CHAPTER 2

Install Cards and Fiber-Optic Cable

This chapter explains how to install the Cisco ONS 15600 cards and fiber-optic cable (fiber).

Before You Begin

Before beginning this chapter, complete Chapter 1, "Install the Bay and Backplane Connections."

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

1. NTP-E10 Install the Common Control Cards, page 2-2—Complete this procedure before continuing with the "NTP-E11 Install the OC-N Cards" procedure on page 2-4.
2. NTP-E11 Install the OC-N Cards, page 2-4—Complete this procedure before continuing with the "NTP-E15 Install the Fiber-Optic Cables" procedure on page 2-9.
3. NTP-E183 Install the ASAP Card, page 2-6—Complete as needed to install the ASAP card, which provides OC-3, OC-12, OC-48, OC-192, and Gigabit Ethernet ports.
4. NTP-E12 Install the Filler Cards, page 2-7—Complete as needed to fill any unused optical card slots with filler cards.
5. NTP-E13 Preprovision a Card Slot, page 2-8—Complete as needed to provision an empty card slot.
6. NTP-E14 Remove and Replace a Card, page 2-8—Complete as needed.
7. NTP-E15 Install the Fiber-Optic Cables, page 2-9—Complete this procedure to install and route the fiber-optic cables.
8. NTP-E16 Replace the Front Door, page 2-12—Complete as needed.

Warning **The intra-building ports of the ONS 15600 are only suitable for connecting intra-building, unexposed wiring, or cabling. The intra-building ports of ONS 15600 must not be metallically connected to interfaces that connect to the OSP or its wiring. These interfaces are designed only to be used as intra-building interfaces (Type 2 or Type 4 ports as described in** GR-1089-CORE, Issue 4**) and require isolation from the exposed OSP cabling. Adding primary protectors is not sufficient to connect these interfaces metallically to OSP wiring.**

Warning **The intrabuilding ports of the ONS 15600 are only suitable for connecting to shielded intra-building cabling grounded at both ends.**

Note The Cisco ONS 15600 is designed only for a Common Bonding Network (CBN), in accordance with the definitions in Section 9.3 of GR1089 Issue 4.

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030

Warning **Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain 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, faceplates, front covers, and rear covers are in place.** Statement 1029

NTP-E10 Install the Common Control Cards

Purpose	This procedure installs the Timing and Shelf Control (TSC) cards and then the Single Shelf Cross-Connect (SSXC) cards, which are required to operate the ONS 15600.
Tools/Equipment	Redundant TSC cards and SSXC cards
Prerequisite Procedures	NTP-E7 Perform the Bay Installation Acceptance Test, page 1-14
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, or you could shock yourself.** Statement 94

Caution Always use the supplied ESD wristband when working with a powered ONS 15600. For detailed instructions on how to wear the ESD wristband, refer to the Cisco ONS Electrostatic Discharge (ESD) and Grounding Guide.

Note For information about the TSC and SSXC cards (such as LED information), refer to the *Cisco ONS 15600 Reference Manual*.

Step 1 Remove the card from the box and antistatic sleeve.

Step 2 Install cards in the following sequence:

- Slot 5, TSC card
- Slot 10, TSC card
- Slots 6 and 7, SSXC card

- Slots 8 and 9, SSXC card

Note Software Release 5.0 or higher requires the SSXC card, so when upgrading to Software R5.0 or higher, you must install an SSXC card. Refer to the release-specific software upgrade guide for more information on upgrading the ONS 15600 software. Software R1.4 cannot be upgraded to Software R5.0 or beyond.

Step 3 Open the card ejectors.

Step 4 Slide a card along the top and bottom guide rails into the correct slot (follow the sequence given in Step 2), noting that the SSXC faceplate occupies two slots. Insert the card until it contacts the backplane.

Note The software on the active TSC card is automatically copied to the TSC that is plugged into the standby (empty) slot. It does not matter if the software on the newly installed TSC is newer or older than that on the active TSC. After loading the new software for several minutes, the newly installed TSC card becomes the standby card. You should install a single TSC, allow it to boot, then open a CTC session and verify that the TSC is running the desired software. If the TSC is not running the desired software version, do an upgrade or remove the current TSC and install the other one to see if it is running the desired software. After you are sure you have the right software load, you can then safely install the SSXC cards.

Note A CTC session is not available until at least one TSC card has been installed and has booted up. Therefore, SSXC cards do appear in CTC until at least one TSC card is installed.

Step 5 Close the ejectors.

Step 6 Verify the LED activity as described in Table 2-1.

Table 2-1 LED Activity During TSC and SSXC Card Installation

Card Type	LED Activity
TSC	1. All LEDs turn on for 20 to 60 seconds. 2. The STAT LED blinks and all other LEDs turn off for 30 to 50 seconds. 3. All LEDs blink once and then turn off for 10 seconds. 4. The SRV LED goes green and the applicable timing indicator goes green (line, external, freerun, holdover).
SSXC	1. The STAT and SRV LEDs turn on for 10 to 15 seconds. 2. The STAT LED blinks and the SRV LED turns off for 30 seconds. 3. All LEDs blink once and the SRV LED comes on.

Note Be careful to insert the TSC and SSXC cards only in their appropriate slots (see Step 2). If you insert a card into a slot that is provisioned for a different card in CTC, all red LEDs turn on.

Step 7 On the TSC card, verify that the ACT/STBY LED is on if the card is active (green) and off if the card is standby. If it is not, refer to the *Cisco ONS 15600 Troubleshooting Guide*.

Step 8 Repeat Steps 1 through 7 for each TSC and SSXC card you need to install.

Caution Do not operate the ONS 15600 with a single TSC card or a single SSXC card installed. Always operate the shelf with two TSC cards and two SSXC cards.

Step 9 After you have logged into CTC, verify that the card appears in the correct slot on the CTC node view. See Chapter 3, "Connect the PC and Log into the GUI" for CTC information and setup instructions.

Stop. You have completed this procedure.

NTP-E11 Install the OC-N Cards

Purpose	This procedure explains how to install optical (OC-N) cards, including OC-48 and OC-192 cards.
Tools/Equipment	OC-48 and OC-192 cards (as applicable)
Prerequisite Procedures	NTP-E7 Perform the Bay Installation Acceptance Test, page 1-14 NTP-E10 Install the Common Control Cards, page 2-2
Required/As Needed	At least one optical card is required to carry traffic. Install according to site plan, if available.
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, or you could shock yourself.** Statement 94

Caution Always use the supplied ESD wristband when working with a powered ONS 15600. For detailed instructions on how to wear the ESD wristband, refer to the Cisco ONS Electrostatic Discharge (ESD) and Grounding Guide.

Warning **Class 1 laser product.** Statement 1008

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Warning **Use of controls, adjustments, or performing procedures other than those specified may result in hazardous radiation exposure.** Statement 1057

Note For information about optical cards, refer to the *Cisco ONS 15600 Reference Manual.*

Step 1 Remove the card from the box and antistatic sleeve.

Caution Setting an OC-N card on its connectors can cause damage to the connectors.

Step 2 Open the card ejectors.

Step 3 Slide the card along the top and bottom guide rails into the correct slot. Slots 1 through 4 and 11 through 14 are available for optical cards. Insert the card until it contacts the backplane.

Step 4 Close the ejectors.

Step 5 Verify the LED activity on the card faceplate:

1. The STAT, SRV, SD, SF, and LASER ON LEDs turn on for 20 seconds.
2. The STAT LED blinks and all other LEDs turn on for 30 to 50 seconds.
3. All LEDs blink once and the SRV and LASER ON LEDs turn on.

Note If the LEDs do not turn on, verify that the power breakers on the power distribution unit (PDU) are on. If the LEDs do not behave as expected, refer to the *Cisco ONS 15600 Troubleshooting Guide*.

Note If you install an optical card in a slot provisioned for another optical rate, the same LED sequence occurs but at the end of the sequence the SRV LED does not turn on. Only the LASER ON LED turns on.

Note If you insert a card into a slot provisioned for a different card, all red LEDs turn on and you will see a mismatched equipment (MEA) alarm for that slot when you open CTC.

Step 6 After you have logged into CTC, verify that the card appears in the correct slot on the CTC node view. See Chapter 3, "Connect the PC and Log into the GUI" for CTC information and setup instructions.

Note If you deleted circuits, data communication channels (DCCs), and timing references for the OC-N card, you must restore them.

Step 7 Complete the "NTP-E183 Install the ASAP Card" procedure on page 2-6 as needed and the "NTP-E15 Install the Fiber-Optic Cables" procedure on page 2-9.

Stop. You have completed this procedure.

NTP-E183 Install the ASAP Card

Purpose	This procedure explains how to install the Any-Service, Any-Port (ASAP) card. The ASAP card installation consists of installing the following components: • Carrier module (card) • 1-port I/O modules (1PIOs) and/or 4-port I/O modules (4PIOs), also known as Pluggable Interface Modules (PIMs) • Small form-factor pluggables (SFPs/XFPs)
Tools/Equipment	ASAP card(s)
Prerequisite Procedures	NTP-E7 Perform the Bay Installation Acceptance Test, page 1-14 NTP-E10 Install the Common Control Cards, page 2-2
Required/As Needed	As needed
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, or you could shock yourself.** Statement 94

Caution Always use the supplied ESD wristband when working with a powered ONS 15600. For detailed instructions on how to wear the ESD wristband, refer to the Cisco ONS Electrostatic Discharge (ESD) and Grounding Guide.

Warning **Class 1 laser product.** Statement 1008

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Warning **Use of controls, adjustments, or performing procedures other than those specified may result in hazardous radiation exposure.** Statement 1057

Note For information about the ASAP card, refer to the *Cisco ONS 15600 Reference Manual.*

Step 1 Complete the "DLP-E210 Install the ASAP Carrier Modules" task on page 18-13.

Step 2 Complete the "DLP-E272 Install the ASAP 1PIO and 4PIO (PIM) Modules" task on page 18-86 to install any combination of up to four ASAP 1PIO and 4PIO (PIM) modules in the ASAP carrier modules.

Step 3 Complete the "DLP-E275 Install an SFP/XFP" task on page 18-92 to install SFPs in the 1 PIO and 4PIO (PIM) modules, or preprovision an SFP using the "DLP-E213 Preprovision an SFP" task on page 18-15. The optical line rate for SFPs must be assigned in CTC.

Step 4 Continue with the "NTP-E15 Install the Fiber-Optic Cables" procedure on page 2-9 as needed.

Note If you deleted circuits, DCCs, and timing references for the ASAP card, you must restore them.

Stop. You have completed this procedure.

NTP-E12 Install the Filler Cards

Purpose	This procedure explains how to install the filler cards (blank faceplates) in any unused optical card slots.
Tools/Equipment	Filler card(s) (Cisco P/N 15600-IO-FILLER)
Prerequisite Procedures	NTP-E10 Install the Common Control Cards, page 2-2 NTP-E11 Install the OC-N Cards, page 2-4
Required/As Needed	As needed for any unused card slots
Onsite/Remote	Onsite
Security Level	None

Warning **Blank faceplates (filler panels) serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain 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.** Statement 156

Step 1 Open the card ejectors.

Step 2 Slide the card along the top and bottom guide rails into the correct optical card slot.

Step 3 Close the ejectors.

Step 4 Repeat for any remaining unused card slots.

Note CTC automatically detects filler cards and includes them in the graphical shelf display.

Stop. You have completed this procedure.

NTP-E13 Preprovision a Card Slot

Purpose	This procedure explains how to preprovision a slot before card installation.
Tools/Equipment	None
Prerequisite Procedures	NTP-E17 Set Up Computer for CTC, page 3-1 NTP-E18 Set Up CTC Computer for Local Craft Connection to the ONS 15600, page 3-3 or NTP-E111 Set Up a CTC Computer for a Corporate LAN Connection to the ONS 15600, page 3-4
Required/As Needed	As needed
Onsite/Remote	Onsite or Remote
Security Level	Provisioning or higher

Step 1 Complete the "DLP-E26 Log into CTC" task on page 16-31 at the node where you want to preprovision the slot.

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 A preprovisioned slot appears violet in CTC rather than white for an installed card.

Stop. You have completed this procedure.

NTP-E14 Remove and Replace a Card

Purpose	This procedure explains how to remove a card from an ONS 15600 shelf.
Tools/Equipment	None
Prerequisite Procedures	NTP-E10 Install the Common Control Cards, page 2-2 or NTP-E11 Install the OC-N Cards, page 2-4
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 inStep 4. When you log into CTC, troubleshoot the mismatched equipment alarm (MEA) with the *Cisco ONS 15600 Troubleshooting Guide*.

Step 2 If you are logged into CTC, complete one of the following:

- "DLP-E17 Delete a Card from CTC" task on page 16-16.
- Complete the "DLP-E165 Change an OC-N Card" task on page 17-52 to delete a card and replace it with a different OC-N card.

Note Provisioning is not maintained during a card change. To change a card, you must first delete all circuits, DCCs, and timing references on the card.

Step 3 If you are removing an optical card with cables connected to the front:

a. Rotate the plastic cable latch over the cable routing channel that corresponds to the optical card so that the latch is open (not blocking the routing channel).

b. Squeeze the latches on both sides of the connector and pull the connector out of the adapter on the front of the card.

Step 4 Physically remove the card:

a. Open the card latches/ejectors.

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

Caution Do not allow the connectors on the card to touch anything as you remove the card.

Step 5 Insert the new card using one of the following procedures as applicable:

- NTP-E10 Install the Common Control Cards, page 2-2
- NTP-E11 Install the OC-N Cards, page 2-4

Stop. You have completed this procedure.

NTP-E15 Install the Fiber-Optic Cables

Purpose	This procedure explains how to install fiber-optic cables on the optical cards.
Tools/Equipment	OGI fiber-optic cables: • 15600-OGI-6M. OGI Male to SC SM UPC, 6.10m, 0.80m breakout • 15600-OGI-8M. OGI Male to SC SM UPC, 8.00m, 0.80m breakout • 15600-OGI-12M. OGI Male to SC SM UPC, 12.00m, 0.80m breakout ASAP PPM fiber-optic cables: 9-micron SMF fiber-optic cables with LC connectors, available from multiple fiber-optic cable suppliers. DWDM PPM fiber-optic cables: 9-micron SMF fiber-optic cables with LC connectors, available from multiple fiber-optic cable suppliers. Attenuators suitable for OC-48 and OC-192 attenuation (3 dB for short reach and 15 to 20 dB for long reach) Optical power meter
Prerequisite Procedures	NTP-E11 Install the OC-N Cards, page 2-4 or NTP-E183 Install the ASAP Card, page 2-6
Required/As Needed	Required

Onsite/Remote	Onsite
Security Level	None

Warning **Class 1 laser product.** Statement 1008

Warning **Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments (for example, eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard.** Statement 1056

Warning **Use of controls, adjustments, or performing procedures other than those specified may result in hazardous radiation exposure.** Statement 1057

Warning **Because invisible radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures.** Statement 125

Caution To comply with the Telcordia GR-1089 NEBS, Issue 5 standard, do not use optical fibers with exposed metallic ferrules. Exposed metallic ferrules may result in ESD damage to the system and can be service affecting.

Caution Always use the supplied ESD wristband when working with a powered ONS 15600. For detailed instructions on how to wear the ESD wristband, refer to the Cisco ONS Electrostatic Discharge (ESD) and Grounding Guide.

Note 15600-OGI-xxM cables are recommended for use with OC-N cards, but when used with OC-192 cards, the cable has six unused optical connectors.

Step 1 Test the optical receive levels for the cards installed and attenuate accordingly. See Table 2-2 for the minimum and maximum levels.

Table 2-2 Optical and ASAP Card Transmit and Receive Levels

	Transmit		Receive	
Card	**Minimum**	**Maximum**	**Minimum**	**Maximum**
OC48 L16 1550	–2 dBm	+3 dBm	–28 dBm	–9 dBm
OC192 L4 1550	+4 dBm	+7 dBm	–22 dBm	–9 dBm
OC48 SR16 1310	–10 dBm	–3 dBm	–18 dBm	–3 dBm

Table 2-2 Optical and ASAP Card Transmit and Receive Levels (continued)

Card	Transmit		Receive	
	Minimum	Maximum	Minimum	Maximum
OC192 SR4 1310	–6 dBm	–1 dBm	–11 dBm	–1 dBm
ASAP SFPs				
ONS-SE-Z1 (Supports OC-3 SR-1, OC-12 SR-1, OC-48 IR-1 or GE LX)	–5.0 dBm	0 dBm	–23[1] –19[2] –18[3]	–3[1] –3[2] 0[3]
ONS-SI-155-L2 (Supports OC-3 LR-2)	–15	–8.0	–28	–8
ONS-SI-622-L2: (Supports OC-12 LR-2)	–5.0	0	–34	–10
ONS-SE-2G-L2: (Supports OC-48 LR-2)	–2.0	3.0	–28	–9
ONS-SI-2G-S1: (Supports OC-48, LR-2)	–2.0	3.0	–9.0	

1. 155.52/622.08 Mbps
2. 1250 Mbps
3. 2488.32 Mbps

Caution Never create physical (hard) fiber loopbacks on the OC-N LR ports unless you use the proper attenuator. Using fiber loopbacks without the proper attenuator causes damage to OC-N LR cards' receivers.

Step 2 As necessary, complete the "DLP-E18 Install Fiber-Optic Cables in a 1+1 Configuration" task on page 16-17.

Step 3 As necessary, complete the "DLP-E172 Install Fiber-Optic Cables for Path Protection Configurations" task on page 17-57.

Step 4 As necessary, complete the "DLP-E234 Install Fiber-Optic Cables for BLSR Configurations" task on page 18-42.

Step 5 Complete the "DLP-E19 Route Fiber-Optic Cables" task on page 16-20.

Stop. You have completed this procedure.

NTP-E16 Replace the Front Door

Purpose	This procedure explains how to reattach the front door of the ONS 15600.
Tools/Equipment	None
Prerequisite Procedures	NTP-E3 Open and Remove the Front Door, page 1-7
Required/As Needed	As Needed
Onsite/Remote	Onsite
Security Level	None

Step 1 Insert the front door in the hinges on the shelf assembly.

Step 2 Lower the door onto the face of the ONS 15600.

Step 3 Pull the metal latches on the door outward and gently push the door toward the shelf, making sure no optical cables are caught or pinched in the door.

Step 4 Click the latches in place and release.

Stop. You have completed this procedure.