Install Hardware

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

This chapter provides procedures for installing the Cisco ONS 15327 shelf, cards, and fiber-optic cable. To view a summary of the tools and equipment required for installation, see the "Required Tools and Equipment" section on page 1-2.

Before You Begin

This section lists the chapter procedures (NTPs). Turn to a procedure for applicable tasks (DLPs).

1. NTP-B1 Unpack and Inspect the ONS 15327 Shelf Assembly, page 1-4—Complete this procedure before continuing with the "NTP-B2 Install the Shelf Assembly" procedure on page 1-5.
2. NTP-B2 Install the Shelf Assembly, page 1-5—Complete this procedure to install the shelf assembly in a rack before continuing with the "NTP-B216 Install the Mechanical Interface Cards" procedure on page 1-11.
3. NTP-B216 Install the Mechanical Interface Cards, page 1-11—Complete this procedure to install the Mechanical Interface cards (MICs) before continuing with the "NTP-B6 Install the Power and Ground" procedure on page 1-12.
4. NTP-B6 Install the Power and Ground, page 1-12—Complete this procedure before continuing with the "NTP-B7 Install the Fan-Tray Assembly" procedure on page 1-20.
5. NTP-B7 Install the Fan-Tray Assembly, page 1-20—Complete this procedure to install the fan-tray assembly in the shelf before continuing with the "NTP-B217 Install the XTCs" procedure on page 1-21.
6. NTP-B217 Install the XTCs, page 1-21—Complete this procedure to install the Cross-Connect Timing and Control (XTC) cards.
7. NTP-B218 Install the Optical and Ethernet Cards, page 1-23—As needed, complete this procedure to install optical and Ethernet cards.
8. NTP-B219 Remove and Replace a Card, page 1-25—As needed, complete this procedure to remove and replace an ONS 15327 card.

9. NTP-B115 Preprovision a Slot, page 1-28—As needed, complete this procedure to preprovision any empty card slot with a card that will be installed later.
10. NTP-B8 Install Wires to Alarm, Timing, LAN, and Craft Pin Connections, page 1-28—Complete this procedure to install cables for alarms, timing, and LAN connections.
11. NTP-B220 Install the Electrical Cables, page 1-33—Complete this procedure to connect and route cables that will carry electrical traffic.
12. NTP-B221 Install Optical Cables, page 1-40—Complete this procedure to connect and route cables that will carry optical traffic.
13. NTP-B13 Perform the Shelf Installation Acceptance Test, page 1-48—Complete this procedure to determine if you have correctly completed all other procedures in the chapter.

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

Warning **The ONS 15327 is intended for installation in restricted access areas. A restricted access area is where access can only be gained by service personnel through the use of a special tool, lock, key, or other means of security. A restricted access area is controlled by the authority responsible for the location.**

Warning **Ultimate disposal of this product should be handled according to all national laws and regulations.**

Note The ONS 15327 is designed to comply with GR-1089-CORE Type 2 and Type 4. Install and operate the ONS 15327 only in environments that do not expose wiring or cabling to the outside plant. Acceptable applications include Central Office Environments (COEs), Electronic Equipment Enclosures (EEEs), Controlled Environment Vaults (CEVs), huts, and Customer Premise Environments (CPEs).

Note The Cisco ONS 15327 is intended for use with telecommunications equipment only.

Required Tools and Equipment

You will need the following tools and equipment to install and test the ONS 15327.

Included Materials

These materials are shipped with the ONS 15327. The number in parentheses provides the quantity of the item included in the package.

- #12-24 x 1/2 pan head Phillips mounting screws (4)
- #10-32 x 3/8 pan head Phillips power lug screws (2)
- #12 AWG dual hole 5/8 in. spaced grounding lug
- Electrostatic discharge (ESD) wrist strap with 1.8 m (6 ft.) coil cable

- Screw-lock power connector
- Terminal-lug power connector
- Terminal lugs (4)
- Terminal lug screws (4)
- Straight DS-1 cable
- Tie-down bar (optional) (15327-TIE-BAR-19 for a 19-inch rack or 15327-TIE-BAR-23 for a 23-inch rack)
- Cable storage tray and screws (4) (optional)

User-Supplied Materials

These materials and tools are required but are not supplied with the ONS 15327.

- Equipment rack (22 inches total width for a 19-inch rack; 26 inches total width for a 23-inch rack)
- Fuse panel
- Copper power cable (from fuse and alarm panel to assembly), #12-16 AWG

  The National Electrical Code recommends #12-14 AWG power cable
- Ground cable, #12 AWG stranded (minimum)
- Alarm cable, CAT-5 terminated with RJ-45 for all alarm connections
- Building Integrated Timing Supply (BITS) clock cable, #22 or #24 shielded AWG wire
- Serial cable, DB-9 connectors
- Single-mode SC fiber jumpers with UPC polish (55 dB or better) for OC12 and OC-48 cards and fiber jumpers with LC connectors for the OC-3 card
- Shielded ABAM cable terminated with Champ connectors for DS-1 ports with #22 or #24 AWG ground wire (optional)
- Shielded coaxial cable terminated with BNC connectors for DS-3 ports
- Tie wraps and/or lacing cord
- Labels

Tools Needed

- #2 Phillips screw driver
- Medium slot head screw driver
- Small slot head screw driver
- Wire cutters
- Wire strippers
- Crimp tool
- Needle nose pliers (for bail locks on Champ connectors)

Test Equipment

- Volt meter
- Power meter (for use with fiber optics only)
- Bit Error Rate (BER) tester, DS-1 and DS-3

Note In this chapter, the terms "ONS 15327" and "shelf assembly" are used interchangeably. In the installation context, these terms have the same meaning. Otherwise, shelf assembly refers to the physical steel enclosure that holds cards and connects power, and ONS 15327 refers to the entire system, both hardware and software.

NTP-B1 Unpack and Inspect the ONS 15327 Shelf Assembly

Purpose	This procedure describes how to unpack the ONS 15327 and verify the contents.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Step 1 Complete the "DLP-B1 Unpack and Verify the Shelf Assembly" task on page 1-4.

Step 2 Complete the "DLP-B2 Inspect the Shelf Assembly" task on page 1-5.

Step 3 Continue with the "NTP-B2 Install the Shelf Assembly" procedure on page 1-5.

Stop. You have completed this procedure.

DLP-B1 Unpack and Verify the Shelf Assembly

Purpose	This task removes the shelf assembly from the package.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Step 1 When you receive the ONS 15327 system equipment at the installation site, open the top of the box. The Cisco Systems logo designates the top of the box.

Step 2 Remove the foam inserts from the box. The box contains the ONS 15327 shelf (wrapped in plastic) and a smaller box containing items needed for installation.

Step 3 To remove the shelf, grasp both sides of the shelf and slowly lift it out of the box.

Step 4 Open the smaller box containing installation materials, and verify that you have all items listed in the "Included Materials" section on page 1-2.

Note The fan-tray assembly is shipped separately.

Step 5 Return to your originating procedure (NTP).

DLP-B2 Inspect the Shelf Assembly

Purpose	This task verifies that all parts of the shelf assembly are in good condition.
Tools/Equipment	None
Prerequisite Procedures	DLP-B1 Unpack and Verify the Shelf Assembly, page 1-4
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Step 1 Verify the following:

- Pins are not bent or broken
- Frame is not bent

Step 2 If the pins are bent or broken, or the frame is bent, call your Cisco sales engineer for a replacement.

Step 3 Return to your originating procedure (NTP).

NTP-B2 Install the Shelf Assembly

Purpose	This procedure describes how to reverse the mounting bracket and mount shelf assemblies in a rack.
Tools/Equipment	#2 Phillips screwdriver Medium slot-head screwdriver Small slot-head screwdriver Two set screws (48-1003-XX)
Prerequisite Procedures	NTP-B1 Unpack and Inspect the ONS 15327 Shelf Assembly, page 1-4
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **To prevent the equipment from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 131°F (55°C). To prevent airflow restriction, allow at least 3 inches (7.6 cm) of clearance around the ventilation openings.**

Warning **The ONS 15327 must have 1 inch of airspace below the installed shelf assembly to allow air flow to the fan intake. The air ramp (the angled piece of sheet metal on top of the shelf assembly) provides this spacing and should not be modified in any way.**

Step 1 Complete the "DLP-B3 Reverse the Mounting Bracket to Fit a 19-inch Rack" task on page 1-6 if you need to convert from a 23-inch to a 19-inch rack.

Step 2 Complete the necessary rack mount task:

- DLP-B5 Mount the ONS 15327 in a Rack, page 1-8
- DLP-B7 Mount Multiple Shelf Assemblies in a Rack, page 1-8

Step 3 As needed, complete the "DLP-B329 Install the Tie-Down Bar" task on page 1-9.

Note You can also install a cable storage drawer in the ONS 15327 rack. This drawer provides room to store up to five feet of slack and can provide a diverse cable route for redundant power feeds and cables. See the "NTP-B223 Install the Fiber-Optic Cable Storage Drawer" procedure on page D-2.

Step 4 Continue with the "NTP-B216 Install the Mechanical Interface Cards" procedure on page 1-11.

Stop. You have completed this procedure.

DLP-B3 Reverse the Mounting Bracket to Fit a 19-inch Rack

Purpose	This task installs the mounting bracket to convert a 23-inch rack to a 19-inch rack.
Tools/Equipment	#2 Phillips screwdriver Medium slot-head screwdriver Small slot-head screwdriver
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Use only the fastening hardware provided with the ONS 15327 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Caution When mounting the ONS 15327 in a frame with a non-conductive coating (such as paint, lacquer, or enamel) use the thread-forming screws provided with the ONS 15327 shipping kit or remove the coating from the threads to ensure electrical continuity.

Step 1 Remove the screws that attach the mounting bracket to the side of the shelf assembly.

Step 2 Flip the detached mounting bracket upside down.

Text imprinted on the mounting bracket will now also be upside down.

Step 3 Place the widest side of the mounting bracket flush against the shelf assembly (see Figure 1-1).

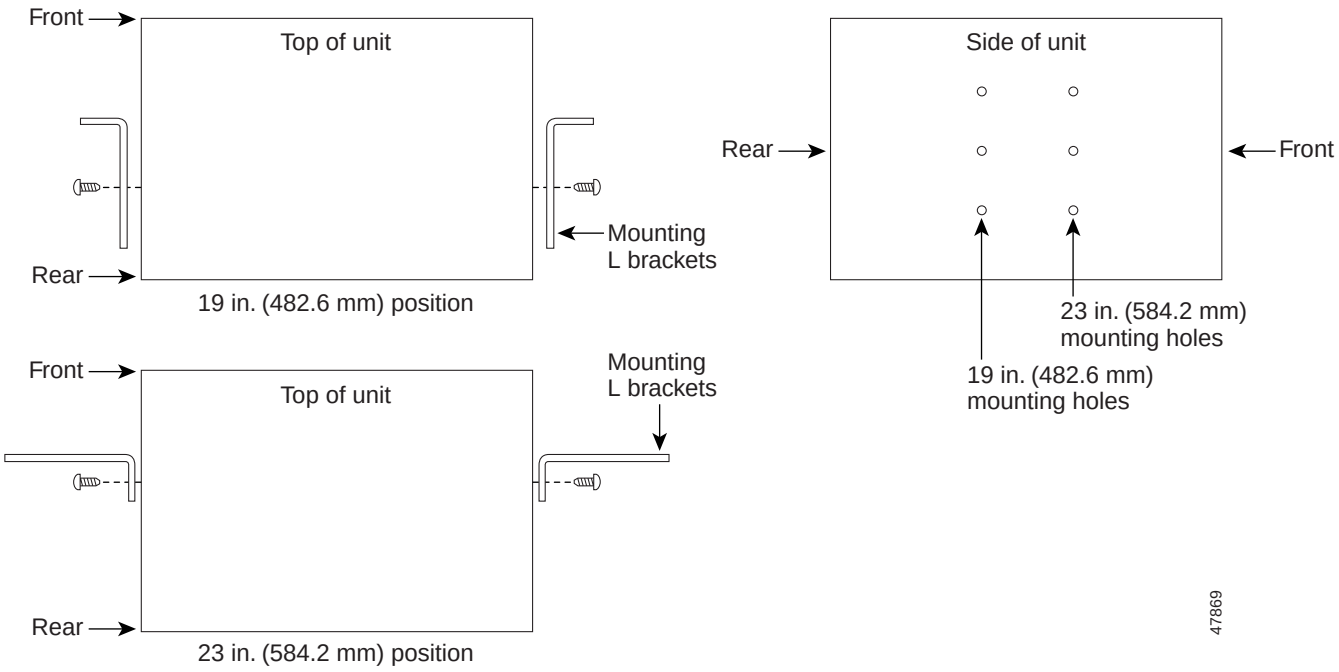
The narrow side of the mounting bracket should be towards the front of the shelf assembly. Text imprinted on the mounting bracket should be visible and upside down.

Step 4 Align the mounting bracket screw holes against the shelf assembly screw holes.

Step 5 Insert the screws that were removed in Step 1 and tighten them.

Step 6 Repeat the task for the mounting bracket on the opposite side.

Figure 1-1 Reversing the Mounting Brackets (23-Inch Position to 19-Inch Position)



Step 7 Return to your originating procedure (NTP).

DLP-B5 Mount the ONS 15327 in a Rack

Purpose	This task allows one person to mount the shelf assembly in a rack.
Tools/Equipment	Two sets of #12-24 mounting screws # 2 Phillips screwdriver Fuse and alarm panel, if not installed
Prerequisite Procedures	DLP-B3 Reverse the Mounting Bracket to Fit a 19-inch Rack, page 1-6, if applicable
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note Mounting the ONS 15327 in a rack requires a minimum of 5.2 inches of vertical rack space (plus 1 inch for air flow). To ensure the mounting is secure, use two to four #12-24 mounting screws for each side of the shelf assembly.

Step 1 Verify that the proper fuse and alarm panel has been installed in the top mounting space. If a fuse and alarm panel has not been installed, you must install one according to manufacturer's instructions. A fuse panel with two 10-amp fuses per shelf is required for Power A and B feeds.

Step 2 Ensure that the shelf assembly is set for the desired rack size (either 19 or 23 inches).

Step 3 Lift the shelf assembly to the desired rack position and set it on the set screws.

Step 4 Align the screw holes on the mounting ears with the mounting holes in the rack.

Step 5 Using the Phillips screwdriver, install one mounting screw in each side of the assembly.

Step 6 When the shelf assembly is secured to the rack, install the remaining mounting screws.

Step 7 Return to your originating procedure (NTP).

DLP-B7 Mount Multiple Shelf Assemblies in a Rack

Purpose	This task installs multiple shelf assemblies in a rack.
Tools/Equipment	#2 Phillips screwdriver Medium slot-head screwdriver Small slot-head screwdriver
Prerequisite Procedures	DLP-B3 Reverse the Mounting Bracket to Fit a 19-inch Rack, page 1-6, if applicable
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note The ONS 15327 must have one inch of air space below the installed shelf assembly to allow air flow to the fan intake. If a second ONS 15327 is installed underneath a shelf assembly, the air ramp on top of the bottom shelf assembly provides the desired space. However, if the ONS 15327 is installed above third-party equipment, you must provide a minimum spacing of one inch between the third-party shelf assembly and the bottom of the ONS 15327. The third-party equipment must not vent heat upward into the ONS 15327.

Step 1 Verify that the proper fuse and alarm panel has been installed in the top mounting space. If a fuse and alarm panel is not present, you must install one according to manufacturer instructions. A fuse panel with two 10-amp fuses per shelf is required for Power A and B feeds.

Step 2 Mount the first ONS 15327 directly below the fuse and alarm panel using the "DLP-B5 Mount the ONS 15327 in a Rack" task on page 1-8.

Note If you want to install a tie-down bar on the rack, be sure to leave 1 RU between each ONS 15327 you plan to install and the tie-down bar.

Step 3 Repeat the task with the remaining ONS 15327s (up to 12 shelves can fit in a rack).

Step 4 Return to your originating procedure (NTP).

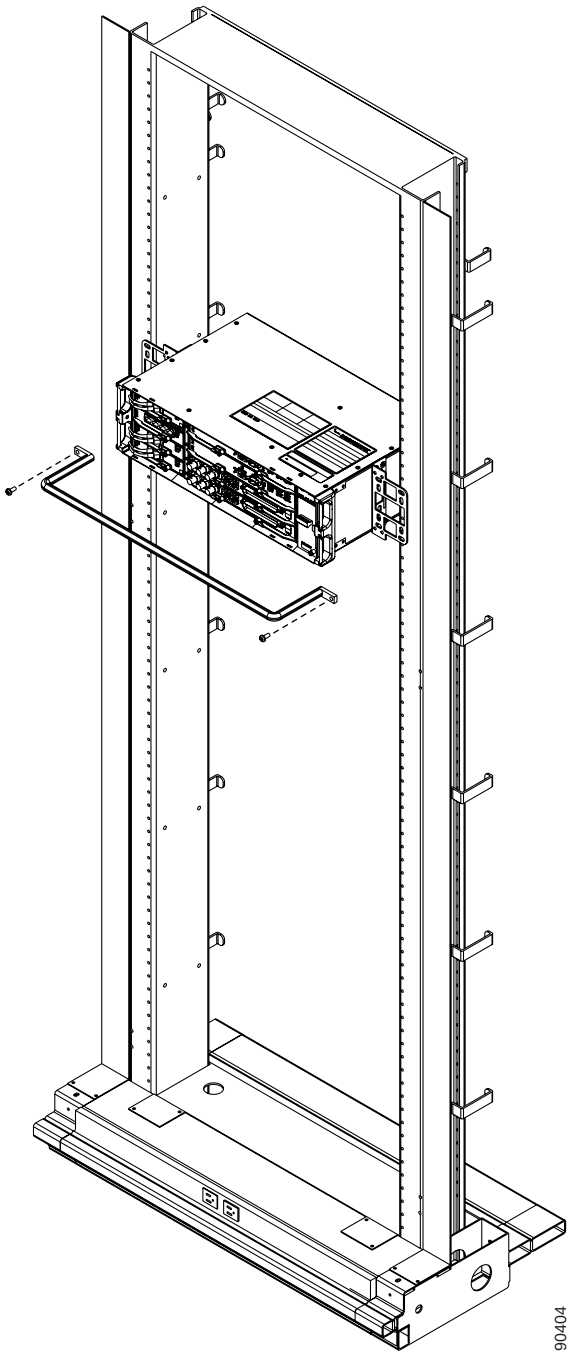
DLP-B329 Install the Tie-Down Bar

Purpose	This task installs the tie-down bar used to secure cabling on the ONS 15327. The tie-down bar can be used to provide a diverse path for redundant power feeds and cables.
Tools/Equipment	Tie-down bar Screws (4)
Prerequisite Procedures	DLP-B5 Mount the ONS 15327 in a Rack, page 1-8
Required/As Needed	As Needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Align the ends of the tie-down bar with the four screw holes located 1 RU below the ONS 15327.

Figure 1-2 shows the tie-down bar, the ONS 15327, and the rack.

Figure 1-2 Tie-Down Bar



Step 2 Install the four screws into the rack.

Step 3 Return to your originating procedure (NTP).

NTP-B216 Install the Mechanical Interface Cards

Purpose	This procedure installs the two Mechanical Interface cards (MICs) in Slots 7 and 8.
Tools/Equipment	None
Prerequisite Procedures	NTP-B2 Install the Shelf Assembly, page 1-5
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool to avoid the risk of shock.**

Step 1 Install MIC A in Slot 8:

a. Open the card ejectors.

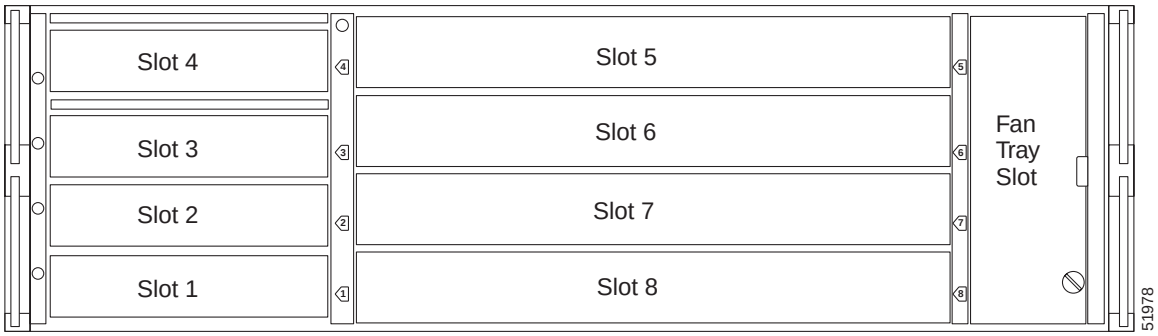
b. Slide the card along the guide rails into the slot.

c. Close the ejectors.

d. Lock the cards into place by tightening the ejector locking screws.

The slots are keyed to ensure that cards are installed in the correct slots. Figure 1-3 shows the location and number of each slot.

Figure 1-3 ONS 15327 Slot Numbering



Step 2 If you require redundant power, more than 14 DS-1s, or you are using DS-3s, install MIC B in Slot 7.

Warning **Always make sure power is disconnected before removing MICs from the ONS 15327.**

Step 3 Continue with the "NTP-B6 Install the Power and Ground" procedure on page 1-12.

Stop. You have completed this procedure.

NTP-B6 Install the Power and Ground

Purpose	This procedure describes how to install power feeds and how to ground the ONS 15327.
Tools/Equipment	Ground cable, #12 AWG stranded (minimum) Copper power cable (from fuse and alarm panel to assembly), #12-16 AWG (the National Electrical Code recommends #12-14 AWG power cable)
Prerequisite Procedures	NTP-B216 Install the Mechanical Interface Cards, page 1-11
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **Shut off the power from the power source or turn off the breakers before beginning work.**

Warning **This equipment is intended to be grounded. Ensure that the host is connected to earth ground during normal use.**

Warning **Do not mix conductors of dissimilar metals in a terminal or splicing connector where physical contact occurs (such as copper and aluminum, or copper and copper-clad aluminum), unless the device is suited for the purpose and conditions of use.**

Warning **Connect the ONS 15327 only to a DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950-based safety standards.**

Warning **The ONS 15327 relies on the protective devices in the building installation to protect against short circuit, overcurrent, and grounding faults. Ensure that the protective devices are properly rated to protect the system, and that they comply with national and local codes.**

Warning **A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.**

Warning **When installing redundant power feeds, do not use aluminum conductors.**

Warning **If you use redundant power leads to power the ONS 15327 disconnecting one lead will not remove power from the node.**

Caution Always use the supplied ESD wristband when working with a powered ONS 15327. Plug the wristband cable into the ESD jack located between the top high-speed and XTC slots.

Step 1 Verify that the proper fuse panel is installed (20-amp fuse per shelf minimum). If not, install one according to manufacturer's instructions.

Step 2 Complete the "DLP-B16 Connect the Office Ground to the ONS 15327" task on page 1-13.

Step 3 Complete the "DLP-B17 Connect Office Power to the ONS 15327 Shelf (Screw-Lock Power Connector)" task on page 1-14.

Step 4 Complete the "DLP-B18 Turn On and Verify Office Power" task on page 1-19.

Step 5 Complete the "DLP-B30 Install Ferrites on Power Cabling" task on page 1-20.

Step 6 Continue with the "NTP-B7 Install the Fan-Tray Assembly" procedure on page 1-20.

Stop. You have completed this procedure.

DLP-B16 Connect the Office Ground to the ONS 15327

Purpose	This task connects ground to the ONS 15327 shelf.
Tools/Equipment	#2 Phillips screwdriver Medium slot-head screwdriver Small slot-head screwdriver Screws Power cable (from fuse and alarm panel to assembly), #10 AWG, copper conductors, 194°F [90°C]) Ground cable #6 AWG stranded Listed pressure terminal connectors such as ring and fork types; connectors must be suitable for #10 AWG copper conductors
Prerequisite Procedures	NTP-B216 Install the Mechanical Interface Cards, page 1-11
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Step 1 Verify that the office ground cable (#6 AWG stranded) is connected to the top of the rack according to local site practice.

Step 2 Attach one end of the shelf ground cable (#10 AWG) to the ground connection point located on the left-hand side panel as you face the ONS 15327.

Note When terminating a frame ground, use the kep-nut provided with the ONS 15327 and tighten it to a torque specification of 31 in-lbs. The kep-nut provides a frame ground connection that minimizes the possibility of loosening caused by rotation during installation and maintenance activity. The type of prevention the kep-nut provides for the frame ground connection is inherently provided by the terminal block for battery and battery return connections.

Step 3 Attach the other end of the shelf ground cable to the rack.

Step 4 Return to your originating procedure (NTP).

DLP-B17 Connect Office Power to the ONS 15327 Shelf (Screw-Lock Power Connector)

Purpose	This task connects power to the ONS 15327 shelf. You must install this power connector if you plan to install the right-angle DS-1 cable.
Tools/Equipment	#2 Phillips screwdriver Medium slot-head screwdriver Small slot-head screwdriver Wire wrapper Wire cutters Wire strippers Crimp tool Fuse panel Screw-lock power connector Power cable (from fuse and alarm panel to assembly), #10 AWG, copper conductors, 194°F [90°C]) Ground cable #6 AWG stranded Listed pressure terminal connectors such as ring and fork types; connectors must be suitable for #10 AWG copper conductors
Prerequisite Procedures	DLP-B16 Connect the Office Ground to the ONS 15327, page 1-13
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **Do not apply power to the ONS 15327 until you complete all installation steps and check the continuity of the -48 VDC and return.**

Caution Before you make any crimp connections, coat all bare conductors (battery, battery return, and frame ground) with an appropriate antioxidant compound. Bring all unplated connectors, braided strap, and bus bars to a bright finish, then coat with an antioxidant before you connect them. You do not need to prepare tinned, solder-plated, or silver-plated connectors and other plated connection surfaces in this manner, but always keep them clean and free of contaminants.

Note You must install this power connector if you plan to install the right-angle DS-1 cable.

Note This procedure explains how to install the screw-lock power connector. To install the terminal-lug power connector also included with the ONS 15327, see the "NTP-B222 Connect Office Power to the ONS 15327 Shelf (Terminal-Lug Power Connector)" procedure on page D-4.

Note If you encounter problems with the power supply, refer to the *Cisco ONS 15327 Troubleshooting Guide*.

Step 1 Connect the office power according to the fuse panel engineering specifications.

Step 2 Measure and cut the cables as needed to reach the ONS 15327 from the fuse panel.

Step 3 Dress the power according to local site practice.

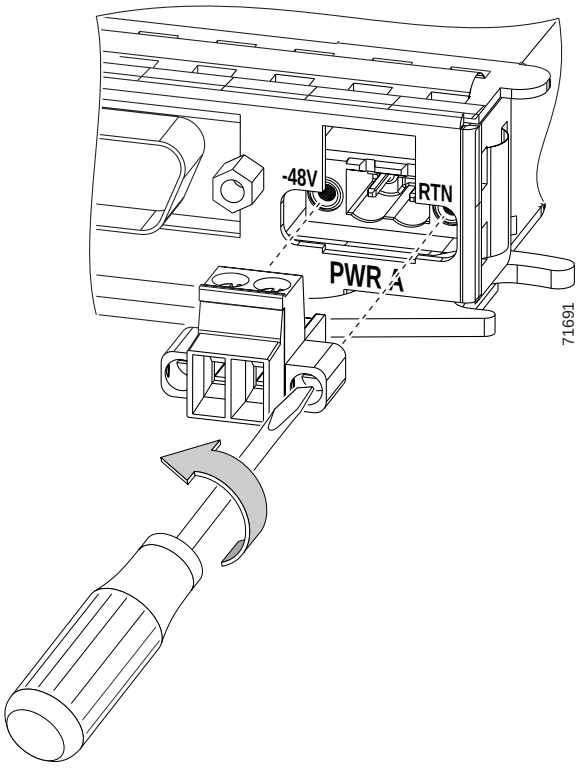
Warning **When installing the ONS 15327, the ground connection must always be made first and disconnected last.**

Step 4 Strip .22 inches of insulation from all power cables that you connect to the ONS 15327 power connectors.

Warning **Do not expose more than .22 inches of bare wire on power cables.**

Step 5 If the power connector is already installed, remove it from the MIC by grasping it with your fingers and gently pulling it. If you cannot remove it easily, you can use a pair of needle nose pliers and grab it by the center of the channel. Figure 1-4 shows the MIC power connector being removed.

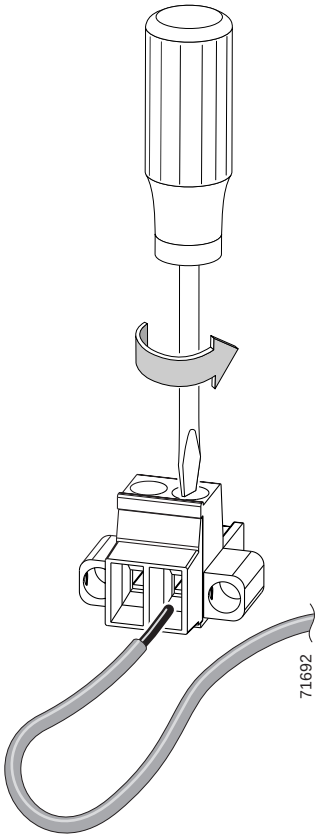
Figure 1-4 Removing the MIC Power Connector



Step 6 Remove the cable fastening screws, which are the screws on the top of the connector that become visible when the connector is removed.

Step 7 Insert the (black) return (RTN) wire into the right connector slot. Figure 1-5 shows a power cable being inserted into the MIC power connector.

Figure 1-5 Inserting a Power Cable into the MIC Power Connector



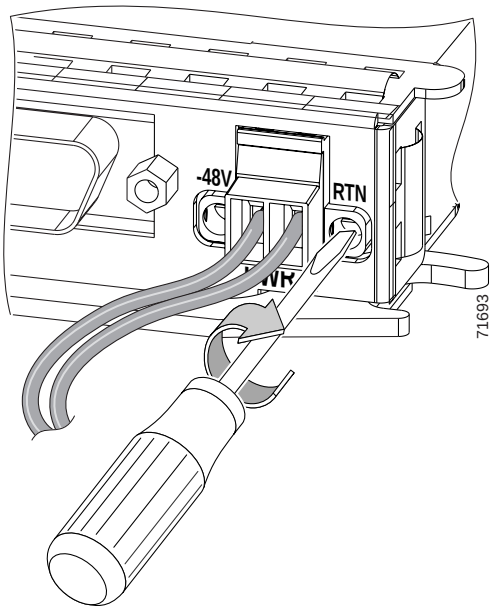
Step 8 Replace the cable fastening screw for the return (RTN) wire and tighten with a small slot-head screwdriver.

Step 9 Insert the battery (red) wire into the left (-48V) connector slot.

Step 10 Replace the cable fastening screw for the battery (-48V) wire and tighten it with the screwdriver.

Step 11 Insert the connector back into the slot on the MIC and tighten the screws with the screwdriver. Figure 1-6 shows the MIC power connector being installed.

Figure 1-6 Installing the MIC Power Connector



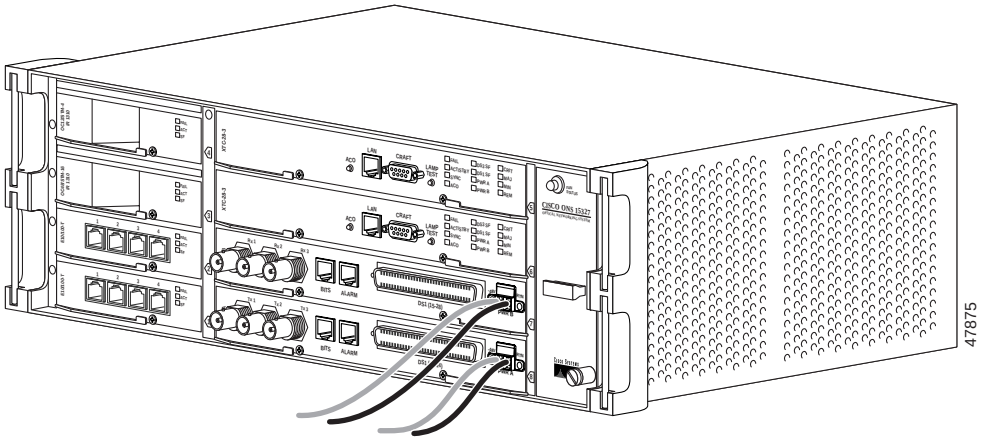
Step 12 Use a small flat-head screwdriver to open the return (RTN) terminal and insert the return lead.

Step 13 If you use redundant power feeds, repeat Steps 5 through 12 on the other MIC.

Caution In case a power cable is damaged or cut, Cisco recommends that you diversely route redundant power leads along different paths. If you installed the tie-down bar, you can run one power lead across the tie-down bar and secure it using tie-wraps or other site-specific methods. You should route the other power cable in the opposite direction.

Figure 1-7 shows redundant power connected to an ONS 15327.

Figure 1-7 Redundant Power Connections



Step 14 Return to your originating procedure (NTP).

DLP-B18 Turn On and Verify Office Power

Purpose	This task measures the power to verify correct power and returns.
Tools/Equipment	Voltmeter
Prerequisite Procedures	DLP-B16 Connect the Office Ground to the ONS 15327, page 1-13 DLP-B17 Connect Office Power to the ONS 15327 Shelf (Screw-Lock Power Connector), page 1-14
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Step 1 Using a voltmeter, verify the office battery and ground at the following points on the fuse and alarm panel:

a. To verify the power, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the A-side connection and verify that it is between -42 VDC and -57 VDC. Place the red test lead on the B-side connection and verify that it is between -42 VDC and -57 VDC.

Note The voltages -42 VDC and -57 VDC are the minimum and maximum amperages required to power the chassis.

b. To verify the ground, place the black test lead of the voltmeter to the frame ground. Place the red test lead on the A-side return ground and verify that no voltage is present. Place the red test lead on the B-side return ground and verify that no voltage is present.

Step 2 Insert a 10-amp fuse into the fuse position according to site practice.

Step 3 Using a voltmeter, verify the shelf for -48 VDC battery and ground:

a. To verify the A-side of the shelf, place the black lead of the voltmeter to the frame ground. Place the red test lead to the BAT1 (A-side battery connection) red cable. Verify it reads between -42 VDC and -57 VDC. Then place the red test lead of the voltmeter to the RET1 (A-side return ground) black cable and verify that no voltage is present.

b. To verify the B-side of the shelf, place the black test lead of the voltmeter to the frame ground. Place the red test lead to the BAT2 (B-side battery connection) red cable. Verify it reads between -42 VDC and -57 VDC. Then place the red test lead of the voltmeter to the RET2 (B-side return ground) black cable and verify that no voltage is present.

Step 4 Return to your originating procedure (NTP).

DLP-B30 Install Ferrites on Power Cabling

Purpose	This task installs third-party ferrites on power cables to dampen electromagnetic interference (EMI) from the ONS 15327.
Tools/Equipment	Voltmeter Block ferrite (Fair Rite 0443164151) for each pair of cables
Prerequisite Procedures	DLP-B16 Connect the Office Ground to the ONS 15327, page 1-13 DLP-B17 Connect Office Power to the ONS 15327 Shelf (Screw-Lock Power Connector), page 1-14
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Note Ferrites must be added to meet the requirements of GR 1089. Refer to the ferrite manufacturer documentation for proper use and installation of the ferrites.

Step 1 Wrap the cables once around and through the block ferrites.

Step 2 Place the block ferrite within 5 to 6 inches of the power terminals.

Step 3 Return to your originating procedure (NTP).

NTP-B7 Install the Fan-Tray Assembly

Purpose	This procedure installs the fan-tray assembly.
Tools/Equipment	#2 Phillips screwdriver Medium slot-head screwdriver Small slot-head screwdriver
Prerequisite Procedures	NTP-B2 Install the Shelf Assembly, page 1-5
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Caution Do not operate an ONS 15327 without a fan-tray air filter. A fan-tray air filter is mandatory.

Caution You must place the edge of the air filter flush against the front of the fan-tray assembly compartment when installing the fan-tray assembly on top of the air filter. Failure to do so could result in damage to the air filter, the fan-tray assembly, or both.

Caution Do not force a fan-tray assembly into place. Doing so can damage the connectors on the fan-tray assembly and/or the connectors on the back panel of the shelf assembly.

Step 1 If cables are installed, reposition them away from the fan-tray assembly slot.

Step 2 Slide the fan-tray assembly into the shelf assembly until the electrical plug at the rear of the tray plugs into the corresponding receptacle on the backplane.

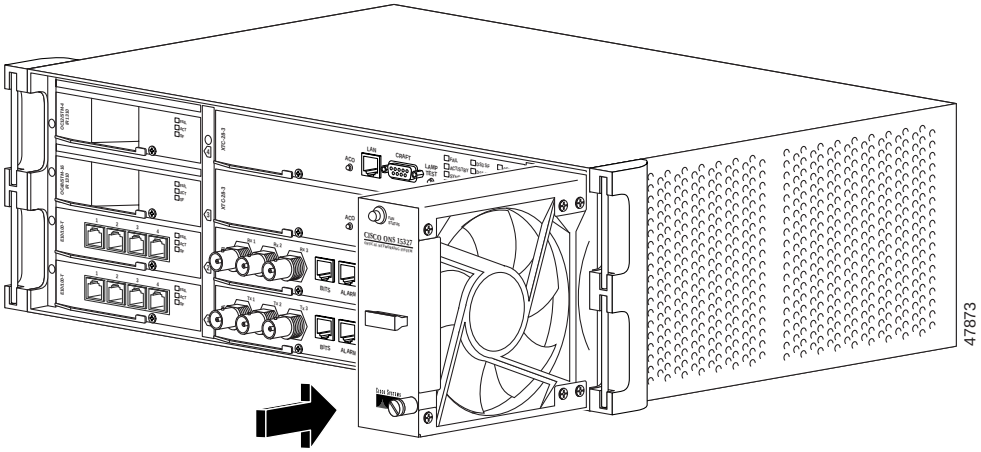
Step 3 Secure the fan-tray assembly into the slot using the attached fastening screw.

Step 4 After power is supplied, confirm that the FAN STATUS LED on the front of the fan-tray assembly is illuminated. This indicates that the fan-tray assembly is operating.

The FAN STATUS LED illuminates only when an XTC card is installed.

Figure 1-8 shows the location of the fan-tray assembly.

Figure 1-8 Installing the Fan-Tray Assembly



Step 5 Continue with the "NTP-B217 Install the XTCs" procedure on page 1-21.

Stop. You have completed this procedure.

NTP-B217 Install the XTCs

Purpose	This procedure installs the Cross-Connect Timing and Control (XTC) cards in Slots 5 and 6.
Tools/Equipment	None
Prerequisite Procedures	NTP-B7 Install the Fan-Tray Assembly, page 1-20 NTP-B216 Install the Mechanical Interface Cards, page 1-11
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Retrieve or higher

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool to avoid the risk of shock.**

Note Because all traffic cards boot from the working XTC card, at least one XTC card must be installed in order to boot any traffic cards.

Step 1 Install an XTC card in Slot 6 (Figure 1-9):

- **a.** Open the card ejectors.
- **b.** Slide the card along the guide rails into the slot.
- **c.** Close the ejectors.
- **d.** Lock the cards into place by tightening the ejector locking screws.

Slot 6 is the working XTC card slot.

Step 2 Verify that the red FAIL LED blinks for approximately 30 seconds.

Note Older versions of the XTC card may have an amber FAIL LED.

Step 3 Verify that all LEDs blink once and turn off.

Step 4 After approximately 5 minutes, verify the ACT/STBY LED is green (active).

Step 5 Install the second XTC card in Slot 5.

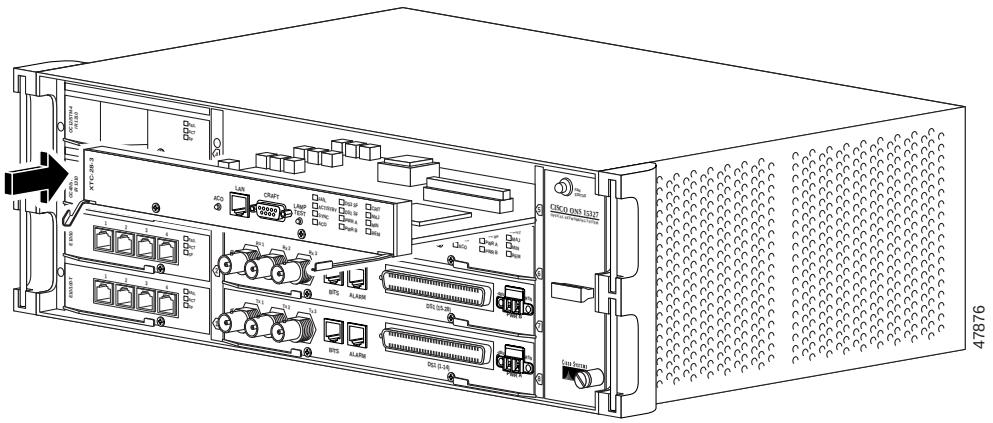
Slot 5 is the protect XTC slot.

Step 6 After the LED boot sequence (Steps 3 and 4), verify that the ACT/STBY LED is amber. The amber LED indicates that the second XTC card is the standby XTC.

Step 7 Press the LAMP TEST button on the faceplate of each XTC and verify that all LEDs illuminate while you press the button.

Step 8 When you log into CTC, verify that the card appears in the correct slot on the node view screen and that the card is white on the CTC node view screen.

Figure 1-9 Installing an XTC (XTC 28-3)



Step 9 Continue with the "NTP-B218 Install the Optical and Ethernet Cards" procedure on page 1-23.

Stop. You have completed this procedure.

NTP-B218 Install the Optical and Ethernet Cards

Purpose	This procedure installs the optical cards (OC-3, OC-12, and OC-48) and Ethernet cards (E10/100-4, G1000-2) in Slots 1 through 4.
Tools/Equipment	None
Prerequisite Procedures	NTP-B7 Install the Fan-Tray Assembly, page 1-20 NTP-B217 Install the XTCs, page 1-21
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Retrieve or higher

Warning **Install blank faceplates into empty card slots. Blank faceplates serve three functions: They prevent exposure to hazardous voltages and currents inside the ONS 15327 chassis, they eliminate electromagnetic interference (EMI) that might disrupt other equipment, and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards and faceplates are in place.**

Step 1 Install an Ethernet or optical card in Slots 1, 2, 3, or 4 (Figure 1-10):

- **a.** Open the card ejectors.
- **b.** Slide the card along the guide rails into the slot.
- **c.** Close the ejectors.
- **d.** Lock the cards into place by tightening the ejector locking screws.

Step 2 Verify that the red FAIL LED illuminates for 20 to 30 seconds.

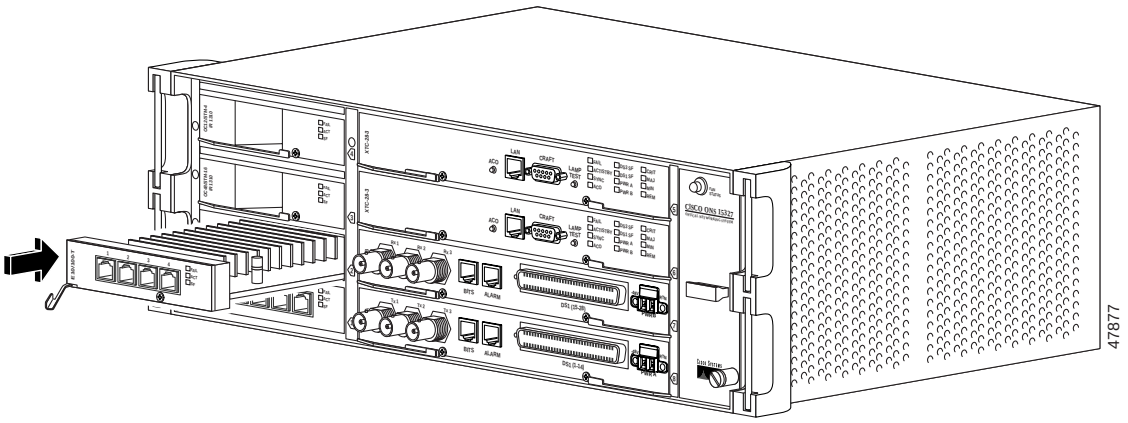
Step 3 Verify that the red FAIL LED blinks for 30 to 45 seconds.

Step 4 Verify that all LEDs blink once and turn off for 5 to 10 seconds.

Step 5 Verify the ACT LED illuminates.

Step 6 When you log into CTC, verify that the card appears in the correct slot on the CTC node view screen and appears white in node view.

Figure 1-10 Installing an Ethernet Card (E10/100-T)



Step 7 Repeat Steps 1 and 6 for each optical and Ethernet card you want to install.

Step 8 If you installed the G1000-2 card, complete the "DLP-D4 Install SFP Connectors on G1000-2 Cards" task on page 1-24.

Note If you need to remove an SFP, complete the "DLP-D6 Remove SFP Connectors from G1000-2 Cards" task on page 1-25.

Stop. You have completed this procedure.

DLP-D4 Install SFP Connectors on G1000-2 Cards

Purpose	This task installs small form-factor pluggables (SFPs) and attaches the fiber.
Tools/Equipment	Short wavelength (1000BaseSX): 15327-SFP-LC-SX Long wavelength/long haul (1000BaseLX): 15327-SFP-LC-LX
Prerequisite Procedures	NTP-B218 Install the Optical and Ethernet Cards, page 1-23
Required/As Needed	Required if you are G1000-2 cards.
Onsite/Remote	Onsite
Security Level	None

Note SFPs are hot-swappable and can be installed or removed while the card or shelf assembly is powered and running.

Warning **Invisible laser radiation may be emitted from the aperture ports of the single-mode fiber optic modules when no cable is connected. Avoid exposure and do not stare into open apertures.**

Step 1 Remove the SFP from its protective packaging.

Step 2 Check the label to verify that the SFP is the correct type (SX or LX) for your network.

Step 3 Verify that you are installing compatible SFPs; for example, SX to SX, LX to LX. SFPs must be matched on either end by type.

Step 4 Plug the duplex connector of the fiber into a Cisco-supported SFP connector. If the new SFP connector has a latch, close the latch over the cable to secure it.

Step 5 Plug the cabled SFP connector into the G1000-2 card port until it clicks.

Step 6 Return to your originating procedure (NTP).

DLP-D6 Remove SFP Connectors from G1000-2 Cards

Purpose	This task removes SFPs from your Ethernet cards.
Tools/Equipment	None
Prerequisite Procedures	DLP-D4 Install SFP Connectors on G1000-2 Cards, page 1-24
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Disconnect the network fiber cable from the SFP duplex connector. If the SFP connector has a latch securing the fiber cable, pull it upward to release the cable.

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.**

Step 2 Pull the fiber cable straight out of the connector.

Step 3 Unplug the SFP connector and fiber from the G1000-2 card.

Step 4 Slide the SFP out of the Gigabit Ethernet card slot.

Step 5 Return to your originating procedure (NTP).

NTP-B219 Remove and Replace a Card

Purpose	This procedure describes how to remove and replace cards in the ONS 15327 shelf.
Tools/Equipment	None
Prerequisite Procedures	None
Required/As Needed	As needed

Onsite/Remote	Onsite
Security Level	Provisioning or higher

Step 1 If you are not logged into CTC and you need to remove a card, remove the card as described in Step 3. When you log into CTC, troubleshoot the mismatched equipment (MEA) alarm with the *Cisco ONS 15327 Troubleshooting Guide*.

Step 2 If you are logged into CTC, either:

- Complete the "DLP-B320 Delete a Card" task on page 1-26 and continue with Step 3 or
- Complete the "DLP-B247 Change an Optical Card" task on page 1-27 to delete a card and replace it with a different optical card while maintaining existing provisioning.

Step 3 Physically remove the card:

a. Open the card latches/ejectors.

b. Use the latches/ejectors to pull the card forward and away from the shelf.

Step 4 Insert the new card using one of the following procedures as applicable:

- NTP-B217 Install the XTCs, page 1-21
- NTP-B218 Install the Optical and Ethernet Cards, page 1-23

Stop. You have completed this procedure.

DLP-B320 Delete a Card

Purpose	This task deletes a card from CTC.
Tools/Equipment	None
Prerequisite Procedures	DLP-B60 Log into CTC, page 2-23
Required/As Needed	As needed
Onsite/Remote	Both
Security Level	Provisioning or higher

Step 1 On the shelf graphic, right-click the card that you want to remove and choose **Delete Card**.

You cannot delete a card if any of the following conditions apply:

- The card is one of two installed XTC cards (a default XTC protection group was created); to replace an XTC card, refer to the Replace Hardware chapter in the *Cisco ONS 15454 Troubleshooting Guide*
- The card is part of a protection group; see DLP-B155 Delete a Protection Group, page 9-14
- The card has circuits; see NTP-B152 Delete Circuits, page 8-15
- The card is part of a bidirectional line switched ring (BLSR); see NTP-B213 Remove a BLSR Node, page 13-9
- The card is being used for timing; see DLP-B157 Change the Node Timing Source, page 9-15
- The card has a SONET DCC termination; see NTP-B204 Delete a SONET DCC Termination, page 9-14

Note If you do not remove a card from the shelf after you delete it in CTC, it will reboot and reappear in CTC.

Step 2 Return to your originating procedure (NTP).

DLP-B247 Change an Optical Card

Purpose	This task describes how to change an optical card while maintaining existing provisioning, including DCCs, circuits, protection, timing, and rings. You cannot change a multiport card to a card with a smaller number of ports, and you cannot change a card to an identical type of card.
Tools/Equipment	None
Prerequisite Procedures	DLP-B60 Log into CTC, page 2-23
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	Provisioning or higher

Caution Physically removing an optical card can cause a loss of working traffic or a protection switch. See Chapter 11, "Upgrade Cards and Spans" for information on upgrading traffic to a higher speed.

Step 1 If the card the active card in a 1+1 protection group, switch traffic away from the card:

a. Log into a node on the network. If you are already logged in, go to Step b.

b. Display the CTC node (login) view.

c. Click the **Maintenance** > **Protection** tabs.

d. Double-click the protection group that contains the reporting card.

e. Click the active card of the selected group.

f. Click **Switch** and **Yes** in the Confirmation dialog box.

Step 2 In node view, right-click the card that you want to remove and choose **Change Card**.

Step 3 From the Change Card drop-down menu, choose the desired card type and click **OK**. A Mismatched Equipment Alarm (MEA) will appear until you replace the card.

Step 4 Physically remove the card:

a. Open the card latches/ejectors.

b. Use the latches/ejectors to pull the card forward and away from the shelf.

Step 5 Return to your originating procedure (NTP).

NTP-B115 Preprovision a Slot

Purpose	This procedure describes how to preprovision a slot in the software before physical card installation.
Tools/Equipment	None
Prerequisite Procedures	Chapter 2, "Connect the PC and Log into the GUI"
Required/As Needed	As needed
Onsite/Remote	Onsite or Remote
Security Level	Provisioning or higher

Step 1 Log into the ONS 15454. See the "DLP-B60 Log into CTC" task on page 2-23 for instructions. The node (default) view displays. If you are already logged in, continue with Step 2.

Step 2 Right-click the empty slot where you will later install a card.

Step 3 From the Add Card popup menu, choose the card type that will be installed.

Note When you preprovision a slot, the card appears purple in the CTC shelf display, rather than white when a card is physically in the slot.

Step 4 Continue with the "NTP-B221 Install Optical Cables" procedure on page 1-40.

Stop. You have completed this procedure.

NTP-B8 Install Wires to Alarm, Timing, LAN, and Craft Pin Connections

Purpose	This procedure describes how to install alarm, timing, LAN, and craft wires.
Tools/Equipment	Alarm cable, CAT-5 terminated with RJ-45 for all alarm connections #22 or #24 shielded AWG wire
Prerequisite Procedures	NTP-B2 Install the Shelf Assembly, page 1-5
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Complete the "DLP-B321 Install External Alarm Cables" task on page 1-29 as necessary.

Step 2 Complete the "DLP-B322 Install Timing Cables" task on page 1-30 as needed. Timing wires are necessary to provision external timing.

Step 3 Complete the "DLP-B323 Install the Serial Cable for TL1 Craft Interface" task on page 1-32 as needed. Craft wires are required to access TL1 using the craft interface.

Step 4 Complete the "DLP-B324 Install DS-1 Champ Cables on a MIC" task on page 1-34 as needed to carry DS-1 traffic.

Step 5 Complete the "DLP-B325 Install Coaxial Cable With BNC Connectors" task on page 1-38 as needed to carry DS-3 traffic.

Caution Always use the supplied ESD wristband when working with a powered ONS 15327. Plug the wristband cable into the ESD jack located between the top high-speed and XTC slots.

Step 6 Continue with the "NTP-B220 Install the Electrical Cables" procedure on page 1-33.

Stop. You have completed this procedure.

DLP-B321 Install External Alarm Cables

Purpose	This task installs alarm cables on the MICs so that you can provision external (environmental) alarms and controls.
Tools/Equipment	Alarm cable, CAT-5 terminated with RJ-45 for all alarm connections
Prerequisite Procedures	NTP-B2 Install the Shelf Assembly, page 1-5
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Plug one end of the alarm cable into the ALARM port on the MIC.

Step 2 Plug the other end of the cable into the alarm-collection equipment according to local site practice.

Step 3 Repeat Steps 1 and 2 for the other MIC.

Note You can use the alarm cutoff (ACO) button to extinguish audible alarms.

Step 4 To define the six external alarm inputs and two external alarm outputs using CTC, see the "NTP-B32 Provision External Alarms and Controls on the XTC" procedure on page 6-33. Table 1-1 shows the input alarm pinouts and the corresponding alarm numbers assigned to each MIC/port. Table 1-2 shows the output alarm pinouts. Refer to these tables when connecting alarm cables to the ONS 15327. See Figure 1-11 for RJ-45 pin numbering.

Table 1-1 Alarm Input Pin Assignments

Alarm Number (MIC A)	Alarm Number (MIC B)	RJ-45 Pin Number	Function
2	1	5	Alarm 2+
		6	Alarm 2-
4	3	3	Alarm 1+
		4	Alarm 1-

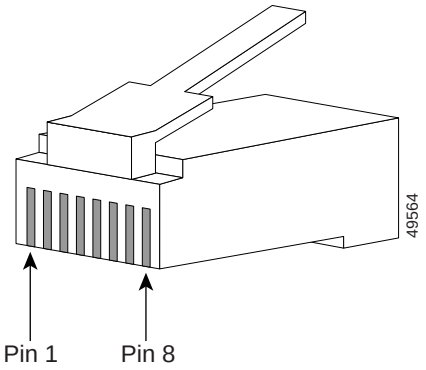
Table 1-1 Alarm Input Pin Assignments

Alarm Number (MIC A)	Alarm Number (MIC B)	RJ-45 Pin Number	Function
6	5	1	Alarm 0+
		2	Alarm 0-

Table 1-2 Alarm (External Control) Output Pin Assignments

Alarm Number (MIC A)	Alarm Number (MIC B)	RJ-45 Pin Number	Function
2	1	7	Contact+
		8	Contact-

Figure 1-11 Pins 1 and 8 on the RJ-45 Connector



Step 5 Return to your originating procedure (NTP).

DLP-B322 Install Timing Cables

Purpose	This task installs timing cables on the MICs so that you can provide BITS timing to the ONS 15327.
Tools/Equipment	#22 or #24 shielded AWG wire
Prerequisite Procedures	NTP-B2 Install the Shelf Assembly, page 1-5
Required/As Needed	Required if the node is using external BITS timing
Onsite/Remote	Onsite
Security Level	None

Step 1 Plug one end of the timing cable into the BITS port on the MIC.

Step 2 Plug the other end of the cable into the BITS clock according to local site practice.

Step 3 Repeat Steps 1 and 2 for the other MIC. See Table 1-3, Figure 1-12, and Figure 1-13 when connecting BITS cables to the ONS 15327.

Table 1-3 BITS Cable Pin Assignments

MIC A	MIC B	RJ-45 Pin Number	Function
BITS 1 In	BITS 2 In	3	BITS Input+
		4	BITS Input-
BITS 1 Out	BITS 2 Out	7	BITS Output+
		8	BITS Output-

Figure 1-12 BITS In Pins on the RJ-45 Connector

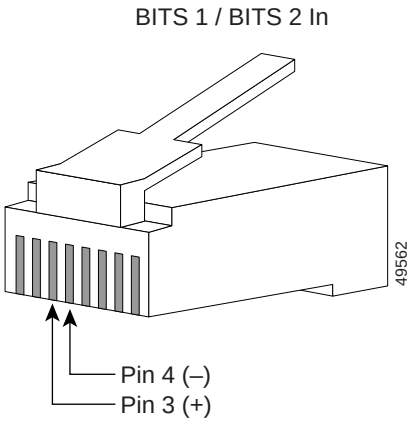


Figure 1-13 BITS Out Pins on the RJ-45 Connector

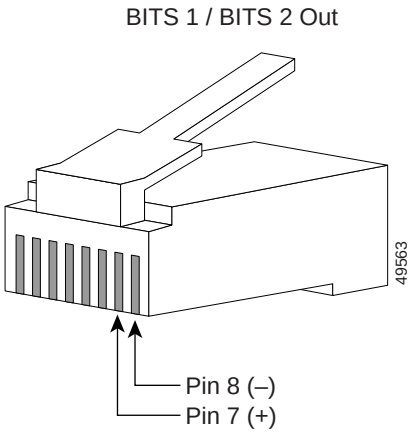


Table 1-4 External Timing Pin Assignments for BITS

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

Note For more detailed information about timing, refer to the *Cisco ONS 15327 Reference Manual*. To set up system timing, see the "NTP-B28 Set Up Timing" procedure on page 3-16.

Step 4 Return to your originating procedure (NTP).

DLP-B323 Install the Serial Cable for TL1 Craft Interface

Purpose	This task installs the TL1 craft interface.
Tools/Equipment	Serial cable (DB-9)
Prerequisite Procedures	NTP-B2 Install the Shelf Assembly, page 1-5
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Plug one end of the serial cable into the front of the XTC card.

Step 2 Connect the other end to the PC you want to use to access the craft.

Note You can connect to either the active or standby XTC DB-9 plug to gain terminal access, but not both simultaneously.

Step 3 Return to your originating procedure (NTP).

NTP-B220 Install the Electrical Cables

Purpose	This procedure describes how to install the electrical DS-1 (AMP Champ) and DS-3 (coaxial) cables. To carry electrical traffic on the ONS 15327, you must install electrical cable.
Tools/Equipment	Shielded coaxial cable terminated with BNC connectors for DS-3 ports Shielded ABAM cable terminated with Champ connectors for DS-1 ports with #22 or #24 AWG ground wire (typically about two feet in length)
Prerequisite Procedures	NTP-B8 Install Wires to Alarm, Timing, LAN, and Craft Pin Connections, page 1-28
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Always use the supplied ESD wristband when working with a powered ONS 15327. Plug the wristband cable into the ESD jack located between the top traffic and XTC slots.

Step 1 Complete the "DLP-B324 Install DS-1 Champ Cables on a MIC" task on page 1-34 as needed.

Step 2 Complete the "DLP-B325 Install Coaxial Cable With BNC Connectors" task on page 1-38 as needed.

Step 3 Complete the "DLP-B326 Route Electrical Cables" task on page 1-39 as needed.

Step 4 Continue with the "NTP-B221 Install Optical Cables" procedure on page 1-40.

Stop. You have completed this procedure.

DLP-B324 Install DS-1 Champ Cables on a MIC

Purpose This task installs DS-1 cables.

Tools/Equipment One of the following DS-1 cables (either right-angle or straight):

- Right-angle DS-1 cable
  - Amphenol GCA70 03006 RSE (30 feet)
  - Amphenol GCA70 03007 RSE (50 feet)
  - Amphenol GCA70 03008 RSE (100 feet)
  - Amphenol GCA70 03009 RSE (250 feet)
  - Volex VLX979-30 (30 feet)
  - Volex VLX979-50 (50 feet)
  - Volex VLX979-100 (100 feet)
  - Volex VLX979-250 (250 feet)
- Straight DS-1 cable

Installing Champ connector DS-1 cables requires 64-pin bundled cable connectors with a 64-pin male Champ connector. You need Champ connector #552285-1 for the plug side and #1-552496-1 for the right-angle shell housing, or their functional equivalents.

Prerequisite Procedures NTP-B8 Install Wires to Alarm, Timing, LAN, and Craft Pin Connections, page 1-28

Required/As Needed As needed

Onsite/Remote Onsite

Security Level None

Caution Always use the supplied ESD wristband when working with a powered ONS 15327. Plug the wristband cable into the ESD jack located between the top high-speed and XTC slots.

Step 1 Prepare a 56-wire cable for each DS-1 connection you will make. See Table 1-5 for the ONS 15327 Champ connector pin assignments.

Table 1-5 Pin Assignments for Champ Connector (the shaded area corresponds to the white/orange binder group)

Signal/Wire	Pin	Pin	Signal/Wire	Signal/Wire	Pin	Pin	Signal/Wire
Tx Tip 1 white/blue	1	33	Tx Ring 1 blue/white	Rx Tip 1 yellow/orange	17	49	Rx Ring 1 orange/yellow
Tx Tip 2 white/orange	2	34	Tx Ring 2 orange/white	Rx Tip 2 yellow/green	18	50	Rx Ring 2 green/yellow
Tx Tip 3 white/green	3	35	Tx Ring 3 green/white	Rx Tip 3 yellow/brown	19	51	Rx Ring 3 brown/yellow
Tx Tip 4 white/brown	4	36	Tx Ring 4 brown/white	Rx Tip 4 yellow/slate	20	52	Rx Ring 4 slate/yellow

Table 1-5 Pin Assignments for Champ Connector (the shaded area corresponds to the white/orange binder group) (continued)

Signal/Wire	Pin	Pin	Signal/Wire	Signal/Wire	Pin	Pin	Signal/Wire
Tx Tip 5 white/slate	5	37	Tx Ring 5 slate/white	Rx Tip 5 violet/blue	21	53	Rx Ring 5 blue/violet
Tx Tip 6 red/blue	6	38	Tx Ring 6 blue/red	Rx Tip 6 violet/orange	22	54	Rx Ring 6 orange/violet
Tx Tip 7 red/orange	7	39	Tx Ring 7 orange/red	Rx Tip 7 violet/green	23	55	Rx Ring 7 green/violet
Tx Tip 8 red/green	8	40	Tx Ring 8 green/red	Rx Tip 8 violet/brown	24	56	Rx Ring 8 brown/violet
Tx Tip 9 red/brown	9	41	Tx Ring 9 brown/red	Rx Tip 9 violet/slate	25	57	Rx Ring 9 slate/violet
Tx Tip 10 red/slate	10	42	Tx Ring 10 slate/red	Rx Tip 10 white/blue	26	58	Rx Ring 10 blue/white
Tx Tip 11 black/blue	11	43	Tx Ring 11 blue/black	Rx Tip 11 white/orange	27	59	Rx Ring 11 orange/white
Tx Tip 12 black/orange	12	44	Tx Ring 12 orange/black	Rx Tip 12 white/green	28	60	Rx Ring 12 green/white
Tx Tip 13 black/green	13	45	Tx Ring 13 green/black	Rx Tip 13 white/brown	29	61	Rx Ring 13 brown/white
Tx Tip 14 black/brown	14	46	Tx Ring 14 brown/black	Rx Tip 14 white/slate	30	62	Rx Ring 14 slate/white
Tx Spare 0+ N/A	15	47	Tx Spare0- N/A	Rx Spare0+ N/A	31	63	Rx Spare 0- N/A
Tx Spare 1+ N/A	16	48	Tx Spare1- N/A	Rx Spare1+ N/A	32	64	Rx Spare 1- N/A

Step 2 Connect the male Champ connector on the cable to the female Champ connector on the ONS 15327 MIC. The DS-1 cable can have a straight or right-angle configuration. Figure 1-14 shows a straight DS-1 cable.

Note To install the right-angle DS-1 cable, you must have the screw-lock power connector installed.

Figure 1-14 Straight DS-1 Cable

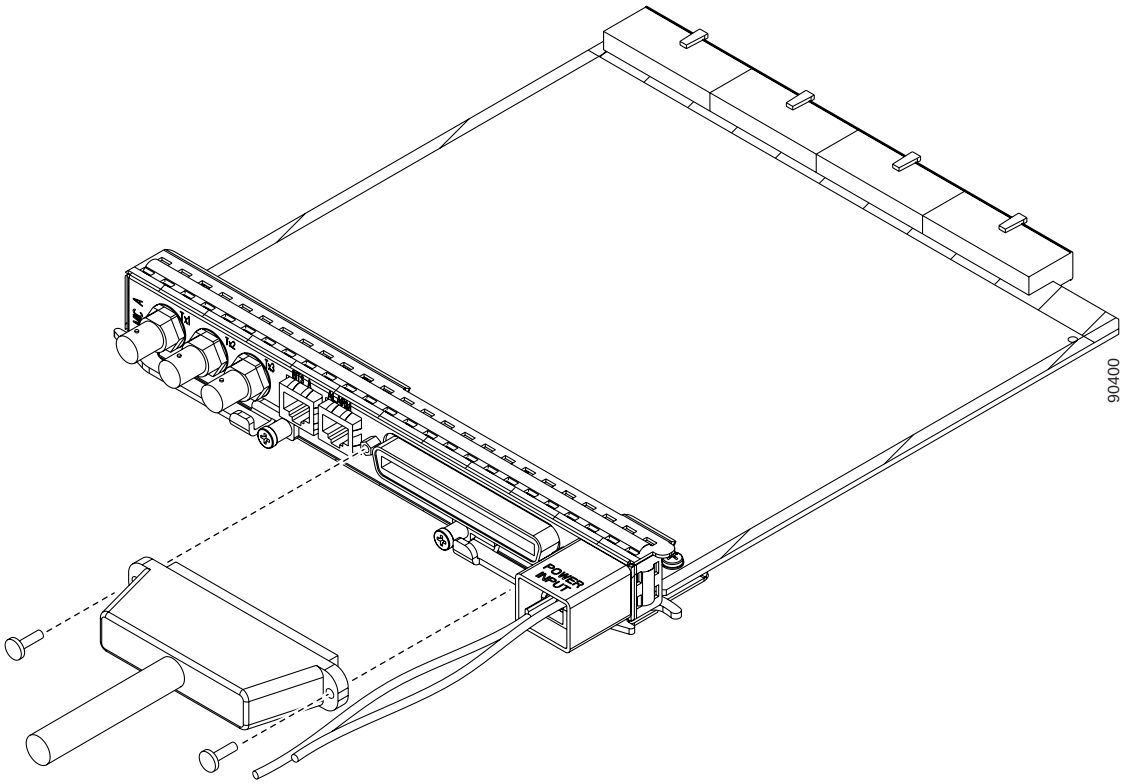
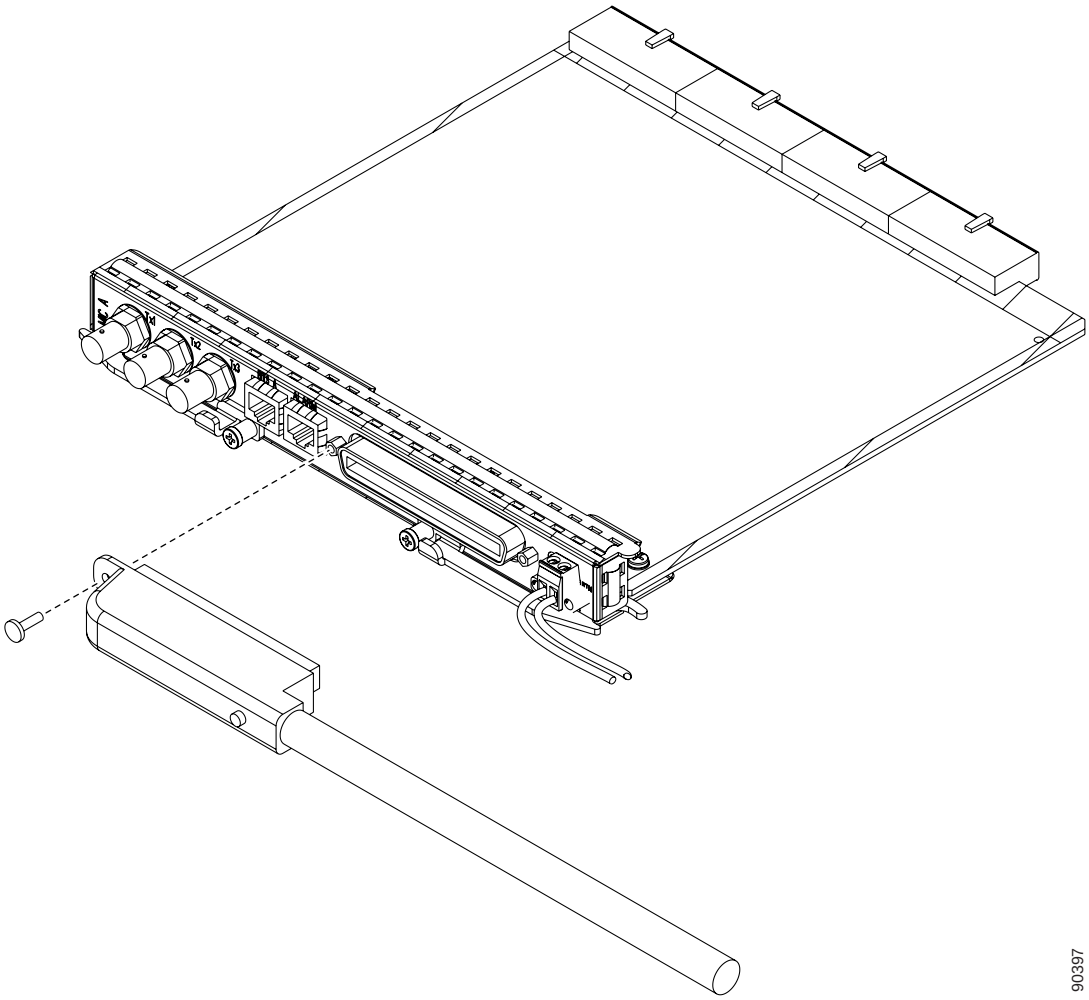


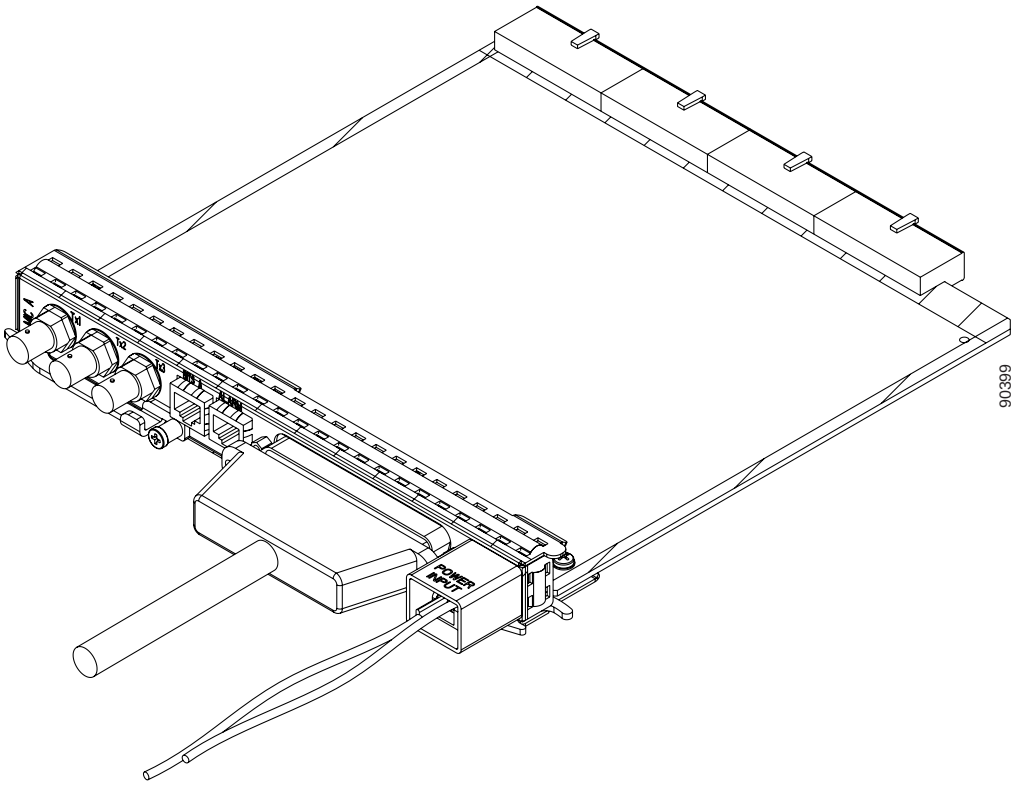
Figure 1-15 shows a right-angle DS-1 cable.

Figure 1-15 Right-Angle DS-1 Cable



Step 3 Use the screws on the male connector to secure the connection. Figure 1-16 shows a straight DS-1 cable installation.

Figure 1-16 Installing a Straight DS-1 Cable



Step 4 Return to your originating procedure (NTP).

DLP-B325 Install Coaxial Cable With BNC Connectors

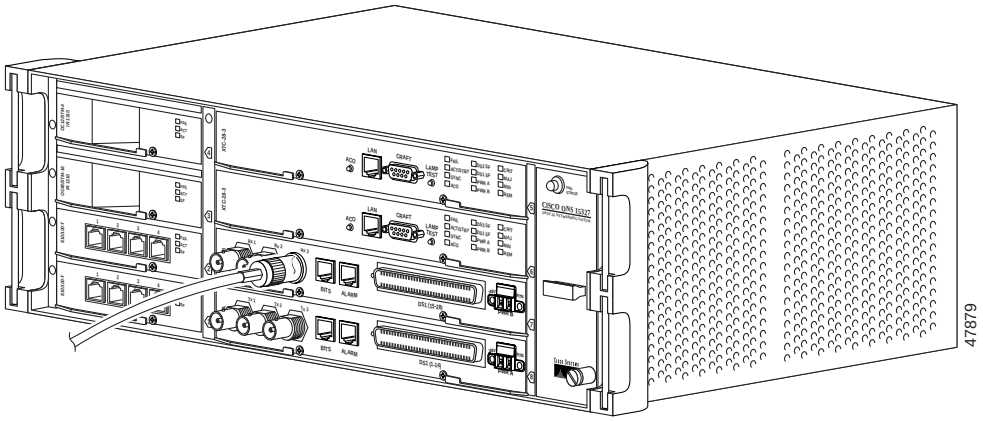
Purpose	This task installs the coaxial cable with BNC connectors to connect DS-3 signals to the ONS 15327.
Tools/Equipment	Shielded coaxial cable terminated with BNC connectors for DS-3 ports
Prerequisite Procedures	None
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Always use the supplied ESD wristband when working with a powered ONS 15327. Plug the wristband cable into the ESD jack located between the top high-speed and XTC slots.

Step 1 Place a BNC cable connector over the connector on the MIC.

Figure 1-17 shows how to connect a coaxial cable to an ONS 15327 MIC.

Figure 1-17 Installing a Coaxial Cable with BNC Connectors



Step 2 Position the cable connector so that the slot in the connector is above the corresponding notch on the MIC connection point.

Step 3 Gently push the connector down until the notch on the MIC connector slides into the slot on the cable connector.

Step 4 Turn the cable connector until the notch clicks into place.

Step 5 Return to your originating procedure (NTP).

DLP-B326 Route Electrical Cables

Purpose	Use this task to route and manage electrical cables.
Tools/Equipment	None
Prerequisite Procedures	NTP-B220 Install the Electrical Cables, page 1-33
Required/As Needed	Required if using electrical cards
Onsite/Remote	Onsite
Security Level	None

Caution Because cables can be damaged or cut, Cisco recommends that you diversely route redundant cables along different paths. If you installed the tie-down bar, you can run one cable across the tie-down bar and secure it using tie-wraps or other site-specific methods. You should route the other cable in the opposite direction. You can also route the cable through the cable storage drawer. See the "NTP-B223 Install the Fiber-Optic Cable Storage Drawer" procedure on page D-2 and the "NTP-B224 Route Cables Through the Fiber-Optic Cable Storage Drawer" procedure on page D-2.

Step 1 Route the cables to the nearest side of the shelf assembly through the side cutouts according to local site practice.

Step 2 Label all cables at each end of the connection to avoid confusion with cables that are similar in appearance.

Step 3 Return to your originating procedure (NTP).

NTP-B221 Install Optical Cables

Purpose	This procedure describes how to install fiber-optic cables on optical cards and small form-factor pluggable (SFP) interfaces.
Tools/Equipment	Single-mode SC fiber jumpers with UPC polish (55 dB or better) for OC12 and OC-48 cards and fiber jumpers with LC connectors for the OC-3 card Fiber boot
Prerequisite Procedures	NTP-B218 Install the Optical and Ethernet Cards, page 1-23
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Warning **Invisible laser radiation can be emitted from the aperture port when no cable is connected. To avoid exposure to laser radiation do not stare into open apertures.**

Caution Always use the supplied electrostatic discharge wristband when working with a powered ONS 15327. Plug the wristband cable into the ESD jack located between the top high-speed and XTC slots.

Note You can install the fiber immediately after installing the cards, or wait until you are ready to turn up the network. See Chapter 4, "Turn Up Network."

Note Inspect and clean all fiber connectors thoroughly. See the "NTP-B112 Clean Fiber Connectors" procedure on page 14-20 for instructions. Dust particles can degrade performance. Put caps on any fiber connectors that are not used.

Note To install fiber-optic cables in the ONS 15327, a fiber cable with the corresponding connector type must be connected to the transmit and receive ports on the ONS 15327 cards.

Step 1 Test the optical receive levels for the installed cards and attenuate them accordingly. See Table 1-6 for the minimum and maximum levels.

Table 1-6 Optical Transmit and Receive Levels

	Transmit		Receive	
Card	**Minimum**	**Maximum**	**Minimum**	**Maximum**
OC3 IR 4 1310	–15 dBm	–8 dBm	–28 dBm	–8 dBm
OC12 IR 1310	–15 dBm	–8 dBm	–29 dBm	–7 dBm
OC12 LR 1550	–3 dBm	+2 dBm	–29 dBm	–7 dBm
OC48 IR 1310	–5 dBm	0 dBm	–18 dBm	–0 dBm
OC48 LR 1310	–2 dBm	+3 dBm	–28 dBm	–8 dBm

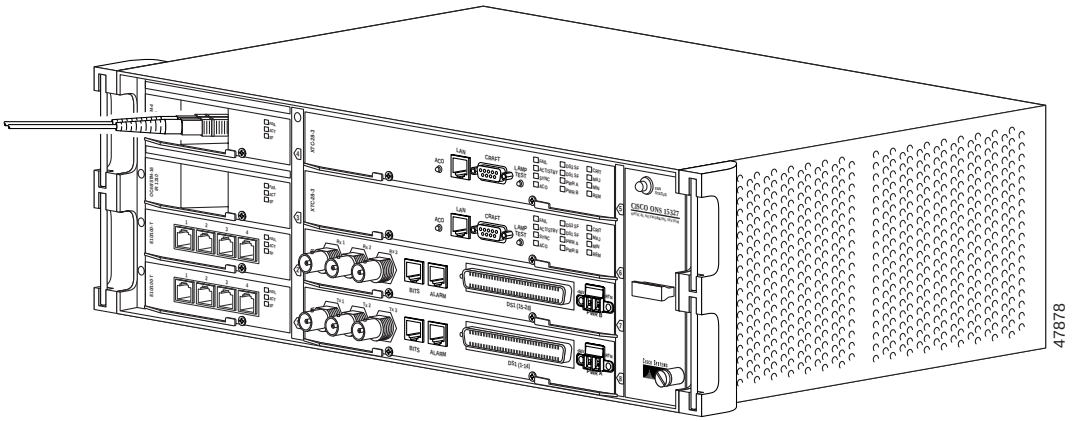
Step 2 As needed, complete the "DLP-B327 Install Fiber-Optic Cables on the LGX Interface" task on page 1-42. Figure 1-18 shows the cable location.

Step 3 As needed, complete the "DLP-B42 Install Fiber-Optic Cables on OC-N Cards" task on page 1-42.

Step 4 As needed, complete the "DLP-B43 Install Fiber-Optic Cables for Path Protection Configurations" task on page 1-43.

Step 5 As needed, complete the "DLP-B44 Install Fiber-Optic Cables for BLSR Configurations" task on page 1-46.

Figure 1-18 Installing a Fiber-Optic Cable



Step 6 As needed, complete the "DLP-B46 Route Fiber-Optic Cables" task on page 1-47.

Step 7 Continue with the "NTP-B13 Perform the Shelf Installation Acceptance Test" task on page 1-48.

Stop. You have completed this procedure.

DLP-B327 Install Fiber-Optic Cables on the LGX Interface

Purpose	This task installs fiber-optic cables on the Lightguide Cross Connect (LGX) interface in the Central Office.
Tools/Equipment	Fiber-optic cables
Prerequisite Procedures	NTP-B218 Install the Optical and Ethernet Cards, page 1-23 NTP-B112 Clean Fiber Connectors, page 14-20
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note Inspect and clean all fiber connectors thoroughly. See the "NTP-B112 Clean Fiber Connectors" procedure on page 14-20 for instructions. Dust particles can degrade performance. Put caps on any fiber connectors that are not used.

Step 1 Align the keyed ridge of the cable connector with the receiving SC connector on the LGX faceplate connection point. Each module supports at least one transmit and one receive connector to create an optical carrier port.

Step 2 Gently insert the cable connector into the faceplate connection point until the connector snaps into place.

Step 3 Connect the fiber optic cable to the OC-N card. See the "DLP-B42 Install Fiber-Optic Cables on OC-N Cards" task on page 1-42.

Step 4 Return to your originating procedure (NTP).

DLP-B42 Install Fiber-Optic Cables on OC-N Cards

Purpose	This task installs fiber-optic cables on optical (OC-N) cards.
Tools/Equipment	Fiber-optic cables
Prerequisite Procedures	NTP-B218 Install the Optical and Ethernet Cards, page 1-23 NTP-B112 Clean Fiber Connectors, page 14-20 DLP-B327 Install Fiber-Optic Cables on the LGX Interface, page 1-42 (as applicable)
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note Inspect and clean all fiber connectors thoroughly. See the "NTP-B112 Clean Fiber Connectors" procedure on page 14-20 for instructions. Dust particles can degrade performance. Put caps on any fiber connectors that are not used.

Note ONS 15327 OC-12 and OC-48 cards have SC connectors and the OC-3 and G1000-2 cards have LC connectors. On ONS 15327 OC-12 and OC-48 card ports, the left connector is the transmit port and the right connector is the receive port.

Step 1 Align the keyed ridge of the cable connector with the receiving connector on the faceplate connection point. Each card supports at least one transmit and one receive connector to create an optical carrier port.

Step 2 Gently insert the cable connector into the faceplate connection point until the connector snaps into place.

Step 3 Return to your originating procedure (NTP).

DLP-B43 Install Fiber-Optic Cables for Path Protection Configurations

Purpose	This task installs the fiber-optic cables to the east and west path protection ports at each node. See Chapter 4, "Turn Up Network" to provision and test path protection configurations.
Tools/Equipment	Fiber-optic cables
Prerequisite Procedures	NTP-B218 Install the Optical and Ethernet Cards, page 1-23 NTP-B112 Clean Fiber Connectors, page 14-20
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note To avoid error, connect fiber-optic cable so that the highest slot in the shelf represents the east port, and the lowest slot represents the west port. Fiber connected to an east port at one node must plug into the west port on an adjacent node.

Note Inspect and clean all fiber connectors thoroughly. See the "NTP-B112 Clean Fiber Connectors" procedure on page 14-20 for instructions. Dust particles can degrade performance. Put caps on any fiber connectors that are not used.

Note You can install the fiber immediately after installing the cards, or wait until you are ready to turn up the network. See Chapter 4, "Turn Up Network."

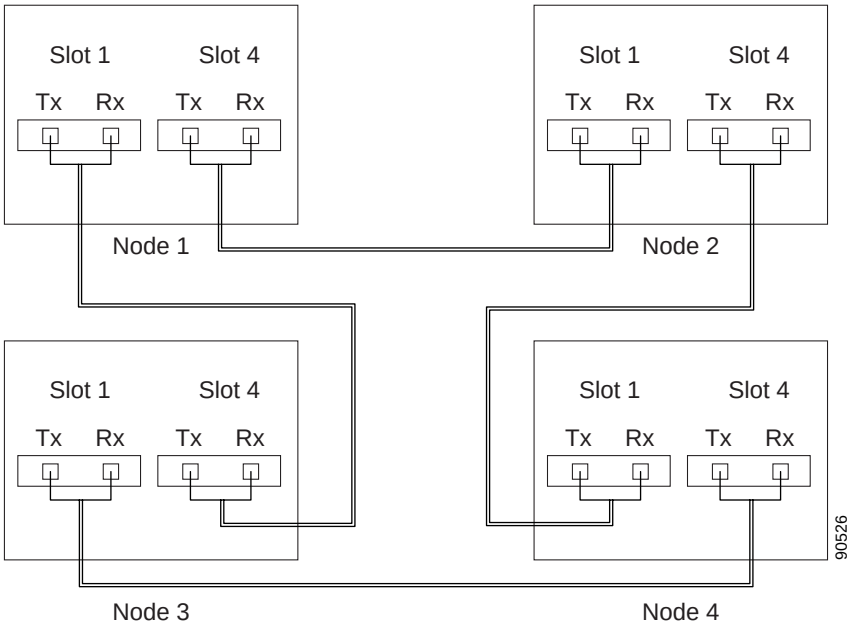
Step 1 Plan your fiber connections. Use the same plan for all path protection nodes.

Step 2 Plug the fiber into the transmit (Tx) connector of an OC-N card at one node and plug the other end of the fiber into the receive (Rx) connector of an OC-N card at the adjacent node. The card will display a signal fail (SF) LED if the transmit and receive fibers are mismatched (for example, one fiber connects a receive port on one card to a receive port on another card).

Step 3 Repeat Step 2 until you have configured the entire ring.

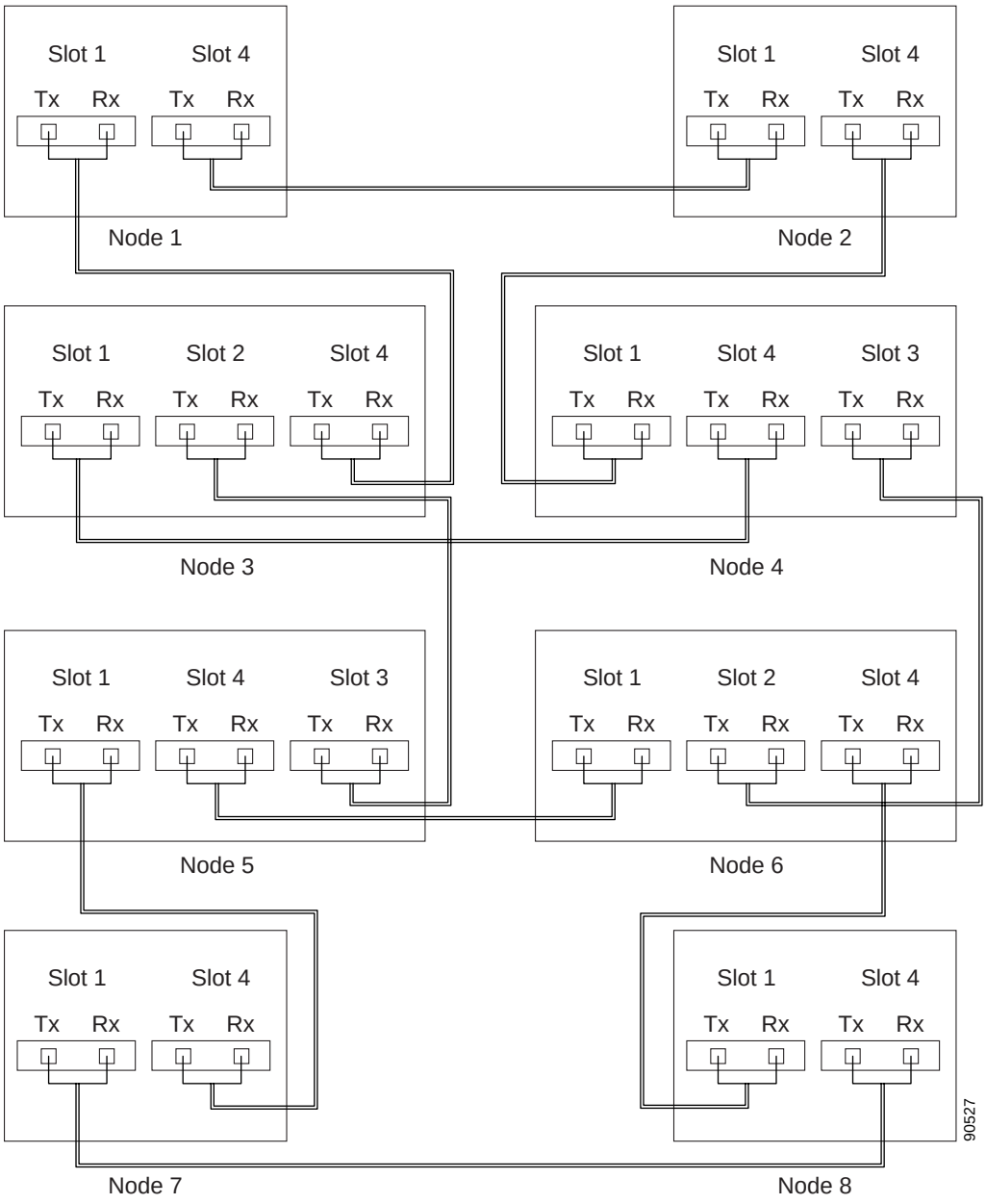
Figure 1-19 shows fiber connections for a four-node path protection with trunk (span) cards in Slot 5 (west) and Slot 12 (east).

Figure 1-19 Connecting Fiber to a Four-Node Path Protection



If you are creating a path protection dual ring interconnect, Figure 1-20 shows a traditional dual ring interconnect example.

Figure 1-20 Connecting Fiber to an Eight-Node Traditional Path Protection Dual-Ring Interconnect



Step 4 Return to your originating procedure (NTP).

DLP-B44 Install Fiber-Optic Cables for BLSR Configurations

Purpose	This task installs the fiber-optics to the east and west BLSR ports at each node. See Chapter 4, "Turn Up Network" to provision and test BLSR configurations.
Tools/Equipment	Fiber-optic cables
Prerequisite Procedures	NTP-B218 Install the Optical and Ethernet Cards, page 1-23 NTP-B112 Clean Fiber Connectors, page 14-20
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Note To avoid error, connect fiber-optic cable so that the highest slot on the 15327 chassis represents the east port, and the lowest slot represents the west port. Fiber connected to an east port at one node must plug into the west port on an adjacent node.

Note Inspect and clean all fiber connectors thoroughly. See the "NTP-B112 Clean Fiber Connectors" procedure on page 14-20 for instructions. Dust particles can degrade performance. Put caps on any fiber connectors that are not used.

Note You can install the fiber immediately after installing the cards, or wait until you are ready to turn up the network. See Chapter 4, "Turn Up Network."

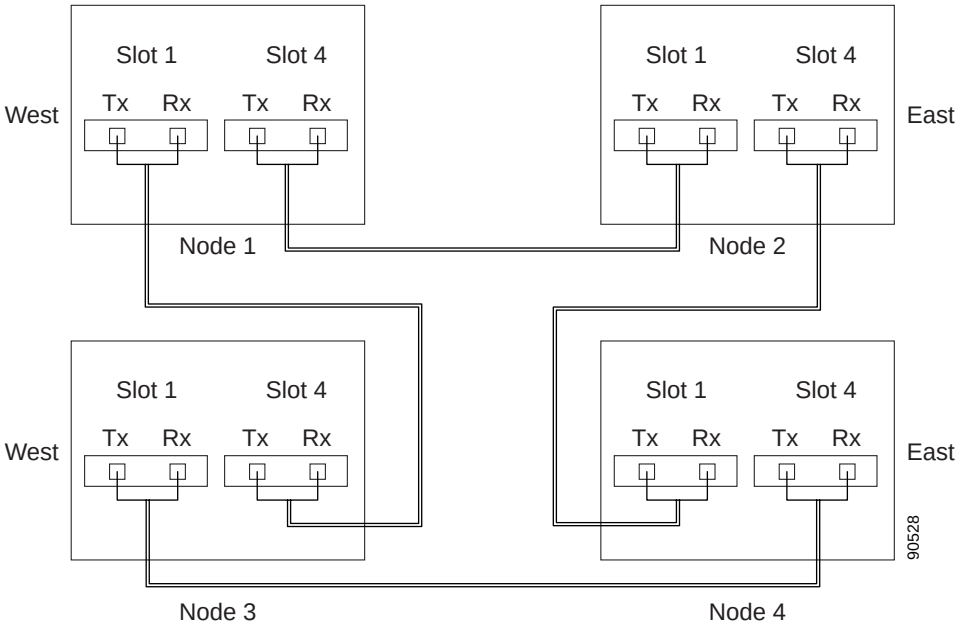
Step 1 Plan your fiber connections. Use the same plan for all BLSR nodes.

Step 2 Plug the fiber into the transmit (Tx) connector of an OC-N card at one node and plug the other end into the receive (Rx) connector of an OC-N card at the adjacent node. The card will display a signal fail (SF) LED if the transmit and receive fibers are mismatched.

Step 3 Repeat Step 2 until you have configured the entire ring.

Figure 1-21 shows fiber connections for a BLSR with trunk (span) cards in Slot 5 (west) and Slot 12 (east).

Figure 1-21 Connecting Fiber to a Four-Node, Two-Fiber BLSR



Step 4 Return to your originating procedure (NTP).

DLP-B46 Route Fiber-Optic Cables

Purpose	This task describes how to route fiber-optic cables through the cable guides on the sides of the shelf assembly.
Tools/Equipment	None
Prerequisite Procedures	NTP-B221 Install Optical Cables, page 1-40
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

Caution Because an optical cable can be damaged or cut, Cisco recommends that you diversely route redundant cables along different paths. If you installed the tie-down bar, you can run one cable across the tie-down bar and secure it using tie-wraps or other site-specific methods. You should route the other cable in the opposite direction. You can also route the cable through the cable storage drawer. See the "NTP-B223 Install the Fiber-Optic Cable Storage Drawer" procedure on page D-2 and the "NTP-B224 Route Cables Through the Fiber-Optic Cable Storage Drawer" procedure on page D-2.

Step 1 Locate the cable guides on either side of the shelf assembly.

Step 2 Gently route the fiber cables through the cable guides.

Step 3 Return to your originating procedure (NTP).

NTP-B13 Perform the Shelf Installation Acceptance Test

Purpose	Use this procedure to perform a shelf installation acceptance test.
Tools/Equipment	Voltmeter
Prerequisite Procedures	Chapter 1, "Install Hardware"
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Retrieve or higher

Step 1 Complete Table 1-7 on page 1-48 by verifying that each procedure was completed.

Table 1-7 ONS 15327 Shelf Installation Task Summary

Description	Completed
NTP-B1 Unpack and Inspect the ONS 15327 Shelf Assembly, page 1-4	
NTP-B2 Install the Shelf Assembly, page 1-5	
NTP-B216 Install the Mechanical Interface Cards, page 1-11	
NTP-B6 Install the Power and Ground, page 1-12	
NTP-B7 Install the Fan-Tray Assembly, page 1-20	
NTP-B217 Install the XTCs, page 1-21	
NTP-B218 Install the Optical and Ethernet Cards, page 1-23	
NTP-B8 Install Wires to Alarm, Timing, LAN, and Craft Pin Connections, page 1-28	
NTP-B220 Install the Electrical Cables, page 1-33	
NTP-B221 Install Optical Cables, page 1-40	

Step 2 Check each wire and cable connection to make sure all cables are locked securely. If a wire or cable is loose, return to the appropriate procedure in this chapter to correct it.

Step 3 Complete the "DLP-B33 Measure Voltage" task on page 1-49.

Stop. You have completed this procedure.

DLP-B33 Measure Voltage

Purpose	This task measures power so you can verify correct power and returns.
Tools/Equipment	Voltmeter
Prerequisite Procedures	NTP-B6 Install the Power and Ground, page 1-12 Table 1-7 on page 1-48.
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None

Step 1 Using a voltmeter, verify the office ground and power shows the power terminals):

a. Place the black lead (positive) on the frame ground on the rack. Hold it there while completing Step b.

b. Place the red lead (negative) on the fuse power points and alarm panel to verify that they read between -42 VDC and -57 VDC (power) and 0 (return ground).

Step 2 Using a voltmeter, verify the shelf ground and power wiring:

a. Place the black lead (positive) on the RET1 and the red lead on the BAT1 point. Verify a reading between -42 VDC and -57 VDC. If there is no voltage, check the following:

- Battery and ground reversed to the shelf
- Battery is open or missing
- Return is open or missing

b. Repeat Step 2 for the RET2 and BAT2 if the B power feed is provided.

Step 3 Return to your originating procedure (NTP).