



Install Cards and Fiber-Optic Cable



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 explains how to install the Cisco ONS 15454 cards and fiber-optic cable (fiber).

Before You Begin

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

1. [NTP-A15 Install the Common Control Cards, page 2-2](#)—Complete this procedure first before installing any other cards.
2. [NTP-A16 Install the OC-N Cards, page 2-6](#)—Complete as needed.
3. [NTP-A17 Install the Electrical Cards, page 2-8](#)—Complete as needed.
4. [NTP-A246 Install Ethernet Cards and Connectors, page 2-10](#)—Complete as needed.
5. [NTP-A274 Install the FC_MR-4 Cards, page 2-11](#)—Complete as needed.
6. [NTP-A316 Install the Filler Cards, page 2-13](#)—Complete as needed.
7. [NTP-A247 Install Fiber-Optic Cables on OC-N Cards, page 2-14](#)—Complete this procedure to install fiber on OC-N cards, Ethernet Gigabit Interface Converters (GBICs), or small form-factor pluggables (SFPs).
8. [NTP-A245 Route Fiber-Optic Cables, page 2-17](#)—Complete as needed.
9. [NTP-A116 Remove and Replace a Card, page 2-17](#)—Complete this procedure as needed to remove and replace a card, including deleting the card from Cisco Transport Controller (CTC) and changing an OC-N card without losing the card’s provisioning.
10. [NTP-A20 Replace the Front Door, page 2-18](#)—If the front door was removed, complete this procedure to replace the front door and ground strap after installing cards and fiber.



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-A15 Install the Common Control Cards

Purpose	This procedure describes how to install the common control cards.
Tools/Equipment	Redundant TCC2/TCC2P cards Redundant XCVT or XC10G (cross-connect) cards AIC/AIC-I card (optional)
Prerequisite Procedures	NTP-A13 Perform the Shelf Installation Acceptance Test, page 1-30
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	Provisioning 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, or you could shock yourself. Statement 94

**Caution**

Always use the supplied ESD wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

**Note**

If protective clips are installed on the backplane connectors of the cards, remove the clips before installing the cards.

**Note**

If you install a card incorrectly, the FAIL LED flashes continuously.

- Step 1** If you plan to install XCVT cards, review [Table 2-1](#) to determine card/slot compatibility. If you plan to install XC10G cards, review [Table 2-2 on page 2-5](#) to determine card/slot compatibility.
- Step 2** Complete the “[DLP-A36 Install the TCC2/TCC2P Cards](#)” task on page 17-42.
- Step 3** Complete the “[DLP-A37 Install the XCVT or XC10G Cards](#)” task on page 17-45.
- Step 4** Complete the “[DLP-A38 Install the Alarm Interface Controller or Alarm Interface Controller–International Card](#)” task on page 17-47, as needed.

**Note**

If you install the wrong card in a slot, see the “[NTP-A116 Remove and Replace a Card](#)” procedure on page 2-17.

Step 5 Install the traffic cards. To determine the appropriate procedure, see the NTP list in the “Before You Begin” section on page 2-1.

In Table 2-1, X indicates that a card is supported in the slot. MS identifies Slots 1 through 4 and 14 through 17 (multispeed slot). HS identifies Slots 5, 6, 12, and 13 (high-speed slot).

**Note**

The XC card is compatible with most cards but does not support features new to Release 5.0. See the *Cisco ONS 15454 Reference Manual* for more information about XC card compatibility.

Table 2-1 Card and Slot Compatibility for the XCVT Card

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Type	MS	MS	MS	MS	HS	HS	TCC	XC	AIC	XC	TCC	HS	HS	MS	MS	MS	MS
TCC2/TCC2P							X				X						
XCVT								X		X							
AIC									X								
AIC-I									X								
DS1-14	X	X	X	X	X	X						X	X	X	X	X	X
DS1N-14 ¹	X	X ³	X	X ³	X ³	X ³						X ³	X ³	X ³	X	X ³	X ³
DS3-12	X	X	X	X	X	X ²						X ²	X	X	X	X	X
DS3-12E	X	X	X	X	X	X ²						X ²	X	X	X	X	X
DS3N-12	X ³	X ³	X	X ³	X ³	X ^{3,2}						X ^{3,2}	X ³	X ³	X	X ³	X ³
DS3N-12E	X ³	X ³	X	X ³	X ³	X ^{3,2}						X ^{3,2}	X ³	X ³	X	X ³	X ³
DS3I-N-12 ³	X ³	X ³	X	X ³	X ³	X ³						X ³	X ³	X ³	X	X ³	X ³
DS3XM-6	X	X	X	X	X	X ²						X ²	X	X	X	X	X
DS3XM-12	X	X	X	X	X	X ²						X ²	X	X	X	X	X
DS3/EC1-48	Not supported with XCVT cards. Requires XC10G cards.																
EC1-12	X	X	X	X	X	X ²						X ⁶	X	X	X	X	X
E100T-12	X	X	X	X	X	X						X	X	X	X	X	X
E1000-2	X	X	X	X	X	X						X	X	X	X	X	X
E100T-G	X	X	X	X	X	X						X	X	X	X	X	X
E1000-2-G	X	X	X	X	X	X						X	X	X	X	X	X
G1000-4	Not supported with XCVT cards. Requires XC10G cards.																
G1K-4					X	X						X	X				
ML100-12					X	X						X	X				
ML1000-2					X	X						X	X				
OC3 IR 4/STM1 SH 1310	X	X	X	X	X	X						X	X	X	X	X	X
OC3IR/STM1SH 1310-8	Not supported with XCVT cards. Requires XC10G cards.																
OC12 IR STM4 SH 1310	X	X	X	X	X	X						X	X	X	X	X	X

Table 2-1 Card and Slot Compatibility for the XCVT Card (continued)

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Type	MS	MS	MS	MS	HS	HS	TCC	XC	AIC	XC	TCC	HS	HS	MS	MS	MS	MS
OC12 LR/STM4 LH 1310	X	X	X	X	X	X						X	X	X	X	X	X
OC12 LR/STM4 LH 1550	X	X	X	X	X	X						X	X	X	X	X	X
OC12 IR/STM4 SH 1310-4	Not supported with XCVT cards. Requires XC10G cards.																
OC48 IR 1310 ⁴					X	X						X	X				
OC48 LR 1550					X	X						X	X				
OC48 IR/STM16 SH AS 1310					X	X						X	X				
OC48 LR/STM16 LH AS 1550					X	X						X	X				
OC48-ELR/STM 16 EH 100 GHz					X	X						X	X				
OC48 ELR 200 GHz					X	X						X	X				
OC192 SR/STM64 IO 1310	Not supported with XCVT cards. Requires XC10G cards.																
OC192 IR/STM64 SH 1550	Not supported with XCVT cards. Requires XC10G cards.																
OC192 LR/STM64 LH 1550	Not supported with XCVT cards. Requires XC10G cards.																
OC192 LR/STM64 LH ITU 15xx.xx	Not supported with XCVT cards. Requires XC10G cards.																
FC_MR-4					X	X						X	X				

1. This identifies 1:N cards that operate as normal DS1 or DS3 cards when installed in certain slots.
2. This DS3 card cannot be used in this slot if used with a high-density EIA or in a 1:N configuration.
3. This card can only be used with the XCVT card, not the XC card.
4. The OC48AS will operate in Slots 5, 6, 12, and 13 with the XC/XCVT in R3.4 through R4.6, and the OC48AS will operate in Slots 5, 6, 12, and 13 with the XCVT in R5.0 and later. In Release R3.3 and earlier, OC48AS with XC/XCVT is not supported.

In [Table 2-2](#), X indicates that a card is supported in the slot. MS identifies Slots 1 through 4 and 14 through 17 (multispeed slot). HS identifies Slots 5, 6, 12, and 13 (high-speed slot). The XC10G card requires the ANSI shelf (5454-SA-ANSI) or the high-density shelf (15454-SA-HD).

Table 2-2 Card and Slot Compatibility for the XC10G Card

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Type	MS	MS	MS	MS	HS	HS	TCC	XC	AIC	XC	TCC	HS	HS	MS	MS	MS	MS
TCC2/TCC2P							X				X						
XC10G								X		X							
AIC									X								
AIC-I									X								
DS1-14	X	X	X	X	X	X						X	X	X	X	X	X
DS1N-14	X ¹	X ¹	X	X ¹	X ¹	X ¹						X ¹	X ¹	X ¹	X	X ¹	X ¹
DS3-12	X	X	X	X	X	X ²						X ²	X	X	X	X	X
DS3-12E	X	X	X	X	X	X						X ²	X	X	X	X	X
DS3N-12	X ¹	X ¹	X	X ¹	X ¹	X ^{1,2}						X ^{1,2}	X ¹	X ¹	X	X ¹	X ¹
DS3N-12E	X ¹	X ¹	X	X ¹	X ¹	X ^{1,2}						X ^{1,2}	X ¹	X ¹	X	X ¹	X ¹
DS3XM-6	X	X	X	X	X	X ²						X ²	X	X	X	X	X
DS3XM-12	X	X	X	X	X	X ²						X ²	X	X	X	X	X
DS3/EC1-48	X	X	X												X	X	X
EC1-12	X	X	X	X	X	X ¹						X	X	X	X	X	X
E100T-12	Not supported with the XC10G card.																
E1000-2	Not supported with the XC10G card.																
E100T-G	X	X	X	X	X	X						X	X	X	X	X	X
E1000-2-G	X	X	X	X	X	X						X	X	X	X	X	X
G1000-4	X	X	X	X	X	X						X	X	X	X	X	X
G1K-4	X	X	X	X	X	X						X	X	X	X	X	X
ML100-12	X	X	X	X	X	X						X	X	X	X	X	X
ML1000-2	X	X	X	X	X	X						X	X	X	X	X	X
OC3 IR 4/STM1 SH 1310	X	X	X	X	X	X						X	X	X	X	X	X
OC3IR/STM1SH 1310-8	X	X	X	X										X	X	X	X
OC12 IR STM4 SH 1310	X	X	X	X	X	X						X	X	X	X	X	X
OC12 LR/STM4 LH 1310	X	X	X	X	X	X						X	X	X	X	X	X
OC12 IR/STM4 SH 1310-4	X	X	X	X										X	X	X	X
OC12 LR/STM4 LH 1550	X	X	X	X	X	X						X	X	X	X	X	X
OC48 IR 1310					X	X						X	X				
OC48 LR 1550					X	X						X	X				

Table 2-2 Card and Slot Compatibility for the XC10G Card (continued)

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Type	MS	MS	MS	MS	HS	HS	TCC	XC	AIC	XC	TCC	HS	HS	MS	MS	MS	MS
OC48 IR/STM16 SH AS 1310	X	X	X	X	X	X						X	X	X	X	X	X
OC48 LR/STM16 LH AS 1550	X	X	X	X	X	X						X	X	X	X	X	X
OC48-ELR/STM1 6 EH 100 GHz					X	X						X	X				
OC48 ELR 200 GHz					X	X						X	X				
OC192 SR/STM64 IO 1310					X	X						X	X				
OC192 IR/STM64 SH 1550					X	X						X	X				
OC192 LR/STM64 LH 1550					X	X						X	X				
OC192 LR/STM64 LH ITU 15xx.xx					X	X						X	X				
FC_MR-4	X	X	X	X	X	X						X	X	X	X	X	X

1. This identifies 1:N cards that operate as normal DS1 or DS3 cards when installed in certain slots.
2. This DS3 card cannot be used in this slot if used with a high-density EIA or in a 1:N configuration.

Stop. You have completed this procedure.

NTP-A16 Install the OC-N Cards

Purpose	This procedure describes how to install optical (OC-N) cards (OC-3, OC-12, OC-48, and OC-192).
Tools/Equipment	OC-3, OC-12, OC-48, and OC-192 cards (as applicable)
Prerequisite Procedures	NTP-A15 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

**Warning**

Class I (CDRH) and Class 1M (IEC) laser products. Statement 1055

**Warning**

Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam 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 could 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**

On all OC-N cards except the OC192 LR/STM64 LH 1550 card, the laser is on even when the optical port is not in service.

**Warning**

On the OC-192 card, the laser is on when the card is booted and the safety key is in the on position (labeled 1). The port does not have to be in service for the laser to be on. The laser is off when the safety key is off (labeled 0). Statement 293

**Caution**

Always use the supplied ESD wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

**Note**

If protective clips are installed on the backplane connectors of the cards, remove the clips before installing the cards.

**Note**

To simplify path protection to bidirectional line switched ring (BLSR) conversion and node addition, install OC-N cards according to a high-speed east (Slots 12 and 13) and west (Slots 5 and 6) configuration. This configuration is not mandatory.

**Note**

If you install a card incorrectly, the FAIL LED flashes continuously.

**Note**

During the boot process, an out-of-service (OOS) OC-N port will output a Line Alarm Indication Signal (AIS-L) to any in-service (IS) far-end receivers. See the *Cisco ONS 15454 Troubleshooting Guide* for further information about the AIS-L condition.

Step 1

If you installed XC or XCVT cards, review [Table 2-1 on page 2-3](#) to determine card/slot compatibility. If you installed XC10G cards, review [Table 2-2 on page 2-5](#) to determine card/slot compatibility.

Install higher-capacity cards first; for example, install an OC-192 card before installing an OC-48 card. Let each card completely boot before installing the next card.

Step 2 Open the card latches/ejectors.

Step 3 Use the latches/ejectors to firmly slide the OC-N card along the guide rails until the card plugs into the receptacle at the back of the slot.



Note If you install the wrong card in a slot, complete the [“NTP-A116 Remove and Replace a Card” procedure on page 2-17](#).

Step 4 Verify that the card is inserted correctly and close the latches/ejectors on the card.



Note It is possible to close the latches/ejectors when the card is not completely plugged into the backplane. Ensure that you cannot insert the card any further.

Step 5 Verify the LED activity:

- The red FAIL LED turns on for 20 to 30 seconds.
- The red FAIL LED blinks for 35 to 45 seconds.
- All LEDs blink once and turn off for 5 to 10 seconds.
- The ACT or ACT/STBY LED becomes amber. The signal fail (SF) LED can persist until all card ports connect to their far end counterparts and a signal is present.

Step 6 If the card does not boot up properly, or the LED activity does not mimic [Step 5](#), check the following:

- When a physical card type does not match the type of card provisioned for that slot in CTC, the card might not boot. If an OC-N card does not boot, open CTC and ensure that the slot is not provisioned for a different card type before assuming the card is faulty.
- If the red FAIL LED does not turn on, check the power.
- If you insert a card into a slot provisioned for a different card, all LEDs turn off.
- If the red FAIL LED is on continuously or the LEDs behave erratically, the card is not installed properly. Remove the card and repeat Steps 2 to 5.

Step 7 Continue with the [“NTP-A247 Install Fiber-Optic Cables on OC-N Cards” procedure on page 2-14](#).

Stop. You have completed this procedure.

NTP-A17 Install the Electrical Cards

Purpose	This procedure describes how to install electrical cards (DS-1, DS-3, DS3XM, and EC-1).
Tools/Equipment	Electrical cards
Prerequisite Procedures	NTP-A15 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 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

Caution

Do not install low-density DS-1 cards in the same side of the shelf as DS3/EC1-48 or DS3XM-12 cards.

Caution

Do not install a DS3/EC1-48 in Slots 1 or 2 if you have installed an MXP_2.5G_10G card in Slot 3. Likewise, do not install a DS3/EC1-48 in Slots 16 or 17 if you have installed an MXP_2.5G_10G card in Slot 15. If you do, the cards will interact and cause DS-3 bit errors.

**Note**

If protective clips are installed on the backplane connectors of the cards, remove the clips before installing the cards.

**Note**

Install higher-capacity cards first; for example, install a DS-3 card before installing a DS-1 card. Let each card boot completely before installing the next card.

**Note**

If you are installing OC-N, TXP, or MXP cards, Cisco recommends that you install these before you install electrical cards, as applicable.

- Step 1** If you installed XC or XCVT cards, review [Table 2-1 on page 2-3](#) to determine card/slot compatibility. If you installed XC10G cards, review [Table 2-2 on page 2-5](#) to determine card/slot compatibility.
- Step 2** Open the card latches/ejectors.
- Step 3** Use the latches/ejectors to firmly slide the card along the guide rails until the card plugs into the receptacle at the back of the slot.

**Note**

If you install the wrong card in a slot, complete the [“NTP-A116 Remove and Replace a Card” procedure on page 2-17](#).

- Step 4** Verify that the card is inserted correctly and close the latches/ejectors on the card.

**Note**

It is possible to close the latches/ejectors when the card is not completely plugged into the backplane. Ensure that you cannot insert the card any further.

- Step 5** Verify the LED activity:
- The red FAIL LED turns on for 10 to 15 seconds.

- The red FAIL LED blinks for 30 to 40 seconds.
- All LEDs blink once and turn off for 1 to 5 seconds.
- The ACT or ACT/STBY LED turns on. The SF LED can persist until all card ports connect to their far end counterparts and a signal is present.

Step 6 If the card does not boot up properly, or the LED activity does not mimic [Step 5](#), check the following:

- If the red FAIL LED does not turn on, check the power.
- If you insert a card into a slot provisioned for a different card, all LEDs turn off.
- If the red FAIL LED is on continuously or the LEDs behave erratically, the card is not installed properly. Remove the card and repeat Steps 2 to 5.

Step 7 Continue with the “[NTP-A246 Install Ethernet Cards and Connectors](#)” procedure on page 2-10 if necessary.

Stop. You have completed this procedure.

NTP-A246 Install Ethernet Cards and Connectors

Purpose	This procedure describes how to install the Ethernet cards (E100T-12, E100T-G, E1000-2, E1000-2-G, G1000-4, G1K-4, ML100-T-12, ML10002, and CE-100T-8).
Tools/Equipment	Ethernet cards
Prerequisite Procedures	NTP-A15 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



Warning

Class I (CDRH) and Class 1M (IEC) laser products. Statement 1055



Warning

Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam 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 could 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

**Caution**

Always use the supplied ESD wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

**Note**

If protective clips are installed on the backplane connectors of the cards, remove the clips before installing the cards.

**Note**

If you are installing OC-N, TXP, or MXP cards, Cisco recommends that you install these before you install Ethernet cards.

- Step 1** If you installed XC or XCVT cards review [Table 2-1 on page 2-3](#) to determine card/slot compatibility. If you installed XC10G cards, review [Table 2-2 on page 2-5](#) to determine card/slot compatibility.
- Step 2** Complete the “[DLP-A39 Install Ethernet Cards](#)” task on page 17-48. Allow each card to boot completely before installing the next card.

**Note**

If you install the wrong card in a slot, complete the “[NTP-A116 Remove and Replace a Card](#)” procedure on page 2-17.

- Step 3** Complete the “[DLP-A469 Install GBIC or SFP Connectors](#)” task on page 21-24 if you are using E1000-2, E1000-2-G, G1000-4, or ML1000-2 cards.

**Note**

If you need to remove a GBIC or SFP, complete the “[DLP-A470 Remove GBIC or SFP Connectors](#)” task on page 21-26.

- Step 4** Continue with the “[NTP-A247 Install Fiber-Optic Cables on OC-N Cards](#)” procedure on page 2-14.
- Stop. You have completed this procedure.**

NTP-A274 Install the FC_MR-4 Cards

Purpose	This procedure installs the FC_MR-4 card, also known as the Fibre Channel card.
Tools/Equipment	FC_MR-4 card(s)
Prerequisite Procedures	NTP-A15 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

**Warning**

Class I (CDRH) and Class 1M (IEC) laser products. Statement 1055

**Warning**

Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam 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 could 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**

High-performance devices on this card can get hot during operation. To remove the card, hold it by the faceplate and bottom edge. Allow the card to cool before touching any other part of it or before placing it in an antistatic bag. Statement 201

**Caution**

Always use the supplied ESD wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

**Note**

If protective clips are installed on the backplane connectors of the cards, remove the clips before installing the cards.

Step 1 If you installed XCVT cards, review [Table 2-1 on page 2-3](#) to determine card/slot compatibility. If you installed XC10G cards, review [Table 2-2 on page 2-5](#) to determine card/slot compatibility.

Step 2 Open the card latches/ejectors.

Step 3 Use the latches/ejectors to firmly slide the card along the guide rails until the card plugs into the receptacle at the back of the slot.

**Note**

If you install the wrong card in a slot, complete the [“NTP-A116 Remove and Replace a Card” procedure on page 2-17](#) and install the correct card.

Step 4 Verify that the card is inserted correctly and close the latches/ejectors on the card.

**Note**

It is possible to close the latches/ejectors when the card is not completely plugged into the backplane. Ensure that you cannot insert the card any further.

Step 5 Verify the LED activity:

- The red FAIL LED turns on for 20 to 30 seconds. The ACT LED is amber for 3 to 5 seconds.
- The red FAIL LED blinks for up to 2 minutes.
- The FAIL and ACT LEDs blink once and turn off for 1 to 5 seconds.

- The ACT LED turns on green.

**Note**

If the red FAIL LED does not turn on, check the power.

**Note**

If you insert a card into a slot provisioned for a different card, all LEDs turn off.

Step 6 Complete the [“DLP-A469 Install GBIC or SFP Connectors” task on page 21-24](#) to install GBICs on the FC_MR-4 card.

**Note**

If you need to remove a GBIC or SFP, complete the [“DLP-A470 Remove GBIC or SFP Connectors” task on page 21-26](#).

Step 7 Continue with the [“NTP-A247 Install Fiber-Optic Cables on OC-N Cards” procedure on page 2-14](#).
Stop. You have completed this procedure.

NTP-A316 Install the Filler Cards

Purpose	This procedure explains how to install the filler cards (blank faceplates) in any unused traffic or AIC card slots (Slots 1 through 6, 9, and 11 through 17). The filler card aids in maintaining proper air flow and EMI requirements.
Tools/Equipment	Filler cards (Cisco P/N 15454-FILLER)
Prerequisite Procedures	NTP-A15 Install the Common Control Cards, page 2-2 NTP-A16 Install the OC-N Cards, page 2-6 NTP-A17 Install the Electrical Cards, page 2-8 NTP-A246 Install Ethernet Cards and Connectors, page 2-10 NTP-A274 Install the FC_MR-4 Cards, page 2-11
Required/As Needed	As needed
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, power modules, and faceplates are in place.

**Caution**

Always use the supplied electrostatic discharge (ESD) wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower right outside edge of the shelf assembly and ensure the shelf assembly is properly grounded.

**Note**

In a future software release this card will be detectable through the management interfaces of the ONS 15454.

-
- Step 1** Open the card ejectors.
- Step 2** Slide the card along the guide rails into the correct slot.
- Step 3** Close the ejectors.
- Step 4** Repeat for any remaining unused card slots.
- Step 5** Continue with the [“NTP-A247 Install Fiber-Optic Cables on OC-N Cards” procedure on page 2-14](#).
- Stop. You have completed this procedure.**
-

NTP-A247 Install Fiber-Optic Cables on OC-N Cards

Purpose	This procedure installs fiber-optic cables on OC-N cards or GBICs according to topology.
Tools/Equipment	Fiber-optic cables Fiber boot
Prerequisite Procedures	NTP-A16 Install the OC-N Cards, page 2-6
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

**Warning**

Class I (CDRH) and Class 1M (IEC) laser products. Statement 1055

**Warning**

Invisible laser radiation could be emitted from the end of the unterminated fiber cable or connector. Do not stare into the beam 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 could 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**

On all OC-N cards except some OC192 LR/STM64 LH 1550 cards, the laser is on even when the optical port is not in service. If an OC-192 card has a safety key, the laser is on when the card is booted and the safety key is in the on position (labeled 1). The port does not have to be in service for the laser to be on. The laser is off when the safety key is off (labeled 0).

**Warning**

Laser radiation presents an invisible hazard, so personnel should avoid exposure to the laser beam. Personnel must be qualified in laser safety procedures and must use proper eye protection before working on this equipment. Statement 300

**Caution**

Do not use fiber loopbacks with the OC192 LR/STM64 LH 1550 or OC192 LR/STM64 LH ITU 15xx.xx card unless you are using a 20-dB attenuator. Never connect a direct fiber loopback. Using fiber loopbacks causes irreparable damage to the OC192 LR/STM64 LH 1550 or OC192 LR/STM64 LH ITU 15xx.xx card.

**Caution**

Do not use fiber loopbacks with the OC192 IR/STM64 SH 1550 card unless you are using a 5-dB attenuator. Never connect a direct, unattenuated fiber loopback. Using unattenuated fiber loopbacks causes irreparable damage to the OC192 IR/STM64 SH 1550 card.

**Caution**

Always use the supplied ESD wristband when working with a powered ONS 15454. Plug the wristband cable into the ESD jack located on the lower-right outside edge of the shelf assembly.

**Note**

Fiber boots are not recommended for OC192 cards or OC48AS cards because of the downward angle of the optical ports.

**Note**

The G1000 port will go into service if you connect a transmit fiber from an OC-48 or OC-192 card to the receive GBIC port on the G1000 card. Any laser light source will cause the port to change states.

**Note**

You can install the fiber immediately after installing the cards, or wait until you are ready to turn up the network. See [Chapter 5, “Turn Up Network.”](#)

Step 1

Test the optical receive levels for the cards installed and attenuate accordingly. See [Table 2-3](#) for the minimum and maximum levels.

Table 2-3 OC-N Card Transmit and Receive Levels

Card	Transmit		Receive	
	Minimum	Maximum	Minimum	Maximum
OC3 IR 4/STM1 SH 1310	–15 dBm	–8 dBm	–28 dBm	–8 dBm
OC3IR/STM1SH 1310-8	–15 dBm	–8 dBm	–28 dBm	–8 dBm
OC12 IR/STM4 SH 1310	–15 dBm	–8 dBm	–28 dBm	–8 dBm
OC12 LR/STM4 LH 1310	–3 dBm	+2 dBm	–28 dBm	–8 dBm
OC12 LR/STM4 LH 1550	–3 dBm	+2 dBm	–28 dBm	–8 dBm
OC12 IR/STM4 SH 1310-4	–15 dBm	–8 dBm	–30 dBm	–8 dBm

Table 2-3 OC-N Card Transmit and Receive Levels (continued)

Card	Transmit		Receive	
	Minimum	Maximum	Minimum	Maximum
OC48 IR 1310	-5 dBm	0 dBm	-18 dBm	0 dBm
OC48 LR 1550	-2 dBm	+3 dBm	-28 dBm	-8 dBm
OC48 IR/STM16 SH AS 1310	-5 dBm	0 dBm	-18 dBm	0 dBm
OC48 LR/STM16 LH AS 1550	-2 dBm	+3 dBm	-28 dBm	-8 dBm
OC48 ELR/STM16 EH 100 GHz	-2 dBm	0 dBm	-27 dBm at 1E-12 BER	-9 dBm
OC48 ELR/STM16 EH 200 GHz	-2 dBm	0 dBm	-28 dBm	-8 dBm
OC192 SR/STM64 IO 1310	-6 dBm	-1 dBm	-11 dBm	-1 dBm
OC192 IR/STM64 SH 1550	-1 dBm	+2 dBm	-14 dBm	-1 dBm
OC192 LR/STM64 LH 1550	+7 dBm	+10 dBm	-19 dBm	-10 dBm
OC192 LR/STM64 LH ITU 15xx.xx	+3 dBm	+6 dBm	-22 dBm	-9 dBm

- Step 2** Inspect and clean all fiber connectors thoroughly. See the “[NTP-A112 Clean Fiber Connectors](#)” procedure on page 15-13 for instructions. Dust particles can degrade performance. Put caps on any fiber connectors that are not used.
- Step 3** As needed, complete the “[DLP-A207 Install Fiber-Optic Cables on the LGX Interface](#)” task on page 19-5.
- Step 4** As needed, complete the “[DLP-A428 Install Fiber-Optic Cables in a 1+1 Configuration](#)” task on page 21-8.



Note To install fiber-optic cables on Ethernet cards, FC_MR-4 cards, or transponder/muxponder cards, see the “[DLP-A469 Install GBIC or SFP Connectors](#)” task on page 21-24.

- Step 5** As needed, complete the “[DLP-A43 Install Fiber-Optic Cables for Path Protection Configurations](#)” task on page 17-49.
- Step 6** As needed, complete the “[DLP-A44 Install Fiber-Optic Cables for BLSR Configurations](#)” task on page 17-52.
- Step 7** As needed, complete the “[DLP-A45 Install the Fiber Boot](#)” task on page 17-54.
- Step 8** Continue with the “[NTP-A245 Route Fiber-Optic Cables](#)” procedure on page 2-17.

Stop. You have completed this procedure.

NTP-A245 Route Fiber-Optic Cables

Purpose	This procedure describes how to route fiber-optic cables.
Tools/Equipment	None
Prerequisite Procedures	Any of the following: NTP-A247 Install Fiber-Optic Cables on OC-N Cards, page 2-14 NTP-A274 Install the FC_MR-4 Cards, page 2-11
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	None

-
- Step 1** Open the fold-down front door on the cable-management tray.
- Step 2** Route the fiber cable on the card faceplate through the fiber clip on the faceplate, if provided. Fiber clips are factory-attached to the faceplate of OC-N cards.
- GBICs do not have fiber clips; therefore, if you are routing fiber from an E1000-2-G, E1000-2, G1000-2-G, G1000-2, or FC_MR-4 card, skip to [Step 3](#).
- Step 3** Route the fiber cables into the cable-management tray.
- Step 4** Route the fiber cables out either side of the cable-management tray through the cutouts on each side of the shelf assembly. Use the reversible fiber guides to route cables out the desired side.
- Step 5** Close the fold-down front door when all fiber cables in the front compartment are properly routed.
- Stop. You have completed this procedure.**
-

NTP-A116 Remove and Replace a Card

Purpose	This procedure removes and replaces all cards housed in the ONS 15454 shelf and rack.
Tools/Equipment	None
Prerequisite Procedures	A card installation procedure
Required/As Needed	As needed
Onsite/Remote	Onsite
Security Level	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 3](#). When you log into CTC, troubleshoot the mismatched equipment alarm (MEA) with the *Cisco ONS 15454 Troubleshooting Guide*.
- Step 2** If you are logged into CTC, complete one of the following:
- Complete the “[DLP-A191 Delete a Card](#)” task on page 18-65 and continue with [Step 3](#).
 - Complete the “[DLP-A247 Change an OC-N Card](#)” task on page 19-29 to delete a card and replace it with a different OC-N 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-A15 Install the Common Control Cards, page 2-2](#)
 • [NTP-A16 Install the OC-N Cards, page 2-6](#)
 • [NTP-A17 Install the Electrical Cards, page 2-8](#)
 • [NTP-A246 Install Ethernet Cards and Connectors, page 2-10](#)
 • [NTP-A274 Install the FC_MR-4 Cards, page 2-11](#)
- Step 5

As needed, continue with the “[NTP-A247 Install Fiber-Optic Cables on OC-N Cards](#)” procedure on [page 2-14](#).

Stop. You have completed this procedure.

NTP-A20 Replace the Front Door

Purpose	This procedure replaces the front door and door ground strap after installing cards and fiber-optic cables.
Tools/Equipment	#2 Phillips screwdriver Medium slot-head screwdriver Small slot-head screwdriver
Prerequisite Procedures	NTP-A3 Open and Remove the Front Door, page 1-6
Required/As Needed	Required
Onsite/Remote	Onsite
Security Level	None



Note

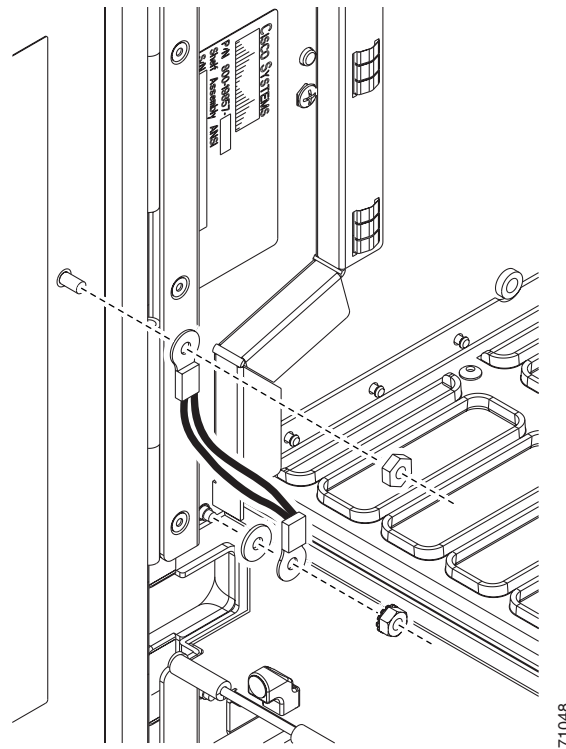
Be careful not to crimp any fiber cables that are connected to the OC-N cards. Some might not have the fiber boot attached.

- Step 1

Insert the front door into the hinges on the shelf assembly.
- Step 2

Attach one end of the ground strap terminal lug (72-3622-01) to the male stud on the inside of the door. Attach and tighten the #6 Kepnut (49-0600-01) using the open-end wrench ([Figure 2-1](#)).

Figure 2-1 Installing the Door Ground Strap Retrofit Kit



- Step 3** Attach the other end of the ground strap to the longer screw on the fiber guide.
- Attach the lock washer.
 - Attach the terminal lug.
 - Using the open-end wrench, attach and tighten the #4 Kepnut (49-0337-01) on the terminal lug.

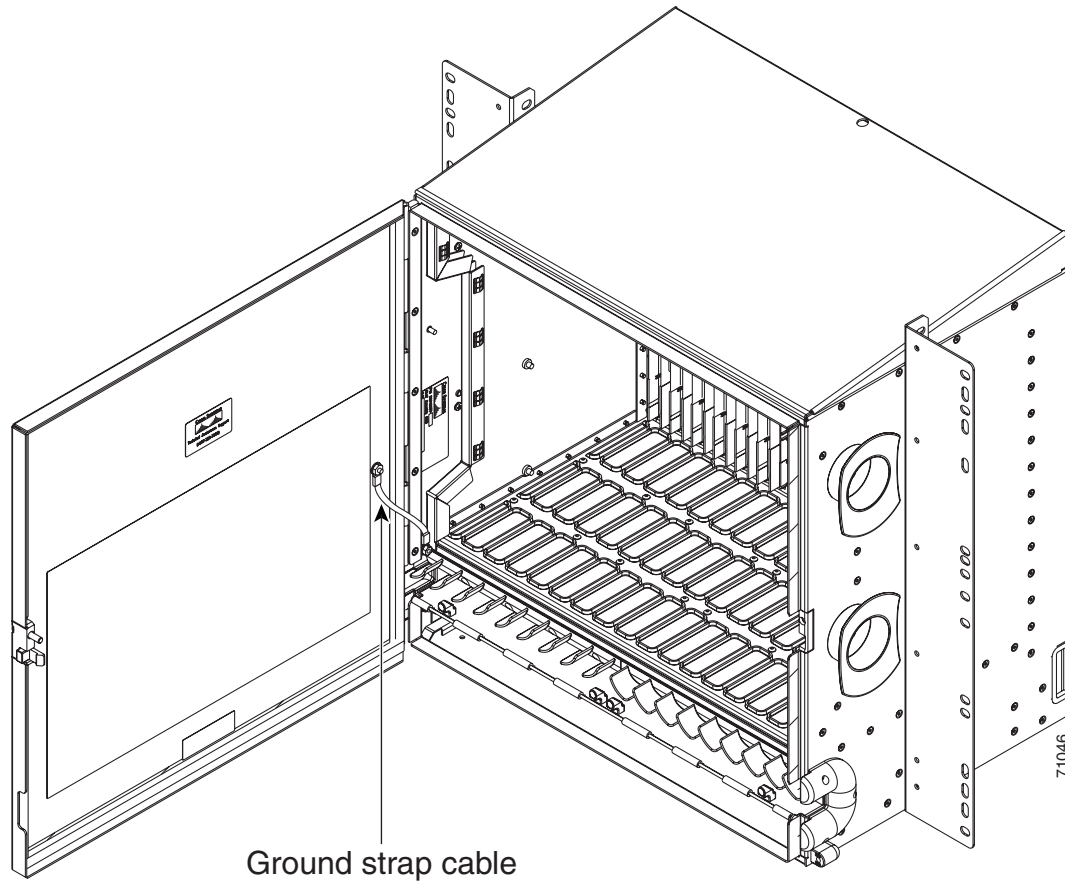


Note To avoid interference with the traffic (line) card, make sure the ground strap is in a flat position when the door is open. To move the ground strap into a flat position, rotate the terminal lug counterclockwise before tightening the Kepnut.

- Step 4** Replace the left cable-routing channel.
- Step 5** Using a Phillips screwdriver, insert and tighten the screws for the cable-routing channel.

Figure 2-2 shows the shelf assembly with the front door and ground strap installed.

Figure 2-2 Shelf Assembly with Door Ground Strap Retrofit Kit Installed



Step 6 Swing the door closed.



Note The ONS 15454 comes with a pinned hex key tool for locking and unlocking the front door. Turn the key counterclockwise to unlock the door and clockwise to lock it.

Stop. You have completed this procedure.