

This section describes power and grounding for the ONS 15200 system and includes the“ONS 15252 MCU Power and Grounding” section on page 3-9 and the “ONS 15201 SCU Power and Grounding” section on page 3-10. The grounding connections for the ONS 15201 SCU and the ONS 15252 MCU are shown in Figure 3-7.

Figure 3-7 ONS 15201 SCU and ONS 15252 MCU grounding



3.3.1 ONS 15252 MCU Power and Grounding

Two power supply connectors are located on the backplane of the ONS 15252 MCU. The far-right power connector (as viewed from the rear of the ONS 15252 MCU) is called PS-1 (power supply one), and the far-left power connector is called PS 2 (power supply two), as shown in Figure 3-7. The equivalent PS-1 and PS-2 power supply connector terminals are designated 0V and -48V. Grounding for the ONS 15252 MCU chassis is provided by two lug-type grounding connectors (Figure 3-7).

Note To prevent ground loops, use only one grounding connector.

3.3.2 ONS 15252 Fan Unit Power and Grounding

The fan unit back panel has two power supply connectors. The far-right power connector (as viewed from the rear of the fan unit) is the primary source, and the far-left power connector is the secondary source. These power connectors are designated as 0V and -48V. A pair of grounding pins (M4 screws) is located next to each of the power connectors on the fan-unit back panel.

3.3.3 ONS 15201 SCU Power and Grounding

The ONS 15201 SCU chassis has two power supply connectors. The power supply located on the front of the ONS 15201 SCU chassis is labeled PS-2 (power supply two), and the power supply connector located on the backplane of the ONS 15201 SCU chassis is labeled PS-1 (power supply one) (Figure 3-6). Lug-type grounding connectors located on the back of the chassis provide grounding. The power supplies convert AC to DC and provide a regulated -48 VDC to the ONS 15201 SCU.

3.4 Environmental Compliance

The ONS 15252 MCU is compliant with Network Element Building Systems (NEBS) Level 3 of Telcordia SR-3580 and applicable sections of Telcordia GR-63-CORE and Telcordia GR-1089-CORE. Additionally, the ONS 15200 system is compliant with ETS 300 019-1-1 (class 1.1), ETS 300 019-1-2 (class 2.3), and ETS 300 019-1-3 (class 3.1) for environmental requirements.

The ONS SCU 15201 is compliant with Network Element Building Systems (NEBS) Level 2 of Telcordia SR-3580 and applicable sections of Telcordia GR-63-CORE and Telcordia GR-1089-CORE. Additionally, the ONS 15200 system is compliant with ETS 300 019-1-1 (class 1.1), ETS 300 019-1-2 (class 2.3), and ETS 300 019-1-3 (class 3.1) for environmental requirements.

3.5 Electromagnetic Compatibility

The ONS 15200 system is compliant with Telcordia GR-1089-CORE and FCC Part 15 specifications for electromagnetic compatibility for NEBS Level 2 (SCU) and Level 3 (MCU). Additionally, the ONS 15200 system is complaint with ETS 300 386-1, classes 1 and 2 for electromagnetic compatibility.

3.6 Safety Specifications

This section provides ONS 15200 system laser and product safety specifications.

3.6.1 Laser Safety

The ONS 15200 system is compliant with IEC-60825-1, IEC 60825-2, and CFR 1040.10 requirements for laser safety.

3.6.2 Product Safety

The ONS 15200 system equipment complies with the product safety requirements in European Norm (EN) 60 950 and Underwriters Laboratory (UL) 1950. The equipment also adheres to the European Union (EU) low voltage directive LVD 73/23/ECC.

3.7 Wavelength Grid

The ONS 15200 system adheres to 200 GHz wavelength spacing and the wavelength specifications defined in ITU-T G.692. Table 3-2 shows the wavelength plan.

Table 3-2 ONS 15200 Wavelength Plan

Channel Number	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

CHAPTER 4

Operation, Administration, and Maintenance

This chapter describes the components required for operation, administration, and maintenance of the Cisco ONS 15200.

4.1 Network Control

The Network Control Board (NCB) supervises, administers, and monitors the ONS 15200. In addition to controlling all of the ONS 15200 system Client Layer Interface Port (CLIP) modules, the NCB module collects information about system status, alarms, parameters, and actions on the internal data bus. See the "Alarms" section on page 4-9 for a description of NCB alarms.

4.2 Network Management Overview

You can manage an ONS 15200 network using three different connection interfaces:

- An Ethernet connection to the NCB module located in an ONS 15252 Multichannel Unit (MCU).
- A Maintenance Manager software connection over the internal data bus to the Communication Interface Module (CIM) located in an ONS 15252 MCU or to the Collector Control Area Network (CCAN) board located in an ONS 15201 Single-Channel Unit (SCU).
- An Electronic Industries Association/Telecommunication Industry Association (EIA/TIA) EIA/TIA-232 (RS-232) port connection located on the CIM in the ONS 15252 MCU. This connection method requires the EIA/TIA-232 cable included with the ONS 15252 MCU.

Figure 4-1 illustrates the three network management interface connections.

You can control the ONS 15200 system using the Subnetwork Manager (SNM) software package running on the NCB module located in the ONS 15252 MCU. Access the SNM through either the EIA/TIA-232 port or the Ethernet port on the front of the NCB module. Additionally, you can manage the ONS 15200 system externally using the Command Line Interface (CLI) software package described in the "Command Line Interface" section on page 4-5 or using the Maintenance Manager (MM) software package described in the "Maintenance Manager" section on page 4-6. With the Internet, you can view the ONS 15200 system using the web-based interface described in the "Web-Based Interface" section on page 4-7. In addition, you can use SNMP and the Cisco Transport Manager (CTM) to have read-only access to the ONS 15200.

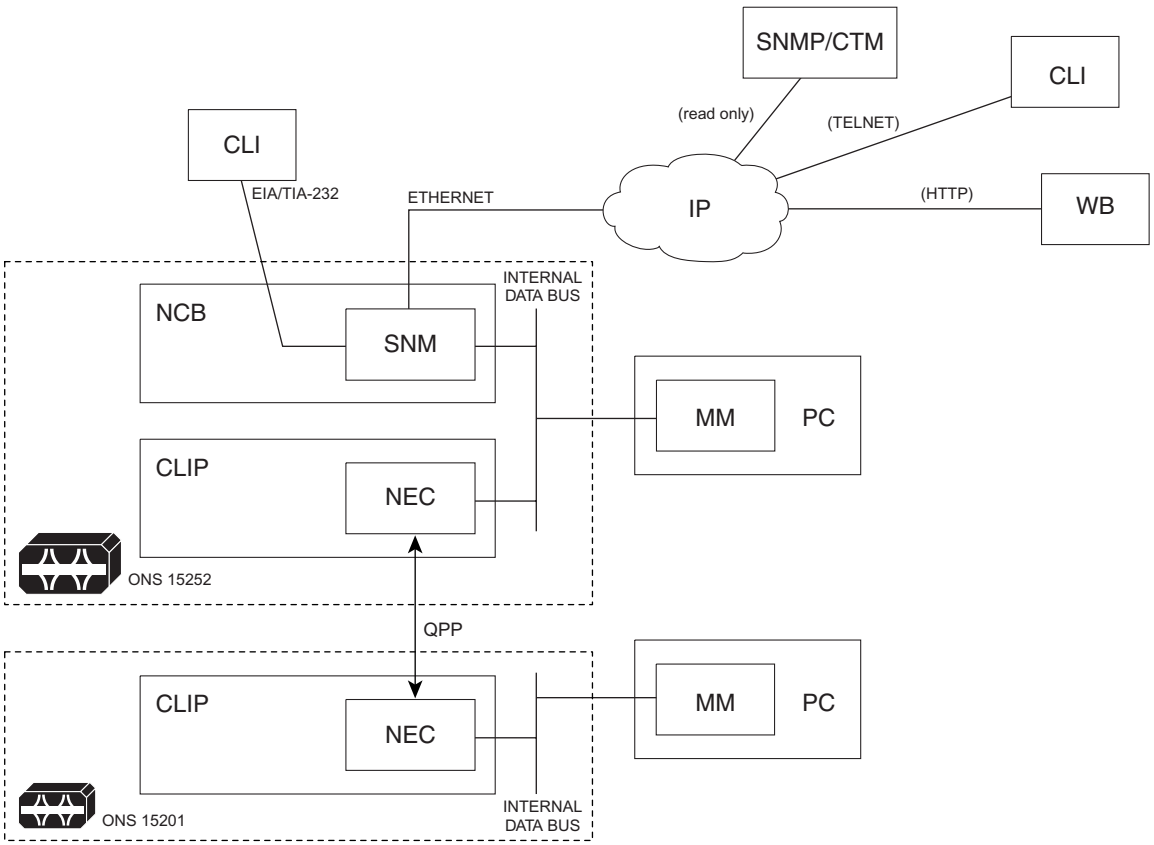
An internal data bus, also called a controller area network (CAN) bus, connects an NCB module to different CLIP modules of the ONS 15252 MCU. You can extend this data bus over several co-located network elements (ONS 15252 MCUs or ONS 15201 SCUs) to a larger logical unit. The ONS 15201 SCU uses the same data bus as the MCU. Normally one CAN bus connects all ONS 15200 equipment located at one site.

An overhead channel exists and is implemented as a base band modulation on the individual DWDM optical channels. Two end-points of a channel communicate using this low frequency signal, called QPP (Qeyton Proprietary Protocol). The QPP specification defines the physical and link layer protocols for communication.

Any CLIP module controlled by an NCB must not be more than two QPP hops away from that NCB. If the CLIP is further away from the NCB, you must install additional NCB modules.

Release 1.1 allows you to configure up to two active NCBs as managers of any CLIP in a network. To manage the CLIP, it must be no further than two CAN and two QPP hops away from the NCB. Any NCB in a network that is not provisioned as an active manager of a CLIP can still inventory the CLIP.

Figure 4-1 An ONS 15200 network management implementation



LEGEND

SOFTWARE APPLICATIONS
CLI - Client Line Interface
MM - Maintenance Manager
NEC - Network Equipment Controller
SNM - Sub-Network Manager
SNMP - Simple Network Management Protocol
CTM - Cisco Transport Manager
WB - Web browser

HARDWARE PLATFORMS
NCB - Network Control Board module
CLIP - Client Line Interface Port module
PC - Personal computer

ADDITIONAL ABBREVIATIONS
CAN - Control Area Network
EIA - Electronic Industry Association
HTTP - Hypertext transport protocol
QPP - Qeyton Properietary Protocol
TIA - Telecommunication Industry Association

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4.3 EIA/TIA-232 (RS-232) Interface

The EIA/TIA-232 port, located at the ONS 15252 MCU management access (MA) interface connector on the CIM, provides access to the SNM software running on the NCB module.

You only need the EIA/TIA-232 interface when you are setting the initial IP address of the NCB module. Two pins of the MA interface host the EIA/TIA-232 port; therefore, access the EIA/TIA-232 using the EIA/TIA-232 cable that is included with the ONS 15252 MCU. After you have set the IP address, you can communicate with the NCB module through the Ethernet port located on the front of the NCB.

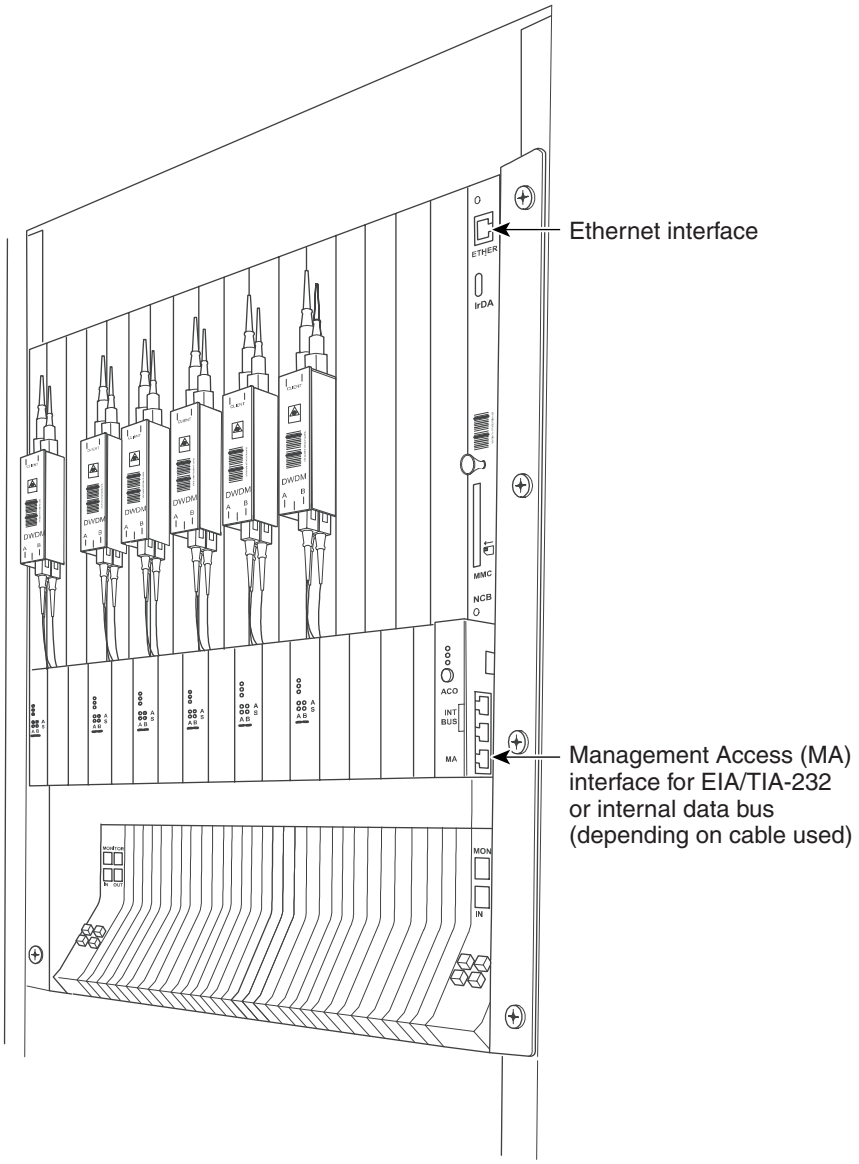
Figure 4-2 on page 4-5 illustrates EIA/TIA-232 interface access and Ethernet access to the ONS 15252 MCU.

After you have assigned an IP address to the NCB module, you can also send information to the NCB module by file transfer protocol (FTP). Set the EIA/TIA-232 interface to the parameters listed in Table 4-1. Set the terminal settings to ASCII (send line end with line feed).

Table 4-1 EIA/TIA-232 interface parameter

Parameter	Value
Speed	19.2 Kbps
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Figure 4-2 ONS 15252 MCU management access



LEGEND
EIA - Electronic Industry Association
TIA - Telecommunication Industry Association

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4.4 Command Line Interface

The SNM software package Command Line Interface (CLI) is a simple, interactive tool that manages the ONS 15200 system.

The CLI interface resides on the NCB module and operates on the database server for the ONS 15200 system. The CLI interface has two modes of access for users—read-and-write access and read-only access. Users are separated into three categories: administrator, operator, and guest. Each category has different privileges:

- Administrator—read-and-write access to security management data
- Operator—read-and-write access to network management data
- Guest—read-only access to network management data

To access the CLI interface, use the Ethernet port on the NCB module or the MA interface on the CIM module. MA interface access requires a EIA/TIA-232 cable.

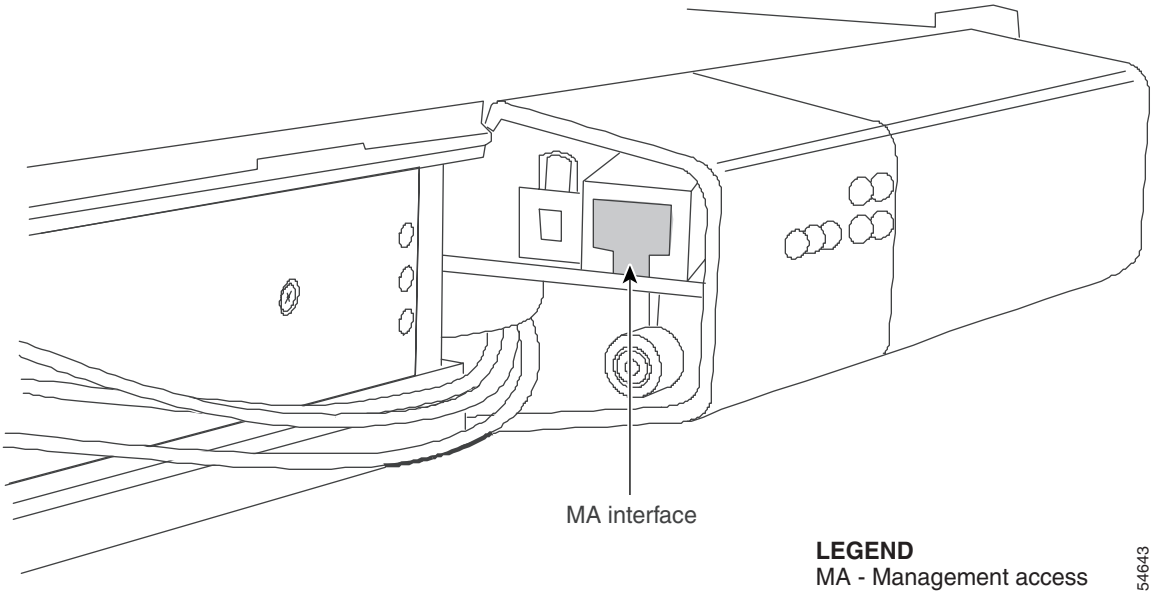
4.5 Maintenance Manager

The Maintenance Manager (MM) interactive software tool, installed on a laptop or PC, provides a local craft interface for the ONS 15200 system. The MM software provides access to the internal data bus at ONS 15252 MCUs or ONS 15201 SCUs. It also facilitates access to data from isolated ONS 15201 SCUs in the ONS 15200 network.

In addition to the required cabling, a laptop must have a controller area network (CAN) Personal Computer Memory Card International Association (PCMCIA) board to use the MM software package as a local craft interface.

Connect your MM-equipped computer to the ONS 15200 system through the MA port as shown in the following figures. Figure 4-2 on page 4-5 shows the management access connection to an ONS 15252 MCU. Figure 4-3 shows the management access connection to an ONS 15201 SCU.

Figure 4-3 ONS 15201 SCU management access interface



4.6 Web-Based Interface

The web-based interface allows read-and-write access to the ONS 15200 system data from any valid IP address. The NCB module must have a defined IP address and you must log into the SNM software package running on the NCB module before accessing the web-based interface.

Note The web-based interface does not function with Internet Explorer 4.0 or 5.0, Netscape Communicator 6.x, or Opera.

4.7 Internal Data Bus

The controller area network (CAN) bus is a serial communications protocol interface bus that allows you to connect several ONS 15200 systems to create a more powerful network element. The CAN bus supports distributed real-time, secure control. Figure 4-4 shows the two data bus extension ports on the ONS 15252 MCU. Figure 4-5 shows the two data bus extension ports located on the ONS 15201 SCU.

Figure 4-4 ONS 15252 MCU internal data bus extension ports

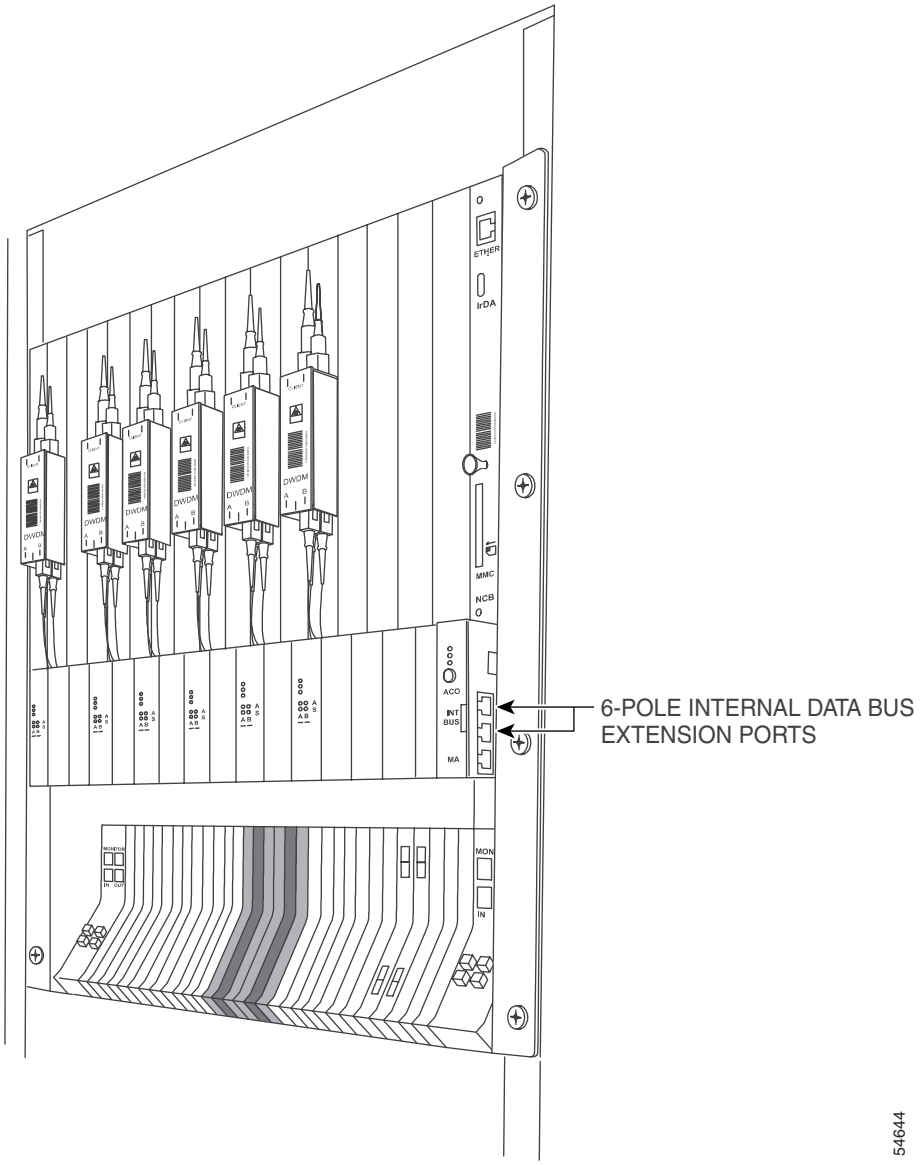
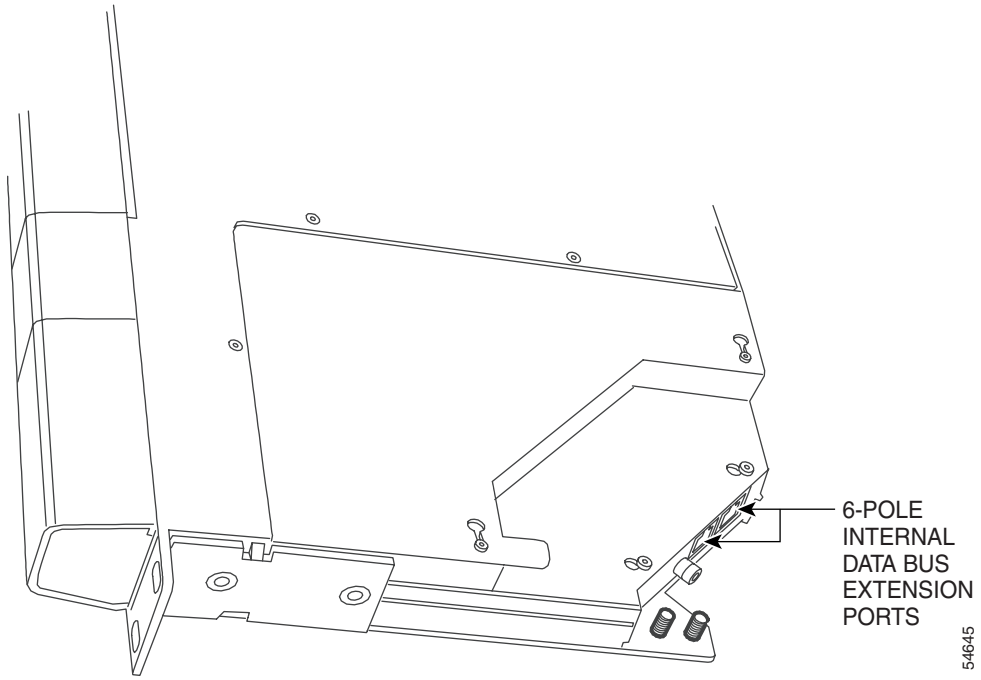


Figure 4-5 ONS 15201 SCU internal data bus extension ports



4.8 Simple Network Management Protocol Interface

The simple network management protocol (SNMP) interface allows read-only access to the ONS 15200 system data. For SNMP access, the NCB module must have an assigned IP address and a valid community name. The SNMP interface supports simple network management protocol versions 1and 2c.

4.9 Cisco Transport Manager

The Cisco Transport Manager (CTM) allows read-only access to the ONS 15200 system data. CTM Release 3.1 supports ONS 15200 Release 1.1.

4.10 Alarms

In the ONS 15200 web-based interface, the Alarms screen shows all the active alarms recorded for each module installed in the network. Table 4-2 describes the CLIP module alarms, Table 4-3 describes alarm status parameters, and Table 4-4 defines the on-screen colors displayed next to the alarm status.

Table 4-2 Environment Parameter Definitions for Protected Channels

Condition Name	Definition
DWDM_RXPOWER (unprotected only)	The power input from the A-side of the ONS 15200 network is outside the acceptable power range.
DWDM_ARXPOWER	The power input from the A-side of the ONS 15200 network is outside the acceptable power range.
DWDM_BRXPOWER	The power input from the B-side of the ONS 15200 network is outside the acceptable power range.
DWDM_PELTIERCURRENT	The Peltier current of the selected CLIP module is outside the acceptable power range.
DWDM_LASERTEMP	The temperature of the laser transmitting to the ONS 15200 network is outside the acceptable temperature range.
CLIENT_RXPOWER	The power input from the client equipment is outside the acceptable power range.
CLIENT_LASERTEMP	The temperature of the laser transmitting to the client equipment is outside the acceptable temperature range.
ENVIRON_BOARDTEMP	The temperature on the surface of the CLIP module circuit board is outside the acceptable temperature range.

Table 4-3 Alarm Status Parameters

Alarm Name	Definition
QPP (unprotected only)	Proprietary protocol error on the A-side of the network
QPPA	Proprietary protocol error on the A-side of the network
QPPB	Proprietary protocol error on the B-side of the network
CAN	Error on the CAN bus
POWER1	PS-1 input is outside of the acceptable range
POWER2	PS-2 input is outside of the acceptable range
FDI	Loss of channel
Miscellaneous alarms	
DAC	D/A converter alarm
FLASH	EEPROM alarm
INSTRUCTION	Software attempted to write to an invalid location (autoclears after two seconds)
STATUS	Alarm indicator

Table 4-4 LED Status Color Definitions (Visible on NAM Front)

Alarm Name	Definition
Red	Critical or major alarm
Amber	Minor alarm or warning
Green	Power on

CHAPTER 5

Module Descriptions

This chapter provides descriptions and specifications for the Cisco ONS 15200 modules, sometimes referred to as a card or blade. For detailed information about each module, consult the *Cisco ONS 15200 Module Handbook*.

5.1 Overview

The ONS 15200 has thirteen modules, four active and nine passive. The following paragraphs describe the four active modules in the ONS 15200 system:

- The “Client Layer Interface Port Module” section on page 5-1
- The “Communication Interface Module” section on page 5-2
- The “Network Adaptation Module” section on page 5-3
- The “Network Control Board Module” section on page 5-3

The following paragraphs describe the nine passive modules in the ONS 15200 system:

- The “Bridge Module” section on page 5-4
- The “Collector Filter Module” section on page 5-4
- The “Connection Module X” section on page 5-4
- The “Connection Module Y” section on page 5-4
- The “Dummy Filter Module” section on page 5-4
- The “Dummy Network Adaptation Module” section on page 5-4
- The “Hub Filter Module” section on page 5-5
- The “Line Module” section on page 5-5
- The “Termination Module” section on page 5-5

5.2 Client Layer Interface Port Module

The CLIP module provides the input port from the client layer to the integrated ONS 15200 system, and the output port from the integrated ONS 15200 to the client layer. The CLIP module receives an optical input signal from the client layer in either the 1310 nm or 1550 nm wavelength regions and converts the

optical signal to a specific International Telecommunication Union (ITU-T) G.692-compatible wavelength. The CLIP module then transfers the converted optical signal to the DWDM side of the ONS 15200 network.

When the CLIP module receives the optical signal from the DWDM side of the ONS 15200 network, the CLIP module converts the selected optical signal to the 1310 nm wavelength region and delivers it to the client layer. If the ONS 15200 system is optically protected (that is, the optical signal is carried on two routes), the CLIP module selects which optical signal to transfer to the client layer. You can install a CLIP module in either the ONS 15252 Multichannel Unit (MCU) or the ONS 15201 Single-Channel Unit (SCU).

When the CLIP modules are not installed, attach front covers for electromagnetic compatibility and electromagnetic interference (EMC/EMI) precautions.

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 management interfaces. The new 2R/3R CLIP is fully compatible with the existing 3R CLIP. The 2R/3R CLIP is user configurable for unprotected or fiber protected operation.

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

Restrictions exist for CLIP replacement based on whether you are using a plenum or a fan unit in the ONS 15252 MCU. Table 5-1 identifies the CLIP restrictions.

Note CLIP replacement restrictions are related to mean time between failure (MTBF) performance and not NEBS-2 compliance.

Table 5-1 CLIP Restrictions

ONS 15252 Equipment	CLIP Version	Maximum number of CLIPs	Restriction	Maximum temperature
2U plenum	3.2	16	None	25°C (77°F)
2U plenum	3.2	4	Slots 1 – 4	40°C (104°F)
2U plenum	3.5	2 (3.5)/14 (3.2)	Not adjacent	25°C (77°F)
2U plenum	3.5	3	Slots 1 – 3	40°C (104°F)
Fan unit	3.2 or 3.5	16	None	None

5.3 Communication Interface Module

The CIM allows you to extend the ONS 15252 MCU internal controller area network (CAN) bus to another ONS 15252 MCU or to an ONS 15201 SCU. Extending the CAN bus allows you to configure several network elements (NEs) into a larger functional unit. The CIM also provides the local craft interface to the Maintenance Manager software package, and the Electronic Industry Association/Telecommunication Industry Association (EIA/TIA) EIA/TIA-232 access interface to the ONS 15252 MCU via an EIA/TIA-232 cable. The CIM is installed in the ONS 15252 MCU. The CIM and the NCB module communicate using ONS 15252 MCU backplane.

5.4 Network Adaptation Module

The NAM splits the outgoing optical signal from the CLIP module (one of the DWDM wavelengths or channels) before transferring it to the passive optical shelf (located in the lower part of the ONS 15252 MCU). The NAM split ratio can be 100/0, 90/10, 50/50, 10/90, or 0/100. Unprotected channels use the split ratios 100/0 and 0/100. Protected channels use the split ratios 90/10, 50/50, and 10/90.

The NAM transfers the signal to the passive optical shelf in the following patterns:

- A side or B side (unprotected channel)
- A side and B side (protected channel)

The HFMs collect the incoming optical signals from the DWDM side of the ONS 15200 system and transfer the outgoing signals to the DWDM side of the ONS 15200 system. The NAMs then transfer these incoming/outgoing optical signals to/from the CLIP modules.

5.5 Network Control Board Module

The NCB module is the hardware platform for the Subnetwork Manager (SNM) software package, which you access using the Ethernet connector on the front of the NCB module. The NCB supervises, administers, and monitors the ONS 15200. 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.

Release 1.1 supports multiple NCBs on the CAN bus; however, you can only configure two active NCBs as managers of any CLIP in a network. Any NCB in a network that is not provisioned as an active manager of a CLIP can still inventory the CLIP. Release 1.0.1 only supports one NCB on the CAN bus.

In addition to alarm lines on the internal data bus, the NCB has three dedicated LEDs. When lit, the LEDs indicate the status shown in Table 5-2.

Table 5-2 NCB Indicators

LED	Status
Red	Critical or major alarm
Amber	Minor alarm or warning
Green	Power on

The ONS 15200 system can function without the NCB module. When you choose not to use an NCB module, mount a front cover in its place for EMC/EMI precautions. The front cover used in place of the NCB module is narrower than the front cover used in place of the CLIP module. Do not interchange the two types of front covers.

5.6 Bridge Module

The BM, installed in the passive optical shelf, transfers the remainder of the incoming optical signal from the A side to the B side and from the B side to the A side. The BM allows the portion of the optical signal that is not intended for the node to bypass the node. If all incoming optical signal wavelengths terminate at the node, you can use two Termination modules (TMs) instead of a BM. TMs reduce optical crosstalk.

5.7 Collector Filter Module

The CFM combines the functionality of the Hub Filter module (HFM) and the NAM in the ONS 15201 SCU. The CFM transfers optical signals between the DWDM side of the ONS 15200 system and the CLIP module.

5.8 Connection Module X

The CMX provides a bridge between the A side of one ONS 15252 MCU and the B side of another ONS 15252 MCU. Using a CMX allows you to extend the bandwidth capability of the ONS 15252 MCU passive optical shelf.

5.9 Connection Module Y

The CMY provides a bridge between the A side of one ONS 15252 MCU and the A side of another ONS 15252 MCU. Alternatively, the CMY provides a bridge between the B side of one ONS 15252 MCU and the B side of another ONS 15252 MCU. The CMY allows you to extend the bandwidth capability of the passive optical shelf.

5.10 Dummy Filter Module

The Dummy Filter module (DFM) mechanically stabilizes the optical filter modules. The DFM resides in the passive optical shelf of the ONS 15252 MCU.

5.11 Dummy Network Adaptation Module

The DNAM replaces a Network Adaptation module (NAM) when a NAM is not installed.

5.12 Hub Filter Module

The HFM filters one wavelength from the incoming DWDM optical signal and transfers the remainder of the wavelengths to subsequent HFMs. The HFMs each add one wavelength to the outgoing DWDM optical signal. The HFM is located to the right of the Line module (LM) on the A side of the ONS 15252 MCU and to the left of the LM on the B side of the ONS 15252 MCU. The row of HFMs must end with either a BM, a TM, a CMX, or a CMY.

5.13 Line Module

The LM receives an incoming aggregate optical signal from the DWDM side of the ONS 15200 system and transfers the outgoing aggregate optical signal to the DWDM side of the ONS 15200 system. A pair of LMs, one for the A side and one for B side, reside in the passive optical shelf of the ONS 15252 MCU. The LM contains the monitoring ports for both the incoming and outgoing traffic streams. The split ratio of the monitoring ports is 10/90. The external interface on the LM can be either an SC or an FC optical connector.

5.14 Termination Module

Install a TM in the passive optical shelf of the ONS 15252 MCU after the you have installed the HFMs. Insert the TM to the right of the HFMs on the A-side of ONS 15252 MCU and to the left of the HFMs on the B-side of the ONS 15252 MCU in place of the BM. The TMs terminate the optical signal and improve crosstalk. The TMs can replace the BM when all traffic terminates at the ONS 15252 MCU.

CHAPTER 6

Engineering Specifications

The tables below provide general specifications for the Cisco ONS 15200 system and specifications specific to the Cisco ONS 15252 Multichannel Unit (MCU) and Cisco ONS 15201 Single-Channel Unit (SCU) components. For module-level specifications, see the *Cisco ONS 15200 Module Handbook*.

6.1 Operational

Table 6-1 provides information about ONS 15200 operating conditions.

Table 6-1 System Parameters

Parameter	Condition	Maximum	Unit
Bit rate per channel	100 Base FX Ethernet	100	Mbps
Bit rate per channel	Fiber Distributed Data Interface (FDDI)	125	Mbps
Bit rate per channel	OC-3/STM-1	155	Mbps
Bit rate per channel	Enterprise Systems Connection (ESCON)	200	Mbps
Bit rate per channel	D1 Video	270	Mbps
Bit rate per channel	OC-12/STM-4	622	Mbps
Bit rate per channel	OC-48/STM-16	2.5	Gbps
Bit rate per channel	2R mode	100 - 1.25	Mbps - Gbps
Bit rate per channel	Fiber Channel	1.06	Gbps
Bit rate per channel	Fiber Connect (FICON)	1.06	Gbps
Bit rate per channel	Gigabit Ethernet	1.25	Gbps
Fiber-protected channels	Optical protection (16 A-side and B-side channels)	16	Channels

Table 6-1 System Parameters (continued)

Parameter	Condition	Maximum	Unit
Number of unprotected channels	No optical protection (16 A-side channels and 16 B-side channels)	32	Channels
Number of mixed fiber-protected and unprotected	Sum of 2 * # (fiber-protected channels) + # (unprotected channels)	32	Channels

6.2 Optical

This section describes optical performance, frequencies, and signal loss.

6.2.1 Optical Performance

Table 6-2 provides information about ONS 15200 optical performance.

Table 6-2 System Performance

Parameter	Condition	Minimum	Unit
Maximum optical dispersion tolerance (very long-range transmitter)	At 2.0 dB optical penalty	3000	ps/nm
Maximum optical dispersion tolerance (long-range transmitter)	At 2.5 dB optical penalty	1800	ps/nm
Maximum optical dispersion tolerance (medium-range transmitter)	At 2.0 dB optical penalty	1800	ps/nm

6.2.2 Optical Frequencies

Table 6-3 shows how the sixteen optical channels are spaced.

Table 6-3 Channel Spacing

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

Table 6-3 Channel Spacing (continued)

ITU Channel	Frequency (THz)	Wavelength (nm)
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

6.2.3 Optical Loss

This section describes the optical loss for the 15252 Multichannel Unit (MCU) and the 15201 Single-Channel Unit (SCU).

6.2.3.1 Multichannel Unit Optical Loss

Table 6-4 provides optical loss information for the Multichannel Unit (MCU). See Figure 6-1 to locate the paths where loss occurs in the MCU (for example, from B to U in a Network Adaptation Module [NAM]).

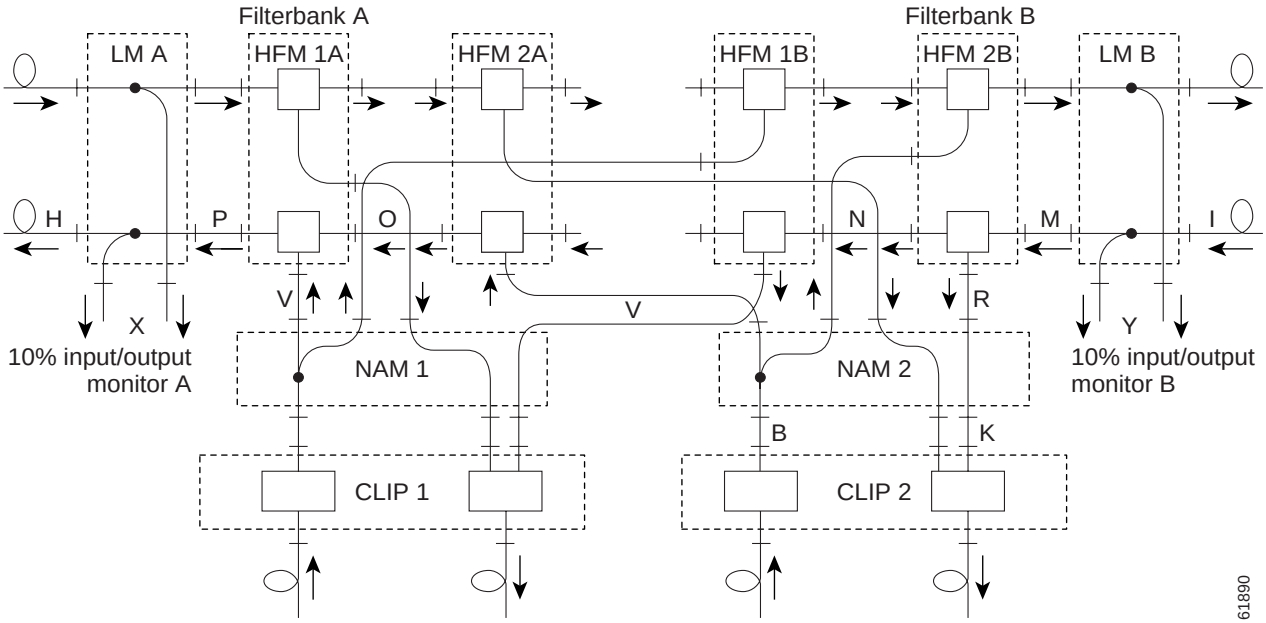
Table 6-4 MCU Optical Loss

Equipment	Maximum (dB)	Includes connectors (Y/N)
Network Adaptation Module		
100% (no power split)	0.3	Y
90% coupler loss, B to V or R to K	0.8	Y
50% coupler loss, B to V or R to K	3.6	Y
10% coupler loss, B to V or R to K	11.0	Y
Hub Filter Module		
Through loss, (adjacent channel), M to N or O to P	0.9	Y
Through loss, (non-adjacent channel), M to N or O to P	0.8	Y
Drop loss, M to R	2.1	Y
Add loss, V to P	1.9	Y
Line Module		
Through signal insertion loss, P to H, or I to M	0.8	Y
Monitor signal insertion loss, P to X, or I to Y	11.0	Y
Connectors		

Table 6-4 MCU Optical Loss (continued)

Equipment	Maximum (dB)	Includes connectors (Y/N)
Insertion loss, MU-type	0.3	—
Insertion loss, SC-type	0.3	—

Figure 6-1 15252 MCU optical path



6.2.3.2 Single-Channel Unit Optical Loss

Table 6-5 provides optical loss information for the SCU. See Figure 6-2 and Figure 6-3 to locate the paths where loss occurs in the SCU (for example, from I to H in a Collector Filter Module [CFM]). Figure 6-2 shows an unprotected path, and Figure 6-3 shows a protected path in the SCU.

Table 6-5 SCU Optical Loss

Equipment	Maximum (dB)	Includes connectors (Y/N)
Collector Filter Module: Unprotected (100/0 or 0/100)		
Through loss (adjacent channel), I to H	0.9	Y
Through loss (non-adjacent channel), I to H	0.8	Y
Drop loss, I to K	2.1	Y
100% Add loss, B to H	1.9	Y
Collector Filter Module: Protected (90/10 or 10/90)		
Through loss (adjacent channel), I to H	1.4	Y

Table 6-5 SCU Optical Loss (continued)

Equipment	Maximum (dB)	Includes connectors (Y/N)
Through loss (non-adjacent channel), I to H	1.3	Y
Drop filter loss, I to K	2.1	Y
10% Add loss, B to H	12.5	Y
90% Add loss, B to H	2.5	Y
Collector Filter Module: Protected (50/50)		
Through loss (adjacent channels), I to H	1.4	Y
Through loss (non-adjacent channel), I to H	1.3	Y
Drop loss, I to K	2.1	Y
50% Add loss, B to H	5.6	Y
Connectors		
Insertion loss, MU-type	0.3	—
Insertion loss, SC-type	0.3	—

Figure 6-2 15201 SCU unprotected optical path (100/0 or 0/100)

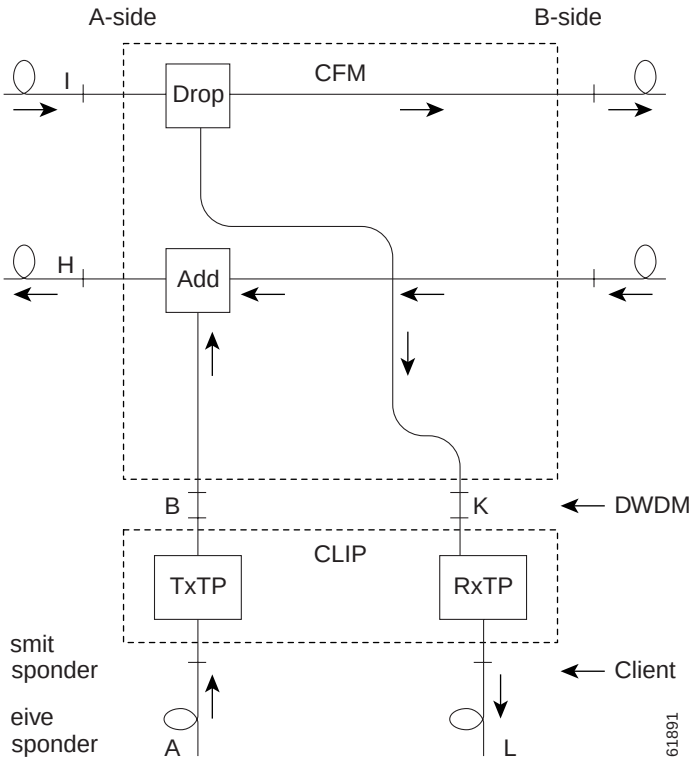
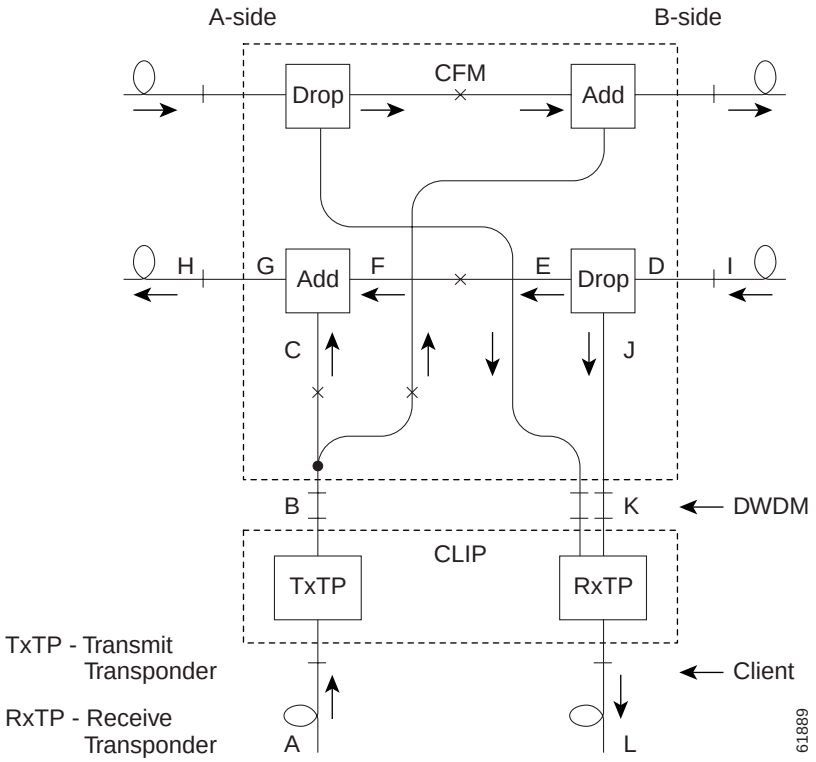


Figure 6-3 15201 SCU protected optical path (10/90, 90/10, and 50/50)



6.3 Environmental

Table 6-6 shows the environmental tolerances of ONS 15252 MCU and ONS 15201 SCU.

Table 6-6 Environmental Operating Conditions

Parameter	Condition	Min.	Max.	Unit
ONS 15252 maximum power consumption	—	—	140	Watts
ONS 15201 maximum power consumption	—	—	8	Watts
ONS 15252 normal operating temperature range	—	+5°C (41°F)	55°C (131°F)	Degrees
ONS 15201 normal operating temperature range	—	+5°C (41°F)	40°C (104°F)	Degrees

Table 6-6 Environmental Operating Conditions (continued)

Parameter	Condition	Min.	Max.	Unit
ONS 15252 operating humidity range	Noncondensing (between 1 and 25 g/m^3) Constraint: at most 0.024 kg of water per kg of dry air	5	85	Percent relative humidity
ONS 15201 operating humidity range	Noncondensing (between 1 and 25 g/m^3) Constraint: at most 0.024 kg of water per kg of dry air	5	85	Percent relative humidity

Note The operating temperature and humidity ranges are normal climatic limits, i.e., values outside these ranges (but inside the short-term conditions specified in Telcordia GR-63-CORE) have a probability of occurrence of less than 1 percent.

6.4 Mechanical

Table 6-7 shows the physical dimensions of the ONS 15252 MCU subrack.

Table 6-7 ONS 15252 Subrack Dimensions

Parameter	Units
Height	621.8 mm (24.5 in.)
Width	485 mm (19.1 in.)
Depth	279 mm (11 in.)
Weight	37 kg (82 lb.) maximum

Table 6-8 shows the physical dimensions of the ONS 15201 SCU subrack.

Table 6-8 ONS 15201 Subrack Dimensions

Parameter	Units
Height	44.5 mm (1.75 in.)
Width	480 mm (18.9 in.)
Depth	275 mm (10.8 in.)
Weight	3 kg (6.6 lb.)

6.5 Electrical

Table 6-9 shows power consumptions of ONS 15252 MCU and ONS 15201 SCU nodes.

Table 6-9 Power Consumption

Parameter	Max.	Unit
ONS 15252 maximum power consumption	140	Watts
ONS 15201 maximum power consumption	8	Watts

APPENDIX A

Acronyms

The following acronyms and initialisms are used in this manual:

A

A

A-side

AC

alternating current

ADM

add/drop multiplexer

APS

automatic protection switching

B

B

B-side

BER

bit error rate

BM

Bridge module

C

C

Celsius

CAN

control area network

CCAN

Collector Control Area Network board

CFM

Collector Filter module

CFR

Code of Federal Regulations

CIM

Communications Interface module

CLI

Command Line Interface

CLIP

Client Layer Interface Port module

CMX

Connection Module X

CMY

Connection Module Y

D

dB (or dBm)

decibels

DC

direct current

DFM

Dummy Filter module

DNAM

Dummy Network Adaptation module

DWDM

dense wavelength division multiplexing

E

EIA

Electronic Industries Association

EMC

electromagnetic compatibility

EMI

electromagnetic interference

ESD

electrostatic discharge

ETS

European telecommunication standard

F

F

Fahrenheit

FCC

Federal Communications Commission

FDA

Food and Drug Administration

FDI

Forward Defect Indication

FTP

file transfer protocol

G

Gbps

gigabits per second

H

HFM

Hub Filter module

I

IEC

International Electrotechnical Commission

IP

Internet protocol

ITU

International Telecommunications Union

L

LM

Line module

M

MA

management access

Mbps

megabits per second

MCU

Multichannel Unit

MM

Maintenance Manager

N

NAM

Network Adaptation module

NCB

Network Control Board module

NE

network element

NEBS

Network Equipment Building Systems

NFPA

National Fire Protection Association

O

OADM

optical add/drop multiplexer

ONS

optical networking system

OSA

optical spectrum analyzer

P

PCI

personal computer interface

PCMCIA

Personal Computer Memory Card International Association

PDP

power distribution panel

PP

proprietary protocol

ps/nm

picoseconds per nanometer

R

RX

optical receiver

S

SCU

Single-Channel Unit

SDH

synchronous digital hierarchy

SNM

Subnetwork Manager

SNMP

simple network management protocol

SONET

synchronous optical network

STM

synchronous transfer mode

T

TAC

Technical Assistance Center

TCP

transport control protocol

TIA

Telecommunication Industry Association

TM

Termination module

TX

optical transmitter

V

VDC

volts direct current

W

WWW

World Wide Web

INDEX

H

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W