



## 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-E147 Install the ASAP Card, page 2-5](#)—Complete as needed to install the ASAP card, which provides OC-3, OC-12, OC-48, 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 2-7](#)—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 2-11](#)—Complete as needed.



Warning

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

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Warning

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**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

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# NTP-E10 Install the Common Control Cards

<b>Purpose</b>	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.
<b>Tools/Equipment</b>	Redundant TSC cards and SSXC cards
<b>Prerequisite Procedures</b>	<a href="#">NTP-E7 Perform the Bay Installation Acceptance Test, page 1-13</a>
<b>Required/As Needed</b>	Required
<b>Onsite/Remote</b>	Onsite
<b>Security Level</b>	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. 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 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

You must use Software Release 5.0 or 6.0 with the SSXC card. Software R5.0 or 6.0 also require the SSXC card, so when upgrading to Software Release 5.0 and beyond, you must install the SSXC card. Refer to the *Upgrading ONS 15600 Software Release 1.x to 5.0* for more information on upgrading the ONS 15600 software. Please note that R1.4 cannot be upgraded to 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	<ol style="list-style-type: none"> <li>1. All LEDs turn on for 20 to 60 seconds.</li> <li>2. The STAT LED blinks and all other LEDs turn off for 30 to 50 seconds.</li> <li>3. All LEDs blink once and then turn off for 10 seconds.</li> <li>4. The SRV LED goes green and the applicable timing indicator goes green (line, external, freerun, holdover).</li> </ol>
SSXC	<ol style="list-style-type: none"> <li>1. The STAT and SRV LEDs turn on for 10 to 15 seconds.</li> <li>2. The STAT LED blinks and the SRV LED turns off for 30 seconds.</li> <li>3. All LEDs blink once and the SRV LED comes on.</li> </ol>

**Note**

Be careful to insert the TSC and SSXC cards only into 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 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 Computer and Log into the GUI”](#) for CTC information and setup instructions.

**Stop. You have completed this procedure.**

# NTP-E11 Install the OC-N Cards

<b>Purpose</b>	This procedure explains how to install the optical (OC-N) cards (OC-48 and OC-192).
<b>Tools/Equipment</b>	OC-48 and OC-192 cards (as applicable)
<b>Prerequisite Procedures</b>	<a href="#">NTP-E7 Perform the Bay Installation Acceptance Test, page 1-13</a> <a href="#">NTP-E10 Install the Common Control Cards, page 2-2</a>
<b>Required/As Needed</b>	At least one optical card is required to carry traffic. Install according to site plan, if available.
<b>Onsite/Remote</b>	Onsite
<b>Security Level</b>	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. 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 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 illuminate.



**Note** If the LEDs do not turn on, check 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 the SRV LED does not turn on and 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 Computer 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-E147 Install the ASAP Card”](#) procedure on page 2-5 and [“NTP-E15 Install the Fiber-Optic Cables”](#) procedure on page 2-9.

**Stop. You have completed this procedure.**

## NTP-E147 Install the ASAP Card

<b>Purpose</b>	This procedure explains how to install the Any-Service, Any-Port (ASAP) card. The ASAP card installation consists of installing the carrier module (card), 4-port I/O modules (4PIOs)/Pluggable Interface Modules (PIMs), and small form-factor pluggables (SFPs).
<b>Tools/Equipment</b>	ASAP card(s)
<b>Prerequisite Procedures</b>	<a href="#">NTP-E7 Perform the Bay Installation Acceptance Test, page 1-13</a> <a href="#">NTP-E10 Install the Common Control Cards, page 2-2</a>
<b>Required/As Needed</b>	As needed
<b>Onsite/Remote</b>	Onsite
<b>Security Level</b>	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. 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 Reference Manual*.

- Step 1** Complete the “[DLP-E210 Install the ASAP Carrier Modules](#)” task on page 18-13.
- Step 2** Complete the “[DLP-E211 Install the ASAP 4PIO \(PIM\) Modules](#)” task on page 18-15 to install up to four ASAP 4PIO/PIM modules in the ASAP carrier modules.
- Step 3** Complete the “[DLP-E215 Install an SFP](#)” task on page 18-20 to install SFPs in the 4PIO/PIM modules, or preprovision an SFP using the “[DLP-E213 Preprovision an SFP](#)” task on page 18-17. 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

<b>Purpose</b>	This procedure explains how to install the filler cards (blank faceplates) in any unused optical card slots.
<b>Tools/Equipment</b>	Filler card(s) (Cisco P/N 15600-IO-FILLER)
<b>Prerequisite Procedures</b>	<a href="#">NTP-E10 Install the Common Control Cards, page 2-2</a> <a href="#">NTP-E11 Install the OC-N Cards, page 2-4</a>
<b>Required/As Needed</b>	As needed for any unused card slots
<b>Onsite/Remote</b>	Onsite
<b>Security Level</b>	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

<b>Purpose</b>	This procedure explains how to preprovision a slot before card installation.
<b>Tools/Equipment</b>	None
<b>Prerequisite Procedures</b>	<a href="#">NTP-E17 Set Up Computer for CTC, page 3-1</a> <a href="#">NTP-E18 Set Up CTC Computer for Local Craft Connection to the ONS 15600, page 3-2</a> or <a href="#">NTP-E111 Set Up a CTC Computer for a Corporate LAN Connection to the ONS 15600, page 3-4</a>
<b>Required/As Needed</b>	As needed
<b>Onsite/Remote</b>	Onsite or Remote
<b>Security Level</b>	Provisioning or higher

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- Step 1** Complete the “[DLP-E26 Log into CTC](#)” task on page 16-39 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.




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

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**Stop. You have completed this procedure.**

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## NTP-E14 Remove and Replace a Card

<b>Purpose</b>	This procedure explains how to remove a card from an ONS 15600 shelf.
<b>Tools/Equipment</b>	None
<b>Prerequisite Procedures</b>	<a href="#">NTP-E10 Install the Common Control Cards</a> , page 2-2 or <a href="#">NTP-E11 Install the OC-N Cards</a> , page 2-4
<b>Required/As Needed</b>	As needed
<b>Onsite/Remote</b>	Onsite
<b>Security Level</b>	Provisioning or higher

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- 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 *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 16-22.
  - Complete the “[DLP-E165 Change an OC-N Card](#)” task on page 17-51 to delete a card and replace it with a different OC-N card.




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**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.

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- 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-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

<b>Purpose</b>	This procedure explains how to install fiber-optic cables on the optical cards.
<b>Tools/Equipment</b>	<p>OGI fiber-optic cables:</p> <ul style="list-style-type: none"> <li>• 15600-OGI-6M. OGI Male to SC SM UPC, 6.10m, 0.80m breakout</li> <li>• 15600-OGI-8M. OGI Male to SC SM UPC, 8.00m, 0.80m breakout</li> <li>• 15600-OGI-12M. OGI Male to SC SM UPC, 12.00m, 0.80m breakout</li> </ul> <p>ASAP PPM fiber-optic cables: 9 micron SMF fiber-optic cables with LC connectors, available from multiple fiber-optic cable suppliers.</p> <p>Attenuators suitable for OC-48 and OC-192 attenuation (3 dB for short reach and 15 to 20 dB for long reach)</p> <p>Optical power meter</p>
<b>Prerequisite Procedures</b>	<a href="#">NTP-E11 Install the OC-N Cards, page 2-4</a>
<b>Required/As Needed</b>	Required
<b>Onsite/Remote</b>	Onsite
<b>Security Level</b>	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. Plug the wristband cable into the ESD jack located on the left-hand outside edge of the shelf.

**Note**

The OC-48 cable can terminate both OC-48 and OC-192 signals but when used with OC-192 cards the cable has six unused optical connectors. OC-192 cables are recommended for termination of OC-192 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 Transmit and Receive Levels*

Card	Transmit		Receive	
	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
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 <sup>1</sup> -19 <sup>2</sup> -18 <sup>3</sup>	-3 <sup>1</sup> -3 <sup>2</sup> 0 <sup>3</sup>
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

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 16-23](#).

**Step 3**

As necessary, complete the “[DLP-E172 Install Fiber-Optic Cables for Path Protection Configurations](#)” task on [page 17-55](#).

**Step 4**

As necessary, complete the “[DLP-E234 Install Fiber-Optic Cables for BLSR Configurations](#)” task on [page 18-47](#).

- Step 5** Complete the “[DLP-E19 Route Fiber-Optic Cables](#)” task on page 16-26.  
**Stop. You have completed this procedure.**
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## NTP-E16 Replace the Front Door

<b>Purpose</b>	This procedure explains how to reattach the front door of the ONS 15600.
<b>Tools/Equipment</b>	None
<b>Prerequisite Procedures</b>	<a href="#">NTP-E3 Open and Remove the Front Door</a> , page 1-6
<b>Required/As Needed</b>	As Needed
<b>Onsite/Remote</b>	Onsite
<b>Security Level</b>	None

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- 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.**
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