



Install Cards and Fiber-Optic Cable

This chapter explains how to install the Cisco ONS 15600 SDH 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-F118 Install the Common Control Cards, page 2-2](#)—Complete this procedure before continuing with the [“NTP-F119 Install the STM-N Cards” procedure on page 2-4](#).
2. [NTP-F119 Install the STM-N Cards, page 2-4](#)—Complete this procedure before continuing with the [“NTP-F124 Install the Fiber-Optic Cables” procedure on page 2-9](#).
3. [NTP-F120 Install the ASAP Card, page 2-6](#)—Complete as needed to install the ASAP card, which provides STM-1, STM-4, STM-16, STM-64, and Gigabit Ethernet ports.
4. [NTP-F121 Install the Filler Cards, page 2-7](#)—Complete as needed to fill any unused optical card slots with filler cards.
5. [NTP-F122 Preprovision a Card Slot, page 2-7](#)—Complete as needed to provision an empty card slot.
6. [NTP-F123 Remove and Replace a Card, page 2-8](#)—Complete as needed.
7. [NTP-F124 Install the Fiber-Optic Cables, page 2-9](#)—Complete this procedure to install and route the fiber-optic cables.
8. [NTP-F125 Replace the Front Door, page 2-12](#)—Complete as needed.



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-F118 Install the Common Control Cards

Purpose	This procedure installs the TSC cards and then the SSXC cards, which are required to operate the ONS 15600 SDH.
Tools/Equipment	Redundant TSC cards and SSXC cards
Prerequisite Procedures	NTP-F117 Perform the Bay Installation Acceptance Test, page 1-13
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 SDH. Plug the wristband cable into the ESD jack located on the lower-left outside edge of the shelf.



Note

For information about the TSC and SSXC cards (such as LED information), refer to the *Cisco ONS 15600 SDH 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 8.0 and later requires the SSXC card, so when upgrading to ONS 15600 SDH Software R8.0 or higher, you must install an SSXC card. Refer to the release-specific software upgrade guide for more information on upgrading the ONS 15600 SDH software.

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	<ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 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 do insert a card into a slot 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 SDH Troubleshooting Guide*.

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

**Caution**

Do not operate the ONS 15600 SDH 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 in 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-F119 Install the STM-N Cards

Purpose	This procedure installs optical (STM-N) cards, including STM-16 and STM-64 cards.
Tools/Equipment	STM-16 and STM-64 cards (as applicable)
Prerequisite Procedures	NTP-F117 Perform the Bay Installation Acceptance Test, page 1-13 NTP-F118 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 SDH. Plug the wristband cable into the ESD jack located on the lower-left outside edge of the shelf.


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 SDH Reference Manual*.

Step 1

Remove the card from the box and antistatic sleeve.


Caution

Setting an STM-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 SDH 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 STM-N card, you must restore them.

- Step 7** Complete the [“NTP-F120 Install the ASAP Card”](#) procedure on page 2-6 and the [“NTP-F124 Install the Fiber-Optic Cables”](#) procedure on page 2-9.

Stop. You have completed this procedure.

NTP-F120 Install the ASAP Card

Purpose	This procedure installs the ASAP card. The ASAP card installation consists of installing the following components: <ul style="list-style-type: none"> • 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)
Tools/Equipment	ASAP card(s)
Prerequisite Procedures	NTP-F117 Perform the Bay Installation Acceptance Test, page 1-13 NTP-F118 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 SDH. Plug the wristband cable into the ESD jack located on the lower-left outside edge of the shelf.


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 SDH Reference Manual*.

- Step 1** Complete the “[DLP-F333 Install the ASAP Carrier Modules](#)” task on page 18-33.
- Step 2** Complete the “[DLP-F384 Install the ASAP 1PIO and 4PIO \(PIM\) Modules](#)” task on page 18-95 to install any combination of up to four ASAP 1PIO and 4PIO (PIM) modules in the ASAP carrier modules.
- Step 3** Complete the “[DLP-F387 Install an SFP/XFP](#)” task on page 18-101 to install SFPs in the 1PIO and 4PIO (PIM) modules, or preprovision an SFP using the “[DLP-F335 Preprovision an SFP](#)” task on page 18-35. The optical line rate for SFPs must be assigned in CTC.

Step 4 Continue with the “[NTP-F124 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-F121 Install the Filler Cards

Purpose	This procedure installs 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-F118 Install the Common Control Cards, page 2-2 NTP-F119 Install the STM-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-F122 Preprovision a Card Slot

Purpose	This procedure preprovisions a slot before card installation.
Tools/Equipment	None

Prerequisite Procedures	NTP-F126 Set Up Computer for CTC, page 3-1 NTP-F127 Set Up CTC Computer for Local Craft Connection to the ONS 15600 SDH, page 3-3 or NTP-F128 Set Up a CTC Computer for a Corporate LAN Connection to the ONS 15600 SDH, page 3-4
Required/As Needed	As needed
Onsite/Remote	Onsite or Remote
Security Level	Provisioning or higher

- Step 1** Complete the “[DLP-F181 Log into CTC](#)” task on page 16-34 at the node where you want to reprovision the slot.
- Step 2** Right-click the empty slot where you will later install a card.
- Step 3** From the Add Card shortcut menu, choose the card type that will be installed.



Note A preprovisioned slot appears violet in CTC. An installed card appears white in CTC.

Stop. You have completed this procedure.

NTP-F123 Remove and Replace a Card

Purpose	This procedure removes a card from an ONS 15600 SDH shelf.
Tools/Equipment	None
Prerequisite Procedures	NTP-F118 Install the Common Control Cards, page 2-2 or NTP-F119 Install the STM-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 in [Step 4](#). When you log into CTC, troubleshoot the mismatched equipment alarm (MEA) with the procedure in the *Cisco ONS 15600 SDH Troubleshooting Guide*.
- Step 2** If you are logged into CTC, complete one of the following:
- “[DLP-F174 Delete a Card from CTC](#)” task on page 16-17
 - “[DLP-F294 Change an STM-N Card](#)” task on page 17-83 (to delete a card and replace it with a different STM-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:
- 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).
 - 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:
- Open the card latches/ejectors.
 - 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-F118 Install the Common Control Cards, page 2-2](#)
 - [NTP-F119 Install the STM-N Cards, page 2-4](#)
- Stop. You have completed this procedure.**
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NTP-F124 Install the Fiber-Optic Cables

Purpose	This procedure explains how to install fiber-optic cables on the optical cards.
Tools/Equipment	<p>OGI fiber-optic cables:</p> <ul style="list-style-type: none"> 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 <p>ASAP PPM fiber-optic cables: 9-micron SMF fiber-optic cables with LC connectors, available from multiple fiber-optic cable suppliers</p> <p>DWDM PPM fiber-optic cables: 9-micron SMF fiber-optic cables with SC connectors, available from multiple fiber-optic cable suppliers.</p> <p>Attenuators suitable for STM-16 and STM-64 attenuation (3 dB for short reach and 15 to 20 dB for long reach)</p> <p>Optical power meter</p>
Prerequisite Procedures	NTP-F119 Install the STM-N Cards, page 2-4
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**

Always use the supplied ESD wristband when working with a powered ONS 15600 SDH. Plug the wristband cable into the ESD jack located on the left-hand outside edge of the shelf.

**Note**

The STM-16 cable can terminate both STM-16 and STM-64 signals but when used with STM-64 cards the cable has six unused optical connectors. STM-64 cables are recommended for termination of STM-64 signals.

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 Card Transmit and Receive Levels**

Card	SFPs (if applicable)	Transmit		Receive	
		Minimum	Maximum	Minimum	Maximum
OC48/STM16 LR/LH 16 Port 1550	—	-2 dBm	+3 dBm	-28 dBm	-9 dBm
OC192/STM64 LR/LH 4 Port 1550	—	+4 dBm	+7 dBm	-22 dBm	-9 dBm
OC48/STM16 SR/SH 16 Port 1310	—	-10 dBm	-3 dBm	-18 dBm	-3 dBm
OC192/STM64 SR/SH 4 Port 1310	—	-6 dBm	-1 dBm	-11 dBm	-1 dBm

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

Card	SFPs (if applicable)	Transmit		Receive	
		Minimum	Maximum	Minimum	Maximum
ASAP	ONS-SE-Z1 (Supports STM-1 SR-1, STM-4 SR-1, STM-16 IR-1 or GE LX)	-5.0 dBm	0 dBm	-23 dBm ¹ -19 dBm ² -18 dBm ³	-3 dBm ² -3 dBm ³ 0 dBm ⁴
	ONS-SI-155-L2 (Supports STM-1 LR-2)	-15 dBm	-8.0 dBm	-28 dBm	-8 dBm
	ONS-SI-622-L2: (Supports STM-4 LR-2)	-5.0 dBm	0 dBm	-34 dBm	-10 dBm
	ONS-SE-2G-L2: (Supports STM-16 LR-2)	-2.0 dBm	3.0 dBm	-28 dBm	-10 dBm
	ONS-SI-2G-S1: (Supports OC-48 LR-2)	-2.0 dBm	3.0 dBm	-9.0 dBm	-9 dBm

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

**Caution**

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

- Step 2** As necessary, complete the “[DLP-F175 Install Fiber-Optic Cables in a 1+1 Configuration](#)” task on [page 16-18](#).
- Step 3** As necessary, complete the “[DLP-F300 Install Fiber-Optic Cables for SNCP Configurations](#)” task on [page 18-1](#).
- Step 4** As necessary, complete the “[DLP-F349 Install Fiber-Optic Cables for MS-SPRing Configurations](#)” task on [page 18-54](#).
- Step 5** Complete the “[DLP-F176 Route Fiber-Optic Cables](#)” task on [page 16-21](#).
- Stop. You have completed this procedure.**

NTP-F125 Replace the Front Door

Purpose	This procedure reattaches the front door of the ONS 15600 SDH.
Tools/Equipment	None
Prerequisite Procedures	NTP-F111 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 SDH.
- Step 3** Pull the metal latches on the door outward and gently push the door toward the shelf, making sure that 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.
