



CHAPTER 4

Installing and Removing SFCs, RPs, MSCs, FPs, LSPs, PLIMs, and Associated Components

This chapter provides instructions on how to install and remove the Cisco CRS Carrier Routing System 4-Slot Line Card Chassis switch fabric cards (SFCs), route processor (RP) or performance route processor (PRP) cards, modular services cards (MSCs), forwarding processor a (FP) cards, label switch processor (LSP) cards, physical layer interface modules (PLIMs), and the associated components.

This chapter presents the following topics:

- [About Installing and Removing Cards and Associated Components, page 4-1](#)
- [How to Remove or Install an Impedance Carrier, page 4-5](#)
- [How to Remove or Install a Card Slide-Assistance Arm \(Handle\), page 4-11](#)
- [How to Install or Remove a Pillow Block, page 4-14](#)
- [How to Install or Remove a Switch Fabric Card, page 4-18](#)
- [How to Install or Remove a Route Processor Card, page 4-24](#)
- [How to Install or Remove an MSC, FP, or LSP, page 4-32](#)
- [How to Install or Remove a Physical Layer Interface Module, page 4-42](#)
- [How to Install or Remove a PCMCIA Card, page 4-51](#)
- [How to Install or Remove a Small Form-Factor Pluggable \(SFP\) Module, page 4-53](#)

About Installing and Removing Cards and Associated Components

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

- [Guidelines for Card Installation and Removal, page 4-2](#)
- [PCMCIA Cards, page 4-4](#)
- [Small Form-Factor Pluggable \(SFP\) Modules, page 4-4](#)
- [Cable Management Brackets, page 4-5](#)

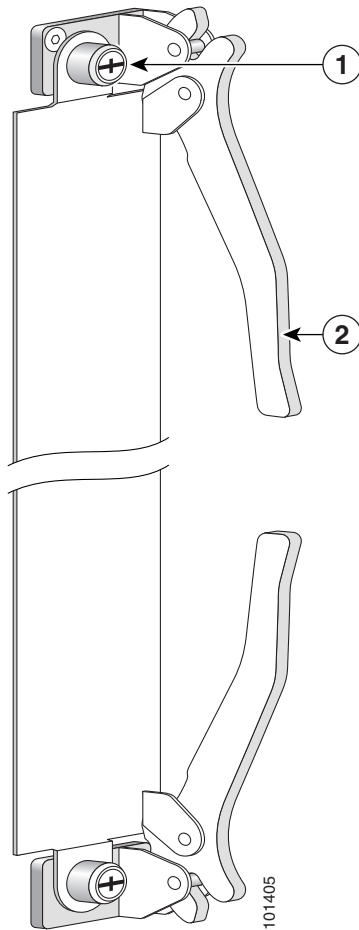
Guidelines for Card Installation and Removal

This section contains the general guidelines for card installation and removal.

Online insertion and removal (OIR) is supported, enabling you to remove and install cards while the Cisco CRS 4-slot line card chassis is operating. OIR is seamless to users on the network, maintains all routing information, and ensures session preservation. Notifying the software or resetting the power is not required. However, you have the option of using the **shutdown** command before removing a card.

The different cards in the 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 from its midplane connector. The exact location of the ejector levers and captive screws varies slightly from card to card, but are in general in the same location: on the upper and bottom of the faceplate of the card. [Figure 4-1](#) shows the location of the ejector levers and captive screws on an MSC.

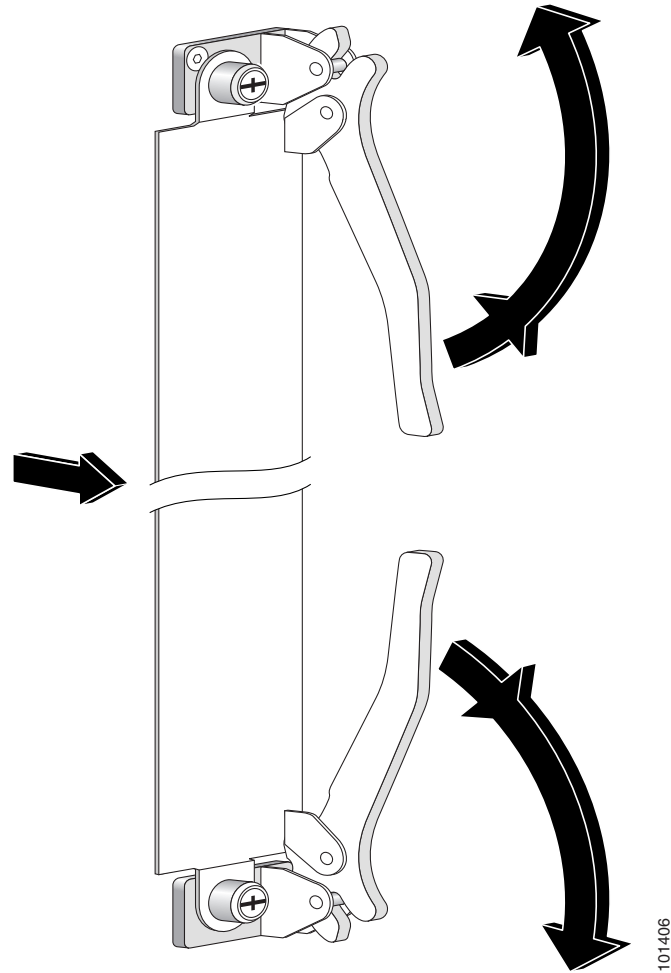
Figure 4-1 Ejector Levers and Captive Screws



1 Captive screw

2 Ejector lever

[Figure 4-2](#) shows how to operate the ejector levers. Be sure to operate both levers simultaneously.

Figure 4-2 Operating Ejector Levers

Recommended Order for Installing Cards

Although it is not critical for you to install the cards in a certain order, following the card installation recommendations in this section will make your installation process easier. We recommend that you install cards in the Cisco CRS 4-slot chassis in the following order:

- Switch fabric cards (SFCs)



Caution

Removing more than one switch fabric card at a time can misalign the chassis and may damage the card or chassis when reinserting the cards. Remove and reinsert only one card at a time.

- Route processors (RPs) or performance route processors (PRPs)
- Modular services cards (MSCs), forwarding processors (FPs), and label switch processor (LSP) cards
- Physical layer interface modules (PLIMs)

**Note**

See the instructions in this chapter for details on how to install the individual cards.

Guidelines

When you install or remove cards on the Cisco CRS 4-slot line card chassis, follow these guidelines:

- Do not operate the Cisco CRS 4-slot line card chassis with any slots completely empty; doing so can lead to an airflow bypass condition that diverts airflow from slots containing heat-generating electronics. This situation can cause thermal alarms to occur at lower-than-expected ambient temperatures. To avoid airflow bypass, make sure that all slots are filled with their appropriate cards or impedance carriers. If you have to replace a card, we recommend leaving the card in place in the chassis until you are ready to install the new one.
- 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.
- To lessen the possibility of damaging the connectors on the chassis midplane, you should visually inspect the connector pins on the cards before you insert them into the chassis.

PCMCIA Cards

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

**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.

Small Form-Factor Pluggable (SFP) Modules

The SFP module for the Cisco CRS 4-slot line card chassis uses the bale-clasp latch type.

**Caution**

Protect the SFP modules by inserting clean dust covers into them after the cables are removed from them. Be sure to clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another SFP module. Avoid getting dust and other contaminants into the optical ports of the SFP modules: The optics do not work correctly when obstructed with dust.

**Note**

Shared port adapters (SPAs) and the 16-port OC-48c/STM-16c PLIM use SFP modules.

Cable Management Brackets

The Cisco CRS 4-slot line card 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.

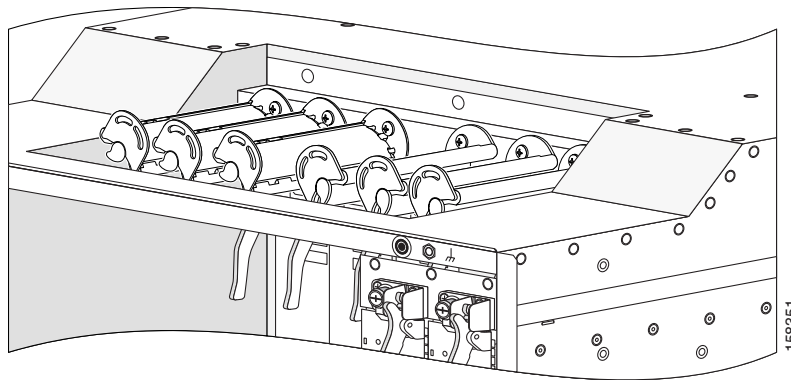
**Caution**

Excessive bending of interface cables can damage the cables.

The Cisco CRS 4-slot line card chassis arrives preinstalled with a horizontal cable management bracket on the front of the chassis; this bracket cannot be removed or replaced.

Figure 4-3 shows the chassis cable management bracket.

Figure 4-3 Cable Management Bracket



How to Remove or Install an Impedance Carrier

This section contains the following procedures:

- [Removing an Impedance Carrier, page 4-10](#)
- [Installing an Impedance Carrier, page 4-10](#)

When shipped, some slots in the chassis may contain impedance carriers to help ensure that the chassis is undamaged during shipment. Four different types of impedance carriers exist for the four different sizes of slots in the chassis (see [Figure 4-4](#), [Figure 4-5](#), [Figure 4-6](#), and [Figure 4-7](#)).

Figure 4-4 Switch Fabric Slot Impedance Carrier

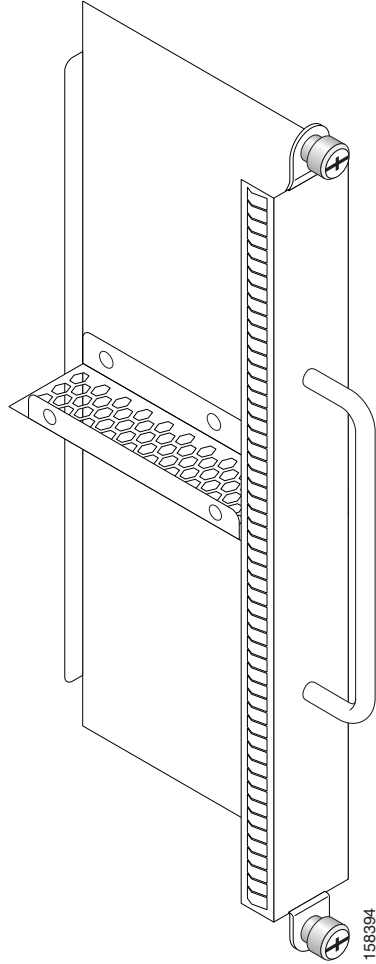


Figure 4-5 *RP Slot Impedance Carrier*

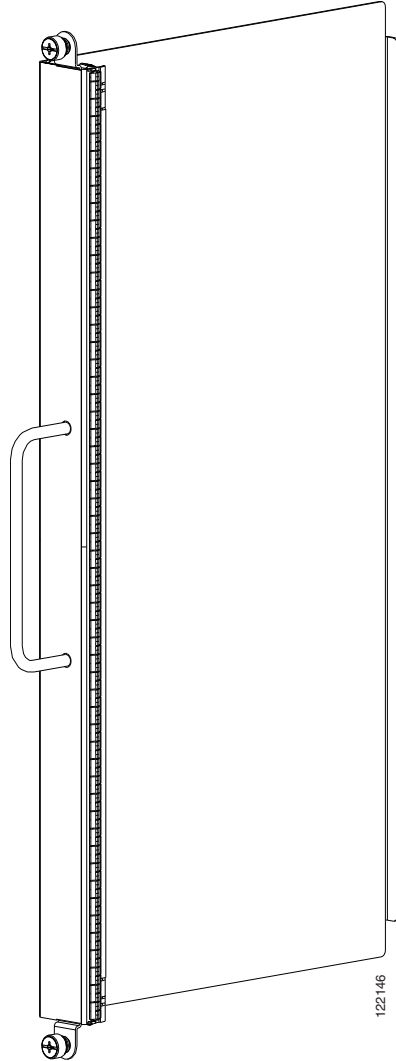
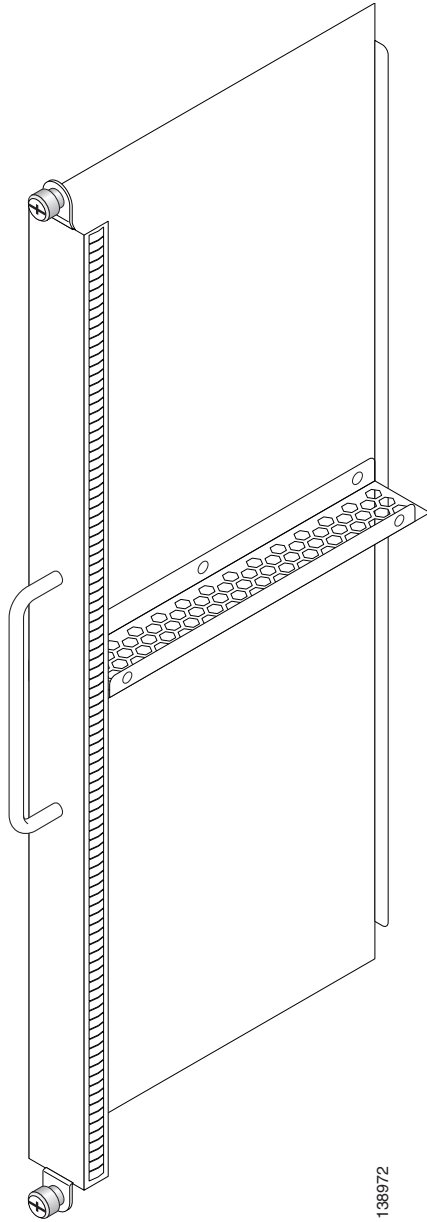
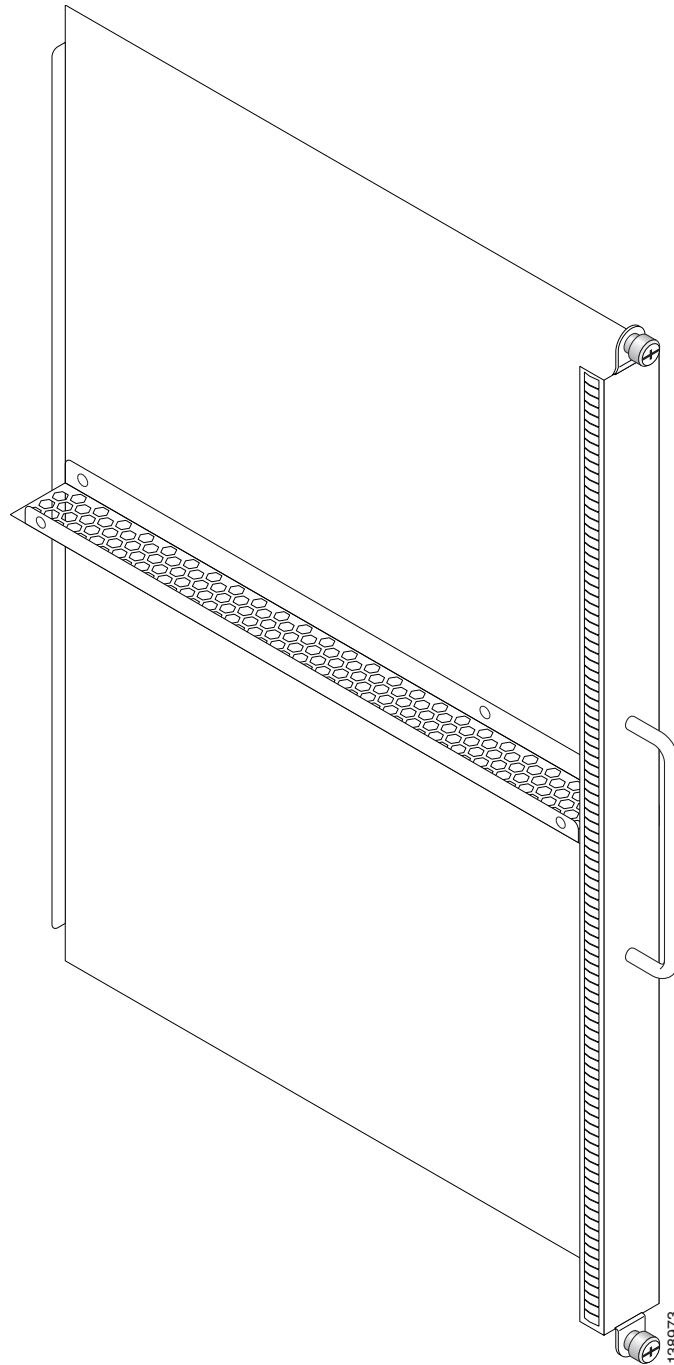


Figure 4-6 *PLIM Slot Impedance Carrier*

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Figure 4-7 *MSC Slot Impedance Carrier*



For more information, see the [“Removing an Impedance Carrier”](#) section on page 4-10 and [“Installing an Impedance Carrier”](#) section on page 4-10.

Removing an Impedance Carrier

This section describes how to remove an impedance carrier from the Cisco CRS 4-slot line card chassis. All impedance carrier types are removed in the same manner.

Prerequisites

There are no prerequisites for this task.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Number 1 Phillips screwdriver

Steps

To remove an impedance carrier, follow these 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 or a bare metal surface on the chassis. |
| Step 2 | Identify the impedance carrier to be removed from the card cage. Use the 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. |
-

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” section on page 4-33](#), the [“Installing a PLIM” section on page 4-42](#), or the [“Installing an RP or PRP Card” section on page 4-26](#) for further details.

Installing an Impedance Carrier

This section describes how to install an impedance carrier into the Cisco CRS 4-slot line card chassis. The chassis is shipped with impedance carriers installed in the MSC, PLIM, RP, and SFC slots. All impedance carrier types are installed in the same manner.

Prerequisites

Before performing this task, open the doors if they are installed and ensure that the slot in which you are about to install the impedance carrier is empty. Depending on the slot in which you are installing an impedance carrier, see the [“Removing an MSC, FP, or LSP”](#) section on page 4-37, the [“Removing a PLIM”](#) section on page 4-48, or the [“Removing an RP or PRP Card”](#) section on page 4-29.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Number 1 Phillips screwdriver
- Impedance carrier
 - SFC impedance carrier (Cisco product number: CRS-4-FC-BLANK)
 - MSC impedance carrier (Cisco product number: CRS-MSC-IMPEDANCE=)
 - PLIM impedance carrier (Cisco product number: CRS-INT-IMPEDANCE=)
 - RP impedance carrier (Cisco product number: CRS-RP-4-BLANK=)

Steps

To install an impedance carrier, follow these 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 or a 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 screwdriver) to make sure that they are both engaged. |
| Step 5 | Use the screwdriver to fully tighten the captive screws to seat the impedance carrier firmly in the slot. |
-

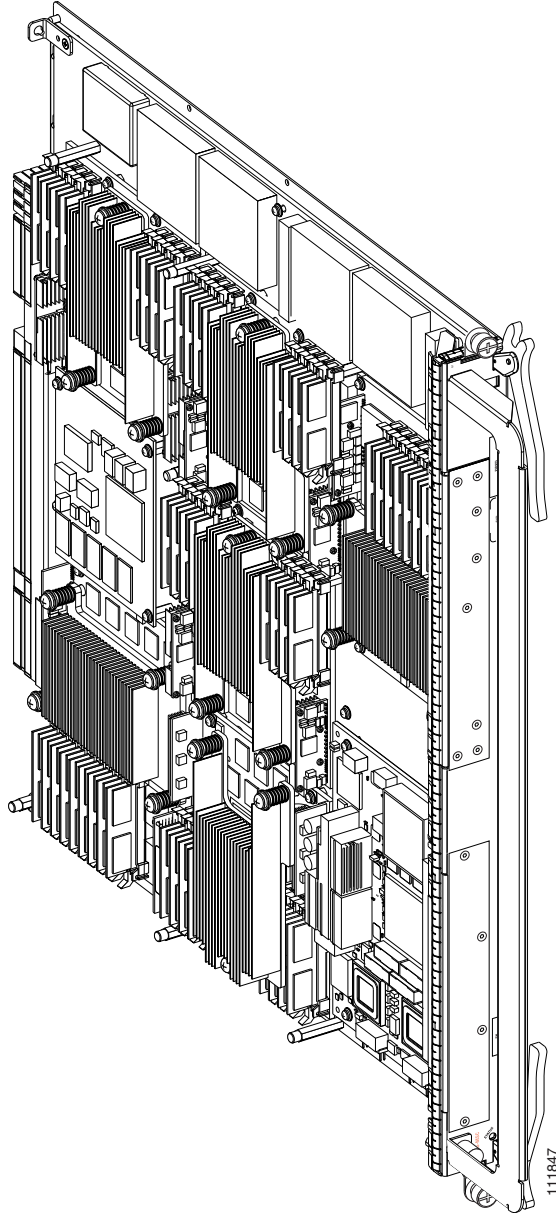
How to Remove or Install a Card Slide-Assistance Arm (Handle)

This section contains the following procedures:

- [Removing a Card Slide-Assistance Arm](#)
- [Installing a Card Slide-Assistance Arm](#)

All line cards, PLIMs, and RPs are shipped with slide-assistance arms (sometimes called *handles*) attached. SPAs, the SIP-800, and SFCs are not shipped with slide-assistance arms. [Figure 4-8](#) shows a slide-assistance arm attached to an MSC.

Figure 4-8 *Modular Services Card (CRS-MSC) with Slide-Assistance Arm Attached*



Removing a Card Slide-Assistance Arm

This section describes how to remove a slide-assistance arm (handle) from a line card, PLIM, or RP card. For details about installing or removing the cards themselves, see the [“How to Install or Remove an MSC, FP, or LSP”](#) section on page 4-32, the [“How to Install or Remove a PCMCIA Card”](#) section on page 4-51, and the [“How to Install or Remove a Physical Layer Interface Module”](#) section on page 4-42.

Prerequisites

No prerequisites exist for this task.

**Caution**

Do not lift cards by the slide-assistance arm. Rotate cards onto their vertical axes, then lift them from the bottom, using the slide-assistance arm only as an aid for balance.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Number 3 Phillips screwdriver.

Steps

To remove a slide-assistance arm, follow these 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 or a bare metal surface on the chassis. |
| Step 2 | Using the small Phillips screwdriver, turn the two captive screws (one top, one bottom) on the slide-assistance arm counter-clockwise to detach the arm from the card face. |
| Step 3 | Set the slide-assistance arm carefully aside. We recommend storing it in the original Cisco packaging. |

What to Do Next

After performing this task, you may install or remove the card as necessary.

Installing a Card Slide-Assistance Arm

This section describes how to install a slide-assistance arm on a line card, PLIM, or RP card. For details about installing or removing the cards themselves, see the [“How to Install or Remove an MSC, FP, or LSP” section on page 4-32](#), the [“How to Install or Remove a PCMCIA Card” section on page 4-51](#), and the [“How to Install or Remove a Physical Layer Interface Module” section on page 4-42](#).

Prerequisites

Before performing this task, be sure to remove the slide-assistance arm and its attachment screws from the packaging, and have the appropriate card available for attachment.

**Caution**

Do not lift cards by the slide-assistance arm. Rotate cards onto their vertical axes, then lift them from the bottom, using the slide-assistance arm only as an aid for balance.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Number 2 Phillips screwdriver
- Card:
 - MSC (CRS-MSC, CRS-MSC-B, or CRS-MSC-140G;
 - FP (CRS-FP40 or CRS-FP-140);
 - LSP (CRS-LSP);
 - RP card (CRS-4-RP) or PRP card (CRS-4-PRP-6G or CRS-4-PRP-12G);
 - PLIM (Refer to the product data sheets for ordering details.)

Steps

To install a slide-assistance arm, follow these 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 or a bare metal surface on the chassis.
- Step 2** Place the slide-assistance arm against the card face so that the screw holes on the card align with the captive screws on the slide-assistance arm.
- Step 3** Using the screwdriver, turn the two screws (one top, one bottom) clockwise to attach the slide-assistance arm to the card face.



Note We recommend keeping the original Cisco packaging for future storage of the slide-assistance arm, should it become necessary.

What to Do Next

After performing this task, you may install or remove the card as necessary.

How to Install or Remove a Pillow Block

This section contains the following procedures:

- [Installing a Pillow Block, page 4-15](#)
- [Removing a Pillow Block, page 4-16](#)

Installing a Pillow Block

This section describes how to install a replacement pillow block on the chassis after removing a damaged pillow block. A pillow block is a bracket with a pin that is attached to the chassis above and below each card slot. When you install or remove a card from the chassis, the card ejector levers hook into the pillow blocks above and below the card slot to secure the cards to the slot and allow you to install and remove the cards.

Prerequisites

Before performing this task, you must first open the front cosmetic doors (if installed). Have the pillow block replacement kit (Cisco product number: CRS-4-PILLBLK=) at hand.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Phillips screwdriver
- Pillow block replacement kit (Cisco product number: CRS-4-PILLBLK=)

The following items are included in the CRS-4-PILLBLK= pillow block replacement kit:

- 2 replacement pillow blocks
- 6 Phillips-head screws

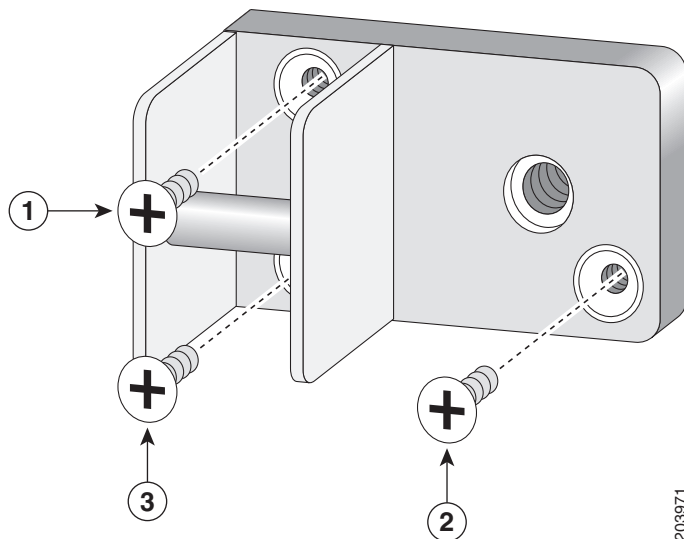
**Note**

A Phillips screwdriver is not included in the CRS-4-PILLBLK= pillow block replacement kit.

Steps

To install a pillow block, follow these 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 or a bare metal surface on the chassis. |
| Step 2 | Locate the slot where the pillow block was removed. |
| Step 3 | Have the replacement Phillips-head screws near at hand. |
| Step 4 | Position the pillow block and align the screw holes. |
| Step 5 | Use a Phillips screwdriver to install the top left screw (located above the pillow block pin). (See item 1 in Figure 4-9 .) |

Figure 4-9 *Installing a Pillow Block*

- Step 6** Install the lower right screw (see item 2 in [Figure 4-9](#)).
- Step 7** Install the lower left screw (located below the pillow block pin). (See item 3 in [Figure 4-9](#).)
- Step 8** Repeat this procedure for the card slot's other pillow block if necessary.

What to Do Next

After performing this task, replace any cosmetic covers.

Removing a Pillow Block

This section describes how to remove a damaged pillow block from the chassis. A pillow block is a bracket with a pin that is attached to the chassis above and below each card slot. When you install or remove a card from the chassis, the card ejector levers hook into the pillow blocks above and below the card slot to secure the cards to the slot and allow you to install and remove the cards.

Prerequisites

Before performing this task, you must first open the front cosmetic doors (if installed). Have the pillow block replacement kit (Cisco product number: CRS-4-PILLBLK=) at hand.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Phillips screwdriver
- Pillow block replacement kit (Cisco product number: CRS-4-PILLBLK=)

The following items are included in the CRS-4-PILLBLK= pillow block replacement kit:

- 2 replacement pillow blocks
- 6 Phillips-head screws


Note

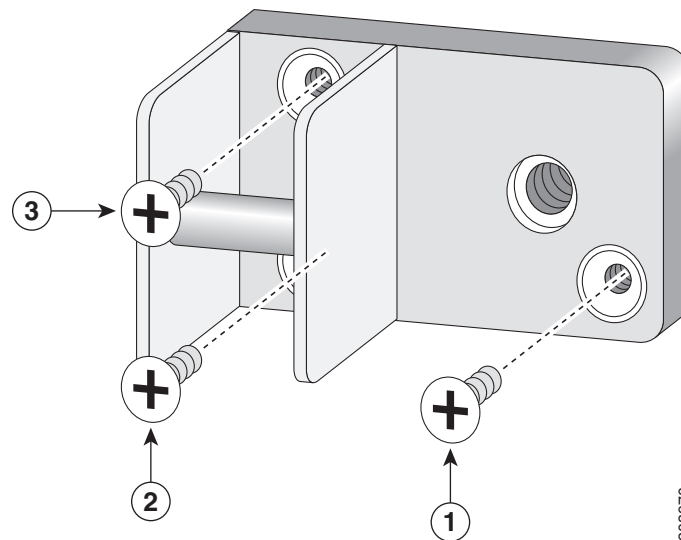
A Phillips screwdriver is not included in the CRS-4-PILLBLK= pillow block replacement kit.

Steps

To remove a pillow block, follow these 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 or a bare metal surface on the chassis.
- Step 2** Locate the pillow block to be replaced. Use a Phillips screwdriver to remove the lower right screw. (See item 1 in [Figure 4-10](#).)

Figure 4-10 Removing a Pillow Block



- Step 3** Remove the lower left screw (located below the pillow block pin). (See item 2 in [Figure 4-10](#).)
- Step 4** Remove the top left screw (located above the pillow block pin). (See item 3 in [Figure 4-10](#).)
- Step 5** Remove the pillow block and set it aside.
- Step 6** Repeat this procedure for the card slot's other pillow block if necessary.

What's Next

After performing this task, you may install a new pillow block (see the [“Installing a Pillow Block”](#) section on page 4-15).

How to Install or Remove a Switch Fabric Card

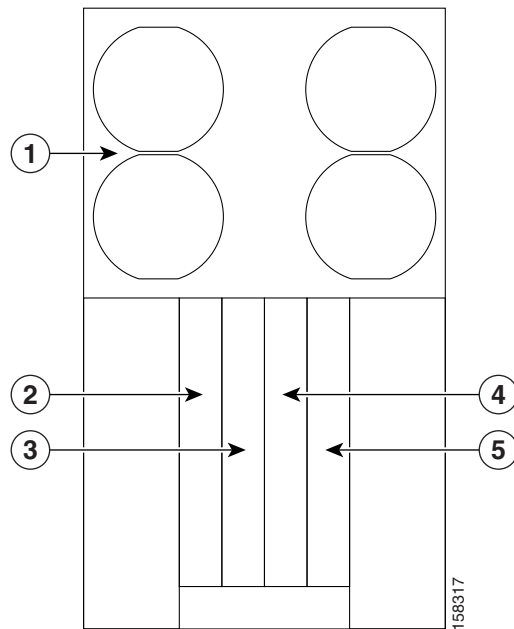
This section contains the following procedures:

- [Switch Fabric Card Location and Slot Numbers](#)
- [Installing a Switch Fabric Card](#)
- [Removing a Switch Fabric Card](#)
- [Verifying the Installation of a Switch Fabric Card](#)

Switch Fabric Card Location and Slot Numbers

The switch fabric cards are installed in the rear of the chassis in the card cage below the fan tray. [Figure 4-11](#) shows the location and slot numbers assigned to the switch fabric cards.

Figure 4-11 Cisco CRS 4-Slot Line Card Chassis Slot Numbers—Rear (SFC) Side

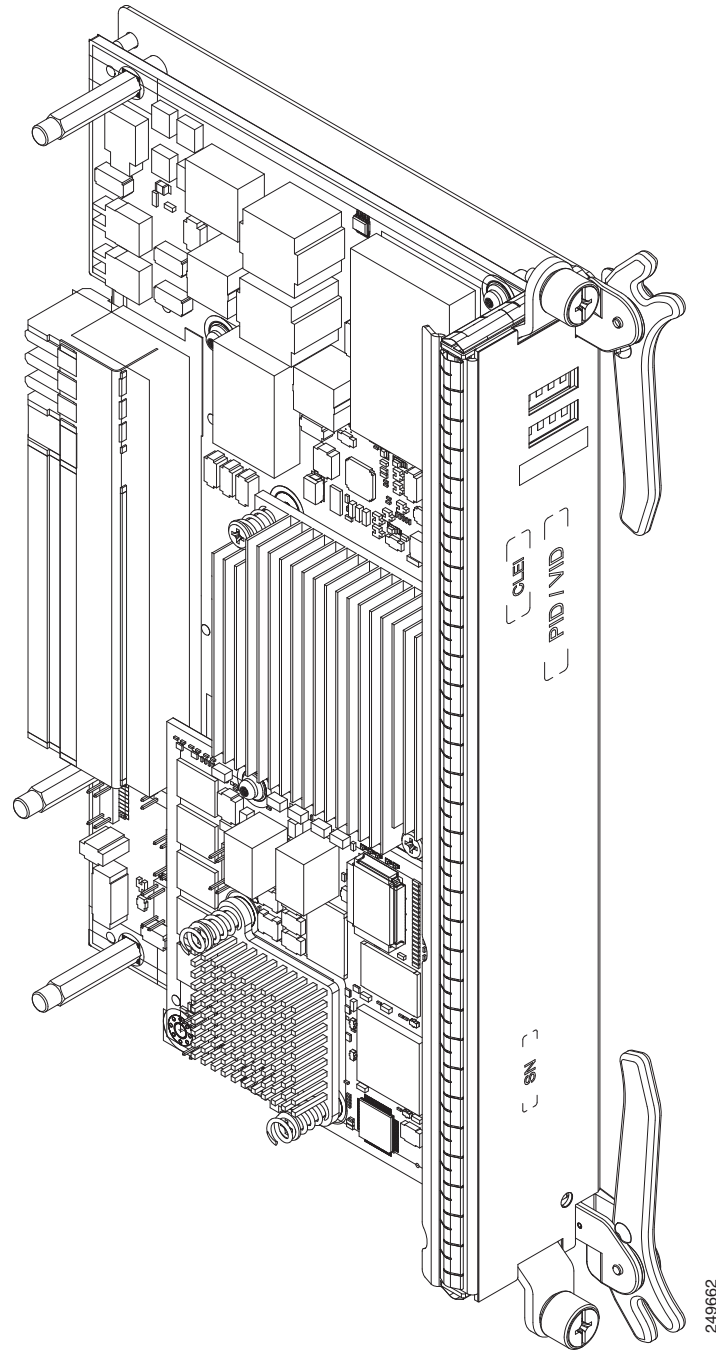


1	Fan tray (FT0)	4	Switch fabric card slot (SM1)
2	Switch fabric card slot (SM3)	5	Switch fabric card slot (SM0)
3	Switch fabric card slot (SM2)		

Installing a Switch Fabric Card

This section describes how to install a switch fabric card in the Cisco CRS 4-slot line card chassis (see [Figure 4-12](#)). For more detailed information on the switch fabric card, see *Cisco CRS Series Carrier Routing System 4-Slot Line Card Chassis System Description*.

There are two types of switch fabric cards: QQ123 and QQ123-140G. [Figure 4-12](#) shows the QQ123-140G switch fabric card.

Figure 4-12 Switch Fabric Card (QQ123-140G)

Prerequisites

Before performing this task, remove the switch fabric card (if there is already one installed) or the switch fabric impedance carrier from the slot in which you plan on installing the switch fabric card. See the [“Removing an Impedance Carrier”](#) section on page 4-10 and the [“Removing a Switch Fabric Card”](#) section on page 4-22.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Number 3 Phillips screwdriver
- Switch fabric card:
 - QQ123 (Cisco product number: CRS-4-FC/S=)
 - QQ123-140G (Cisco product number: CRS-4-FC140/S=)



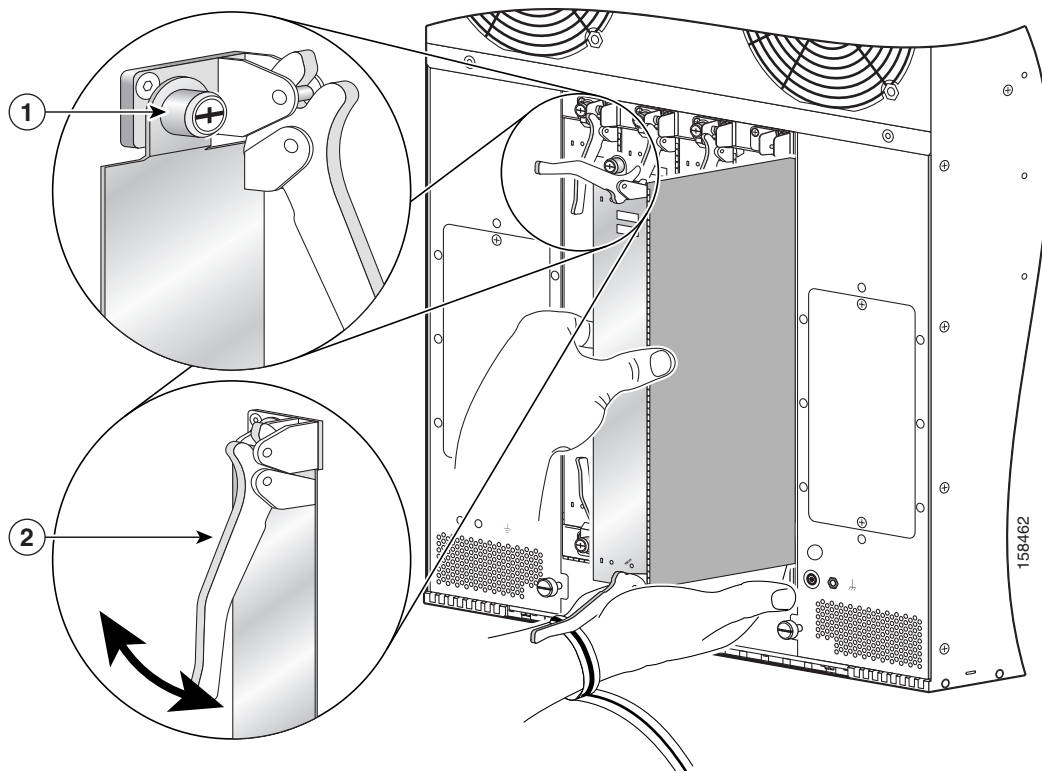
Note

Only one type of switch fabric card should be installed in a system. A router with a mix of QQ123 and QQ123-140G SFCs is not a supported mode of operation. A mix of QQ123 and QQ123-140G is only allowed during a switch fabric upgrade.

Steps

To install a switch fabric card, see [Figure 4-13](#) and follow these steps:

Figure 4-13 Installing a Switch Fabric Card



1 Captive screw

2 Ejector lever

- Step 1** Go to the rear of the chassis. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets on the rear (SFC) side of the chassis or a bare metal surface on the chassis.
- Step 2** Remove the switch fabric card from its antistatic packaging.
- Step 3** Use a medium Phillips screwdriver to remove the switch fabric card from its protective carrier.
- Step 4** Visually inspect the connector pins on the card before you insert it into the chassis.



Note Do not attempt to install a card with bent pins, because this may damage the chassis midplane connectors.

- Step 5** Identify the card slot in the card cage where the switch fabric card should be installed.
- a. If there is an impedance carrier in the slot, remove it (see the [“Removing an Impedance Carrier” section on page 4-10.](#))
 - b. If there is a switch fabric card already installed in the slot, remove the card (see the [“Removing a Switch Fabric Card” section on page 4-22.](#))
- Step 6** Grasp the face plate of the card with one hand and place your other hand under the card to support and guide it into the correct slot.
- Step 7** Orient the route processor card so that the status display is on top, then position the card for insertion into the card cage slot. Avoid touching the card circuitry or any connectors.



Note There are alignment grooves on each slot in the card cage. When you install a card, make sure that you align both the top and bottom edges of the card carrier in the slot grooves.

- Step 8** Grasp both card ejector levers simultaneously, then push them both outward until they are fully extended in the open position.
- Step 9** 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 lip of the card cage. If they do not catch, try reinserting the switch fabric card until the ejector lever hooks are fully latched.
- Step 10** To fully seat the card in the midplane connector, grasp both card ejector levers simultaneously, then push them both inward until they are flush against the front edge of the card carrier.



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



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.

- Step 11** To seat the card firmly in the slot, use the screwdriver to tighten the captive screws.

What to Do Next

After performing this task:

- Place the impedance carrier in an antistatic bag for storage and future use.
- If you are performing the initial installation of the system, install the RPs or PRPs (see the [“Installing an RP or PRP Card”](#) section on page 4-26).

Removing a Switch Fabric Card

This section describes how to remove a switch fabric card from the Cisco CRS 4-slot line card chassis. For more detailed information on the switch fabric card, see *Cisco CRS Series Carrier Routing System 4-Slot Line Card Chassis System Description*.

Prerequisites

There are no prerequisites for this task.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Number 1 Phillips screwdriver

Steps

To remove a switch fabric card, see [Figure 4-14](#) and follow these steps:

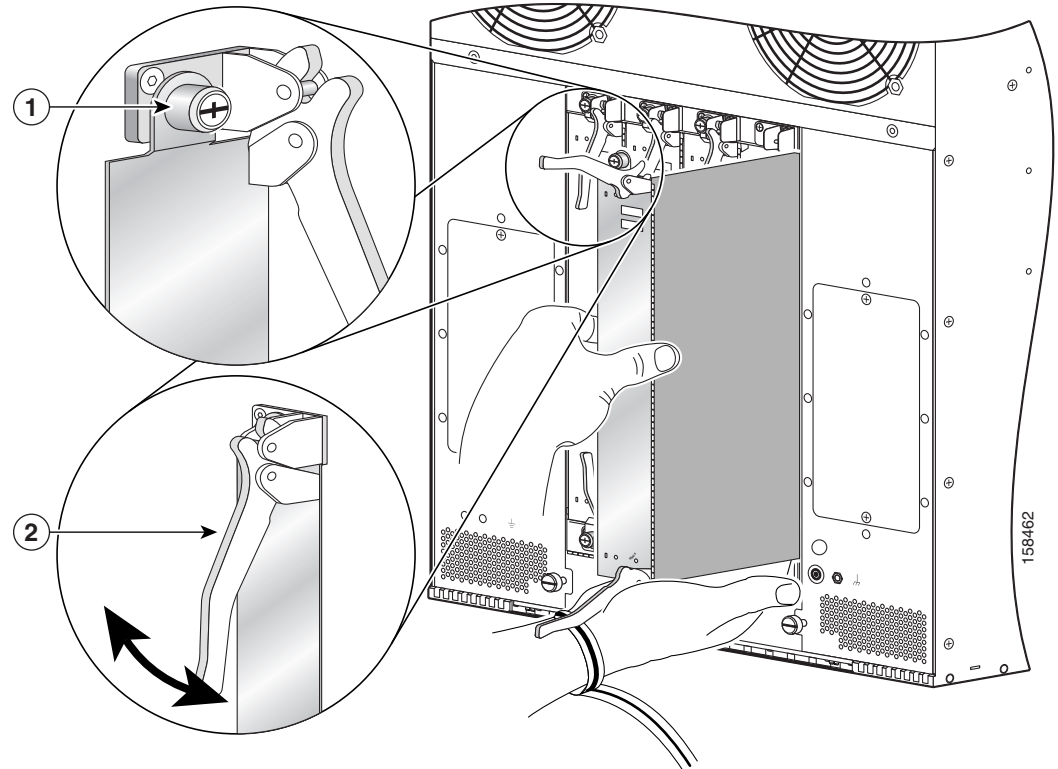
-
- Step 1** Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets on the rear (SFC) side of the chassis or a bare metal surface on the chassis.



Caution

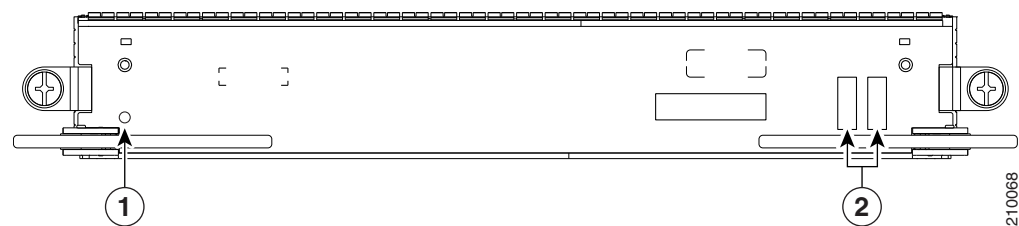
Removing more than one switch fabric card at a time can misalign the chassis and may damage the card or chassis when reinserting the cards. Remove and insert only one switch fabric card at a time.

- Step 2** Identify the switch fabric card to be removed from the card cage. Use the screwdriver to turn the two captive screws on the front panel of the card counterclockwise to loosen it from the slot.
- Step 3** To unseat the card from the midplane connector, grasp the two card ejector levers and simultaneously pivot both ejector levers outward from the front edge of the card slot. As you pivot the ejector levers outward, the switch fabric card is partially pulled from the slot.
- Step 4** 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 its original shipping container.

Figure 4-14 Removing a Switch Fabric Card**1** Captive screw**2** Ejector lever

Verifying the Installation of a Switch Fabric Card

This section describes how to verify that a QQ123 or QQ123-140G switch fabric card has been properly installed. [Figure 4-15](#) shows the QQ123 switch fabric card front panel. The QQ123-140G card is similar.

Figure 4-15 Switch Fabric Card Front View (QQ123 Shown)**1** Status LED**2** Alphanumeric LEDs

Understanding the LEDs

Alphanumeric LEDs

At one end of the faceplate, near an ejector lever, a switch fabric 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.

Status LEDs

Use the status LEDs, 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, make sure that the card is installed correctly.
- When the Status is blinking yellow, a problem exists on the board.
- When the Status is off, the board state is unknown. Verify that there is power to the board by looking at the indicators on the power module.
- If there is a failure during the board boot sequence, the two-row, four-character alphanumeric display indicates the current boot phase, to assist you in debugging the board failure.

Troubleshooting the Switch Fabric Card

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

- Make sure that the card is seated firmly in the Cisco CRS 4-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 reseat the switch fabric card.
- Examine the alarm LEDs to see if there are any active alarm conditions.
- Examine the power shelves to see whether the chassis, as a whole, is receiving power.

How to Install or Remove a Route Processor Card

This section contains the following procedures:

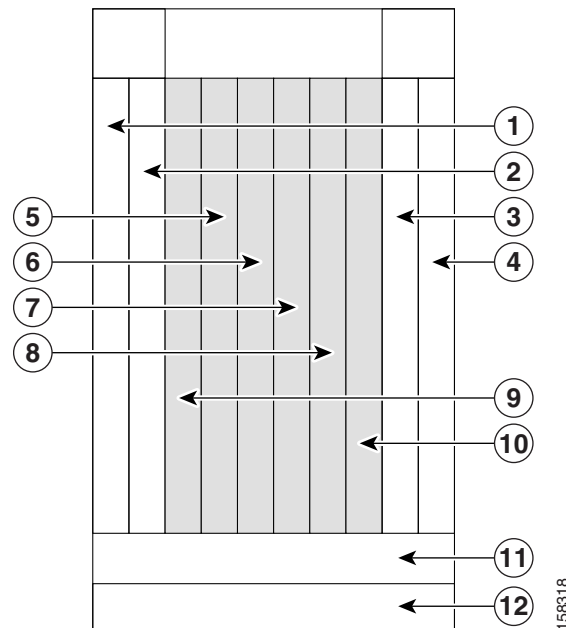
- [Location and Slot Numbers for the RPs, MSCs, FPs, LSPs, and PLIMs, page 4-25](#)
- [Installing an RP or PRP Card, page 4-26](#)
- [Removing an RP or PRP Card, page 4-29](#)
- [Verifying the Installation of an RP or PRP Card, page 4-30](#)
- [Installing a PCMCIA Card, page 4-51](#)
- [Removing an RP PCMCIA Card, page 4-52](#)

Location and Slot Numbers for the RPs, MSCs, FPs, LSPs, and PLIMs

The route processors, MSCs, FPs, LSPs, and PLIMs are installed in the front of chassis. Note that FP cards are installed in the MSC slots.

Figure 4-16 shows the location and slot numbers for these cards:

Figure 4-16 Cisco CRS 4-Slot Line Card Chassis Slot Numbers—Front (PLIM) Side



1	MSC slot 0	7	PLIM slot 2
2	MSC slot 1	8	PLIM slot 3
3	MSC slot 2	9	RP slot (RP0)
4	MSC slot 3	10	RP slot (RP1)
5	PLIM slot 0	11	Air intake
6	PLIM slot 1	12	AC or DC power shelf

Installing an RP or PRP Card

This section describes how to install a route processor (RP) or performance route processor (PRP) card in the chassis (see [Figure 4-17](#)). For more detailed information on the route processor card, see *Cisco CRS Carrier Routing System 4-Slot Line Card Chassis System Description*.

Every Cisco CRS 4-slot line card chassis contains two RP or PRP cards in dedicated slots on the front (PLIM) side of the chassis (see [Figure 4-17](#)).



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).



Note

For enhanced immunity to external electromagnetic disturbance levels of 10V per meter and 10 V RMS, you must use a shielded Ethernet (CAT5 or better STP) cable on the Management Ethernet connection of the RP card (CRS-4-RP) or PRP card (CRS-4-PRP-6G or CRS-4-PRP-12G).

RP Installation Guidelines

Chassis operation may be effected by the installation of a route processor card. A route processor card is normally installed under one of the following conditions:

- When you are certain that the second RP in the chassis is operational and, if not already the active RP, ready to assume control (this happens automatically).
- When the chassis is undergoing scheduled maintenance.
- When the Cisco CRS 4-slot line card chassis is powered down.

Monitoring the RP Card Start-Up Process

Monitoring the RP card during its start-up process must be done through a console port connection. For details, see the latest release of the *Cisco IOS XR Getting Started Guide* on www.cisco.com.

To monitor the RP card during its start-up, follow these steps:

Step 1 Install the console port connection to the front of the RP.

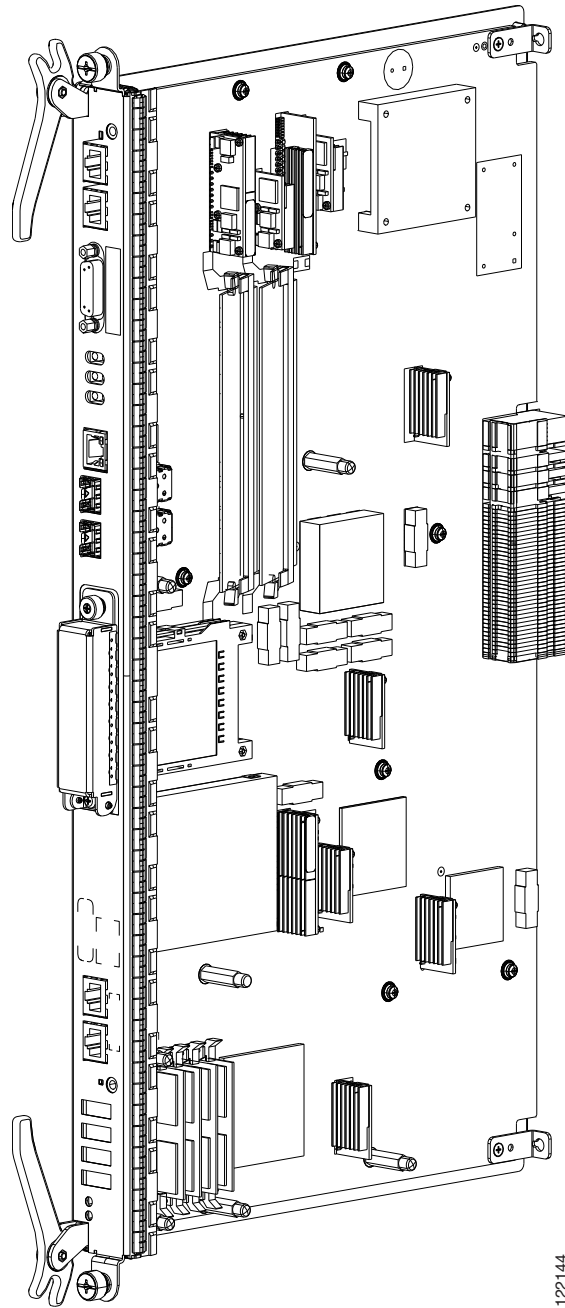


Tip

If you want to monitor the start-up process on the RP, you must physically attach the console port connection and open the console port connection prior to inserting the RP into its designated slot.

Step 2 Insert the RP into its designated slot as described in this section.

Step 3 At the console, verify the status of the RP.

Figure 4-17 **Route Processor (RP) Card**

Prerequisites

There are no prerequisites for this task.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Large (number 1) Phillips screwdriver
- Route processor card (CRS-4-RP) or PRP card (CRS-4-PRP-6 or GCRS-4-PRP-12G)

Steps

To install an RP or PRP card, follow these steps:

-
- Step 1** Go to the front of the chassis. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets on the rear side of the chassis or a bare metal surface on the chassis.
- Step 2** Remove the route processor card from its antistatic packaging.
- Step 3** Use a medium (number 2) Phillips screwdriver to remove the route processor card from its protective carrier.
- Step 4** Visually inspect the connector pins on the card before you insert it into the chassis.



Caution

Do not attempt to install a card with bent pins, because this may damage the chassis midplane connectors.

- Step 5** Identify the card slot in the card cage where the route processor card should be installed.
- If there is an impedance carrier in the slot, remove it (see the [“Removing an Impedance Carrier” section on page 4-10.](#))
 - If there is an RP card already installed in the slot, remove any cables connected to the front panel of an existing card in the slot, then remove the card (see the [“Removing an RP or PRP Card” section on page 4-29.](#))
- Step 6** Grasp the face plate of the card with one hand and place your other hand under the card to support and guide it into the correct slot.
- Step 7** Orient the route processor card so that the status display is on top, then position the card for insertion into the card cage slot. Avoid touching the card circuitry or any connectors.



Note

There are alignment grooves on each slot in the card cage. When you install a card in the card cage, make sure that you align both the top and bottom edges of the card carrier in the slot grooves.

- Step 8** Grasp both card ejector levers simultaneously, then push them both outward until they are fully extended in the open position.
- Step 9** Carefully slide the route processor card into the slot until the ejector levers meet the edges of the card cage, then *stop* when the ejector lever hooks catch the lip of the card cage. If they do not catch, try reinserting the route processor card until the ejector lever hooks are fully latched.

- Step 10** To fully seat the card in the midplane connector, grasp both card ejector levers simultaneously, then push them both inward until they are flush against the front edge of the card carrier. After the guide pins make contact, continue pushing the card carrier until the card ejector levers begin pivoting forward.

**Caution**

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

- Step 11** To seat the card firmly in the slot, use the screwdriver to tighten the captive screws.

**Note**

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Ethernet interfaces only to intrabuilding or nonexposed wiring or cabling. The intrabuilding cable must be shielded and the shielding must be grounded at both ends.

What to Do Next

After performing this task:

- Place the impedance carrier in an antistatic bag for storage and future use.
- Verify that the card has been installed properly (see the [“Verifying the Installation of an RP or PRP Card”](#) section on page 4-30).
- Connect the console port and LAN port. For more information, see the latest release of the *Cisco IOS XR Getting Started Guide* on www.cisco.com.
- If you are performing the initial installation of the system, install the MSCs (see the [“Installing an MSC, FP, or LSP”](#) section on page 4-33).

Removing an RP or PRP Card

This section describes how to remove a route processor (RP) or performance route processor (PRP) card from the chassis. For more detailed information on the route processor card, see *Cisco CRS Series Carrier Routing System 4-Slot Line Card Chassis System Description*.

Every Cisco CRS 4-slot line card chassis contains two route processor cards in dedicated slots on the front (PLIM) side of the chassis (see [Figure 4-17](#)).

Prerequisites

Because chassis operation may be impacted by the removal of an RP 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 active RP, ready to assume control (this happens automatically).
- When the chassis is undergoing scheduled maintenance.
- When the Cisco CRS 4-slot line card chassis is powered down.

Failure to follow these guidelines can result in interruptions in data communications and network connectivity.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Large (number 1) Phillips screwdriver

Steps

To remove an RP card, follow these 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 or a bare metal surface on the chassis. |
| Step 2 | Identify the card to be removed from the card cage. Remove any cables connected to the front panel of the card. |
| Step 3 | PRP cards only—Before removing a PRP card, you must first push the OIR button (using a pointed object such as a pen), which causes the blue OIR Ready LED to start blinking. When the board is ready for removal, the blue LED glows solidly. |
| Step 4 | Use the 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. |
-

Verifying the Installation of an RP or PRP Card

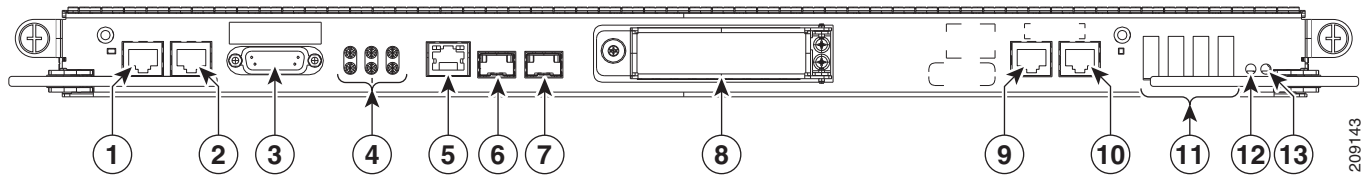
This section describes how to verify and troubleshoot the installation of a route processor (RP) or performance route processor (PRP) card in the Cisco CRS 4-slot line card chassis. For more detailed information on the RP or PRP card, see *Cisco CRS Series Carrier Routing System 4-Slot Line Card Chassis System Description*.

This section describes how to verify that the card has been properly installed. Status indicators on the RP front panel include:

- Alphanumeric LED display
- Status OK LED
- Active/Standby LED

Figure 4-18 shows the RP card front panel.

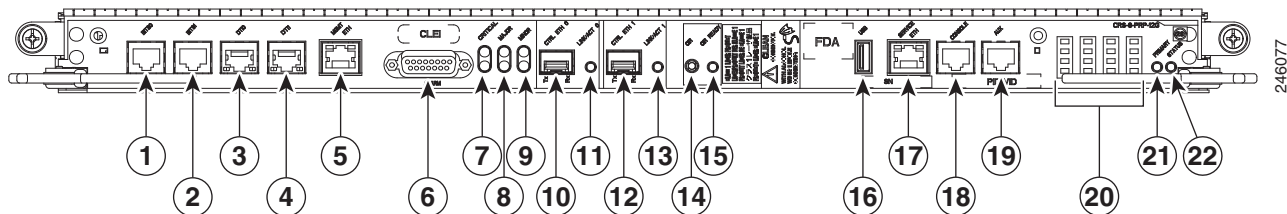
Figure 4-18 RP Card Front Panel



1	Console port	6	Control Ethernet 0 port	11	Alphanumeric LEDs
2	AUX port	7	Control Ethernet 1 port	12	PRIMARY LED
3	Alarm connector	8	PC card slot	13	STATUS LED
4	Alarm LED array	9	EXT CLK 0 port		
5	Management Ethernet port	10	EXT CLK 1 port		

Figure 4-19 shows the PRP card front panel.

Figure 4-19 PRP Card Front Panel



1	BITS 0	12	Control Ethernet 1 port (SFP or SFP+)
2	BITS 1	13	Link/Active 1 LED
3	DTI 0	14	OIR push button—Press to initiate OIR process
4	DTI 1	15	OIR Ready LED
5	Management Ethernet RJ45 port	16	USB socket
6	Alarm connector	17	Service Ethernet RJ45 port
7	Critical Alarm LED	18	Console port
8	Major Alarm LED	19	Auxiliary port
9	Minor Alarm LED	20	Alphanumeric LED Display
10	Control Ethernet 0 port (SFP or SFP+)	21	PRIMARY LED—PRP active or standby indicator
11	Link/Active 0 LED	22	STATUS LED—Card status indicator

Understanding the LEDs

Alphanumeric LEDs

At one end of the faceplate, near an ejector lever, an RP or PRP 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 alphanumeric LED display to be read.

Status LEDs

Use the status LEDs, located on the 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 state is unknown. Verify that there is power to the board by looking at the indicators on the power module.
- When the Primary LED is on, the board is executing control processing functions and is not in a secondary or standby role.
- If there is a failure during the board boot sequence, the four-row, four-character alphanumeric display indicates the current boot phase to assist you in debugging the board failure.

Troubleshooting the RP Card

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

1. Make sure that the card is seated firmly in the Cisco CRS 4-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.

2. 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.
3. Examine the alarm LEDs on the faceplate to see if there are any active alarm conditions.
4. Examine the power shelves to see whether the chassis, as a whole, is receiving power.

How to Install or Remove an MSC, FP, or LSP

This section contains the following procedures:

- [Installing an MSC, FP, or LSP, page 4-33](#)
- [Removing an MSC, FP, or LSP, page 4-37](#)
- [Verifying the Installation of an MSC, FP, or LSP, page 4-40](#)

Installing an MSC, FP, or LSP

This section describes how to install an MSC, FP, or LSP line card in the Cisco CRS 4-slot line card chassis. For more detailed information on line cards refer to the *Cisco CRS Carrier Routing System 4-Slot Line Card Chassis System Description*.

The line cards are Layer 3 forwarding engines in the Cisco CRS routing system. A line card can be paired with different types of physical layer interface modules (PLIMs) to provide a variety of interfaces.

There are three versions of the MSC: The original version (CRS-MSC), Version B (CRS-MSC-B), and the CRS-MSC-140G version. .

There are two versions of the FP: The original version (CRS-FP40) and the FP-140 version (CRS-FP-140). Both versions of the card provide the same functionality, except that the FP-140 provides 140 Gbps capability.

There is one LSP: CRS-LSP.



Caution

MSC-140G and FP-140 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 and FP40 line cards 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. The FP40 line card can only be paired with a subset of PLIMs. See the release notes for details.

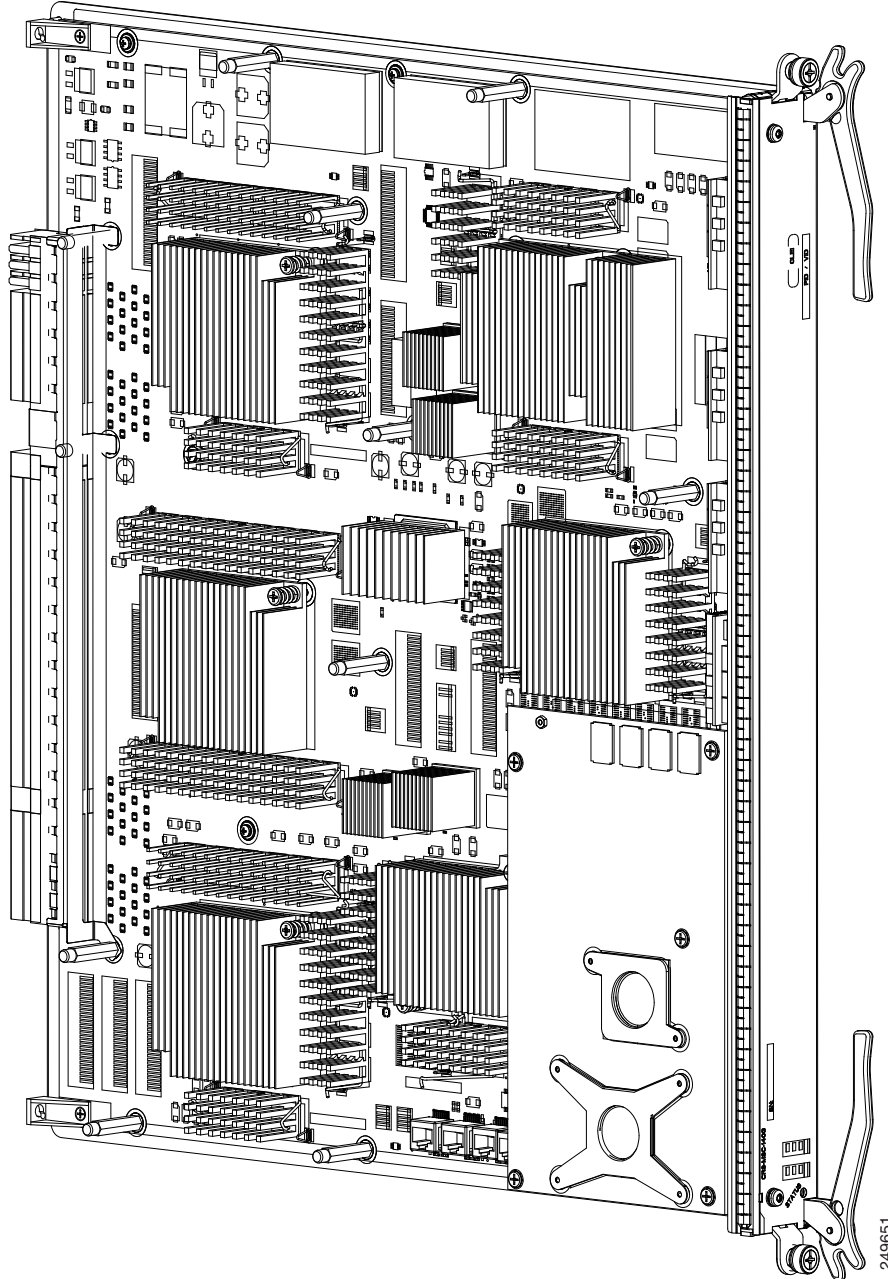
A line card fits into any available MSC slot and connects directly to the midplane. If you install a new line card, you must first remove the MSC impedance carrier from the available slot.

[Figure 4-20](#) shows the CRS-MSC-140G MSC. The other MSC, FP, and LSP cards are similar in appearance.



Note

If your Cisco CRS 4-slot line card chassis uses a Cisco CRS SIP-800, refer to the “Installing and Removing a SIP” chapter in the *Cisco CRS SIP and SPA Hardware Installation Guide* on www.cisco.com.

Figure 4-20 *Modular Services Card (CRS-MSC-140G)*

Prerequisites



Do not carry a line card by the slide-assistance arm attached to the faceplate (if attached).

Required Tools and Equipment

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

- ESD-preventive strap
- Small Phillips screwdriver
- Medium flat-blade or Phillips screwdriver
- Card:
 - Modular services card (Cisco product number: CRS-MSC, CRS-MSC-B, or CRS-MSC-140G. See the product data sheet for ordering details.)
 - Forwarding Processor (FP) card (Cisco product number: CRS-FP40 or CRS-FP-140. See the product data sheet for ordering details.)
 - Label Switch Processor card: (Cisco product number: CRS-LSP. See the product data sheet for ordering details.)


Steps

To install a modular services card, follow these steps:

-
- Step 1** Go to the front of the chassis. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets on the front side of the chassis or a bare metal surface on the chassis.
- Step 2** Remove the line card from its antistatic packaging.
- Step 3** Use a medium Phillips screwdriver to remove the line card from its protective carrier.
- Step 4** Remove the slide-assistance arm (handle) currently attached to the line card:
- a. Using a small Phillips screwdriver, turn the two captive screws (one top, one bottom) on the slide-assistance arm counter-clockwise to detach the arm from the card face.
 - b. Set the slide-assistance arm carefully aside. We recommend storing it in the original Cisco packaging.
- Step 5** Visually inspect the connector pins on the card before you insert it into the chassis.

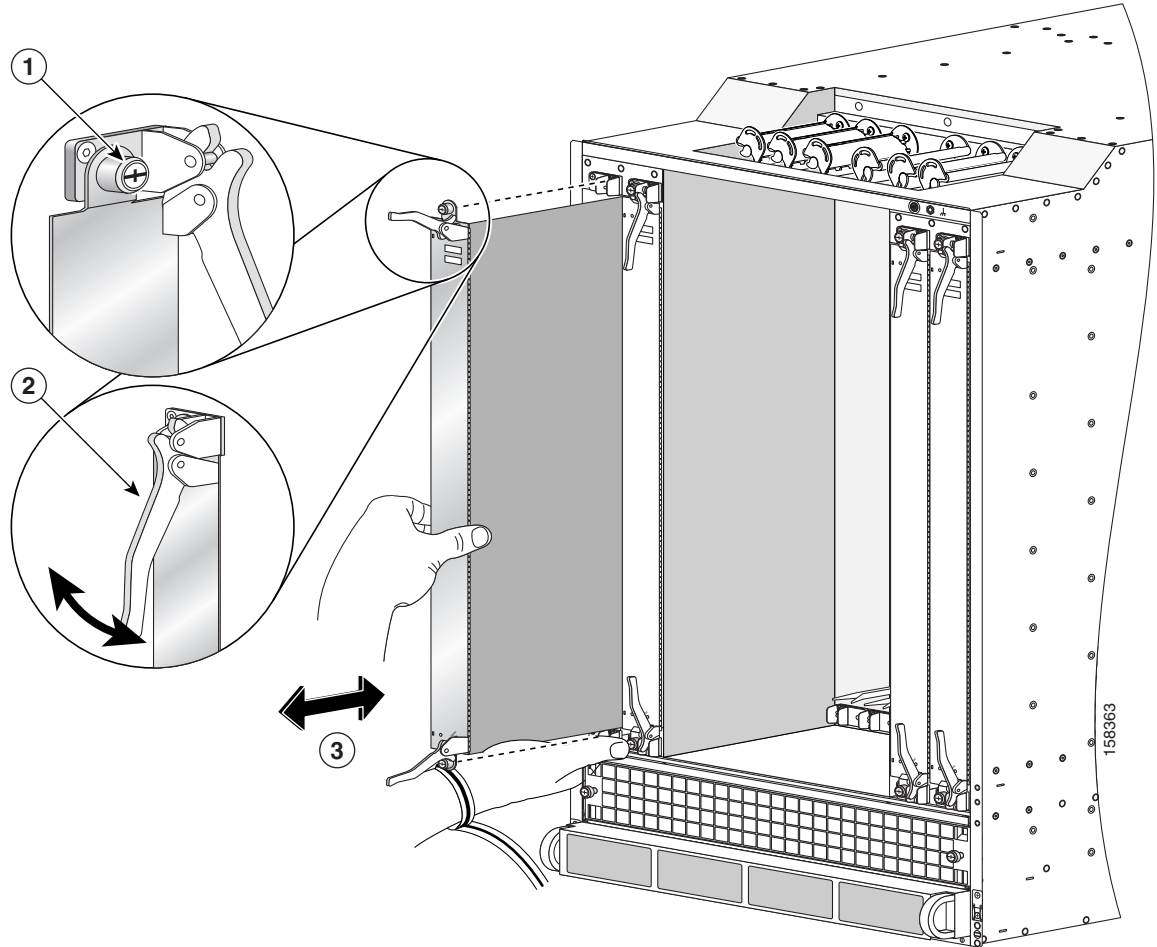


Note Do not attempt to install a card with bent pins, because this may damage the chassis midplane connectors.

- Step 6** Identify the card slot in the card cage where the line card should be installed.
- a. If there is an impedance carrier in the slot, remove it (see the [“Removing an Impedance Carrier” section on page 4-10.](#))
- 
-
- 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.
-
- b. If there is a line card already installed in the slot, remove the card (see the [“Removing an MSC, FP, or LSP” section on page 4-37.](#))

- Step 7** Grasp the face plate of the card with one hand and place your other hand under the card to support and guide it into the correct slot (see [Figure 4-21](#)).

Figure 4-21 Installing a MSC, FP, or LSP Card



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

- Step 8** Orient the line card so that the status display is on top, then position the card for insertion into the card cage slot. Avoid touching the card circuitry or any connectors.



Note There are alignment grooves on each slot in the card cage. When you install a card, make sure that you align both the top and bottom edges of the card carrier in the slot grooves.

- Step 9** Grasp both card ejector levers simultaneously, then push them both outward until they are fully extended in the open position.

- Step 10** Carefully slide the line card into the slot until the ejector levers meet the edges of the card cage, then *stop* when the ejector lever hooks catch the lip of the card cage. If they do not catch, try reinserting the card until the ejector lever hooks are fully latched.



Note Line cards have guide pins that make initial contact with the midplane connector as you slide a card into its slot.

- Step 11** To fully seat the card in the midplane connector, grasp both card ejector levers simultaneously, then push them both inward until they are flush against the front edge of the card carrier. After the guide pins make contact, continue pushing the card carrier until the card ejector levers begin pivoting forward.



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

- Step 12** To ensure proper EMI shielding and prevent the line card from becoming partially dislodged from the midplane, use a screwdriver to fully tighten the captive screws next to each line card ejector lever.



Caution To ensure adequate space for additional line cards, always tighten the captive installation screws on each newly installed line card *before* you insert another line card. These captive screws also prevent accidental removal and provide proper grounding and EMI shielding for the system.

What to Do Next

After performing this task:

- Place the impedance carrier in an antistatic bag for storage and future use.
- Verify that the card has been installed properly (see the [“Verifying the Installation of an MSC, FP, or LSP”](#) section on page 4-40).
- If you are performing the initial installation of the system, install the PLIMs (see the [“How to Install or Remove a Physical Layer Interface Module”](#) section on page 4-42).

Removing an MSC, FP, or LSP

This section describes how to remove an MSC, FP, or LSP line card from the Cisco CRS 4-slot line card chassis. For more detailed information on the MSC and FP, see *Cisco CRS Carrier Routing System 4-Slot Line Card Chassis System Description*.

A line card fits into any available line card slot and connects directly to the midplane.

Prerequisites

There are no prerequisites for this task.

Required Tools and Equipment

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

- ESD-preventive strap
- Medium flat-blade or Phillips screwdriver
- Impedance carrier (Cisco product number: CRS-MSC-IMPEDANCE=)

Steps

To remove a line card, follow these 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 or a bare metal surface on the chassis.

Step 2 Use a screwdriver to loosen the captive screw next to each line card ejector lever.

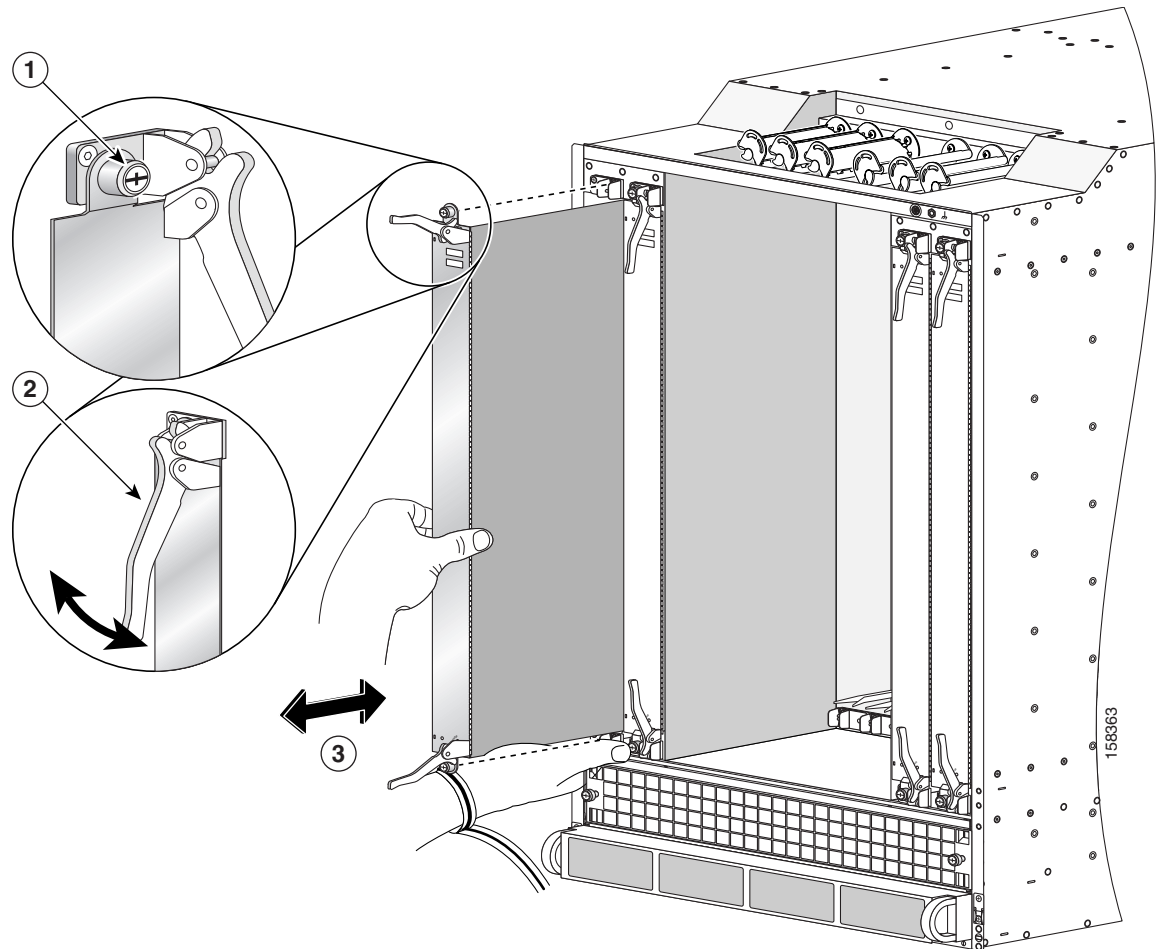


Caution To prevent ESD damage, handle a line card by its ejector levers or the line card carrier edges only. Do not touch any of the electrical components, pins, or circuitry.

Step 3 Simultaneously pivot the ejector levers away from the faceplate to release the line card from the midplane connectors.

Step 4 Grasp the card carrier edges, and gently pull the line card halfway from the slot (see [Figure 4-22](#)).

Step 5 Move one hand under the line card to guide it. Avoid touching the line card printed circuit board, components, or any connector pins. Lift cards from the bottom.

Figure 4-22 Removing an MSC, FP, or LSP Card

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

- Step 6** Place the removed line card on an antistatic mat, or immediately place it in an antistatic bag if you plan to return it to the factory.
- Step 7** If the line card slot is to remain empty, install a line card impedance carrier to keep dust from the chassis and maintain proper airflow through the line card compartment. See the [“Installing an Impedance Carrier”](#) section on page 4-10.
- Step 8** To ensure proper EMI shielding and to maintain proper airflow throughout the chassis, use a screwdriver to tighten the captive screws next to each impedance carrier ejector lever.

What to Do Next

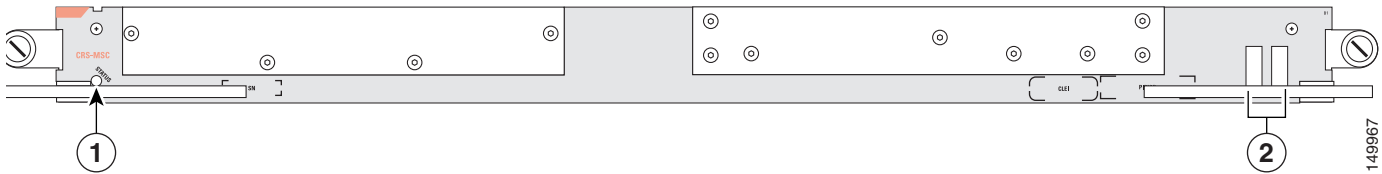
If you are installing the Cisco CRS 4-slot line card chassis for the first time, install the inlet grille and doors. (See [Chapter 5, “Installing and Removing the Doors and Grille.”](#))

Verifying the Installation of an MSC, FP, or LSP

This section describes how to verify that a line card has been properly installed.

Figure 4-23 shows the front panel of the CRS-MSC,

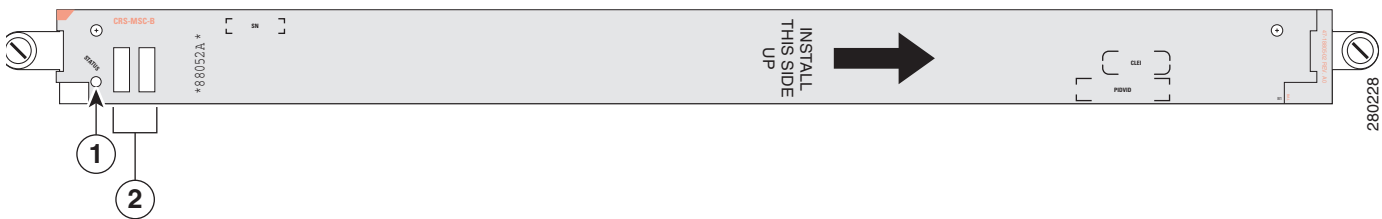
Figure 4-23 CRS-MSC Front Panel



1	Status LED	2	Alphanumeric LEDs
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Figure 4-24 shows the front panel of the CRS-MSC-B.

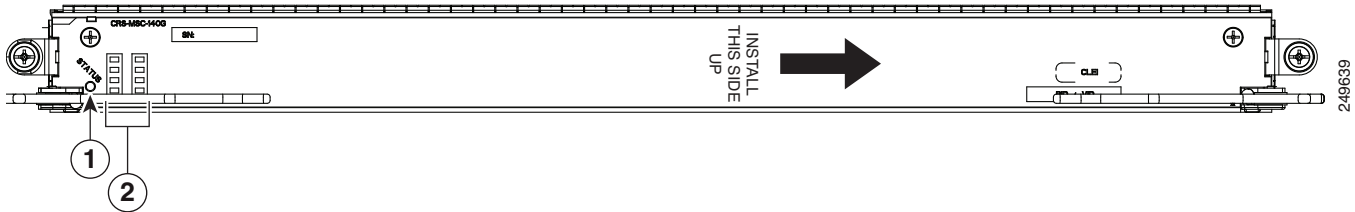
Figure 4-24 CRS-MSC-B Front Panel



1	Status LED	2	Alphanumeric LEDs
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Figure 4-25 shows the front panel of the CRS-MSC-140G.

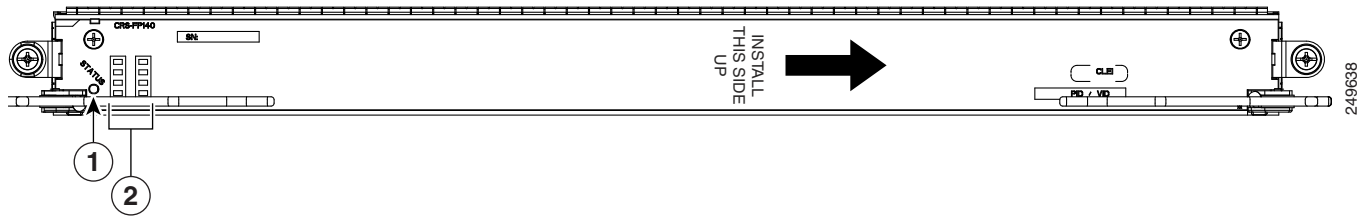
Figure 4-25 CRS-MSC-140G Front Panel



1	Status LED	2	Alphanumeric LEDs
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Figure 4-26 shows the CRS-FP140 front panel.

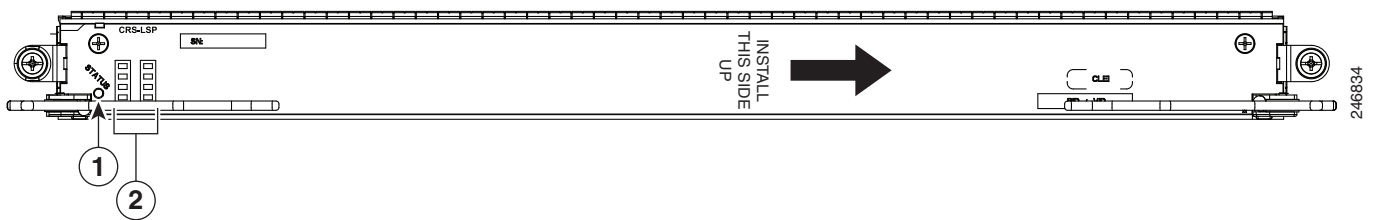
Figure 4-26 CRS-FP140 Front Panel



1	Status LED	2	Alphanumeric LEDs
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Figure 4-27 shows the CRS-LSP front panel.

Figure 4-27 CRS-LSP Front Panel



1	Status LED	2	Alphanumeric LEDs
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Understanding the LEDs

Alphanumeric LEDs

At one end of the faceplate, near an ejector lever, a line 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.

Status LEDs

Use the status LEDs, 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.
- When the Status LED is blinking yellow, a problem exists on the board.
- When the Status LED is off, the board state is unknown. Verify that there is power to the board by looking at the indicators on the power module.

Troubleshooting the MSC, FP, or LSP

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

- Make sure that the card is seated firmly in the Cisco CRS 4-slot line card chassis slot. One easy way to verify physical installation is to see whether the front faceplate of the line 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 line card.
- Examine the Cisco CRS 4-slot line card chassis alarm LEDs on the RP to see if there are any active alarm conditions.
- Examine the Cisco CRS 4-slot line card chassis power shelves to see whether the chassis, as a whole, is receiving power.

How to Install or Remove a Physical Layer Interface Module

This section contains the following procedures:

- [Installing a PLIM, page 4-42](#)
- [Removing a PLIM, page 4-48](#)
- [Verifying the Installation of a PLIM, page 4-50](#)

Installing a PLIM

This section describes how to install a physical layer interface module (PLIM) in the Cisco CRS 4-slot line card chassis. For more detailed information on PLIMs, see the *Cisco CRS Series Carrier Routing System 4-Slot Line Card Chassis System Description*.

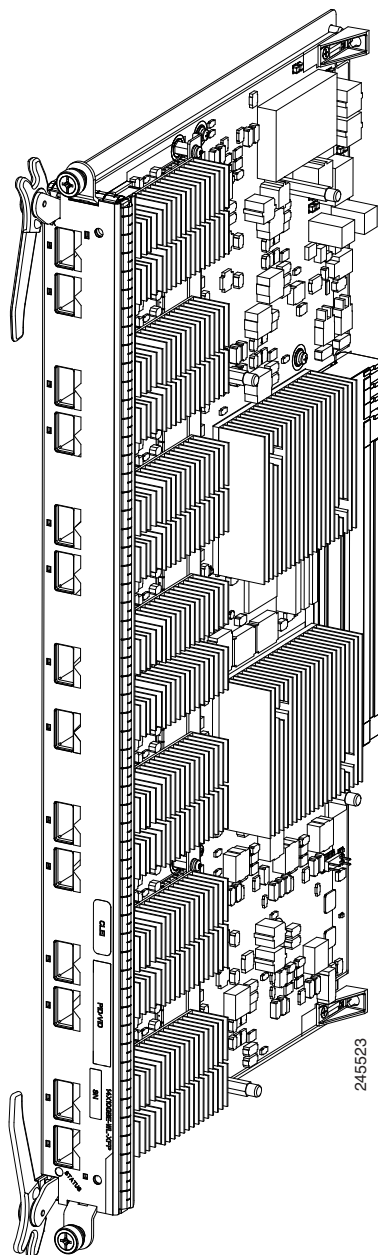
A physical layer interface module (PLIM) is paired with a line card through the midplane of the chassis. A PLIM provides the ability to choose several interfaces. [Figure 4-28](#) shows a typical PLIM (in this case, a 14-port 10-GE XFP PLIM).

**Caution**

MSC-140G and FP-140 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 and FP40 line cards 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. The FP40 line card can only be paired with a subset of PLIMs. See the release notes for details.

For information about installing or removing SIPs and SPAs, refer to the *Cisco CRS SIP and SPA Hardware Installation Guide* on www.cisco.com.

Figure 4-28 Typical Physical Layer Interface Module (PLIM) - 14-Port 10-GE XFP PLIM

You can install a PLIM in any of the four center slots in the front of the chassis (see [Figure 4-16](#)).

**Caution**

The system may 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, remove the impedance carrier.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Medium Phillips screwdriver
- PLIM

Steps

To install a physical layer interface module (PLIM), follow these steps:

-
- Step 1** Go to the front of the chassis. Attach the ESD-preventive wrist strap to your wrist and connect its leash to one of the ESD connection sockets on the front side of the chassis or a bare metal surface on the chassis.
- Step 2** Remove the PLIM from its antistatic packaging.
- Step 3** Use the Phillips screwdriver to remove the PLIM from its protective carrier.
- Step 4** Visually inspect the connector pins on the card before you insert it into the chassis.



Note Do not attempt to install a card with bent pins, because this may damage the chassis midplane connectors.


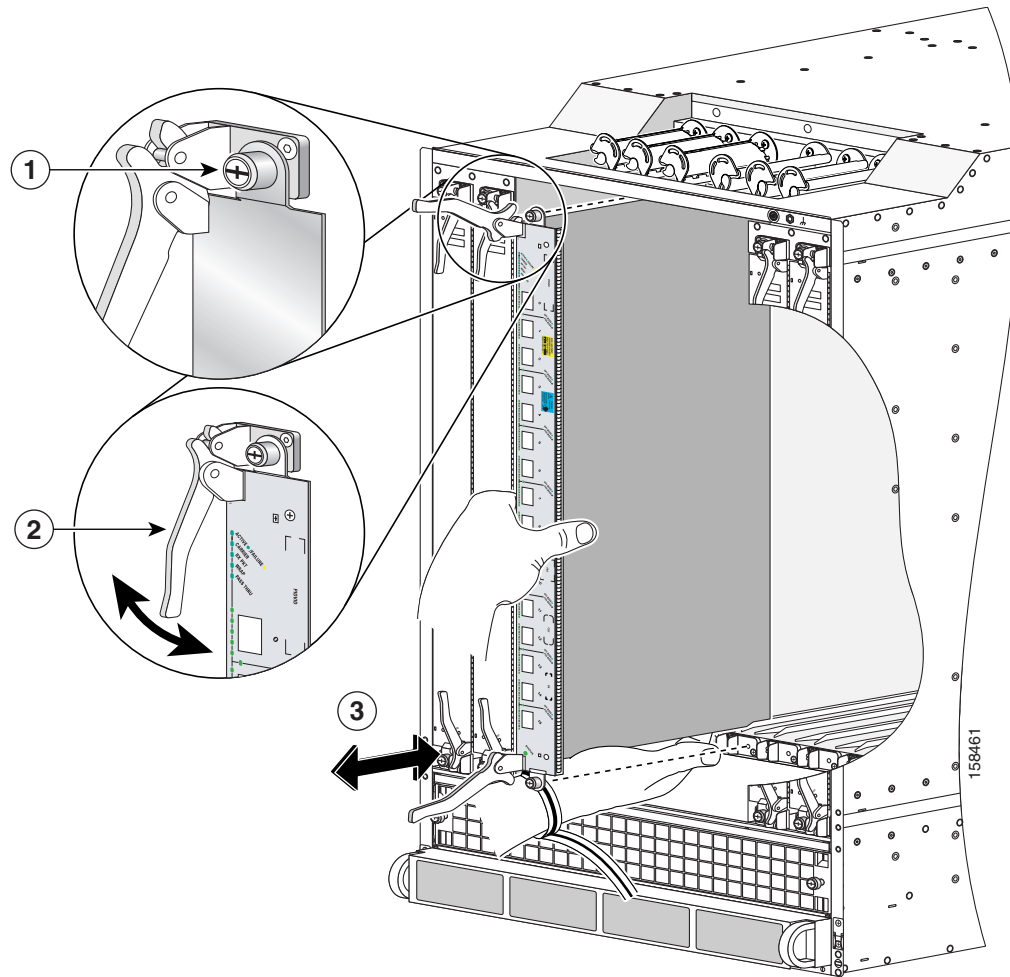
- Step 5** Identify the card slot in the card cage where the PLIM should be installed.
- If there is an impedance carrier in the slot, remove it (see the [“Removing an Impedance Carrier” section on page 4-10.](#))
- 
- Note** Remove only one impedance carrier and install one PLIM at a time. Be sure to verify that each PLIM is fully installed and secured before installing another PLIM.
-
- If there is a PLIM already installed in the slot, remove any cables connected to the front panel of an existing card in the slot, then remove the card (see the [“Removing a PLIM” section on page 4-48.](#))
 - If you need to remove a Cisco CRS SIP-800, refer to the “Removing a SIP” section in the “Installing and Removing a SIP” chapter of the *Cisco CRS SIP and SPA Hardware Installation Guide* on www.cisco.com.
- Step 6** Grasp the face plate of the card with one hand and place your other hand under the card to support and guide it into the correct slot (see [Figure 4-29](#)).

Figure 4-29 *Installing a PLIM*

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

Step 7 Orient the PLIM so that the status display is on top, then position the card for insertion into the card cage slot. Avoid touching the card circuitry or any connectors.



Note There are alignment grooves on each slot in the card cage. When you install a card, make sure that you align both the top and bottom edges of the card carrier in the slot grooves.

Step 8 Grasp both card ejector levers simultaneously, then push them both outward until they are fully extended in the open position.

- Step 9** Carefully slide the PLIM into the slot until the ejector levers meet the edges of the card cage, then *stop* when the ejector lever hooks catch the lip of the card cage. If they do not catch, try reinserting the card until the ejector lever hooks are fully latched.



Note PLIMs have guide pins that make initial contact with the midplane connector as you slide a card into its slot.

- Step 10** To fully seat the PLIM in the midplane connector, grasp both card ejector levers simultaneously, then push them both inward until they are flush against the front edge of the card carrier. After the guide pins make contact, continue pushing the card carrier until the card ejector levers begin pivoting forward.



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

- Step 11** To ensure proper EMI shielding and prevent the PLIM from becoming partially dislodged from the midplane, use a screwdriver to fully tighten the captive screws next to each PLIM ejector lever.



Caution To ensure adequate space for additional PLIMs, always tighten the captive installation screws on each newly installed PLIM *before* you insert another PLIM. These captive screws also prevent accidental removal and provide proper grounding and EMI shielding for the system.

- Step 12** Install optical modules into the installed PLIMs (for example, install XFP modules in the 14-port 10-GE XFP PLIM, if this PLIM is installed in your system).

What to Do Next

After performing this task:

- Place the impedance carrier in an antistatic bag for storage and future use.
- Verify that the PLIM has been installed properly (see the [“Verifying the Installation of a PLIM” section on page 4-50](#)).
- If you are performing the initial installation of the system and the system includes the grille and doors, install those cosmetic components (see [Chapter 5, “Installing and Removing the Doors and Grille”](#)).

Warnings Regarding PLIM Installation

Some PLIMs contain Class 1 lasers, and some contain Class 1M lasers. See the documentation for the specific PLIM for details.



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

**Warning****Class 1 Laser Product.** Statement 113**Warning****Class 1 LED product.** Statement 126**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

Removing a PLIM

This section describes how to remove a PLIM from the Cisco CRS 4-slot line card chassis.

If you need to remove a Cisco CRS SIP-800, refer to the “Removing a SIP” section in the “Installing and Removing a SIP” chapter of the *Cisco CRS SIP and SPA Hardware Installation Guide* on www.cisco.com.

**Note**

To prevent anomalies when you reinstall a new or reconfigured PLIM, we strongly recommend that you use the **shutdown** command before removing a PLIM. For instructions, refer to the latest release of the *Cisco IOS XR Getting Started Guide*.

Prerequisites

There are no prerequisites for this task.

Required Tools and Equipment

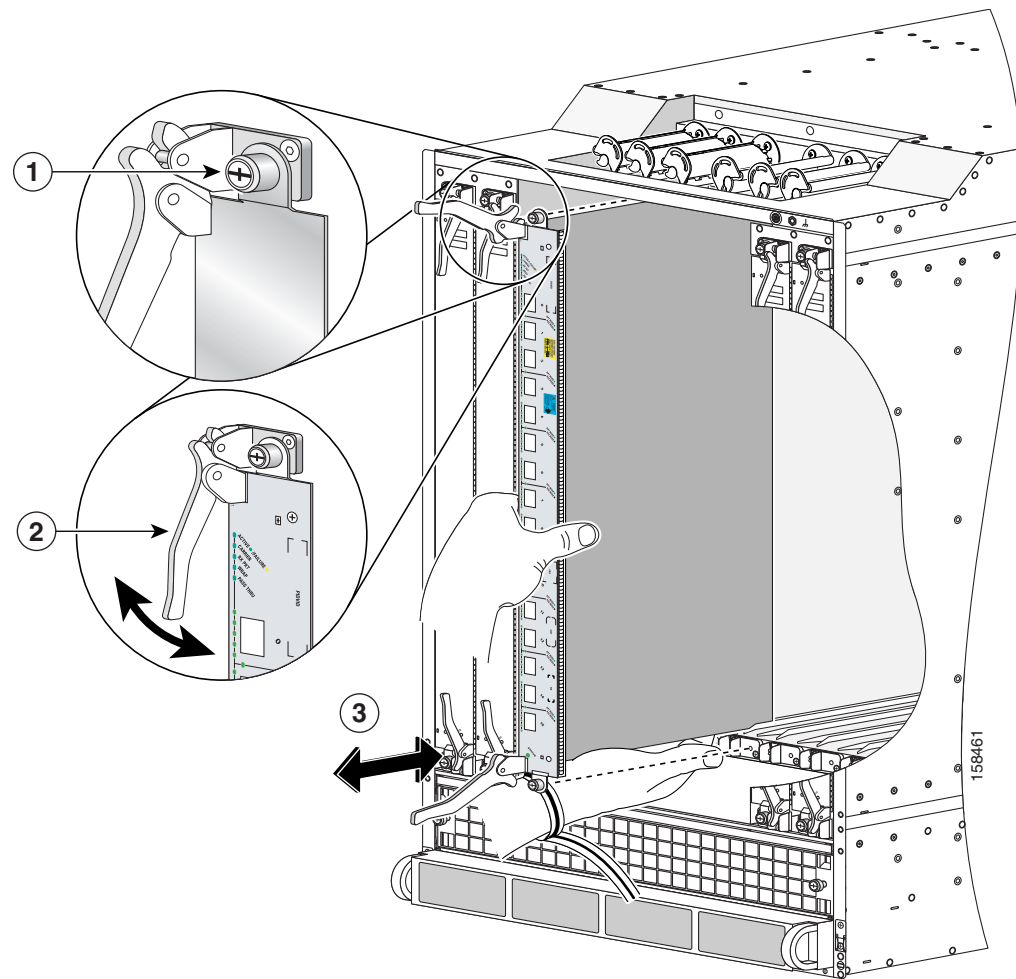
You need the following tools to perform this task:

- ESD-preventive wrist strap
- Medium Phillips screwdriver

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

Steps

To remove a PLIM, see [Figure 4-30](#) and follow these steps:

Figure 4-30 Removing a PLIM

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

- 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 or a bare metal surface on the chassis.
- Step 2** Identify the card to be replaced.
- Step 3** Loosen the two captive screws holding the card in place.
- Step 4** Grasp the two card ejector levers and simultaneously pivot both ejector levers 90 degrees (70 degrees for a newer PLIM) away from the front edge of the card carrier to unseat the card from the backplane connector.
- Step 5** Grasp the slide-assistance arm (if installed) or the card carrier edges, and gently pull the PLIM halfway from the slot.

- Step 6** Move one hand under the PLIM to guide it. Avoid touching the PLIM printed circuit board, components, or any connector pins. *Do not lift cards by the slide-assistance arm*; lift them from the bottom, using the slide-assistance arm only as an aid for balance.
- Step 7** Slide the card from the slot and place it directly into an antistatic sack or other ESD-preventive container.

**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 lasers. See the documentation for the specific PLIM for details.

What to Do Next

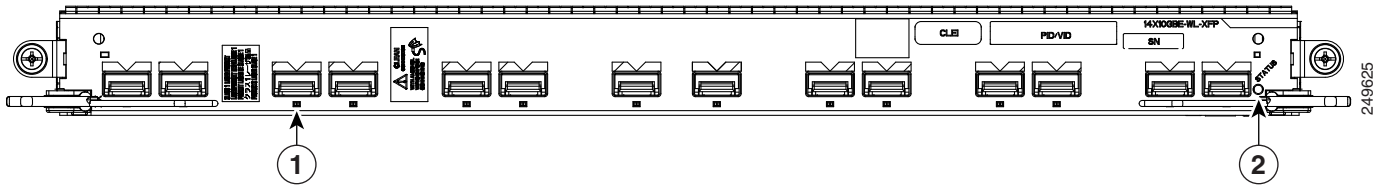
After performing this task, replace any front cover plates.

Verifying the Installation of a PLIM

This section describes how to verify that the PLIM has been properly installed.

Figure 4-31 shows an example of a PLIM front panel (in this case, a 14-port 10-GE XFP PLIM).

Figure 4-31 Example of PLIM Front Panel



1	Port LED (one per port)	2	Status LED
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Use the status LEDs, located on the PLIM faceplate, to verify the correct installation of the card:

There are two types of LEDs on a PLIM: the board-level LED labeled **Status** and the port-level LEDs that are labeled differently depending on the PLIM type.

When the PLIM is properly installed, the Status LED turns green. If this LED is off, verify that the PLIM is installed correctly. (For details on the information provided by the port-level LEDs, see the documentation specific to that PLIM.)

Troubleshooting the PLIM

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

- Make sure that the PLIM is seated firmly in the Cisco CRS 4-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 reseal the PLIM.
- Examine the alarm LEDs on the RP to see if there are any active alarm conditions.
- Examine the power shelves to see whether the chassis, as a whole, is receiving power.

How to Install or Remove a PCMCIA Card

This section contains the following procedures:

- [Installing a PCMCIA Card, page 4-51](#)
- [Removing an RP PCMCIA Card, page 4-52](#)

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

Installing a PCMCIA Card

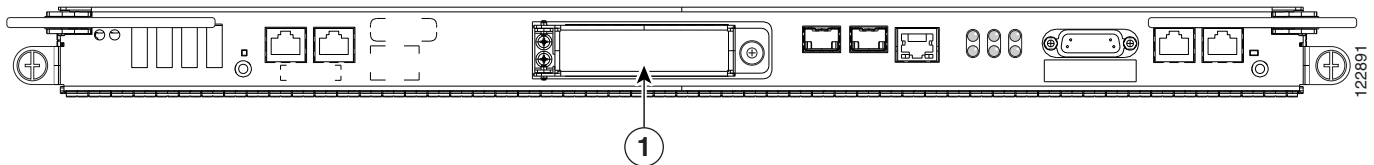
This section describes how to install a PCMCIA card in an RP card PCMCIA slot. For more detailed information on PCMCIA cards, see the *Cisco CRS Carrier Routing System 4-Slot Line Card Chassis System Description*. [Figure 4-32](#) shows you the location of the PCMCIA door in the RP card faceplate.



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 4-32 RP Card PCMCIA Slot Door



1	PCMCIA flip-up slot door
----------	--------------------------

Prerequisites

If you are replacing a PCMCIA card, see the [“Removing an RP PCMCIA Card” section on page 4-52](#) to remove the PCMCIA card from the PCMCIA card slot.

Required Tools and Equipment

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

- ESD-preventive strap
- Medium flat-head screwdriver
- PCMCIA card

Steps

To install a PCMCIA card, follow these 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 or a bare metal surface on the chassis. |
| Step 2 | Using the 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 screwdriver. |
-

Removing an RP PCMCIA Card

This section describes how to remove a PCMCIA card from an RP card PCMCIA slot. For more detailed information on PCMCIA cards, see the [“PCMCIA Cards” section on page 4-4](#), or the *Cisco CRS Carrier Routing System 4-Slot Line Card Chassis System Description*. [Figure 4-32](#) shows you the location of the PCMCIA door in the RP card faceplate.

Prerequisites

Before performing this task, remove any front (PLIM) side cover plates.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive strap
- Medium Phillips screwdriver

Steps

To remove the PCMCIA card, follow these 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 or a bare metal surface on the chassis. |
| Step 2 | Using the 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, press the release button for the card slot to disengage the card from the card, and then carefully pull out the far left removable PCMCIA flash card. |
| Step 4 | Place the removed PCMCIA card on an antistatic mat, or immediately place it in an antistatic bag if you plan to return it to the factory. |
| Step 5 | If the PCMCIA card slot is to remain empty, close the door to keep dust out and tighten the captive screw with the screwdriver. Otherwise, install the new PCMCIA card. |
-

What to Do Next

If you intend to install a new PCMCIA card, see the [“Installing a PCMCIA Card” section on page 4-51](#).

How to Install or Remove a Small Form-Factor Pluggable (SFP) Module

This section contains the following procedures:

- [Installing a Bale-Clasp SFP Module](#)
- [Removing a Bale-Clasp SFP Module](#)

For general information about SFP modules, see the [“Small Form-Factor Pluggable \(SFP\) Modules” section on page 4-4](#). For information on SFP optical cleaning, see “Inspection and Cleaning Procedures for Fiber-Optic Connections,” at the following URL:

<http://www.cisco.com/warp/public/127/cleanfiber2.html>.



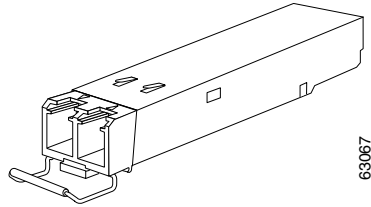
Warning

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 Bale-Clasp SFP Module

This section describes how to install a bale-clasp SFP module. The module has a clasp used to install and remove the module (see [Figure 4-33](#)).

Figure 4-33 *Bale-Clasp SFP Module*



Prerequisites

Before installing a module, remove any front cover plates.

Required Tools and Equipment

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

- ESD-preventive wrist strap
- Bale-clasp SFP module

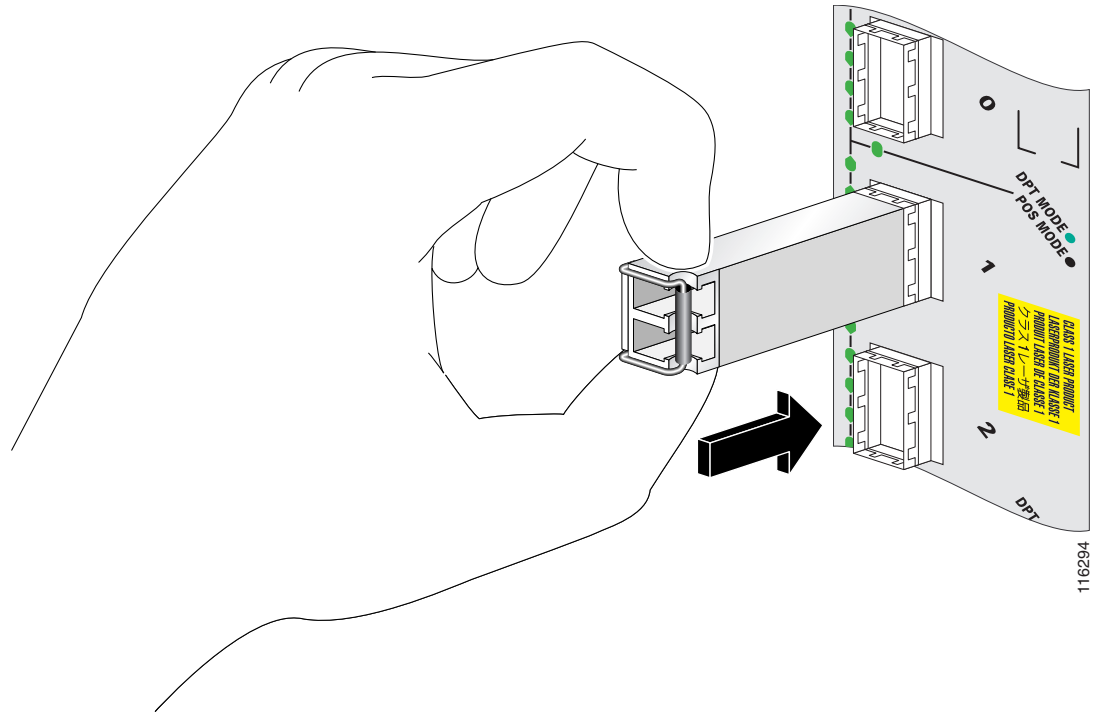
Steps

To install a bale-clasp SFP module (into a PLIM), follow these 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 or a bare metal surface on the chassis.
- Step 2** Close the bale clasp before inserting the module.
- Step 3** Align the module with the port and slide it into the port (see [Figure 4-34](#)).



Note Be careful to hold the module in such a way so as to not damage the bale clasp.

Figure 4-34 Installing a Bale-Clasp SFP Module into a Port

Removing a Bale-Clasp SFP Module

This section describes how to remove a bale-clasp SFP module. The module has a clasp used to install and remove the module (see [Figure 4-33](#)).

Prerequisites

Before removing a module, disconnect any connected interface cables.

Required Tools and Equipment

You need the following tools to perform this task:

- ESD-preventive wrist strap
- Small flat-blade screwdriver

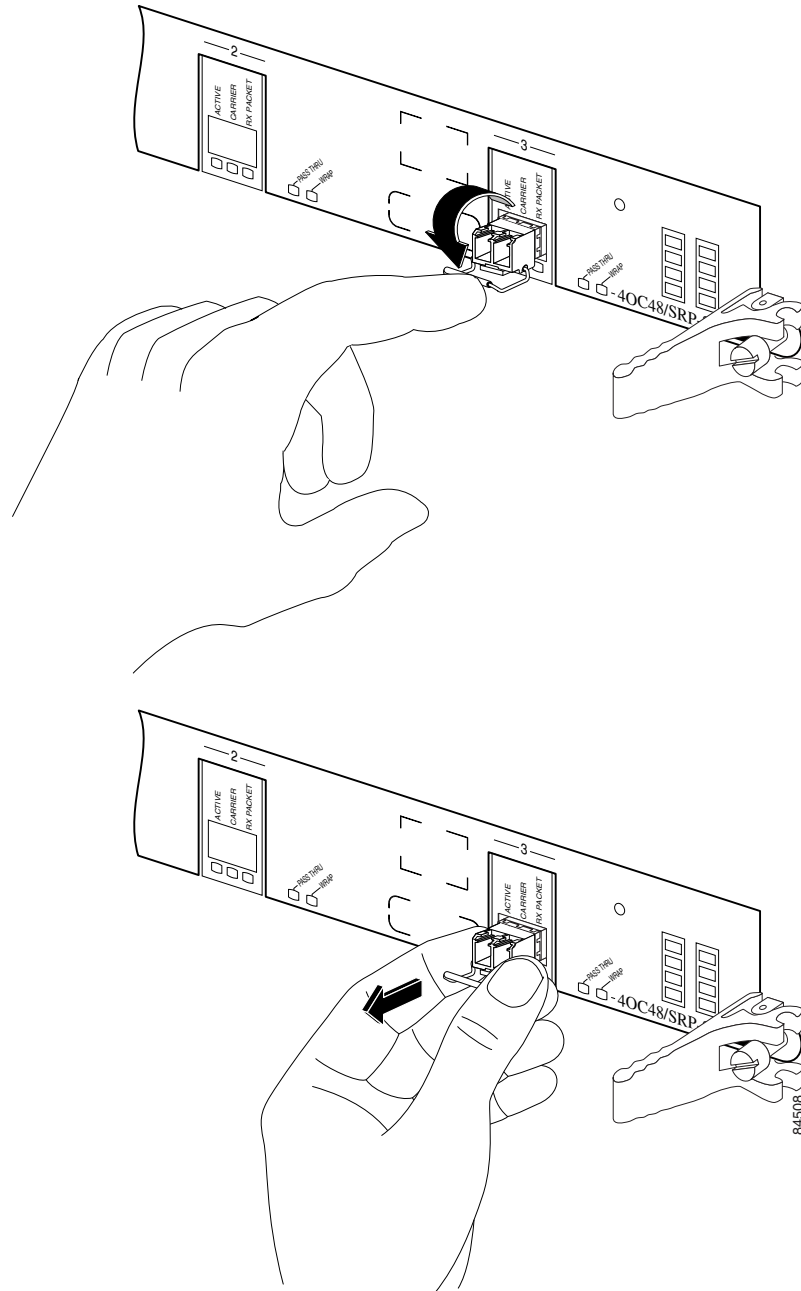
Steps

To remove a bale-clasp SFP module from a PLIM, follow these 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 or a bare metal surface on the chassis.
 - Step 2** Disconnect and remove all interface cables from the ports. Be sure to note the current connections of the cables to the ports on the PLIM.
 - Step 3** Open the bale-clasp on the module with your index finger in a downward direction (see [Figure 4-35](#)). If the bale-clasp is obstructed and you cannot use your index finger to open it, use a small screwdriver or other long, narrow instrument to open the bale-clasp.
 - Step 4** Grasp the module between your thumb and index finger and carefully remove it from the port (see [Figure 4-35](#)).



Note Be careful to hold the module in such a way so as to not damage the bale-clasp.

Figure 4-35 Removing a Bale-Clasp SFP Module

- Step 5** Place the removed module on an antistatic mat, or immediately place it in a static-shielding bag if you plan to return it to the factory.
- Step 6** Protect the PLIM by inserting clean SFP module cage covers into the optical module cage when there is no module installed.

