



Installing Line Cards, PLIMs, and Associated Components

This chapter provides instructions on how to install the Cisco CRS Enhanced 16-Slot Line Card Chassis (LCC) cards, physical layer interface modules (PLIMs), and any associated components.

This chapter presents the following topics:

- [About Installing and Removing Cards and Associated Components, page 1](#)
- [Installing or Removing a Slot Cover, page 10](#)
- [Installing or Removing an Impedance Carrier, page 14](#)
- [Installing an RP, PRP, or DRP Card, page 18](#)
- [Installing a Fan Controller Card, page 32](#)
- [Installing a Switch Fabric Card, page 37](#)
- [Installing a Line Card, page 44](#)
- [Installing a PLIM, page 53](#)
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About Installing and Removing Cards and Associated Components

This section contains some general information about installing and removing cards, PLIMs, and associated components.

Guidelines for Card Installation and Removal

Guidelines for card installation and removal include the following:

- Online (in-service) insertion and removal (OIR) is supported, enabling you to remove and install cards while the router is operating. OIR is seamless to users on the network, maintains all routing information, and ensures session preservation. You do not need to notify the software or reset the power. You have the option of using the Cisco IOS XR **shutdown** command before removing a card.



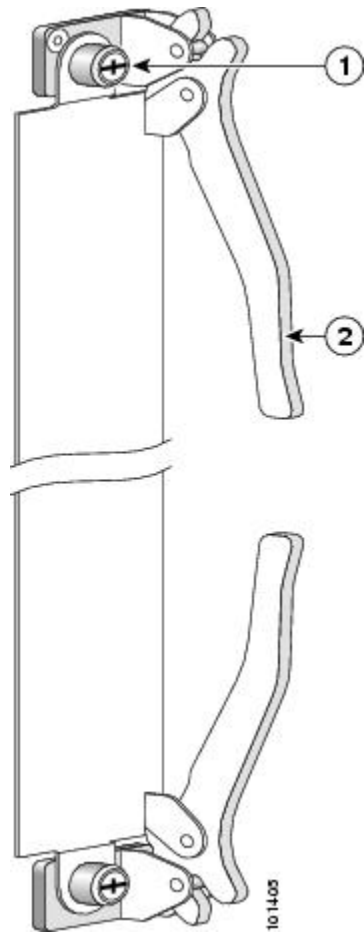
Note

OIR removes power to a specific slot before the switch fabric card is replaced. The power remains on for all other slots.

- The different cards and PLIMs in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis are all attached to the chassis itself using a pair of ejector levers and captive screws. The two ejector levers release the card or PLIM from its midplane connector. The exact locations of the ejector levers and captive screws vary slightly from card to card, but are, in general, in the same locations: on the upper

and bottom ends of the faceplate of the card. This figure shows the locations of the ejector levers and captive screws (on a modular services card [MSC]).

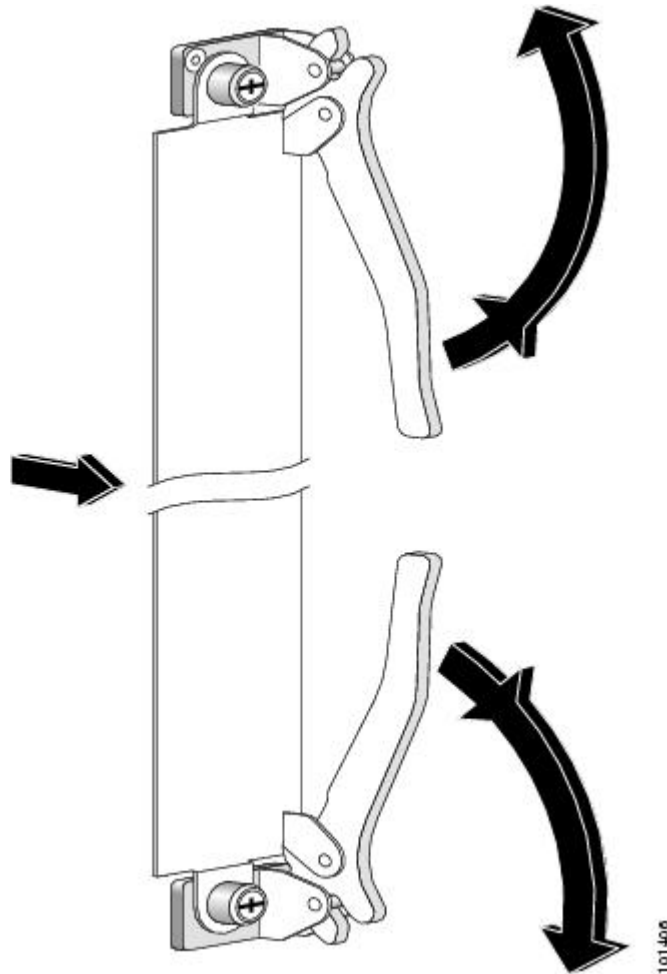
Figure 1: Ejector Levers and Captive Screws



1	Captive screw	2	Ejector lever
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This figure shows how to operate the ejector levers. Be sure to operate both levers simultaneously.

Figure 2: Operating Ejector Levers



Caution

When you remove a card, always use the ejector levers to ensure that the connector pins disconnect from the midplane in the sequence expected by the router.

- You should install the cards in the following order during the chassis initial installation process:
 - Always install cards in the empty slots first from one side to the other. The chassis is shipped with all slots either containing impedance carriers or covered by slot covers to help maintain chassis stiffness and ensure that the chassis is undamaged during shipment. See the [About Impedance Carriers and Slot Covers](#), on page 5.
 - Install the route processor (RP) cards first, the left one before the right one. Tighten the screws only after fully inserting both RP cards.
 - Install the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller cards in the same manner.

- Install the switch fabric cards in the same manner, one shelf at a time.
- For an MSC, FP, or LSP line card or a PLIM, remove one impedance carrier, install a functional board and tighten the screw, and then repeat the process until all line cards and PLIMs have been installed.

For information about the slot numbers, see the [Slot Numbers](#) section.

**Caution**

The router may indicate a hardware failure if you do not follow proper procedures. Remove or install only one card at a time. Allow at least 15 seconds for the router to complete the preceding tasks before removing or installing another card.

About Impedance Carriers and Slot Covers

When shipped, some slots in the chassis may contain impedance carriers or are covered by slot covers to help ensure that the chassis is undamaged during shipment. Four different types of impedance carriers and slot covers exist for the four different sizes of slots in the chassis (see below figures).

For further information on installing and removing the slot covers and impedance carriers, see the [Installing a Slot Cover, on page 11](#), the [Removing a Slot Cover, on page 13](#), the [Installing an Impedance Carrier, on page 14](#), and the [Removing an Impedance Carrier, on page 17](#).

Figure 3: RP Slot Cover

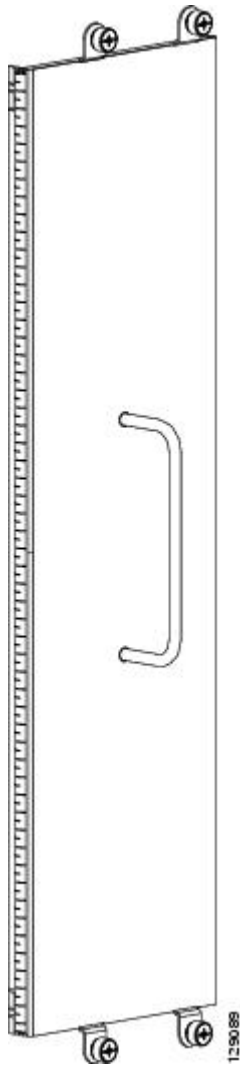


Figure 4: Switch Fabric Slot Cover

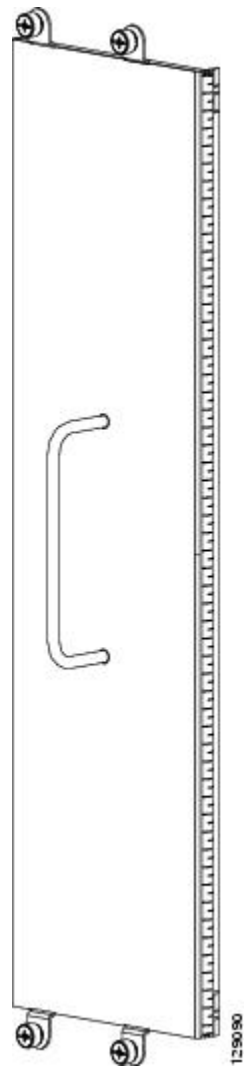


Figure 5: PLIM Slot Impedance Carrier

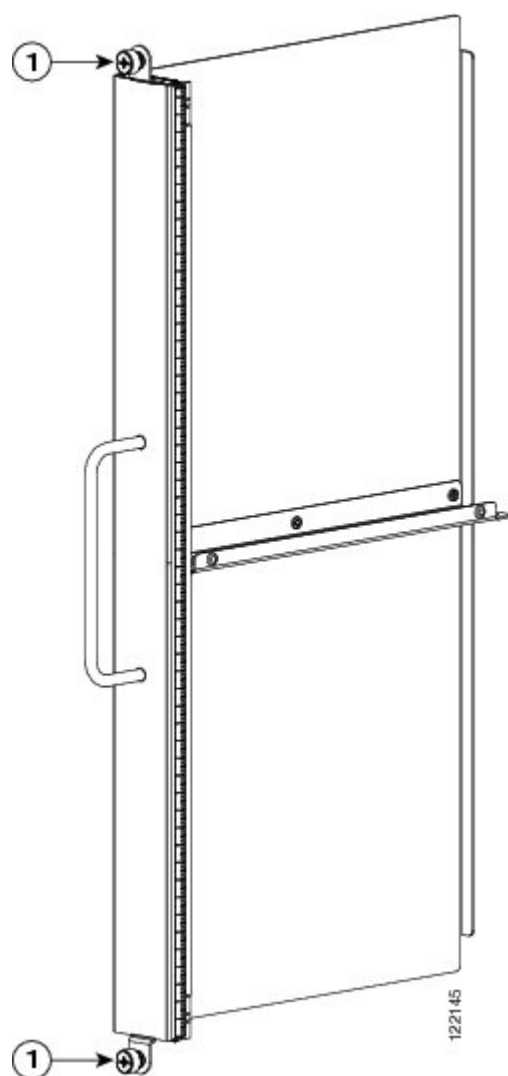
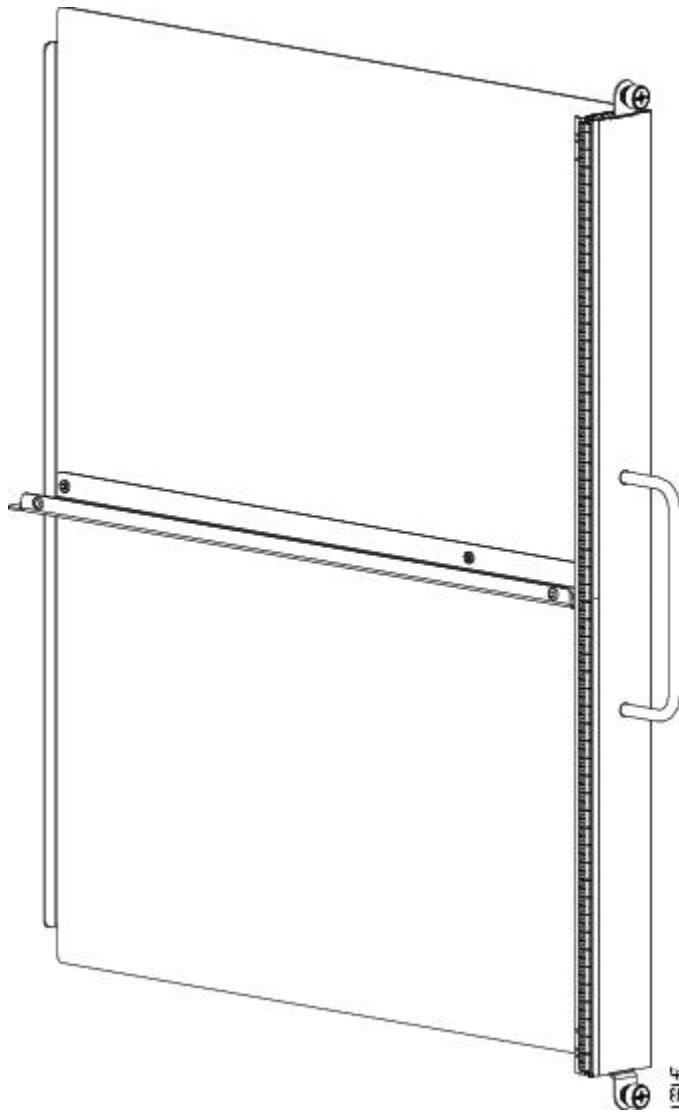


Figure 6: MSC Slot Impedance Carrier



About Hard Drives and PCMCIA Cards

Both replacement and additional optional hard drives and PCMCIA cards are available for both the RP and DRP cards.

The hard drive is an IDE hard drive used for gathering debugging information, such as core dumps from the RPs, DRPs, or line cards. The IDE hard drive is typically powered down and activated only when there is a need to store data. The drive is not vital to a functioning Cisco CRS Series Enhanced 16-Slot Line Card Chassis and is optional.

**Note**

Only the original route processor (RP) card uses a PCMCIA card. The performance route processor (PRP) card has a USB connector for using a flash drive.

**Note**

Core dumps are discoverable only through intervention with the Cisco CRS Series Enhanced 16-Slot Line Card Chassis system software.

Physically, the RP or DRP hard drive is a hot-pluggable PC board and sled-mounted drive with a connector interface that gets cleanly seated into a route processor card. In general, removal and replacement of this drive is not required.

The RP and DRP cards provide two PCMCIA flash slots, each card providing up to 1 GB of flash storage. One PCMCIA flash subsystem is accessible externally, is removable, and allows you to transfer images and configurations by plugging in a PCMCIA flash card. The other subsystem is fixed to the RP or DRP, not removable, and for permanent storage of configurations and images.

About Cable Management Brackets

The chassis includes a cable management system that organizes the interface cables entering and exiting the different cards, keeping them out of the way and free of sharp bends.

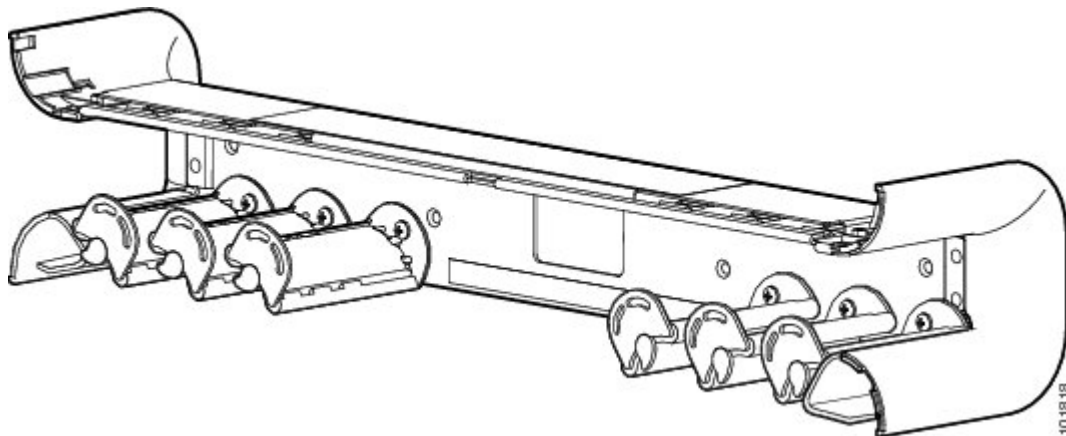
**Caution**

Excessive bending of interface cables can cause damage to the cables.

The Cisco CRS Series Enhanced 16-Slot Line Card Chassis arrives with a midchassis and upper-chassis horizontal cable management bracket preinstalled on the front (PLIM) side of the chassis.

This figure shows the midchassis cable management bracket.

Figure 7: Midchassis Cable Management Bracket (Front [PLIM] Side of Chassis Only)



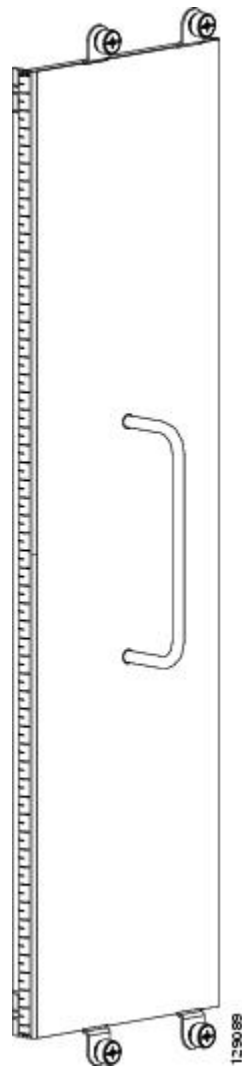
Installing or Removing a Slot Cover

This section contains the following procedures:

Installing a Slot Cover

This section describes how to install a slot cover in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. The chassis is shipped with slot covers over the switch fabric card and RP card slots; we advise installing slot covers over any empty slots in the chassis. Both slot cover types are installed in the same manner. The figure below shows an RP slot cover for reference. For more detailed information on the slot covers, see the [About Impedance Carriers and Slot Covers](#), on page 5.

Figure 8: RP Slot Cover



Prerequisites

Before performing this task, open the cosmetic doors, if installed, and ensure that the slot over which you are about to install the cover is empty. See the [About Impedance Carriers and Slot Covers](#), on page 5 and the [Removing a Switch Fabric Card](#).

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- Slot cover

Steps

To install a slot cover, perform the following steps:

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Using the handle, hold the slot cover in place over the slot.
3. Partially tighten each of the four captive screws on the front panel of the slot cover (either by hand or with the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver) to make sure that they are all engaged.
4. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to fully tighten the captive screws to seat the slot cover firmly in place.

DETAILED STEPS

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|---------------|---|
| Step 1 | Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis. |
| Step 2 | Using the handle, hold the slot cover in place over the slot. |
| Step 3 | Partially tighten each of the four captive screws on the front panel of the slot cover (either by hand or with the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver) to make sure that they are all engaged. |
| Step 4 | Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to fully tighten the captive screws to seat the slot cover firmly in place. |
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What to Do Next

After performing this task, close the front (PLIM) side cosmetic doors, if installed.

Removing a Slot Cover

This section describes how to remove a slot cover from the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. The chassis may be shipped with slot covers over the switch fabric card and RP card slots. Both slot cover types are removed in the same manner. [Figure 8: RP Slot Cover, on page 11](#) shows an RP slot cover for reference. For more detailed information on the slot covers, see the [About Impedance Carriers and Slot Covers, on page 5](#).

Prerequisites

Before performing this task, open the front (PLIM) side cosmetic doors, if installed.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver

Steps

To remove a slot cover, perform the following steps:

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Grasp the slot cover with one hand.
3. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to loosen the four captive screws that attach the slot cover to the chassis.
4. Holding the slot cover by the handle, remove it, and set it carefully aside.

DETAILED STEPS

Step 1

Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the

chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.

Step 2 Grasp the slot cover with one hand.

Step 3 Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to loosen the four captive screws that attach the slot cover to the chassis.

Step 4 Holding the slot cover by the handle, remove it, and set it carefully aside.

What to Do Next

After performing this task, store the slot cover for later reuse. You may now install a card in the uncovered slot. See the [Installing a Switch Fabric Card, on page 38](#) and the [Installing an RP, PRP, or DRP Card, on page 22](#) for further details.

Installing or Removing an Impedance Carrier

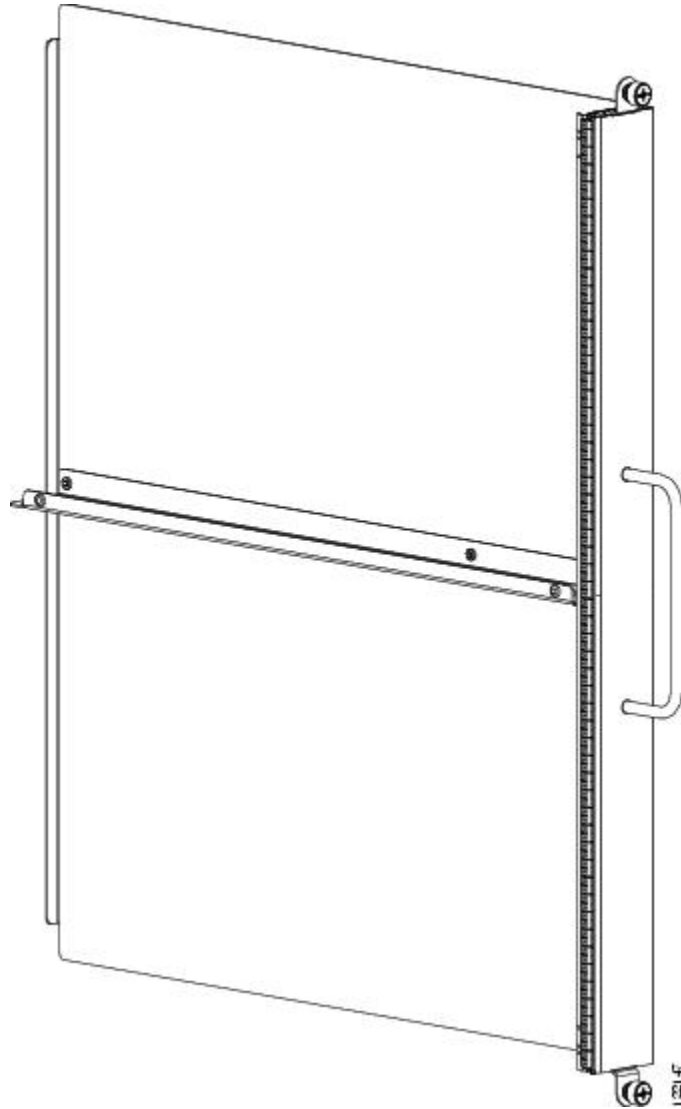
This section contains the following procedures:

Installing an Impedance Carrier

This section describes how to install an impedance carrier in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. The chassis is shipped with impedance carriers installed in the MSC and PLIM slots. Both types of impedance carrier are installed in the same manner. This figure shows an MSC impedance carrier for

reference. For more detailed information on impedance carriers, see the [About Impedance Carriers and Slot Covers](#), on page 5.

Figure 9: MSC Slot Impedance Carrier



Prerequisites

Before performing this task, open the cosmetic doors, if installed, and ensure that the slot in which you are about to install the impedance carrier is empty. See the [About Impedance Carriers and Slot Covers](#), on page 5 and the [Removing an MSC, FP, or LSP Line Card](#) or the [Removing a PLIM](#) (depending on the slot in which you are installing an impedance carrier).

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- Impedance carrier:
 - MSC impedance carrier—Cisco Product number CRS-MSC-IMPEDANCE=

or

- ◦ PLIM impedance carrier—Cisco Product number CRS-INT-IMPEDANCE=

Steps

To install an impedance carrier, perform the following steps:

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Use both hands while inserting an impedance carrier. Use one hand on the faceplate and the other hand along the base of the impedance carrier to guide it into a slot.
3. Slide the impedance carrier into the chassis until the captive screw plates are flush with the chassis.
4. Partially tighten the two captive screws on the front panel of the impedance carrier (either by hand or with the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver) to make sure that they are both engaged.
5. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to fully tighten the captive screws to seat the impedance carrier firmly in the slot.

DETAILED STEPS

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- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the

chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.

- Step 2** Use both hands while inserting an impedance carrier. Use one hand on the faceplate and the other hand along the base of the impedance carrier to guide it into a slot.
- Step 3** Slide the impedance carrier into the chassis until the captive screw plates are flush with the chassis.
- Step 4** Partially tighten the two captive screws on the front panel of the impedance carrier (either by hand or with the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver) to make sure that they are both engaged.
- Step 5** Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to fully tighten the captive screws to seat the impedance carrier firmly in the slot.
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What to Do Next

After performing this task, close the cosmetic doors, if installed.

Removing an Impedance Carrier

This section describes how to remove an impedance carrier from the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. Both types of impedance carrier types are removed in the same manner. [Figure 9: MSC Slot Impedance Carrier, on page 15](#) shows an MSC impedance carrier for reference. For more detailed information on impedance carriers, see the [About Impedance Carriers and Slot Covers, on page 5](#).

Prerequisites

Before performing this task, open the cosmetic doors, if installed.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver

Steps

To remove an impedance carrier, perform the following steps:

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Identify the impedance carrier to be removed from the card cage. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the card counterclockwise to loosen it from the slot.
3. Grasp the impedance carrier handle with one hand and gently pull it halfway from the slot.
4. Place one hand under the impedance carrier to guide it.
5. Holding the impedance carrier underneath and by the handle, pull it from the slot, and set it carefully aside.

DETAILED STEPS

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- | | |
|---------------|---|
| Step 1 | Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis. |
| Step 2 | Identify the impedance carrier to be removed from the card cage. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the card counterclockwise to loosen it from the slot. |
| Step 3 | Grasp the impedance carrier handle with one hand and gently pull it halfway from the slot. |
| Step 4 | Place one hand under the impedance carrier to guide it. |
| Step 5 | Holding the impedance carrier underneath and by the handle, pull it from the slot, and set it carefully aside. |
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What to Do Next

After performing this task, store the impedance carrier for future use. You may now install a card in the uncovered slot. See the [Installing an MSC, FP, or LSP Line Card, on page 44](#) and the [Installing a PLIM, on page 53](#) for further details.

Installing an RP, PRP, or DRP Card

This section contains the following procedures:



Warning

Class 1 Laser Product. Statement 113

**Warning**

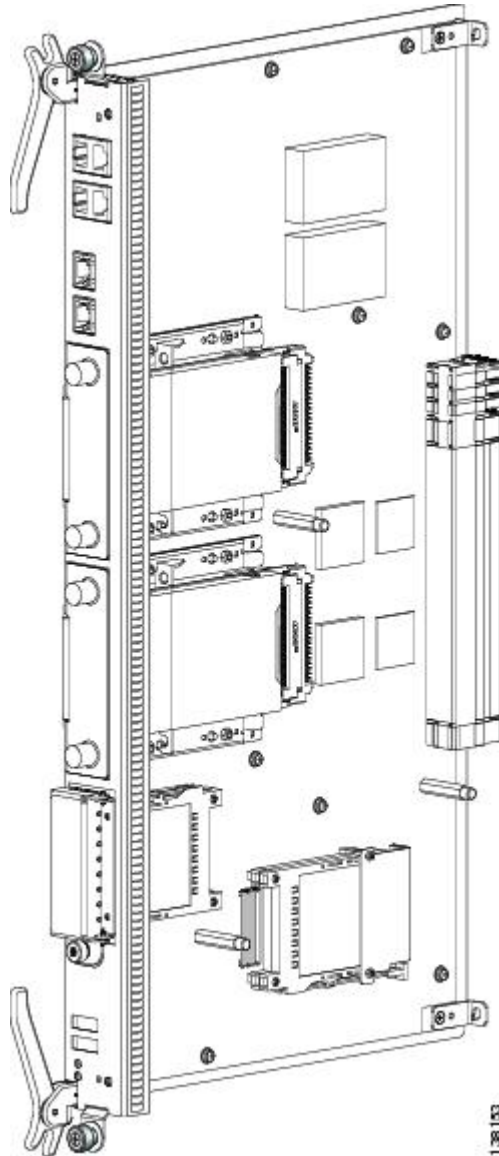
Because invisible radiation may be emitted from the aperture of the port when no fiber cable is connected, avoid exposure to radiation and do not stare into open apertures. Statement 125

About Distributed Route Processors and Distributed Route Processor PLIMs

The Cisco CRS Carrier Routing System provides distributed route processor (DRP) support through the installation of DRP PLIMs and DRP cards on the Cisco CRS Series Enhanced 16-Slot Line Card Chassis (see *Distributed Route Processor PLIM* and *Distributed Route Processor Card*). The installation of DRPs provides

you with the ability to configure the system for logical router support and additional processor power for multichassis systems.

Figure 10: Distributed Route Processor PLIM



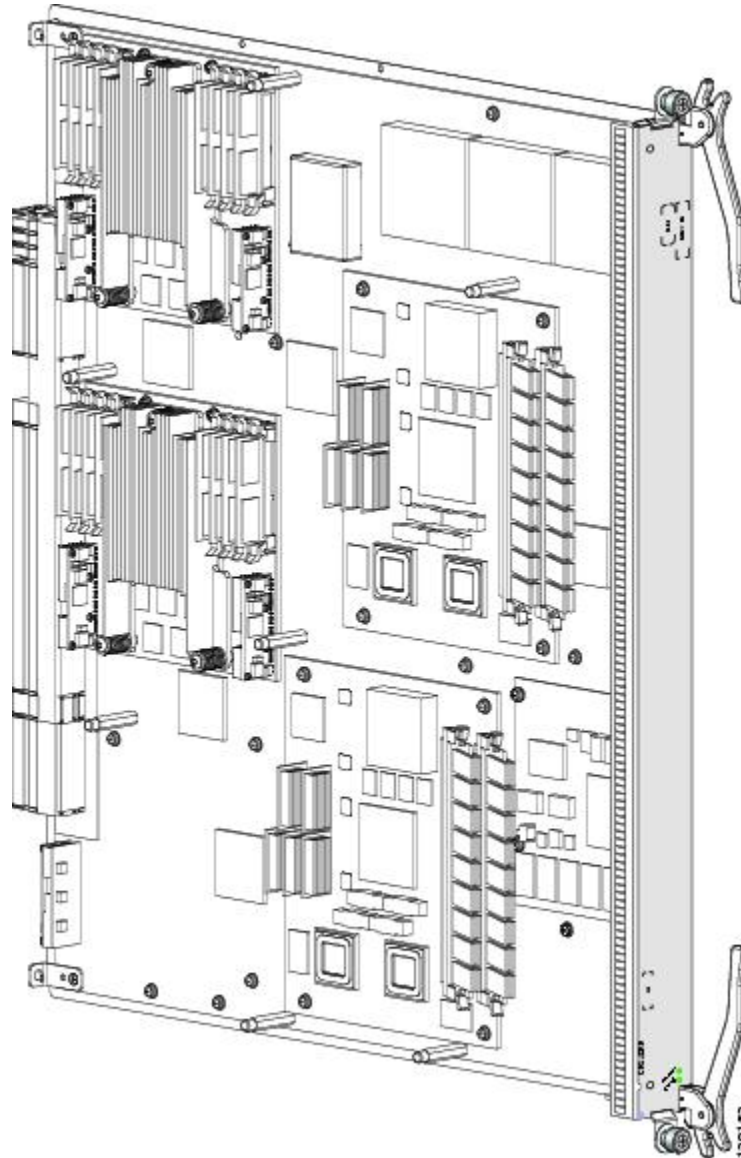
Note

The distributed route processor (DRP) card and DRP PLIM have no dedicated slots. The DRP card is installed in an open MSC slot and the DRP PLIM is installed in the corresponding PLIM slot.

For DRP support, you must install both the DRP PLIM in a PLIM slot on the front (PLIM) side of the chassis and a DRP card in the corresponding slot on the rear (MSC) side of the chassis. The DRP PLIM and DRP

cards are installed in the same manner as regular PLIMs and MSCs. See the [Installing a Line Card, on page 44](#) or the [Installing a PLIM, on page 53](#) for further information.

Figure 11: Distributed Route Processor Card



DRPs contain two CPU complexes, independent of each other, each with its own hard drive. In addition, the DRP provides you with two PCMCIA card slots, similar to the RP. For further information, see the [About Hard Drives and PCMCIA Cards, on page 9](#). For installation information, see the [Installing a Card-Based Hard Drive, on page 59](#) or the [Installing a PCMCIA Card, on page 60](#).

For more detailed information on the DRP PLIMs and DRP cards, see *Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description*.

Installing an RP, PRP, or DRP Card

This section describes how to install a route processor (RP), performance route processor (PRP), or a DRP card in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. For more detailed information on route processor cards, see Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description.

Every Cisco CRS Series Enhanced 16-Slot Line Card Chassis contains two RP or PRP cards in dedicated slots on the PLIM side of the chassis.

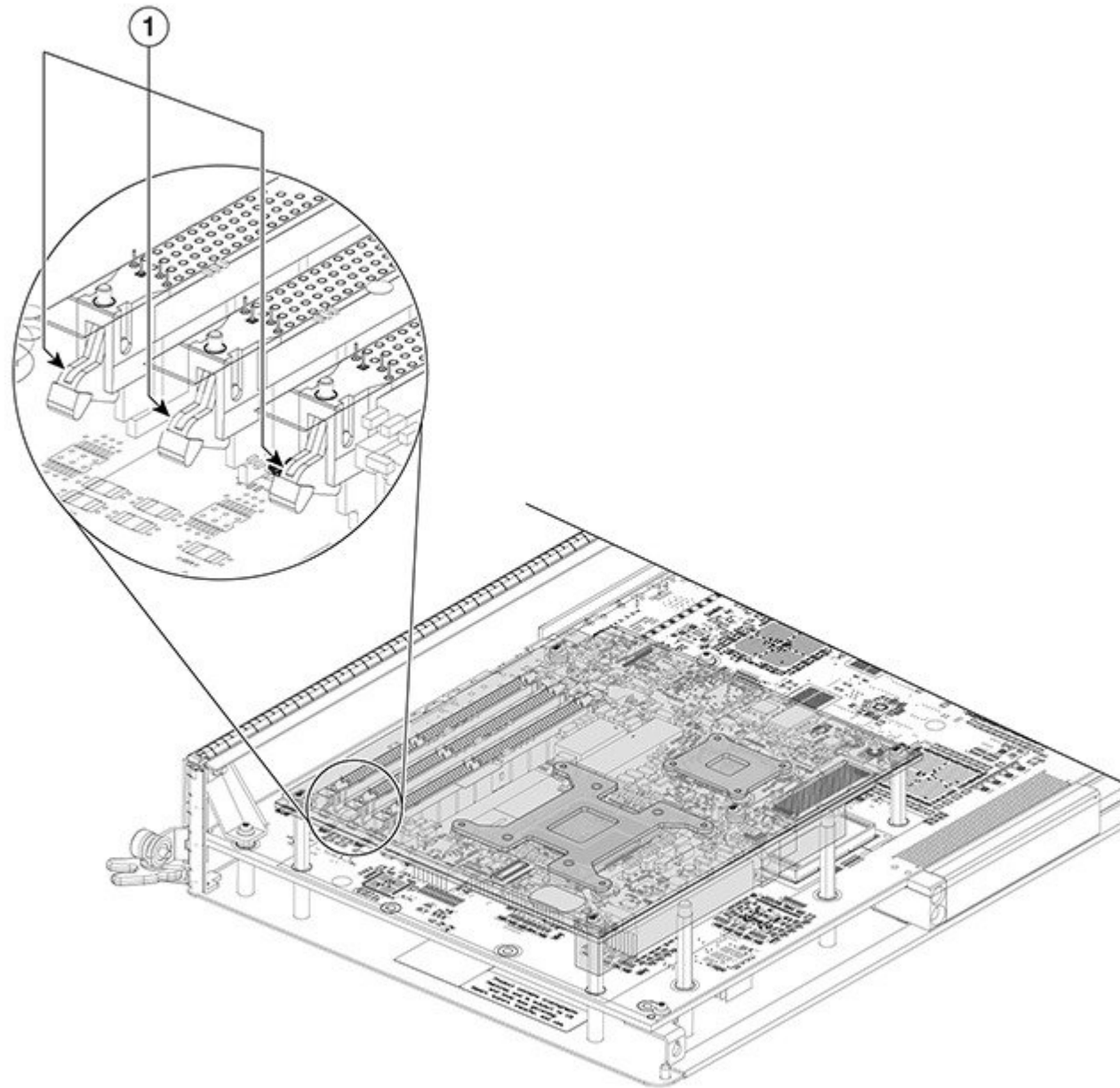
**Note**

A chassis may not be populated with a mix of RP and PRP cards. Both route processor cards should be of the same type (RP or PRP). If you are using Cisco CRS-X, you must use only PRP cards.

**Caution**

Be careful while handling the PRP line cards to avoid pressing the memory module latches on the daughter board and accidentally disengaging the memory modules. For the location of these latches, see the following figure.

Figure 12: Memory Modules Latches on the Daughter Board



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Memory Module Latches

Prerequisites

Because chassis operation may be impacted by the installation of a route processor card, perform these tasks only if one of the following conditions exists:

- When you are certain that the second RP in the chassis is operational and, if not already the master RP, ready to assume control (this happens automatically)
- When the chassis is undergoing scheduled maintenance
- When the Cisco CRS Series Enhanced 16-Slot Line Card Chassis is powered down

Failure to follow these guidelines can result in interruptions in data communications and network connectivity. Before performing this task, open the cosmetic doors, if installed.

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- RP, PRP, or DRP card:
 - RP card—Cisco product number: CRS-16-RP=
 - PRP card—Cisco product number: CRS-16-PRP-6G=
 - PRP card—Cisco product number: CRS-16-PRP-12G=
 - DRP card—Cisco product number: CRS-DRP-CPU=

Steps

To install an RP, PRP, or DRP card, perform the following steps:

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Remove the card from its antistatic packaging.
3. Identify the card to be replaced in the card cage. Remove any cables connected to the front panel of the RP card.
4. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the card counterclockwise to loosen the card from the slot.
5. Grasp the two card ejector levers and simultaneously pivot both ejector levers 90 degrees away from the front edge of the card carrier to unseat the card from the backplane connector.
6. Touching only the metal card carrier, slide the card from the slot and place it directly into an antistatic sack or other ESD-preventive container. If you plan to return the defective card to the factory, repackage it in the shipping container you received with the replacement card.
7. Grasp the card carrier handle with one hand and place your other hand under the carrier to support and guide it into the correct slot. Slide the card halfway into the slot. Avoid touching the card circuitry or any connectors.
8. Pivot both card ejector levers so that the openings on the card ejector cams at the top and bottom of the card pass over the tabs on each side of the card cage slot.
9. Continue sliding the card into the card cage slot until the openings on the card ejector cams engage the tabs on each side of the card cage slot.
10. To seat the card in the backplane connector, grasp both card ejector levers and pivot them inward toward the handle in the card carrier until they are flush against the front edge of the card carrier.
11. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the card clockwise to seat the card firmly in the slot.
12. Reattach any cables you removed in Step 3.

DETAILED STEPS

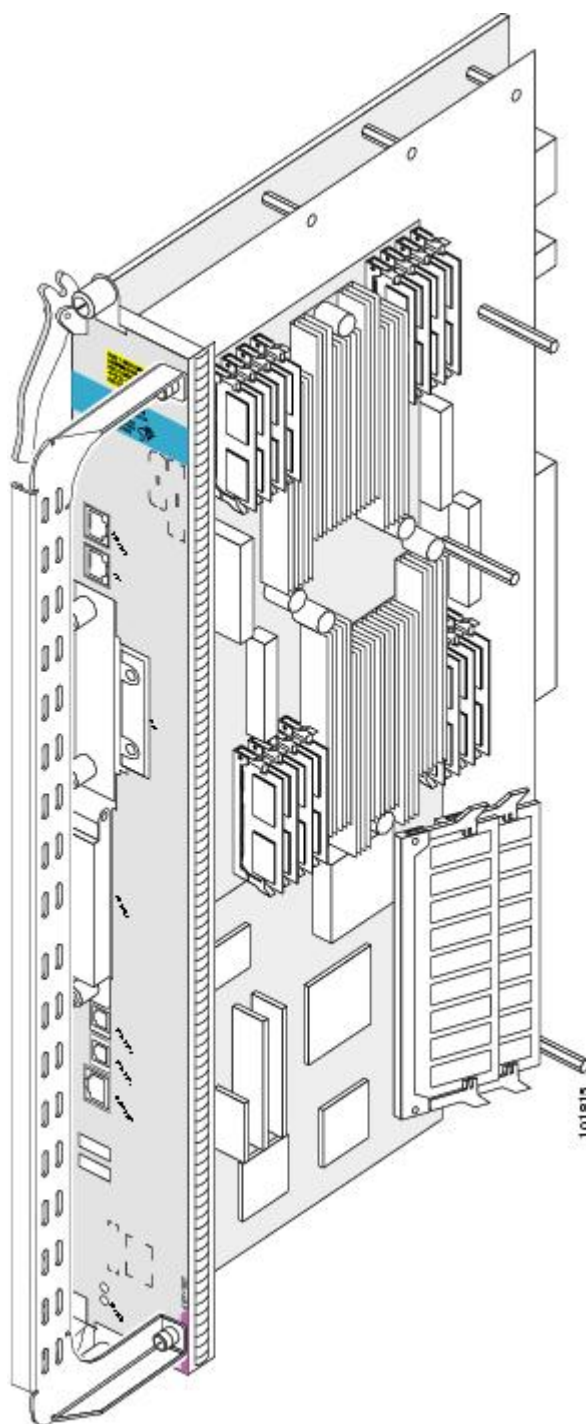
-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the

chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.

Step 2 Remove the card from its antistatic packaging.

Step 3 Identify the card to be replaced in the card cage. Remove any cables connected to the front panel of the RP card.

Figure 13: Route Processor (RP) Card



- Step 4** Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the card counterclockwise to loosen the card from the slot.
- Step 5** Grasp the two card ejector levers and simultaneously pivot both ejector levers 90 degrees away from the front edge of the card carrier to unseat the card from the backplane connector.
- Step 6** Touching only the metal card carrier, slide the card from the slot and place it directly into an antistatic sack or other ESD-preventive container. If you plan to return the defective card to the factory, repackage it in the shipping container you received with the replacement card.
- Step 7** Grasp the card carrier handle with one hand and place your other hand under the carrier to support and guide it into the correct slot. Slide the card halfway into the slot. Avoid touching the card circuitry or any connectors.
- Note** Alignment grooves exist on each slot in the card cage. When you install a card in the card cage, make sure that you align both edges of the card carrier in the slot grooves.
- Step 8** Pivot both card ejector levers so that the openings on the card ejector cams at the top and bottom of the card pass over the tabs on each side of the card cage slot.
- Caution** Verify that the openings on the card ejector cams pass over the tabs; otherwise, one or both ejector levers might bind when you attempt to close the ejector levers, thereby damaging or breaking one or both ejector levers.
- Step 9** Continue sliding the card into the card cage slot until the openings on the card ejector cams engage the tabs on each side of the card cage slot.
- Note** RP and PRP cards have guide pins that make initial contact with the backplane connector as you slide the card into its slot. After the guide pins make contact, continue pushing on the card carrier until the card ejector levers begin pivoting forward toward the handle in the card carrier.
- Step 10** To seat the card in the backplane connector, grasp both card ejector levers and pivot them inward toward the handle in the card carrier until they are flush against the front edge of the card carrier.
- Step 11** Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the card clockwise to seat the card firmly in the slot.
- Step 12** Reattach any cables you removed in Step 3.
-

What to Do Next

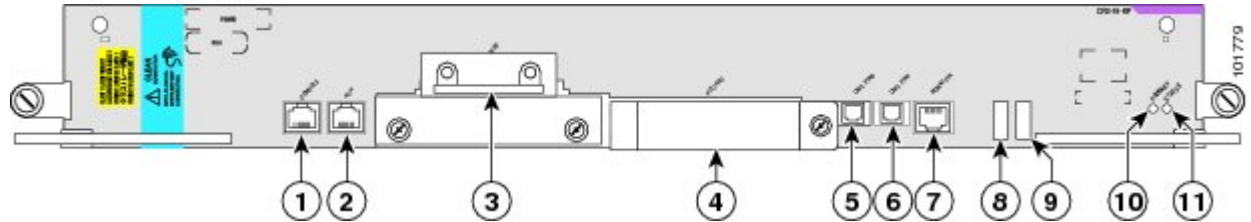
After performing this task, close the cosmetic doors, if installed, and verify that the card has been installed properly.

Verifying the Installation of an RP, PRP, or DRP Card

This section describes how to verify and troubleshoot the installation of a route processor (RP), performance route processor (PRP), or distributed route processor (DRP) card in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. For more detailed information on the RP card, see Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description.

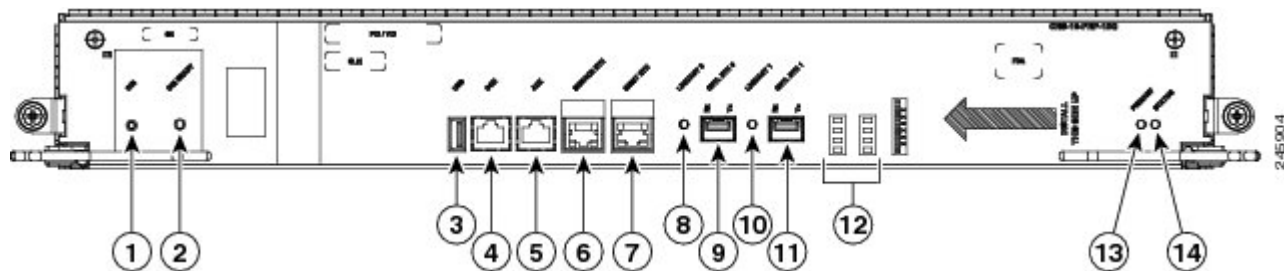
This section tells you how to verify that the card has been properly installed. The figure *RP Card Front Panel* shows the RP card front panel and *Performance Route Processor Front Panel* shows the PRP card front panel.

Figure 14: RP Card Front Panel



1	Console port	7	Management Ethernet RJ45 port
2	Aux port	8	Alphanumeric LED Display
3	Internal hard disk	9	Alphanumeric LED Display
4	PC card slot	10	PRIMARY LED—PRP active or standby indicator
5	Control Ethernet 0 port	11	STATUS LED—Card status indicator
6	Control Ethernet 1 port		

Figure 15: Performance Route Processor Front Panel



1	OIR push button—Press to initiate OIR process	8	Link/Active 0 LED
2	OIR Ready LED	9	Control Ethernet 0 port (SFP or SFP+)

3	USB socket	10	Link/Active 1 LED
4	Console port	11	Control Ethernet 1 port (SFP or SFP+)
5	Auxiliary port	12	Alphanumeric LED Display
6	Service Ethernet RJ45 port	13	PRIMARY LED—PRP active or standby indicator
7	Management Ethernet RJ45 port	14	STATUS LED—Card status indicator

Understanding the Alphanumeric LEDs

On the card front panel, the RP, PRP, or DRP card has an alphanumeric LED display that shows a sequence of messages indicating the state of the card.



Note

It is normal for some displayed messages to appear too briefly in the LED display to be read.

Troubleshooting the RP, PRP, or DRP Card

If the installed or replaced card fails to operate or to power up on installation:

- Make sure that the card is seated firmly in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis slot. One easy way to verify physical installation is to see whether the front faceplate of the card is even with the fronts of the other cards installed in the card cage.



Note

PRP cards only—If the PRP is not seated properly, the blue OIR Ready LED on the faceplate glows solidly, and the PRIMARY and STATUS LEDs keep blinking to indicate that the card is not seated correctly. If this happens, remove the card fully and re-insert fully.

- Check whether the ejector levers are latched and that the captive screws are fastened properly. If you are uncertain, unlatch the levers, loosen the screws, and attempt to reseat the card.
- Examine the alarm module to see if there are any active alarm conditions. (See *Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description* for information on the alarm module.)
- Examine the power shelves to see whether the chassis, as a whole, is receiving power.

Use the card status LED, located on the RP and PRP card front panel, to verify the correct installation of the card:

- When the card is properly installed, the card status LED turns green. If this LED is off, verify that the card is installed correctly.
- When the card status LED is blinking yellow, a problem exists on the board.
- When the card status LED is off, the board status is unknown. Verify that there is power to the board by looking at the indicators on the power shelf.
- If a failure occurs during the board boot sequence, the four-digit alphanumeric display indicates the current boot phase to assist you in debugging the board failure.

Installing a Fan Controller Card

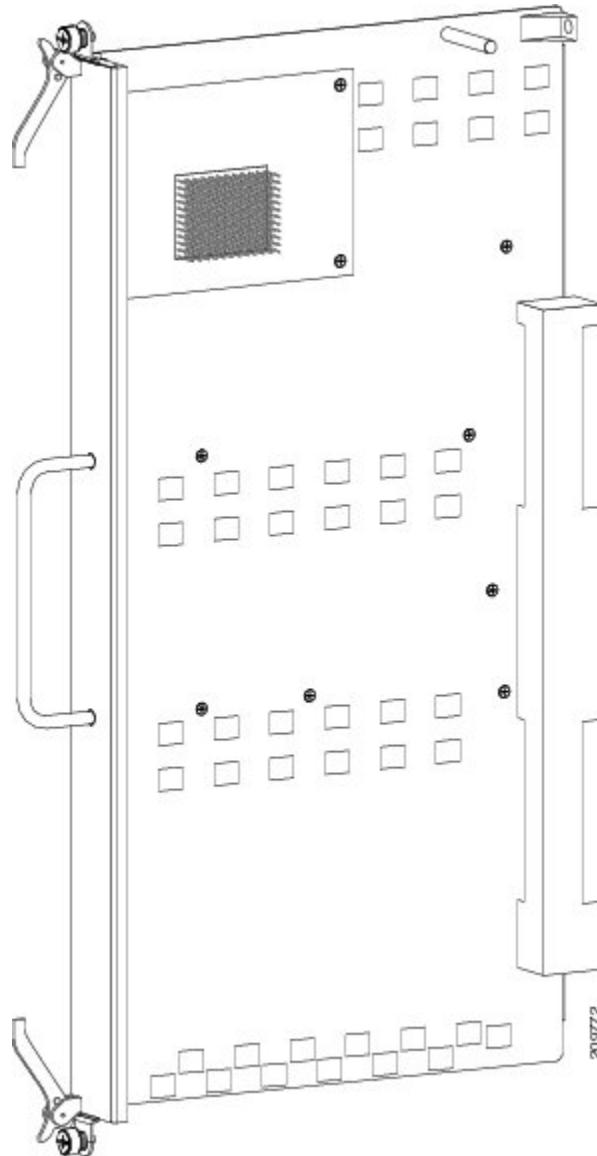
This section contains the following procedures:

Installing a Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card

This section describes how to install a Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller (LCFC) card in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. For more detailed information on the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card, see Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description.

Two Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller cards, shown in the figure below, exist in every Cisco CRS Series Enhanced 16-Slot Line Card Chassis.

Figure 16: Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card



Prerequisites

Before performing this task, open the front (PLIM) cosmetic doors, if installed.

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card—Cisco product number CRS-16-LCC-FAN-CT=

Steps

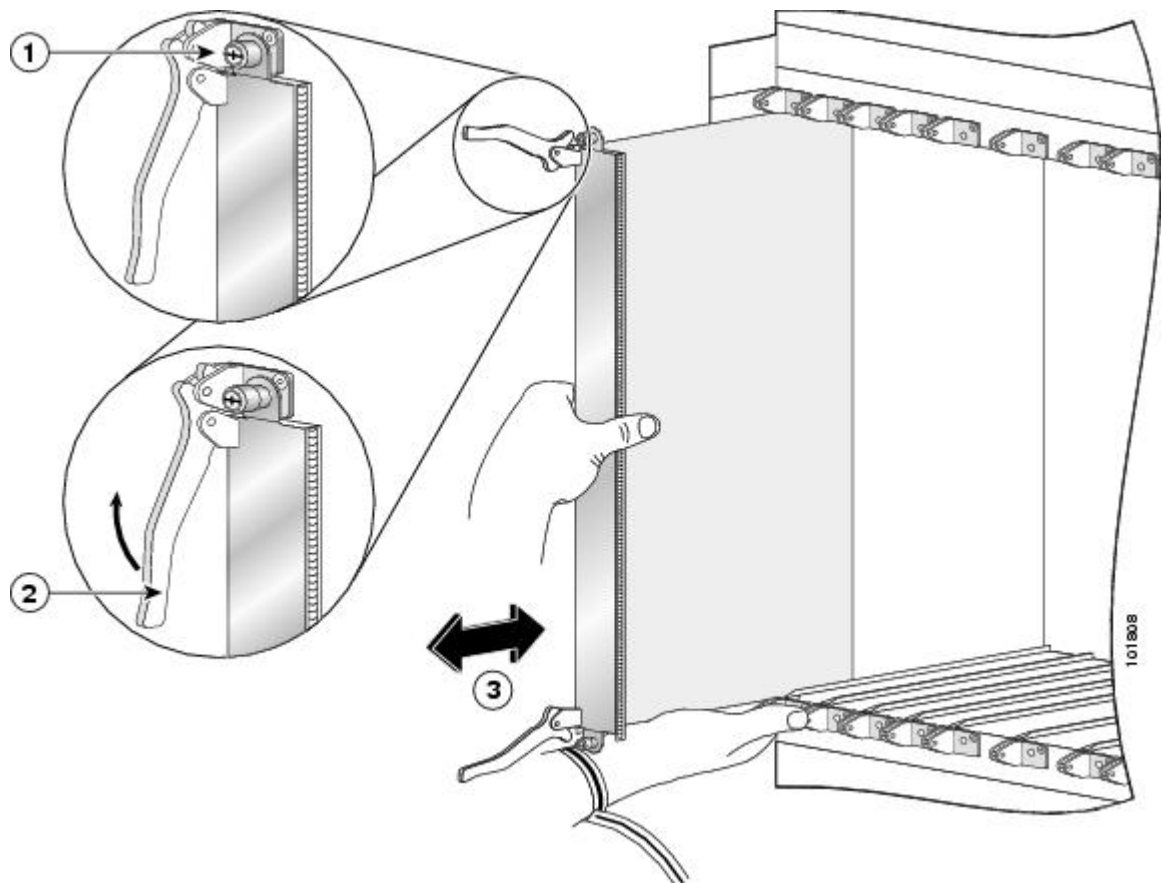
To install a Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card, see [Figure 17: Installing a Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card](#), on page 34 and perform the following steps:



Note

In the card installation figure, *Installing a Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card*, an Impedance Carrier is shown. Refer to figure *Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card Front Panel* for an example of the actual Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card.

Figure 17: Installing a Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card



1	Captive screw	3	Direction of installation or removal
2	Ejector lever		

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Remove the impedance carrier card from the available slot in which you plan to install the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card.
3. Remove the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card from its antistatic packaging.
4. Grasp the card carrier handle with one hand and place your other hand under the carrier to support and guide it into the correct slot.
5. Slide the card halfway into the slot. Avoid touching the card circuitry or any connectors.
6. Pivot both card ejector levers so that the openings on the card ejector cams at the top and bottom of the card pass over the tabs on each side of the card cage slot.
7. Continue sliding the card into the card cage slot until the openings on the card ejector cams engage the tabs on each side of the slot.
8. To seat the card in the midplane connector, grasp both card ejector levers and pivot them inward toward the handle in the card carrier until they are flush against the front edge of the card carrier.
9. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card clockwise to seat the card firmly in the slot.

DETAILED STEPS

-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
- Step 2** Remove the impedance carrier card from the available slot in which you plan to install the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card.
- Step 3** Remove the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card from its antistatic packaging.
- Step 4** Grasp the card carrier handle with one hand and place your other hand under the carrier to support and guide it into the correct slot.
Note For easier installation, install the far left card first.
- Step 5** Slide the card halfway into the slot. Avoid touching the card circuitry or any connectors.

- Note** Alignment grooves exist on each slot in the card cage. When you install a card in the card cage, make sure that you align both edges of the card carrier in the slot grooves.
- Step 6** Pivot both card ejector levers so that the openings on the card ejector cams at the top and bottom of the card pass over the tabs on each side of the card cage slot.
- Caution** Verify that the openings on the card ejector cams pass over the tabs; otherwise, one or both ejector levers might bind when you attempt to close the levers, thereby damaging or breaking one or both of them.
- Step 7** Continue sliding the card into the card cage slot until the openings on the card ejector cams engage the tabs on each side of the slot.
- Note** The Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card has guide pins that make initial contact with the midplane connector as you slide a card into its slot. After the guide pins make contact, continue pushing the card carrier until the card ejector levers begin pivoting forward, toward the handle in the card carrier.
- Step 8** To seat the card in the midplane connector, grasp both card ejector levers and pivot them inward toward the handle in the card carrier until they are flush against the front edge of the card carrier.
- Note** For easier installation, install both Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller cards before you tighten the fasteners.
- Step 9** Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card clockwise to seat the card firmly in the slot.

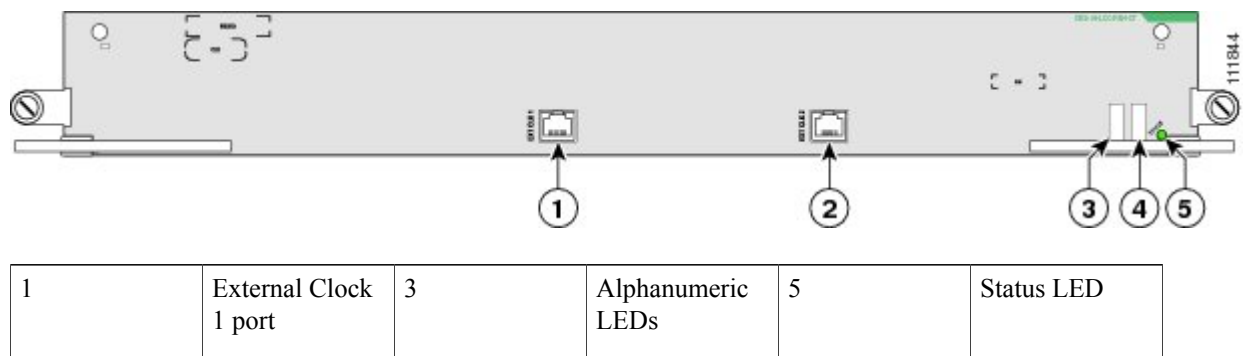
What to Do Next

After performing this task, place the impedance carrier in an antistatic bag for storage and future use. Close the front (PLIM) side cosmetic doors and verify that the card has been installed properly (see the [Verifying the Installation of a Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card](#), on page 36).

Verifying the Installation of a Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card

This section describes how to verify that the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card has been properly installed. This figure is an illustration of the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller front panel.

Figure 18: Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card Front Panel



2	External Clock 2 port	4	Alphanumeric LEDs		
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Understanding the Alphanumeric LEDs

At one end of the faceplate, near an ejector lever, a Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card has two four-digit alphanumeric LED displays that show a sequence of messages indicating the state of the card.



Note

It is normal for some displayed messages to appear too briefly in the LED display to be read.

Troubleshooting the Cisco CRS Series Enhanced 16-Slot Line Card Chassis Fan Controller Card

If the installed or replaced Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card fails to operate or to power up on installation:

- Make sure that the card is seated firmly in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis slot. One easy way to verify physical installation is to see whether the front faceplate of the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card is even with the fronts of the other cards installed in the card cage.
- Check whether the ejector levers are latched and that the captive screws are fastened properly. If you are uncertain, unlatch the levers, loosen the screws, and attempt to reseat the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card.
- Examine the alarm module to see if there are any active alarm conditions. (See Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description.)
- Examine the power shelves to see whether the chassis, as a whole, is receiving power.

Use the Status LED, located on the Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card faceplate, to verify the correct installation of the card:

- When the card is properly installed, the Status LED turns green. If this LED is off, verify that the card is installed correctly.
- When the Status LED is blinking yellow, a problem exists on the board.
- When the Status LED is off, the board status is unknown. Verify that there is power to the board by looking at the indicators on the power shelf.
- If a failure occurs during the board boot sequence, the two four-digit alphanumeric display indicate the current boot phase to assist you in debugging the board failure.

Installing a Switch Fabric Card

This section contains the following procedures:

**Note**

Some switch fabric cards (SFCs) contain Class 1 lasers, while others contain Class 1M lasers; for details on the specifics of your card, see Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description.

**Warning**

Class 1 Laser Product. Statement 113

**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**

Class 1M laser radiation when open. Do not view directly with optical instruments. Statement 281

**Warning**

For diverging beams, viewing the laser output with certain optical instruments within a distance of 100 mm may pose an eye hazard. For collimated beams, viewing the laser output with certain optical instruments designed for use at a distance may pose an eye hazard. Statement 282

**Warning**

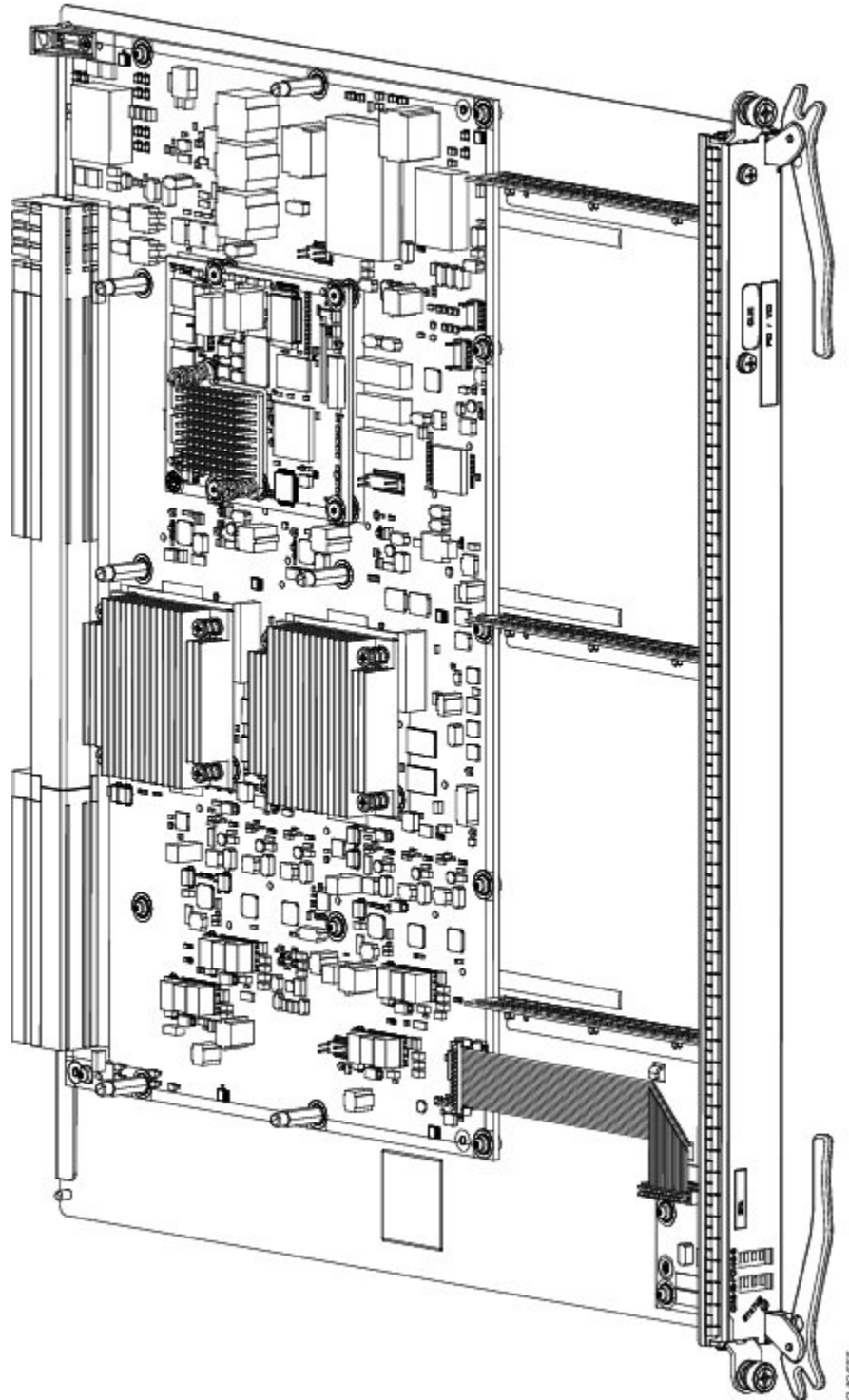
Laser radiation. Do not view directly with optical instruments. Class 1M laser product. Statement 283

Installing a Switch Fabric Card

This section describes how to install a switch fabric card (SFC) in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. For more detailed information on the different types of switch fabric cards available and details on the cards themselves, see Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description.

This figure shows the FQ123-140G switch fabric card for a single-chassis system (in other words, a system that has only a single Cisco CRS Series Enhanced 16-Slot Line Card Chassis).

Figure 19: FQ123 -140G Switch Fabric Card



Prerequisites

Before performing this task, open the front (PLIM) side cosmetic doors, if installed.

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- Switch fabric card:
 - FQ123—Cisco product number: CRS-16-FC/S=

or

- ◦ FQ123-140G—Cisco product number: CRS-16-FC140/S=

or

- ◦ FQ123-400G—Cisco product number: CRS-16-FC400/S=

Steps

To install a switch fabric card, perform the following steps:

SUMMARY STEPS

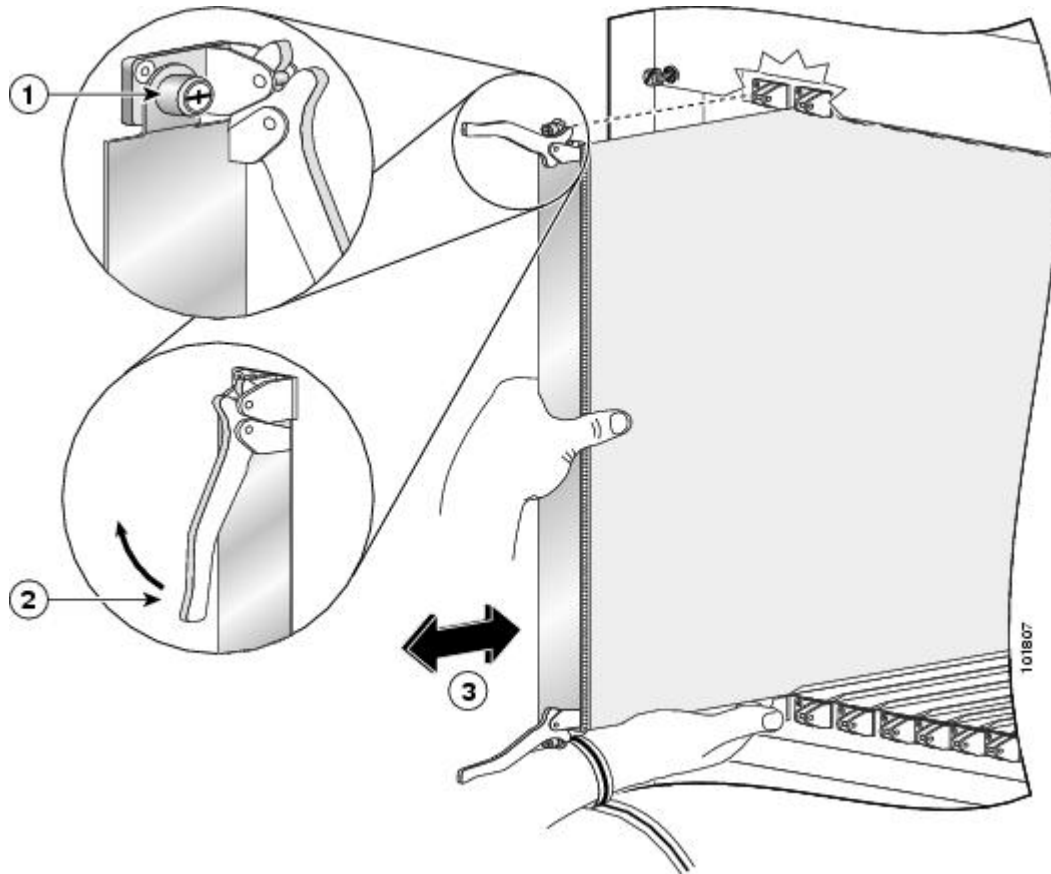
1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Remove the switch fabric card from its antistatic packaging.
3. Grasp the card carrier handle with one hand and place your other hand under the carrier to support and guide it into the correct slot (see figure *Installing a Switch Fabric Card*).
4. Position the card for insertion into the card cage slot. Avoid touching the card circuitry or any connectors.
5. Orient the switch fabric card so that the PCB faces left and the carrier is to the right; if the card does not slide easily into the slot, the orientation may be wrong and the misorientation rejection flange is stopping the card from going into the slot. Reorient the switch fabric card, if necessary.
6. Carefully slide the switch fabric card into the slot until the ejector levers meet the edges of the card cage, then *stop* when the ejector lever hooks catch the pillow block in the card cage. If they do not catch, try reinserting the switch fabric card until the ejector lever hooks are fully latched.
7. Pivot both card ejector levers so that the openings on the card ejector cams at the top and bottom of the card pass over the tabs on each side of the card cage slot.
8. Continue sliding the card into the card cage slot until the openings on the card ejector cams engage the tabs on each side of the card cage slot.
9. To seat the card in the midplane connector, grasp both card ejector levers and pivot them inward toward the handle in the card carrier until they are flush against the front edge of the card carrier.
10. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the card clockwise to seat the card firmly in the slot.

DETAILED STEPS

- | | |
|---------------|--|
| Step 1 | Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis. |
| Step 2 | Remove the switch fabric card from its antistatic packaging. |
| Step 3 | <p>Grasp the card carrier handle with one hand and place your other hand under the carrier to support and guide it into the correct slot (see figure <i>Installing a Switch Fabric Card</i>).</p> <p>Note For easiest installation, install the cards from right to left sequentially, starting from the far right slot.</p> <p>Note In the switch fabric card installation figure, an Impedance Carrier is shown. Refer to Figure 19: FQ123 -140G Switch Fabric Card, on page 39 for an example of the actual switch fabric card.</p> |
| Step 4 | Position the card for insertion into the card cage slot. Avoid touching the card circuitry or any connectors. |

Note Alignment grooves exist on each slot in the card cage. When you install a card in the card cage, make sure that you align both edges of the card carrier in the slot grooves.

Figure 20: Installing a Switch Fabric Card



1	Captive screw	3	Direction of installation or removal
2	Ejector lever		

Step 5 Orient the switch fabric card so that the PCB faces left and the carrier is to the right; if the card does not slide easily into the slot, the orientation may be wrong and the misorientation rejection flange is stopping the card from going into the slot. Reorient the switch fabric card, if necessary.

Step 6 Carefully slide the switch fabric card into the slot until the ejector levers meet the edges of the card cage, then *stop* when the ejector lever hooks catch the pillow block in the card cage. If they do not catch, try reinserting the switch fabric card until the ejector lever hooks are fully latched.

Step 7 Pivot both card ejector levers so that the openings on the card ejector cams at the top and bottom of the card pass over the tabs on each side of the card cage slot.

Caution Verify that the openings on the card ejector cams pass over the tabs; otherwise, one or both ejector levers might bind when you attempt to close the levers, thereby damaging or breaking one or both of them.

- Step 8** Continue sliding the card into the card cage slot until the openings on the card ejector cams engage the tabs on each side of the card cage slot.
- Note** Switch fabric cards have guide pins that make initial contact with the midplane connector as you slide a card into its slot. After the guide pins make contact, continue pushing the card carrier until the card ejector levers begin pivoting forward, toward the handle in the card carrier.
- Step 9** To seat the card in the midplane connector, grasp both card ejector levers and pivot them inward toward the handle in the card carrier until they are flush against the front edge of the card carrier.
- Note** For easier installation, install all four switch fabric cards in each bay before securing any fasteners.
- Step 10** Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to turn the two captive screws on the front panel of the card clockwise to seat the card firmly in the slot.

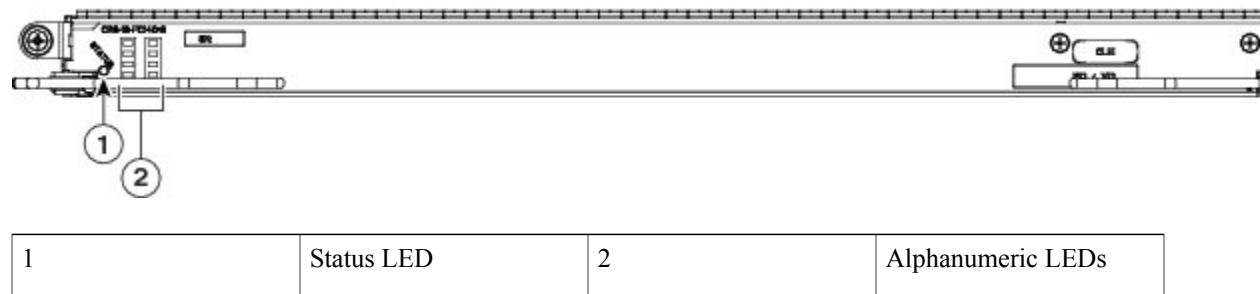
What to Do Next

After performing this task, place the impedance carrier in an antistatic bag for storage and future use. Close the front (PLIM) side cosmetic doors, if installed, and verify that the card has been installed properly (see the next section *Verifying the Installation of a Switch Fabric Card*). If you are performing the initial installation of the system, install the MSCs (see the [Installing an MSC, FP, or LSP Line Card](#), on page 44) after you complete the installation of the switch fabric cards.

Verifying the Installation of a Switch Fabric Card

This section tells you how to verify that a switch fabric card (SFC) has been properly installed. This figure shows an FQ123-140G switch fabric card for a single-chassis system (in other words, a system that has only a single Cisco CRS Series Enhanced 16-Slot Line Card Chassis). The FQ123 SFC is similar.

Figure 21: FQ123-140G Switch Fabric Card Front View



Understanding the Alphanumeric LEDs

At one end of the faceplate, near an ejector lever, a switch fabric card has two four-digit alphanumeric LED displays that show a sequence of messages indicating the state of the card.

**Note**

It is normal for some displayed messages to appear too briefly in the LED display to be read.

Troubleshooting the Switch Fabric Card

If the installed or replaced switch fabric card fails to operate or power up on installation:

- Make sure that the card is seated firmly in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis slot. One easy way to verify physical installation is to see whether the front faceplate of the switch fabric card is even with the fronts of the other cards installed in the card cage.
- Check whether the ejector levers are latched and that the captive screws are fastened properly. If you are uncertain, unlatch the levers, loosen the screws, and attempt to reseal the switch fabric card.
- Examine the alarm module to see if there are any active alarm conditions. See *Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description* for information on the alarm module.
- Examine the power shelves to see whether the chassis, as a whole, is receiving power.

Use the Status LED, located on the switch fabric card faceplate, to verify the correct installation of the card:

- When the card is properly installed, the Status LED turns green. If this LED is off, verify that the card is installed correctly.
- When the Status LED is blinking yellow, a problem exists on the board.
- When the Status LED is off, the board status is unknown. Verify that there is power to the board by looking at the indicators on the power shelf.
- If a failure occurs during the board boot sequence, the two four-digit alphanumeric displays indicate the current boot phase to assist you in debugging the board failure.

Installing a Line Card

This section contains the following procedures:

Installing an MSC, FP, or LSP Line Card

This section describes how to install a modular services card (MSC), forwarding processor (FP) card, or label switch processor (LSP) in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. For more detailed information on the MSC, see *Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description*.

The MSC, FP, and LSP are Layer 3 forwarding engines.

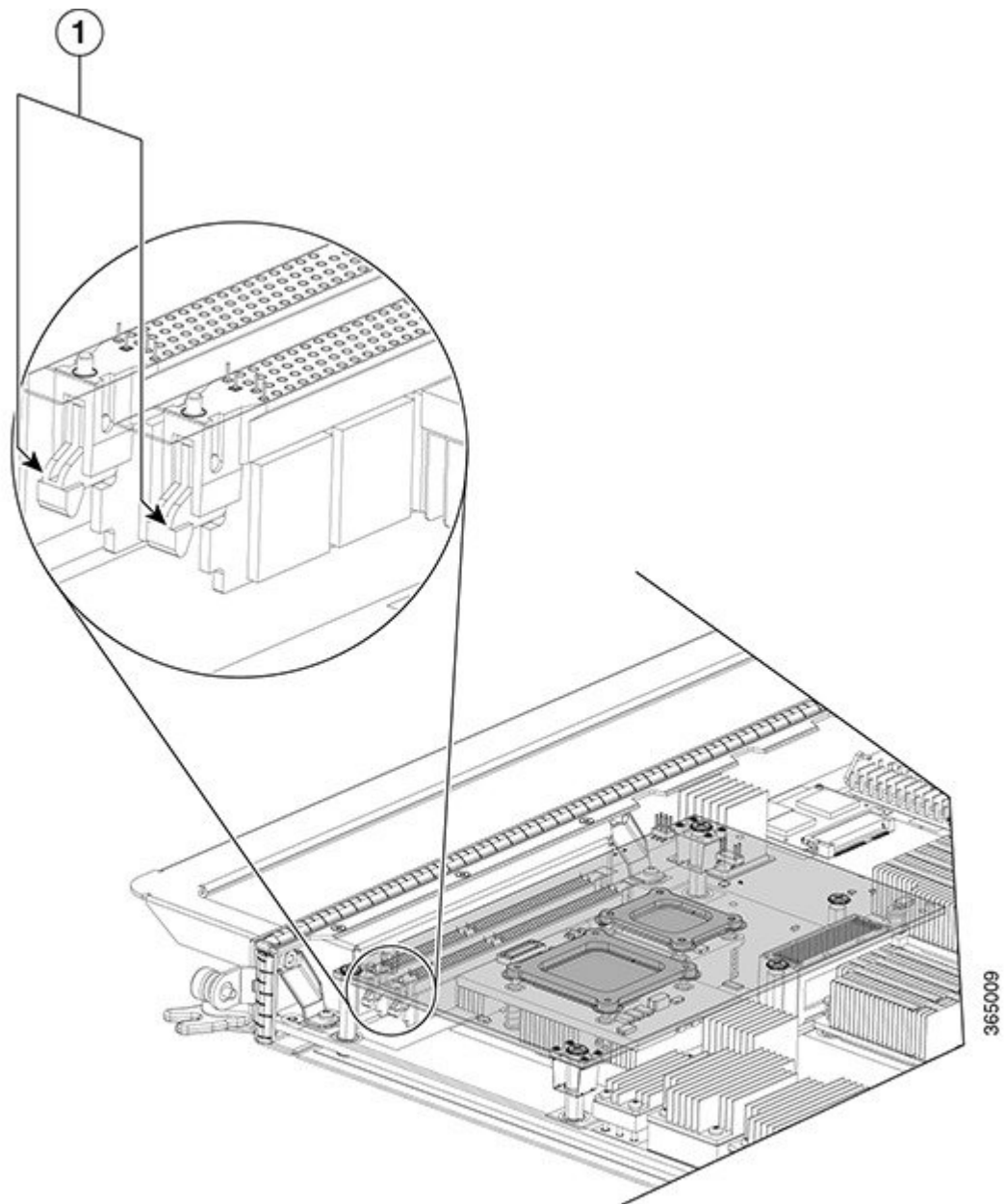
- The MSCs include: CRS-MSC, CRS-MSC-B, CRS-MSC-140G, and CRS-MSC-X (400G).
- The FPs include: CRS-FP-140, CRS-FP-X (400G).
- The LSPs include: CRS-LSP, CRS-LSP-X (400G).

The card versions provide different scale and feature capabilities to address requirements of different positions in the network.

**Caution**

Be careful while handling these line cards to avoid pressing the memory module latches on the daughter board and accidentally disengaging the memory modules. For the location of these latches, see the following figure.

Figure 22: Memory Modules Latches on the Daughter Board



1

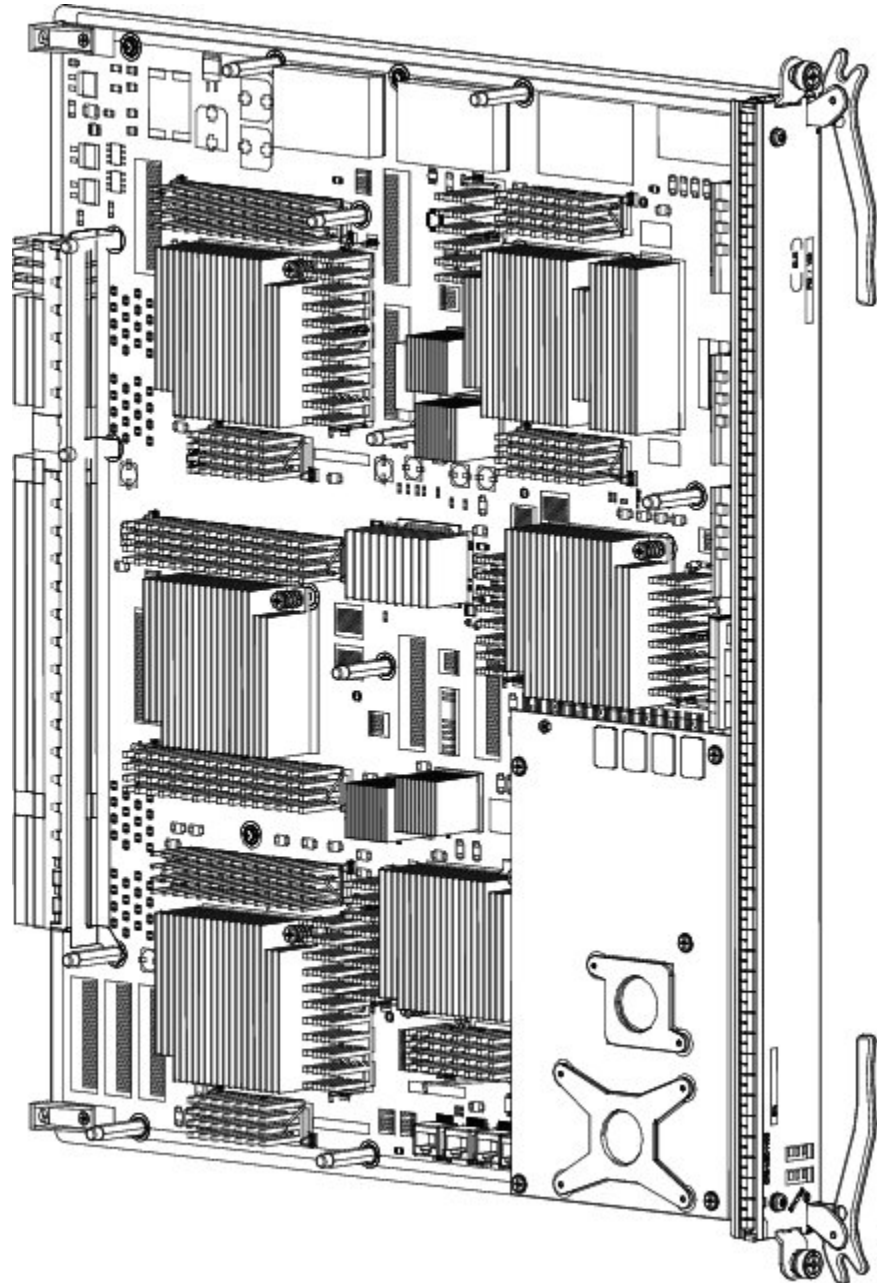
Memory Module Latches

This figure shows the CRS-MSC-140G MSC. The other MSCs and the FP and LSP cards are similar.

**Caution**

MSC-140G, FP-140, and LSP line cards should only be paired with 20-port and 14-port 10-GE XFP PLIMs and 1-port 100-GE CFP PLIMs. The MSC-40 line card should not be paired with 20-port and 14-port 10-GE XFP PLIMs or 1-port 100-GE CFP PLIMs. The MSC-40 line card can be paired with all previous PLIMs. See the release notes for details.

Figure 23: Modular Services Card (CRS-MSC-140G)



Prerequisites

Before performing this task, open the cosmetic doors, if installed.

**Caution**

Remove or install only one modular services card at a time. Allow at least 15 seconds for the router to complete the preceding tasks before removing or installing another modular services card. The router may indicate a hardware failure if you do not follow proper procedures.

**Caution**

Do not carry a line card by the bracket attached to the faceplate.

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- MSC, FP, or LSP (see the product data sheet for ordering details).

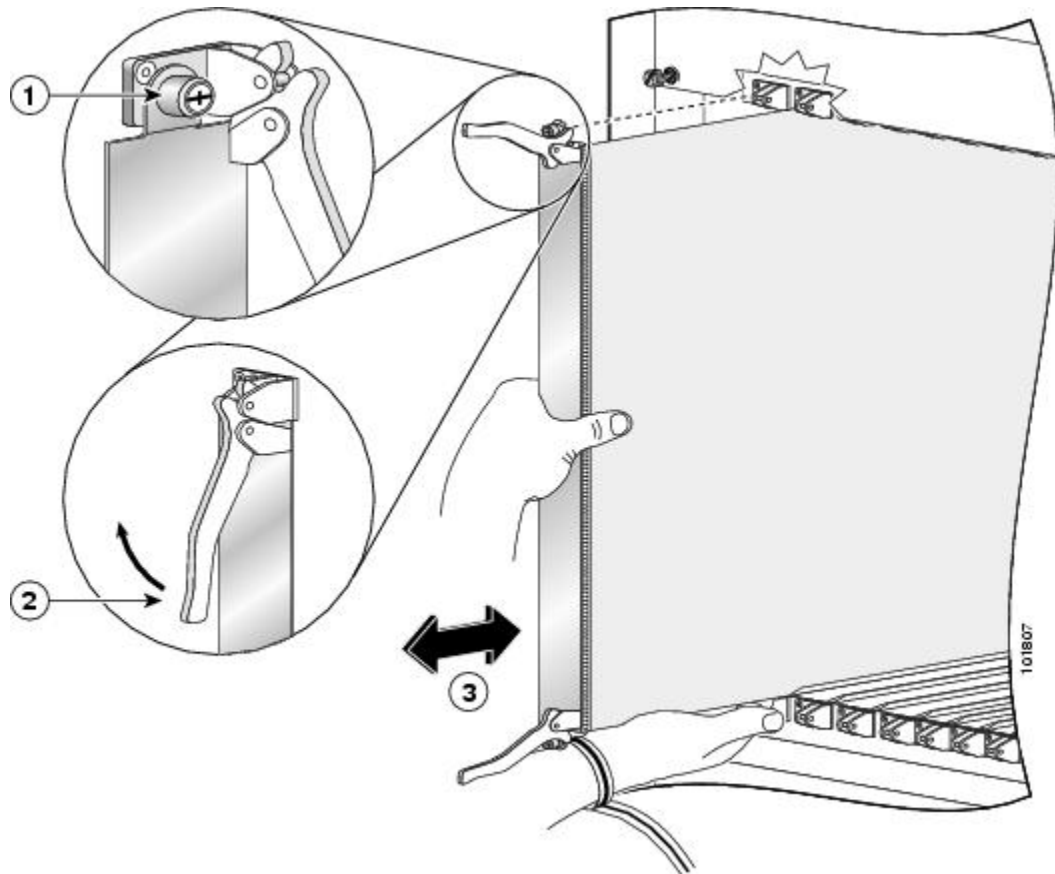
Steps

To install a line card, see the below figure and perform the following steps:

**Note**

In the card installation figure below, an Impedance Carrier is shown. Refer to [Figure 25: CRS-MSC-140G Front Panel](#), on page 51 and [Figure 26: CRS-FP140 Front Panel](#), on page 52 for examples of the actual Modular Service Cards (MSCs).

Figure 24: Installing a Line Card



1	Captive screw	3	Direction of installation or removal
2	Ejector lever		

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Choose an available modular services card slot for the line card.
3. Remove the MSC impedance carrier from the slot you need to fill and set it aside.
4. Remove the replacement line card from the antistatic bag or mat.
5. Use both hands while inserting a line card. Use one hand on the faceplate and the other hand along the base of the line card to guide it into a slot.
6. Orient the line card so that the PCB faces left and the carrier is to the right; if the card does not slide easily into the slot, the orientation may be wrong and the misorientation rejection flange is stopping the card from going into the slot. Reorient the line card, if necessary.
7. Make sure that the ejector levers are oriented properly to engage with the pin as the line card slides into the slot. Carefully slide the line card into the slot until the ejector levers engage the catches, then *stop*.
8. Simultaneously pivot the ejector levers toward the faceplate of the line card. Do not force the line card; the ejector levers properly seat the line card against the midplane.
9. Use a number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to tighten the captive screws next to each line card ejector lever to ensure proper EMI shielding and prevent the line card from becoming partially dislodged from the midplane.
10. Attach the bracket to the line card; use the screws that came with it.

DETAILED STEPS

-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
- Step 2** Choose an available modular services card slot for the line card.
- Caution** To prevent ESD damage, handle a modular services card by its ejector levers or the line card carrier edges only. Do not touch any of the electrical components, pins, or circuitry.
- Step 3** Remove the MSC impedance carrier from the slot you need to fill and set it aside.
- Note** Remove only one impedance carrier and install one line card at a time. Be sure to verify that each line card is fully installed and secured before installing another card.

- Step 4** Remove the replacement line card from the antistatic bag or mat.
- Step 5** Use both hands while inserting a line card. Use one hand on the faceplate and the other hand along the base of the line card to guide it into a slot.
- Step 6** Orient the line card so that the PCB faces left and the carrier is to the right; if the card does not slide easily into the slot, the orientation may be wrong and the misorientation rejection flange is stopping the card from going into the slot. Reorient the line card, if necessary.
- Step 7** Make sure that the ejector levers are oriented properly to engage with the pin as the line card slides into the slot. Carefully slide the line card into the slot until the ejector levers engage the catches, then *stop*.
- Step 8** Simultaneously pivot the ejector levers toward the faceplate of the line card. Do not force the line card; the ejector levers properly seat the line card against the midplane.
- Note** If the captive screws are difficult to tighten, ensure that each ejector lever is properly secured to each catch and that the line card is properly seated in the slot.
- Step 9** Use a number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to tighten the captive screws next to each line card ejector lever to ensure proper EMI shielding and prevent the line card from becoming partially dislodged from the midplane.
- Caution** To ensure adequate space for additional PLIMs or line cards, always tighten the captive installation screws on each newly installed PLIM *before* you insert any additional PLIM or line card. These screws also prevent accidental removal and provide proper grounding and EMI shielding for the system.
- Step 10** Attach the bracket to the line card; use the screws that came with it.

What to Do Next

After performing this task, place the impedance carrier in an antistatic bag for storage and future use. Close the cosmetic doors, if installed, and verify that the card has been installed properly (see the next section *Verifying the Installation of an MSC, FP, or LSP Line Card*). If you are performing the initial installation of the system, install the PLIMs (see the [Installing a PLIM, on page 53](#)) after you complete the installation of the line cards.

Verifying the Installation of an MSC, FP, or LSP Line Card

This section describes how to verify that a line card has been properly installed. *CRS-MSC-140G Front Panel* is an illustration of the MSC-140G front panel. *CRS-FP140 Front Panel* shows the FP-140 front panel. The other MSC, FP, and LSP cards are similar.

Figure 25: CRS-MSC-140G Front Panel

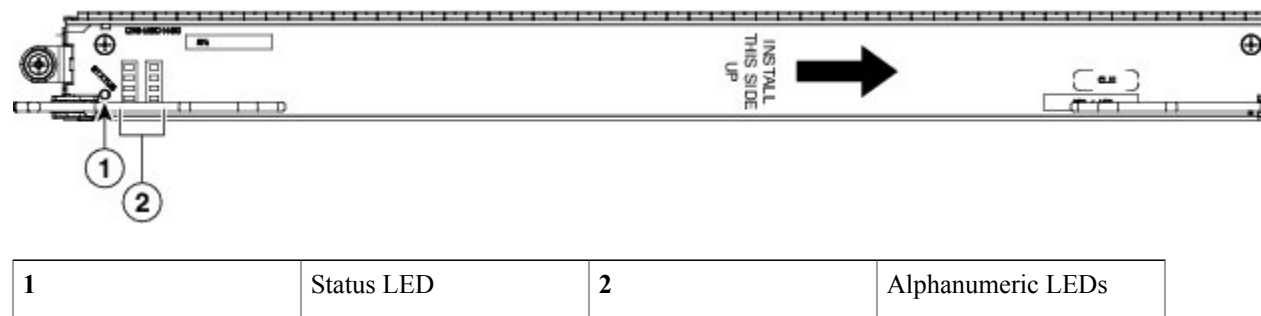
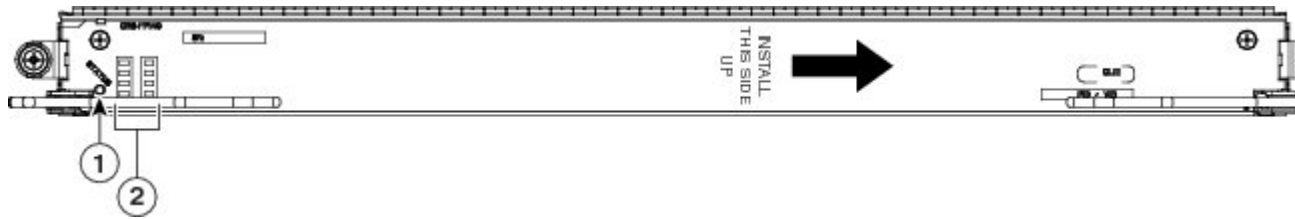


Figure 26: CRS-FP140 Front Panel



1	Status LED	2	Alphanumeric LEDs
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Understanding the Alphanumeric LEDs

At one end of the faceplate, near an ejector lever, an MSC has two four-digit alphanumeric LED displays that show a sequence of messages indicating the state of the card.



Note

It is normal for some displayed messages to appear too briefly in the LED display to be read.

Troubleshooting the MSC, FP, or LSP Card

If the installed or replaced line card fails to operate or to power up on installation:

- Make sure that the card is seated firmly into the Cisco CRS Series Enhanced 16-Slot Line Card Chassis slot. One easy way to verify physical installation is to see whether the front faceplate of the card is even with the fronts of the other cards installed in the card cage.
- Check whether the ejector levers are latched and that the captive screws are fastened properly. If you are uncertain, unlatch the levers, loosen the screws, and attempt to reseat the card.
- Examine the Cisco CRS Series Enhanced 16-Slot Line Card Chassis alarm module to see if there are any active alarm conditions. (See *Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description* for information on the alarm module.)
- Examine the Cisco CRS Series Enhanced 16-Slot Line Card Chassis power shelves to see whether the chassis, as a whole, is receiving power.

Use the Status LED, located on the line card faceplate, to verify the correct installation of the line card:

- When the card is properly installed, the Status LED turns green. If this LED is off, verify that the card is installed correctly.
- If a failure occurs during the board boot sequence, the two four-digit alphanumeric LED displays indicate the current boot phase to assist you in debugging the board failure.

Installing a PLIM

This section contains the following procedures:

**Note**

Some PLIMs contain Class 1 lasers, while others contain Class 1M lasers; for details of your PLIM, see Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description.

**Warning**

Class 1 Laser Product. Statement 113

**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**

Class 1M laser radiation when open. Do not view directly with optical instruments. Statement 281

**Warning**

For diverging beams, viewing the laser output with certain optical instruments within a distance of 100 mm may pose an eye hazard. For collimated beams, viewing the laser output with certain optical instruments designed for use at a distance may pose an eye hazard. Statement 282

**Warning**

Laser radiation. Do not view directly with optical instruments. Class 1M laser product. Statement 283

Installing a PLIM

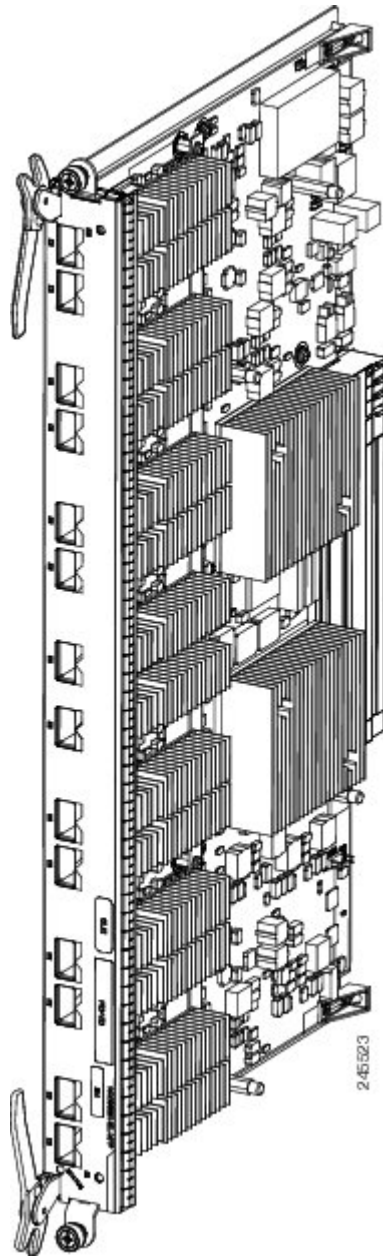
This section describes how to install a PLIM in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. For more detailed information on PLIMs, see Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description.

**Caution**

MSC-140G, FP-140, and LSP line cards should only be paired with 20-port and 14-port 10-GE XFP PLIMs and 1-port 100-GE CFP PLIMs. The MSC-40 line card should not be paired with 20-port and 14-port 10-GE XFP PLIMs or 1-port 100-GE CFP PLIMs. The MSC-40 line card can be paired with all previous PLIMs. See the release notes for details.

A PLIM is paired with a line card through the midplane of the chassis. A PLIM provides the ability to choose several interfaces (for example, Packet-over-SONET [PoS]). This figure shows a typical PLIM (in this case, a 14-port 10-GE XFP PLIM).

Figure 27: Typical PLIM - 14-Port 10-GE XFP PLIM



You can install a PLIM in any slot not occupied by an RP or Cisco CRS Series Enhanced 16-Slot Line Card Chassis fan controller card. If you install a new line card or PLIM, remove the impedance carrier card from the available slot.

**Caution**

The system can indicate a hardware failure if you do not follow proper procedures. Remove or install only one PLIM at a time. Allow at least 15 seconds for the system to complete the preceding tasks before removing or installing another PLIM.

Prerequisites

Before performing this task, open the front (PLIM) side cosmetic doors, if installed.

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- PLIM

Steps

To install a PLIM, see the below figure and perform the following steps:

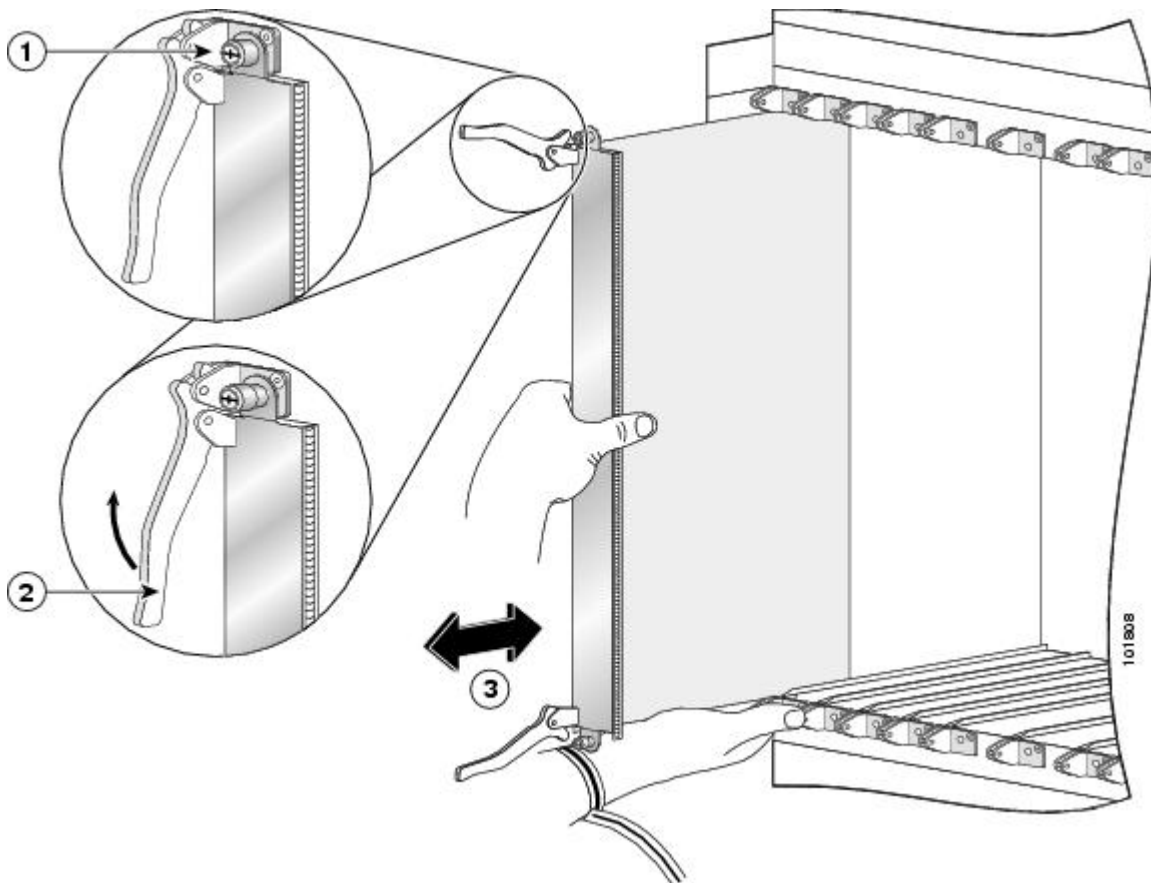
SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Remove the PLIM from its antistatic packaging.
3. Remove the PLIM impedance carrier from the slot you need to fill and set it aside.
4. Grasp the card carrier handle with one hand and place your other hand under the carrier to support and guide it into the correct slot (see below figure). Slide the card halfway into the far left slot. Avoid touching the card circuitry or any connectors.
5. Pivot both card ejector levers so that the openings on the card ejector cams at the top and bottom of the card pass over the tabs on each side of the card cage slot.
6. Continue sliding the card into the card cage slot until the openings on the card ejector cams engage the tabs on each side of the card cage slot.
7. To seat the card in the midplane connector, grasp both card ejector levers and pivot them inward toward the handle in the card carrier until they are flush against the front edge of the card carrier.
8. Tighten the captive screws on the PLIM.
9. Install the optical modules, if applicable.
10. Install the PLIM cable management bracket.
11. Install the interface cables.

DETAILED STEPS

- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
- Step 2** Remove the PLIM from its antistatic packaging.
- Step 3** Remove the PLIM impedance carrier from the slot you need to fill and set it aside. Remove only one impedance carrier and install one PLIM at a time. Be sure to verify that each PLIM is fully installed and secured before installing another card.
- Step 4** Grasp the card carrier handle with one hand and place your other hand under the carrier to support and guide it into the correct slot (see below figure). Slide the card halfway into the far left slot. Avoid touching the card circuitry or any connectors.
- Note** In the PLIM installation figure below, an Impedance Carrier is shown. Refer to [Figure 29: 14-Port 10-Gigabit Ethernet XFP PLIM front panel](#), on page 58 for an example of an actual PLIM faceplate.

Figure 28: Installing a PLIM



1	Captive screw	3	Direction of installation or removal
2	Ejector lever		

- Step 5** Pivot both card ejector levers so that the openings on the card ejector cams at the top and bottom of the card pass over the tabs on each side of the card cage slot.
- Caution** Verify that the openings on the card ejector cams pass over the tabs; otherwise, one or both ejector levers might bind when you attempt to close the ejector levers, thereby damaging or breaking one or both ejector levers.
- Step 6** Continue sliding the card into the card cage slot until the openings on the card ejector cams engage the tabs on each side of the card cage slot.
- Note** Guide pins exist that make initial contact with the backplane connector as you slide a card into its slot. After the guide pins make contact, continue pushing on the card carrier until the card ejector levers begin pivoting forward, toward the handle in the card carrier.
- Step 7** To seat the card in the midplane connector, grasp both card ejector levers and pivot them inward toward the handle in the card carrier until they are flush against the front edge of the card carrier.
- Step 8** Tighten the captive screws on the PLIM.
- Caution** To ensure adequate space for additional PLIMs, MSCs, FPs, or LSPs, always tighten the captive installation screws on each newly installed PLIM *before* you insert any additional PLIM, MSC, FP, or LSP. These screws also prevent accidental removal and provide proper grounding and EMI shielding for the system.
- Step 9** Install the optical modules, if applicable.
- Step 10** Install the PLIM cable management bracket.
- Step 11** Install the interface cables.
- Warning** Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures. Statement 70
- Some PLIMs contain Class 1 lasers and some contain Class 1M. See the documentation for the specific PLIM for details.

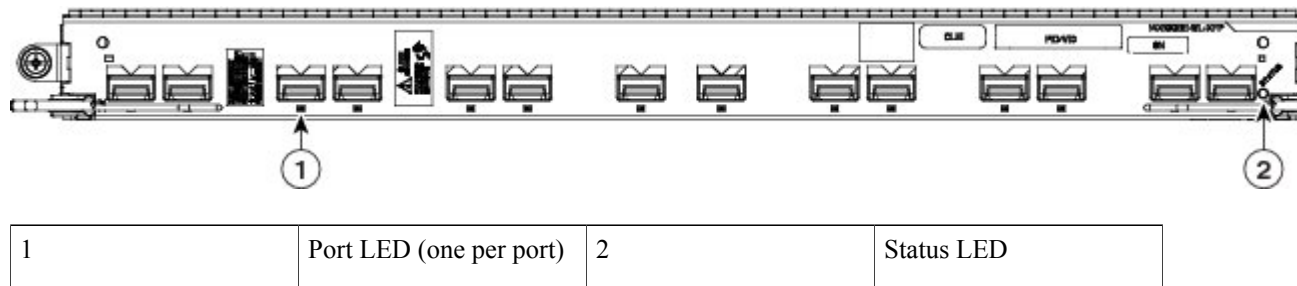
What to Do Next

After performing this task, place the impedance carrier in an antistatic bag for storage and future use. Close the front (PLIM) side cosmetic doors, if installed, and verify that the card has been installed properly (see the [Verifying the Installation of a PLIM](#), on page 58).

Verifying the Installation of a PLIM

This section describes how to verify that the PLIM has been properly installed. This figure shows an example of a PLIM front panel (in this case, a 14-port 10-GE XFP PLIM).

Figure 29: 14-Port 10-Gigabit Ethernet XFP PLIM front panel



Troubleshooting the PLIM

If a PLIM fails to operate or to power up on installation:

- Make sure that the PLIM is seated firmly in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis slot. One easy way to verify physical installation is to see whether the front faceplate of the PLIM is even with the fronts of the other PLIMs installed in the card cage.
- Check whether the ejector levers are latched and that the captive screws are fastened properly. If you are uncertain, unlatch the levers, loosen the screws, and attempt to reseat the PLIM.
- Examine the alarm module to see if there are any active alarm conditions. (See *Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description* for information on the alarm module.)
- Examine the power shelves to see whether the chassis, as a whole, is receiving power.

Use the LEDs on the PLIM faceplate to verify the correct installation and operation of the card:

- Status LED—Indicates whether the card is properly seated and operating OK.
 - Green—Card is properly installed and operating OK.
 - Yellow—Problem exists on the card.
 - Off—PLIM is not properly seated or system power is off.

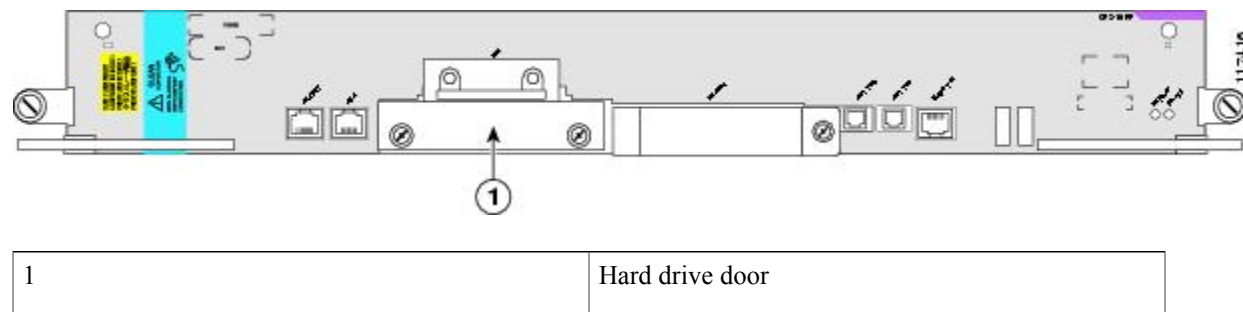
Port Status LED:

- ◦ On—Port is logically active and the laser is on.
- ◦ Off—Port is not active.

Installing a Card-Based Hard Drive

This section describes how to install a hard drive in an RP or a DRP PLIM. Hard drives are available as an option on both the RP and DRP PLIM and are installed in the same manner. For more detailed information on the hard drives, see the [About Hard Drives and PCMCIA Cards, on page 9](#), or *Cisco CRS Series Enhanced 16-Slot Line Card Chassis System Description*. This figure shows the hard drive location on the RP card. (The hard drive for the DRP PLIM is in a similar location.)

Figure 30: RP Card Hard Drive Location



Prerequisites

Before performing this task, open the cosmetic doors, if installed.

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- Hard drive

Steps

To install a hard drive, perform the following steps:

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to loosen the captive screws at the left and right of the hard drive door on the faceplate of the card. If needed, use a number 2 Phillips screwdriver or number 2 common (flat head) screwdriver on the captive screws.
3. Remove the hard drive door and set it carefully aside.
4. Carefully align the hard drive sled (attached to the hard drive), and slowly insert it into the hard drive slot.
5. After the hard drive is in the slot, firmly press it all the way in so that it is properly seated. (When the hard drive is firmly seated, the release button on the card pops out slightly.)
6. Replace the hard drive door to keep dust out, and tighten the captive screws.

DETAILED STEPS

-
- | | |
|---------------|---|
| Step 1 | Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis. |
| Step 2 | Use the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver to loosen the captive screws at the left and right of the hard drive door on the faceplate of the card. If needed, use a number 2 Phillips screwdriver or number 2 common (flat head) screwdriver on the captive screws. |
| Step 3 | Remove the hard drive door and set it carefully aside. |
| Step 4 | Carefully align the hard drive sled (attached to the hard drive), and slowly insert it into the hard drive slot. |
| Step 5 | After the hard drive is in the slot, firmly press it all the way in so that it is properly seated. (When the hard drive is firmly seated, the release button on the card pops out slightly.) |
| Step 6 | Replace the hard drive door to keep dust out, and tighten the captive screws. |
-

What to Do Next

After performing this task, replace any cosmetic cover plates.

After installing the hard disk, use the **proc restart hd_drv** and **proc mandatory on hd_drv** commands to reduce the chances of data corruption.

Installing a PCMCIA Card

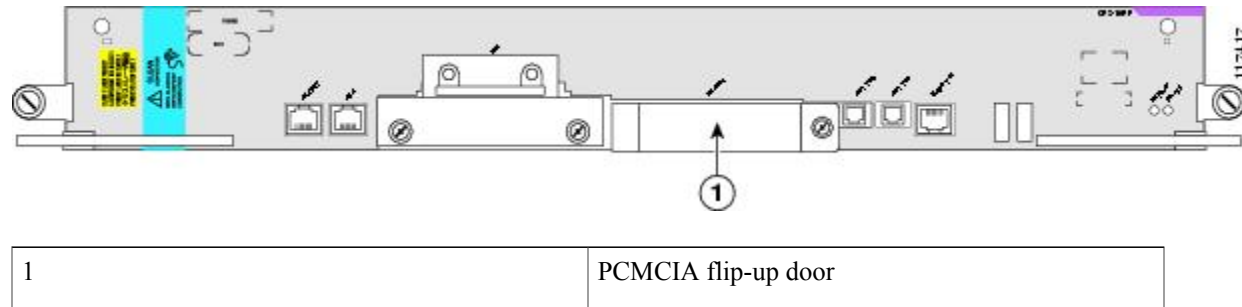
This section describes how to install a PCMCIA card in an RP or a DRP card PCMCIA slot. For more detailed information on PCMCIA cards, see the [About Hard Drives and PCMCIA Cards](#), on page 9, or Cisco CRS

Series Enhanced 16-Slot Line Card Chassis System Description. This figure shows you the location of the PCMCIA door in the RP card faceplate. (The PCMCIA cards for the DRP are in a similar location.)

**Note**

Only the original route processor (RP) card uses a PCMCIA card. The performance route processor (PRP) card has a USB connector for using a flash drive.

Figure 31: RP Card PCMCIA Slot Door



Prerequisites

If you are replacing a PCMCIA card, see the [Removing an RP PCMCIA Card](#) for information on how to remove the PCMCIA card from the PCMCIA card slot.

Before performing this task, open the cosmetic doors, if installed.

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- PCMCIA card

Steps

To install a PCMCIA card, perform the following steps:

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Using the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver, loosen the captive screw at the bottom of the PCMCIA slot door on the faceplate of the card.
3. While lifting the hinged PCMCIA slot door up, carefully insert the new PCMCIA flash card into the left slot of the PCMCIA card cage. When the card is fully inserted, the release button pops up. (If the button fails to pop up, you may not have the card in right side up; turn the card over and try again.)
4. Close the door to keep dust out, and tighten the captive screw with the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver.

DETAILED STEPS

-
- | | |
|---------------|---|
| Step 1 | Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis. |
| Step 2 | Using the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver, loosen the captive screw at the bottom of the PCMCIA slot door on the faceplate of the card. |
| Step 3 | While lifting the hinged PCMCIA slot door up, carefully insert the new PCMCIA flash card into the left slot of the PCMCIA card cage. When the card is fully inserted, the release button pops up. (If the button fails to pop up, you may not have the card in right side up; turn the card over and try again.) |
| Step 4 | Close the door to keep dust out, and tighten the captive screw with the number 2 Phillips screwdriver or number 2 common (flat head) screwdriver. |
-

What to Do Next

After performing this task, close the cosmetic doors, if installed.

Installing Optical Modules

Refer to the *Cisco CRS Carrier Routing System Ethernet Physical Layer Interface Module Installation Note* for information on how to install SFP, XFP, and other modules for your PLIM.



Warning

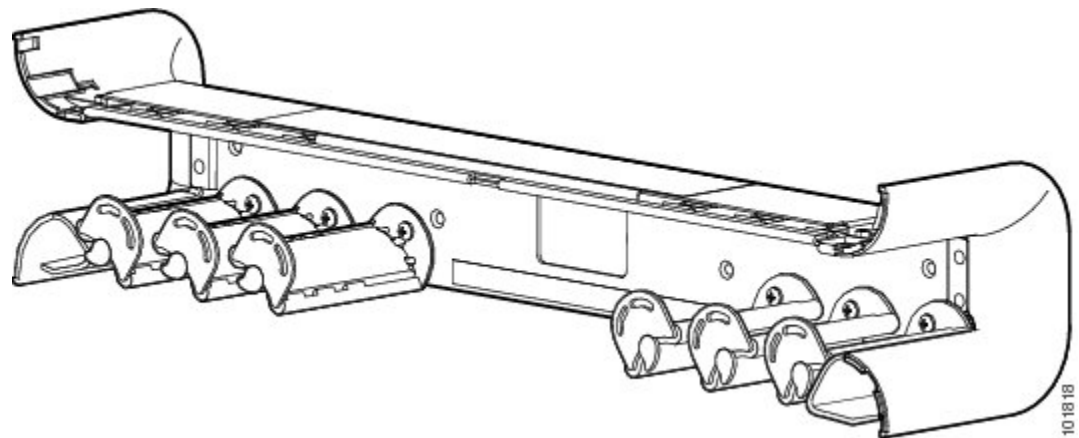
Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures. Statement 70

Installing a Cable Management Bracket

This section describes how to install a cable management bracket in the Cisco CRS Series Enhanced 16-Slot Line Card Chassis.

The horizontal cable management brackets provide cable management capabilities for the MSCs and PLIMs on the Cisco CRS Series Enhanced 16-Slot Line Card Chassis. This figure shows a midchassis cable management bracket. The midchassis cable management bracket is installed on the front (PLIM) side of the chassis.

Figure 32: Cable Management Bracket



Prerequisites

Before performing this task, open the cosmetic doors, if installed, and be sure that there are no cables impeding your access to the area of the chassis on which you wish to install the bracket.

Required Tools and Equipment

You need the following tools and part to perform this task:

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver or number 2 common (flat head) screwdriver
- Cable management bracket (800-23374-03)

Steps

To install a cable management bracket, perform the following steps:

SUMMARY STEPS

1. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis.
2. Position the cable management bracket on the chassis.
3. Insert and tighten the four screws used to secure the bracket to the chassis.

DETAILED STEPS

-
- | | |
|---------------|---|
| Step 1 | Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets: on the front (PLIM) side of the chassis there is one ESD connection socket right above the fan controllers. On the rear (MSC) side of the chassis there are two ESD connection sockets right above the cable management tray in the center of the chassis (left and right). You can also connect the ESD-preventive wrist strap leash to any bare metal surface on the chassis. |
| Step 2 | Position the cable management bracket on the chassis. |
| Step 3 | Insert and tighten the four screws used to secure the bracket to the chassis. |
-

What to Do Next

Use the cable management bracket to organize the cables. Close the cosmetic doors, if installed.